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Executive Summary

This document describes and develops two different processes in parallel: the description on how to implement a Living Lab (LL) in general, whatever its nature or subject matter, and the application of this protocol in a Soil LL, developed in the contextual framework of the ECOLOOP project. Therefore, in each section of the document, it is previously exposed how this protocol would be developed in a generic way, explaining the common aspects to any LL development. Then the execution of these key points, focused and applied to the ECOLOOP Soil LL will be presented.

The first section covers the key concepts, including their definition, participants, location, and how to set objectives according to the scope of the initiative. For the case study (ECOLOOP Soil LL), the main objective was defined as the improvement of soil quality through stakeholders (SH) collaboration. This collaboration will be coordinated by the Polytechnic University of Valencia and the Valencian Association of Farmers (AVA-ASAJA), both partners of this project. In terms of location, the implementation of this Soil LL has been carried out in the province of Valencia, Spain. Specifically, it will be held at the facilities of the UPV (Horta Nord area) and AVA (Polinyà del Xúquer).

In addition, the importance of selecting and evaluating participants based on criteria in line with the purpose of the project is also emphasized. The SH of this innovative environment was pre-selected based on the quadruple helix model and their relationship with the field, research, and soil science or agronomy.

Finally, the document analyzes the process of transferring results to SH, which within the ECOLOOP project, the transfer of Soil LL results will be carried out through the main digital dissemination media that are being developed throughout the project, as well as the different meetings, public events, and scientific articles that will be developed in the future and guarantee greater commitment and interest from participants and society in general.

Copyright statement

1. Introduction

1.1. Purpose of the document

Academic studies on LLs are over a decade old [1]. These spaces were created in the late 1990s to address contemporary problems in any field. The first reference to a testbed is from Professor William J. Mitchell of the MIT Media Lab [2], who used the "LL" expression to describe a user-oriented research approach to experiment, prototyping, apply, validate, and perfecting solutions to challenges established by actors involved in the production process in a real environment. The existing literature views these collaborative innovation environments not only as a fascinating topic that provides numerous research opportunities for innovative scholars but also as an effective tool, methodology, and design for practitioners to tackle various challenges and needs in today's world [3]. Currently, many innovation Labs are in active operation worldwide, although there is a high concentration in Europe [4]. The European Network of LLs “ENoLL” (European Network of LLs) [5] has more than 37 countries involved in developing Innovation Lab with different objectives.

This document has been developed along these lines. From this perspective, within the **ECOLOOP PROJECT**, the aim is to implement a LL in which the health of the soil is improved with the byproducts derived from energy production. Specifically, the deliverable has been carried out during Work Package 2 (WP2) of the project, entitled “Project Foundations and LL”, allowing to lay the experimental foundations of the Spanish pilot and to establish better relationships with SH. The result of this is the **ECOLOOP Soil LL,** which aims to test the potential and behavior of a digestate from anaerobic digestion of plant waste in order to obtain an improved bioproduct. To achieve this, this document has been produced and presents two main purposes: on the one hand, to elaborate a guide with the key factors necessary to develop a LL, and on the other hand, to describe in detail the step-by-step implementation process of the ECOLOOP Soil LL.

1.2. Scope of the document

This document is addressed to the ECOLOOP project partners as well as to all actors involved and/or interested in the design, implementation, and evaluation of LLs as innovative projects in real environments. This includes, but is not limited to:

- Researchers and academics
- Companies and entrepreneurs
- Public administrations
- Local community and citizens
- Farmers and Agricultural Cooperatives
- Regulatory Bodies and Policy Makers
- Consumers of Agricultural Products
- Non-governmental organizations (NGOs) and social interest groups

1.3. Structure of the document

This manual for implementing a LL is organized into two main sections. The first section provides essential information for implementation, including definitions, objectives, methodologies, and techniques (chapters from 1 to 8). The second section includes templates to guide various tasks throughout the development process (chapter 9).

After the introduction, this deliverable presents 12 chapters as follows:

- Sections 1 to 2 cover key aspects such as the definition of the initiative,
- Section 3 presents the main objectives.
- Section 4 describes the workspace.
- Section 5 on SH
- Section 6 on dynamic activities
- Section 7 presents the evaluation and monitoring process.
- Section 8 focuses on the transferability of the project.
- Section 9 lists several templates for tasks ranging from meetings to welcome emails and other communications during the initiative’s development.

- Section 10 conclusion where the key points of the teaching, both from the theoretical part and the implementation of the ECOLOOP Soil Living Lab, are gathered.
- Section 11 consists of a list of all acronyms mentioned throughout the document.
- Section 12 is the bibliography supporting this document is included in.

Ultimately, this document serves as a fundamental guide for the implementation of the ECOLOOP LL, providing a clear framework for its execution. At the end of each point, it is explained how each theoretical part has been implemented in the ECOLOOP Soil LL.

2. Living Lab

2.1. Definition

Living Lab (LL) has emerged worldwide as a key and adequate research infrastructure involving different actors in an open, iterative, and user-centered innovation ecosystem in which co-creation is encouraged in a real environment. In the same way, these LL are considered a methodology that uses a collaborative approach to developing an open environment. A networked infrastructure to carry out innovation in the form of co-creation and prototyping of technologies, products, and services through a partnership involving interaction between users and other SH is the base of the LL development, where the outcome is to test and validate activities and processes based on real-life contexts that solve actual problems or concerns in the society [6]

These spaces are environments for creation and innovation nowadays, and they were introduced in Europe in the 2000s. Before formulating these co-creation environments, participatory methodology was used in European countries. The cooperative design of the Scandinavian countries in the 1970s can be highlighted, where the involvement of users or other external personnel in research projects, especially in computing, was encouraged. This methodology was used as the basis for formulating current Innovation Lab.

More specifically, William J. Mitchell, Kent Larson, and Alex Pentland of the Massachusetts Institute of Technology (MIT) created a term for laboratories built to experiment with interactions and innovations in a defined space. They established a space where a series of users lived within an environment created explicitly for this purpose. The analysis of their interactions was the basis

of the research in an environment called "PlaceLab." The first European Living Labs were driven by the European Network of Living Labs (ENoLL), which sought to create an open innovative society where the importance of innovation and research in new technologies was reinforced. In 2006, they created what is known as the Helsinki Manifesto, a platform for the exchange of knowledge and collaboration, where innovation processes are supported and stimulated. This network, which initially emerged as a European initiative and an open innovation strategy by the European Union, has grown to include members from other continents, such as Brazil, Canada, and China [7].

In another way, in the last few years, a new term has appeared inside the Co-creation Lab environment: the lighthouses. In this setting, solutions are demonstrated, seeking to be a reference site where technologies and innovations can be implemented. Therefore, when a LL is successful, it can become a lighthouse [8].

2.2. Types of Living Labs

There are many types of LL, depending on the areas of work they aim to study, and the scope or scale of research in which they are carried out. However, according to ENoLL, the vast majority can be classified into four different categories based on the nature and services of the organizations that carry them out [9], as described below in the following subsections. It should be added that among these four major groups, ECOLOOP Soil LL could be included within the **Rural and Research-driven types.**

It should be noted that most of these co-creation spaces could combine several types, but always with more focus on one of the described below. In addition to these four major groups, it is possible to find others of a more specific nature, such as healthcare and well-being, environmental and sustainability, and energy and sustainability.

2.2.1. Urban or rural Living Lab

Urban or rural Living Labs (UoRLL) introduce the city/region as a site for experimentation and co-creation, consider active user participation, experimentation in real-life environments, multiple SH, and multiple methods. Urban LL are, for example, an advanced and explicit form of

intervention delivering sustainability goals for cities. In addition, UoRLL are in a particular geographic area where policymakers, researchers, companies, service providers, people, and other SH collaborate to create and test novel approaches to the local inhabitants' challenges or problems. The scaling of the results from a local to a global environment, which can benefit other similar areas, can be covered through the transfer of knowledge. Established at the boundaries between research, innovation, and policy, Urban LL are intended to design, demonstrate, and learn about the effects of urban interventions in real time [10]. An example of this type of LL is expressed in the ROBUST project [11], a placed-based form of experimental collaboration involving 11 LLs that represent typical rural-urban settings throughout Europe.,

2.2.2. Living Lab testbed

A "testbed" type environment is characterized by its focus on technological testing, piloting, and demonstration within controlled settings linked to real-life systems. These testbeds offer infrastructures where new technologies can be assessed for technical feasibility and interoperability before wider deployment. Unlike traditional collaborative innovation environments, which emphasize user-centered co-creation and operate in open, real-world contexts, testbed-type models focus primarily on the technical aspects of innovation [12], [13].

For example, in the energy sector, testbeds are understood as technological testing, piloting, and demo infrastructures connected to real-life energy systems. They support developers by providing validation capabilities related to new technological innovations' technical feasibility and interoperability [14].

In summary, traditional LL emphasize user involvement and co-creation in real-life contexts, while testbed-type environments focus more on providing controlled settings for the technical validation of innovations.

2.2.3. Research-driven Living Lab

A primary focus on scientific investigation and experimentation characterizes a research-driven LL. This type of co-creation space prioritizes academic research and collaboration with research institutions. Their primary goal is to generate new knowledge and advance scientific understanding [15], [16].

2.2.4. Living Lab as a service

"LL as a service" refers to a model where organizations provide facilities and expertise to external entities, such as businesses, startups, or government agencies. This approach enables external partners to take advantage of an established innovation environment's infrastructure, resources, and knowledge without the need to develop and maintain their own.[15], [17].

This Experimental Environment has been utilized to foster collaborative development of public services in the context of public sector innovation. An integrative literature review highlights how LL serve as platforms for co-creation, allowing public sector entities to engage with citizens and other SH to design and test new services and policies in real-world environments [18].

2.3. ECOLOOP Soil Living Lab

Once the official definition of a LL and its key components was created, a definition was developed for the Spanish Pilot Soil LL.

The first step was to formulate a basic definition of an LL. With it, the rest of the participants in the project were asked if they thought this definition is correct, understandable and aligned with what the project objectives.

This type of form provides feedback between the ECOLOOP project participants and the coordinators. In this survey, ideas were provided on how to improve this basic definition.

The first definition shown below is the initial one proposed to the collaborators.

"LL is a methodology that uses a collaborative approach for the development of an open environment which employs a network infrastructure to carry out innovation in the form of co-creation and prototyping of technologies, products and services, in a specific territory, through a partnership involving interaction between users and other SH, to test and validate activities and processes based on real-life contexts."

Comments made by the various ECOLOOP organizations include the following:

- It can be defined much more simply. “A LL is a user-centric innovation milieu built on everyday practice and research, with an approach that facilitates user influence in open and distributed innovation processes engaging all relevant partners in real-life contexts, aiming to create sustainable values.”
- LL are more than a methodology. It could be more an environment, concept, ecosystem, framework, etc.

After that, a new definition is formulated considering the feedback provided in the previous survey.

“A LL is a collaborative innovation ecosystem created in a real-world context that promotes partnership between diverse SH. Utilizing a user-centered iterative approach enables the co-development, testing, and confirmation of creative solutions. Through diverse expertise and experimental engagement, LL promotes the creation of innovations that affect community and local problems.”

Once the concept has been established, its definition is reinforced, considering that a Soil LL (SLL) has a specific objective: the relationship between the soil and agriculture and its environment. For this purpose, it has been based on the project's final goals (section 3.2)

“ECOLOOP Soil LL is an open innovation ecosystem created in a real-world environment. It is focused on optimizing soil quality by improving its physico-chemical and biological characteristics using advanced bioproducts. It fosters cross-disciplinary cooperation among SH-farmers, researchers, policymakers, and industries-driving collaborative development, testing, and verification of sustainable soil management practices.”

2.4. Fundamental parts of a Living Lab

To understand how this collaborative innovation model works, it is essential to know how development takes place and the involvement of all participating users. The fundamentals used in these spaces encourage co-creation and innovation in an open environment. As observed from previous practices, there are three different levels of analysis, as defined by ENoLL in their methodology handbook published in 2017 [19].

Firstly, the macro level encompasses the organizations and all the actors that are part of the initiative. Secondly, there is the meso-level, which includes the project where activities are carried out; and finally, the micro level, or user activity, incorporating SH and users into the project in various tasks.

Understanding this is necessary to know how the different levels relate to each other in the project framework and how all participating parties are involved in the various stages of the process.

Therefore, to better understand how this approach functions, the three fundamentals involved in its creation and implementation are developed more extensively in the following sections

2.4.1. Exploration

The first phase of a project is to identify the problem and seek a solution, to understand the current situation.

To identify the problem, an overview of the current issues must be obtained, followed by a focus on the specific topic or sector of interest. Once this is established, the main problems affecting users and their needs and desires should be identified. This helps to understand the issue and the innovations already made to address current challenges.

As the name suggests, existing technologies, current habits, and how users engage with these solutions and innovations must be explored during this phase. This knowledge can then be used to propose a solution to the identified needs.

In addition to exploring the current problems, this phase also considers the potential impact and implications of the proposed innovations.

2.4.2. Experimentation

The second stage of the innovation development process, known as ‘experimentation,’ involves testing a concept by developing and evaluating a prototype. In a LL approach, this testing occurs in real-life settings, with the level of realism depending on the design’s maturity. Prototypes can be tangible or intangible (services or experiences), but their primary purpose is to assess the feasibility of the envisioned future state.

This stage focuses on understanding user reactions, attitudes, and behaviors by testing solutions in realistic contexts. Depending on maturity, these interventions range from proxy technology assessments and UX testing to full field trials.

Once the prototype is stable, testing can be extended to real-world trials, which vary in duration, user involvement, and scope, although these variables tend to be greater as the prototype matures or evolves. The emphasis should be on capturing actual user behavior (i.e., their actions) rather than relying solely on the feedback they provide. Ultimately, the experimentation phase determines whether further refinement is needed or whether the innovation can move to the evaluation phase. In short, the experimentation phase tests the designed solution in an environment close to the real context and allows for deciding whether to return to the exploration phase to iterate the solution or to move to the evaluation phase.

2.4.3. Evaluation

Evaluation is the last stage in the LL implementation. It focuses on evaluating the innovation carried out in the previous stage concerning the problem to be solved.

This stage is compared to the exploration phase, where the starting point (i.e., the current state of the problem) is provided. In this phase, a comparison is made with a prototype solution already applied, in order to see the impact of this innovation on the issue.

The aim is to launch and implement the resulting innovation outside the LL. Therefore, it is analyzed whether this innovation is key in the potential market of the sector to be addressed and whether other techniques can be implemented.

In order to know whether this solution can be successful in the future, it is necessary to see which advantages it offers in comparison to the initial problem in order to see the potential acceptance this innovation can have. Therefore, an initial follow-up is carried out after the launch to redesign or adapt this solution to the different needs.

Readers can consult the official ENoLL website [5] for more detailed information on the methodologies used in LL.

2.5. Implementation of a Living Lab

Setting up a collaborative innovation environment is not an easy process, as it initially depends on the definition of clear objectives and the components of the initiative itself. This again requires a major information gathering and planning effort. Once all the participants have been identified, the experimentation environments and their conditions must be established. Next, the initiatives and actions resulting from the interaction of the participants must be developed, and then the results must be evaluated and transferred to external environments to assess their suitability.

This is why four significant phases can be established in implementing a LL: planning, implementation, evaluation, and transfer. In Figure 1, the last two points of evaluation and transfer have been put in the same step.

2.5.1. Planning and organization phase

In this phase, all the necessary aspects to set up a LL must be prepared and planned. Therefore, a detailed plan of the objectives, activities, and SH that will be part of the project, as well as the interaction environment, must be carried out. The steps that need to be carried out in this first part of the project are presented below:

2.5.1.1. Objectives

As will be seen later, in the corresponding section of this document (section 3.2), the main and secondary objectives to be achieved by implementing this LL must be established and defined.

2.5.1.2. Determination of the collaborative environment

The interaction environment or ecosystem is the place/space where the LL will be implemented. This must be done concisely, considering all local and regional conditions since the results depend on it. It should be noted that this environment can be a specific area, a computer environment, or any ecosystem that favors interaction between actors.

Section 4.2 shows how the determination of the physical space in the ECOLOOP Soil LL has been carried out.

These two steps can sometimes be carried out in reverse when implementing a LL. Sometimes, there is an established area with an aspect to improve or an innovation to implement. The first step is to define the study area and then the objectives or goals to be achieved within the project.

2.5.1.3. Stakeholder

The interaction within the LL is created by the individuals or entities that constitute the project's core, as their engagement will lead to progress in knowledge and outcomes that can address the issues identified as goals. Stakeholders (SH) includes those people, groups, or institutions involved in the project because they have the same objective or purpose: implementing the LL to solve a key societal problem. In this phase, SH from all project-related parties in the area or zone of influence need to be identified, and in the implementation phase, SH will be selected based on the capacity of the LL to work with.

As shown in point 5.1, one of the most common models for SH identification is the quadruple helix model. According to this model, in the LL implementation (section 5.5) a demonstration on how the process of identification and selection of the ECOLOOP Soil LL SH is given.

2.5.2. Implementation phase

In this phase, a detailed analysis of the different existing methods and tools is carried out, as well as the methodologies that best suit the project (Figure 1). This is followed by the active collaboration of the SH, where dynamic activities or interviews will be carried out, and they will give feedback on the viability or effectiveness of the innovations to obtain the expected results. In this phase, the indicators and characteristics, processes, or objects on which action is to be taken must be defined.

This is the phase of significant interaction, where co-creation and innovation occur. This is the most extensive phase, where the process of how a LL is carried out is explained. The steps to be taken are as follows:

2.5.2.1. Prioritization methodologies in the stakeholder

Following the previous phase, once the SH have been identified, it is necessary to see which of them have been chosen to form part of the project and their interest in it. For this purpose, there are different methodologies for prioritizing SH, of which only one or two are necessary. This is done considering the objectives set, the area of study, and the aspects that the organizers/managers consider required.

2.5.2.2. Dynamic activities

Once the SH involved in the initiative have been identified, a series of activities will be carried out to foster collaboration and participation within the environment.

2.5.2.3. Experimentation activities

Based on the interaction of the SH, the parameters or processes to improve within the environment must be defined. Quality indicators, processes, laws, actions, or properties must be tested with the selected methodologies, giving rise to an experimentation phase that generates results.

2.5.3. Evaluation phase

In the last step, the main objective is to evaluate the achievement of the initial proposed objectives, as well as to measure the impact achieved. Furthermore, assessing whether it is feasible to scale the Innovation Lab or replicate it in other environments with similar or different conditions is necessary. Feasibility analysis is key in these cases, having to consider the reality of the LL.

2.5.3.1. Evaluation and Monitoring of a Living Lab

The evaluation seeks to measure the results obtained and verify whether the proposed objectives are being achieved/fulfilled.

This step can be taken at the end to evaluate the project or throughout the LL to monitor how it evolves and prevent possible risks.

2.5.4. Transferability

The LL can be adapted or replicated in other environments or sectors. This is the final step in a project of this type since one of its key points is that it can benefit other users and enhance other sectors innovation.

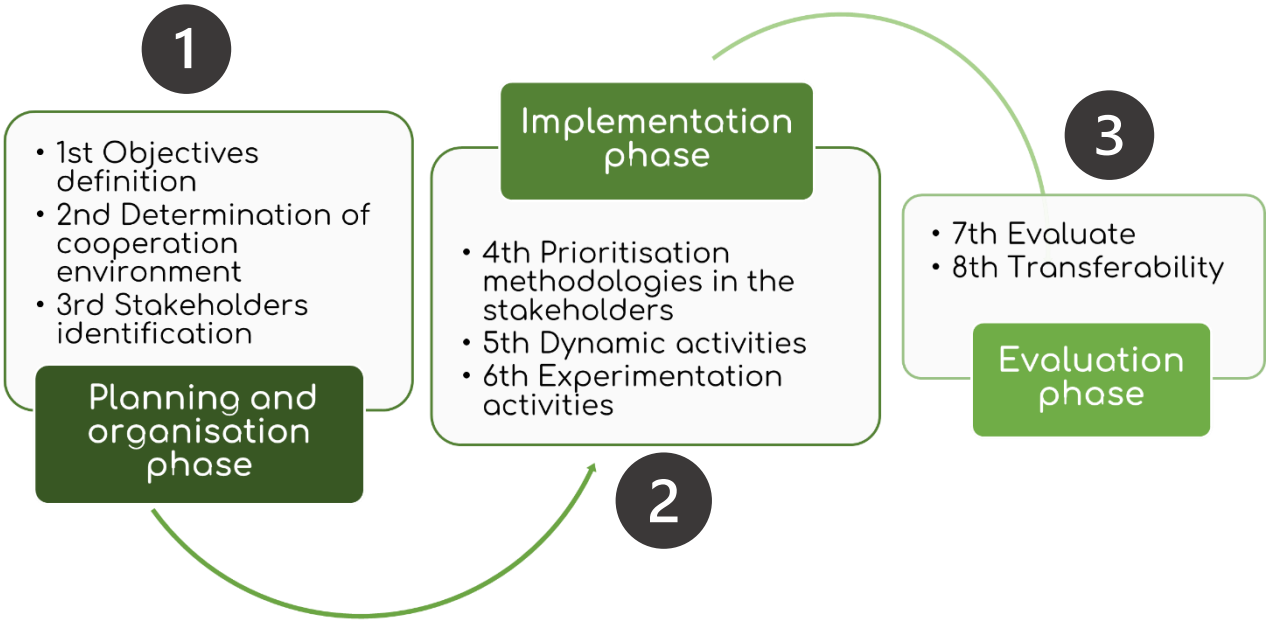

Figure 1. Scheme to follow for the implementation of a LL.

3. Objectives

An objective or goal is the ultimate end toward which the actions or operations of a specific project are directed. It represents the main aim or purpose to be achieved, with all efforts contributing to its realization. Success or failure is typically measured by the extent to which the objective is attained.

The goals become the principal item in the development of actions and processes because they determine the success or failure of the project from the beginning. If the primary and secondary

objectives are well defined, the methodology and development of the results and conclusions are usually much more precise. Therefore, the answers to the questions raised in the study must be correctly defined in the objectives and specified in the conclusions. These must be based on a good bibliographical base and as far as possible, must try to surpass the state of the art in the concepts to be developed or solve questions related to problems of society that can be addressed from a scientific-technical point of view. Several authors affirm that, as a general rule, an objective must begin with a verb in the infinitive since these intrinsically involve the fact of carrying out an action to achieve and therefore, they tend to express the need to act: to obtain, to load, to define, etc.

3.1. How to define an objective

The objectives must follow four premises (SMART objectives): Specific, Measurable, Achievable, Realistic, and Time-limited. Furthermore, goals can be classified into primary, which are of maximum relevance and must answer the questions posed by the study, and secondary, which may be subject to slight modifications according to the evolution of the research and usually arise from the main goals, but with a greater level of detail or specificity in the research topic.

Since a LL represents a multidisciplinary open work environment where information can be obtained and shared among different entities and SH, it is necessary to establish a holistic research approach. Under this approach, the objectives are understood as a way of generating knowledge, constituting an evolutionary process that has different degrees of complexity, classified in various levels (Figure 2):

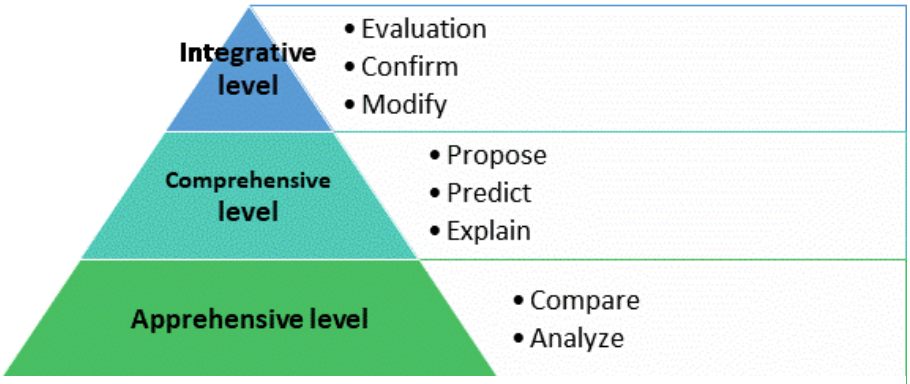

Figure 2. Outline the different levels according to the complexity of the objectives.

3.1.1. Perceptual level

At this level, the researcher studies an event from the most evident and manifest characteristics, trying to make as few interpretations as possible and limiting himself to the initial assumptions of the study to capture more faithfully the manifestations of the event under study. At this level, the objectives are explored and described, and the reasons for these results or conclusions are not examined in depth. It is not a level at which critical thinking is developed, but merely an attempt to resolve hypotheses based on the researcher's description.

Example:

1. To describe the effect of incorporating organic matter in the agricultural management of rice plots.
2. To explore the modification of crop fertilizer in the crop development.

3.1.2. Apprehensive level

In this case, the characteristics of the study are related to each other in order to reinterpret the observations to obtain qualities or characteristics that are not appreciable at first sight. At this level, the verbs are analyzed and compared. Critical thinking is already an explicit part of the development of the research project since, at this level, the aim is to take a further step concerning the objectives set at the lower level (perceptual). General objectives are normally set at the apprehensive level and secondary objectives at the perceptual level. Comparing or analyzing hypotheses or situations based on previous results, which have been previously described, produces a clear advance in generating knowledge and its discussion.

Example:

1. To compare the effect of applying two doses of biostimulants on soil health.
2. To analyze the water infiltration rate after applying a soil improver.

3.1.3. Comprehensive level

Defining objectives at this level requires a deeper understanding, as connections are established between different events and their characteristics. This can be used to explain how they behave, relate or interact. These explanations allow us to anticipate future situations and plan or develop proposals reliably. To explain a phenomenon or result is necessary to describe, explore, analyze, and compare it with standards under the same conditions. With this, it is possible to explain with foundation and to propose future solutions or behaviors, as well as to predict or launch ideas about the state of the art and how to overcome it. The verbs explain, predict, and propose are located at this level.

Example:

1. To explain how the accumulation of soluble nitrogen can degrade the environment.
2. To propose improvement measures to prevent soil degradation.

3.1.4. Integrative level

In this last level, knowledge transcends beyond explanations to be expressed in concrete actions that modify or transform the studied event. New conclusions or expertise can be obtained in the process.

1. To evaluate the impact of agroecological practices on soil quality, biodiversity, and yields.
2. To verify the correct implementation of the agronomic techniques learned and see if there is an improvement in soil quality.

3.1.5. How to formulate objectives correctly: common mistakes

The objectives are fundamental in developing a project in general and, in this case, the ECOLOOP LL; therefore, their correct formulation is essential. However, mistakes are often made and can

compromise their meaning or understanding and, therefore, the project and or the ECOLOOP LL correct development and implementation.

The **first mistake** is to think that an objective is the same as a purpose, being two different terms but not mutually exclusive. As some authors explain, objectives are results or achievements intended to be reached at the end of the research, which serves as an orientation to start investigating the topic. On the other hand, a purpose is an intention, the reason why a project or research is carried out. Objectives or goals are measurable and concrete, while purposes are abstract, and their success cannot be quantifiably determined. Objectives respond to "what" is sought with the following research, while a purpose responds to "why or what for" this research is being carried out.

Another common mistake when formulating objectives is confusing general objectives with specific ones. Specific or secondary objectives are derived from the general or primary objective. In summary, the primary objective must respond to the purpose of the research or project. Secondary objectives, on the other hand, are objectives that must be achieved in order to complement the purpose of the study, which is related to the general objective.

- Specific objectives are proposed to be fulfilled and must be written with verbs that indicate a concrete action. They are more detailed and specific within the project.
- The general objective is the purpose of the project and to convey the result or outputs to be achieved.

The specific objectives should not be more complex than the main objective since the aim is to facilitate the achievement of the last one. In a research project, a single general objective must be established, or two at the most, that covers the purpose of the project together with several specific objectives that break down the main objective. All of them should be established in a quantifiable manner, allowing for a more objective evaluation.

The primary goals are expected to be formulated at a much higher level (integrative) than the secondary ones. Therefore, it cannot be assumed that the main objective will be to explore the “X” concept, and the secondary aim will be to confirm or evaluate the behavior of the “X” concept.

Usually, it is necessary to describe concept "X" first and then to confirm or evaluate its behavior concerning some pattern or circumstance.

Another critical issue is to confirm the feasibility of the objectives. It is necessary to assess whether the purpose is realistic given the resources, time, and capabilities available and to avoid overly ambitious or unattainable goals since the risk of the project or LL to fail is higher.

Along the same lines, objectives must present a clear and defined time frame with dates to achieve the purpose (even more so if they are necessary to achieve the main objective).

Finally, one of the most common mistakes is not starting with the infinitive form of an action verb. This leads to the objective for being action oriented.

3.2. ECOLOOP Soil Living Lab Objectives

Once the objectives formulating criteria, and the methodology have been set, the proposed objectives for the ECOLOOP soil LL are detailed. These have been formulated to ensure that the identified needs and the expected results are aligned and achievable.

The same question-answer structure and procedure was followed for the formulation of the LL objectives as the one explained before in section 2.3 for the LL definition,

Following the methodology on how an objective should be created, for this project, a single main objective and seven secondary objectives have been proposed as a basis to facilitate the fulfillment of the main objective.

In the form sent to the rest of the project partners, the objectives were stated at different points to clarify what is proposed with this LL and how they are to be obtained. The basic objectives stated are shown below.

The main objective of the ECOLOOP soil LL:

> "To improve and modify soil quality (physicochemical and biological properties) through the use of advanced bioproducts."

Secondary objectives of the ECOLOOP soil LL:

1. To propose an ideal space (LL and LH) for the generation of knowledge, based on the concept of citizen science (participation of SH), obtaining quantifiable results applicable to the study area, which will generate an important social and economic impact.
2. To propose LL as neutral spaces to test, learn, and co-develop innovations in real and applied contexts to generate specific knowledge about the soil according to the needs of the different agents, such as farmers, energy managers, administrations, and companies.
3. To improve or modify awareness on the importance of soil health and its ecological and agronomic value in the academic and professional spheres, promoting education in soil science.
4. To advance in the knowledge of the use of bioproducts that reduce the utilization of fertilizers and improve soil properties.
5. To increase the sequestration of organic carbon in the soil.
6. To implement new agricultural management that is more respectful of the environment within the idea of a circular economy
7. To use of new target strategies (bioproducts) to reduce the impact of soil degradation processes

Feedback obtained from the partners for the main objective was as follows:

"To generate specific knowledge about the soil according to the needs of the different agents, such as farmers, energy managers, administrations and companies, to improve soil quality (physicochemical and biological properties)"

The secondary objectives were as shown below:

- In objective 1: To define "LL and LH" to ensure clarity for all readers.

- In objective 6: To implement new agricultural techniques that help conserve and improve soil quality.

- In objective 7: To promote regenerative agriculture as biodiversity development and sustainable resource management.

Once the answers provided by the partners have been evaluated and analyzed, the objectives were reformulated, and the final ones are as follows.

Main objective of the ECOLOOP soil LL:

"To produce specific knowledge on soil characteristics adapted to the needs of different SH to improve and modify soil quality (physical, chemical, and biological properties through the application of innovative bioproducts."

Secondary objectives of the ECOLOOP soil LL:

1. To propose an open environment for the generation of knowledge based on the participation of all SH, obtaining quantifiable results applicable to the study area, which generates an important social and economic impact.
2. To propose LL as neutral spaces to test, learn, and generate specific knowledge on soil according to the needs of different SH, such as farmers, energy managers, administrations, and companies.
3. To improve or modify awareness of the importance of soil health and its ecological and agronomic value in the academic and professional spheres, promoting education in soil science.
4. To advance in the knowledge of the use of bioproducts that reduce the use of fertilizers and improve soil properties, reducing the impact of soil degradation processes.
5. To increase the sequestration of organic carbon in the soil.
6. To implement environmentally respectful agricultural management practices aligned with circular economic principles.
7. To promote regenerative agriculture for the development of biodiversity and sustainable resource management.

4. Description of the interactive environment

As explained in previous sections, an LL is carried out in a real environment where people interact, live or work. It is in these spaces where the response to the proposed objectives is carried out, and it can be a real physical or virtual environment or a mixture of both.

LL without a defined physical space are carried out virtually, without a location or site. More specifically, on online platforms or in digital environments. This type of testbed can be developed simultaneously in different places, allowing the collaboration of other users in various locations without needing to define or focus on a single space.

The advantage offered by this type of LL is the greater scope that can be obtained by not being delimited in a specific place, facilitating the cooperation and collaboration of multiple users from different locations. In addition, the project cost is lower as it does not require physical construction or setting boundaries. These co-creation spaces focus on innovation through new technologies, such as developing new artificial intelligence or a new tool to reduce energy consumption.

LL with a defined physical space are the most common ones. As it name indicates, they have a physical location, either in a specific place, such as a classroom or laboratory, or in a larger space, such as a city, rural area, or region, if that area is defined.

One of the advantages of the physical LL is that the users interact with the objectives themselves. Unlike the virtual one, where there was a significant number of users from different places, this one allows participants to test and interact with the services or technologies proposed, with a more dynamic collaboration and exchange of opinions. This can create greater confidence in the user or consumer of the innovation since it is being tested in an environment that allows them to take an active role.

To carry out a LL in a physical space, it is essential to well define where it will be carried out since this will provide information about the area and what can be found there. Therefore, it is necessary to consider the following points:

- Area contextualization, i.e., description of where the project will be carried out. This description should define the area covered by the zone or place, provide information on the total population, and state which is the largest urban center. If the area where the project is going to be carried out comprises several terms (municipalities, towns, or cities), it is convenient to provide the information individually.
- Identification of the main economic activity in the area; it can be one or several activities. This will provide information on the resources available in the region and socioeconomic context, indicating the area's development level and the services offered.
- Limitations and resources available in the area. Knowing what the area is like as well as its economic activity allows to understand the primary resources available and the limitations that can be found in it. This point is essential since it is possible to analyze the problems that may arise during the LL or project in advance.
- Citizen participation. This point includes all interested groups who want to participate, which is an advantage because they have a better knowledge of the environment, both its resources and the needs of the area, allowing better results and greater satisfaction on the part of future SH.

As it can be seen, to establish the location where the LL is going to be developed, is necessary to know and understand the aim and objectives to be achieved within the project. With these factors, it is possible to have a clearer vision of the place that best adapts to the established goals and facilitates the development of the project or the co-creation space.

For a better understanding of the study area, it is essential to analyze it to know better from where to start and how to act on it. For example, in a soil LL developed in an agricultural or forestry region, it is necessary to know the edaphoclimatic factors of the area, both the current and past state of the soil, to understand the starting point and see which is the best way to act in that environment, favoring and facilitating the achievement of good results.

For this purpose, in the templates' section (section 9), there are two examples of the templates created for the ECOLOOP soil LL, where the aim was to know the climatology of the area and the relief and topography of where the project was to be carried out. See 9.1 Study area description.

4.1. Importance of establishing a space or place for a Living Lab

A LL is an open, innovative environment with a specific space (either physical or virtual) where a project is created and developed. Establishing a place is essential; interactions between participants will occur in that space, and problems and solutions will be developed.

It is a collaborative space where the different participating groups contribute with their ideas and opinions, thus creating a space where co-creation is encouraged and collaboration is stimulated.

A LL is a space where trials and errors are conducted. Therefore, it is essential to establish a place where all the advances and the results obtained can be "exhibited" in an authentic context, such as through a digital platform or in a physical location. In this way, the results obtained allow an accurate evaluation of the impact generated on the community and economic and social aspects.

It also allows users to interact with the environment where the LL has been established and developed, and also with each of the different collaborators. Finally, they are able to see how the project works in real space.

Having a defined space, whether physical or virtual, is important, as it reinforces the existence and creation of the collaborative innovation environment. Depending on the type of initiative, there may or may not be a designated physical space. It serves as a genuine setting where the different participating groups come together, unifying the community and addressing the real problems they encounter.

As can be seen, establishing a place or space is essential to carry out what is known as the LL, which, as mentioned in the definition offered, is an open place where cooperation and co-creation are encouraged, and new technologies are tested.

4.2. ECOLOOP soil Living Lab

As observed, a LL can have a defined or undefined physical space. In this case, the ECOLOOP LL is focused on soil health, and as mentioned in section 3.2, where the objectives were defined, it is essential to establish and define a place where the LL can be carried out.

For this task from WP2 (T2.4. Implementation of ECOLOOP-SOIL LL for experimentation) of ECOLOOP, that is being carried out in the Spanish Pilot, several areas have been established for developing the experimental part of the soil LL.

In the first place, located in La Ribera Baja, region of Valencia, is Finca Sinyent, an agricultural experimentation area of AVA-ASAJA. This farm has 33 hectares for agricultural trials involving both woody and herbaceous species, allowing the evaluation of different crops under real conditions. This association participating in the project is focused on studying and researching possible improvements that can benefit the agricultural sector, both at a productive level and in terms of improving soil quality. In addition, its direct link with the agricultural industry facilitates the transfer of knowledge to farmers, which is one of the main project targets.

The second space where the LL will be developed is located at the Polytechnic University of Valencia (UPV). This academic environment has the necessary infrastructure and knowledge to conduct experimental trials. This space has experimental plots located in L'Horta Nord, as well as a greenhouse for conducting trials. This allows to combine experiences under real conditions, such as in the field, or controlled conditions, such as in the greenhouse.

An advantage of having an academic space such as the university is that research centers or scientific communities that can contribute to the LL are available for their use and interaction. These institutions are essential in tackling the difficulties encountered by farmers and in promoting more sustainable farming methods.

Being the physical part or location of the LL defined (including experimental areas, meetings, and dissemination activities) the next step is to broaden the knowledge about the places where the trials will take place.

To start with the LL project experiences, it is necessary to have a more detailed knowledge of the plots where everything will be carried out. To have a starting point and be able to evaluate if the objectives are achieved, the template mentioned in previous sections (section 9.1), has been used. It gathers essential information about the historical use of the soil, as well as all the relevant information that may be of benefit or risk, such as climatic conditions or soil characteristics. This

form allows the creation of a baseline to analyze the progress in the project, facilitating the comparison of results and decision-making based on it.

Knowing this, it has been verified that the plots where trials will be carried out present ideal soil properties for cultivating herbaceous crops and that the woody crops have fertile soil, presenting a proper structure for the settlement of the roots.

Regarding the climate, high evapotranspiration is observed, causing faster water loss, making the soil drier and more compact. This can hinder the absorption of water by the roots. Comparing temperatures with rainfall (Figure 3), it can be observed that, in general, there are no periods of climatic drought in both farms.

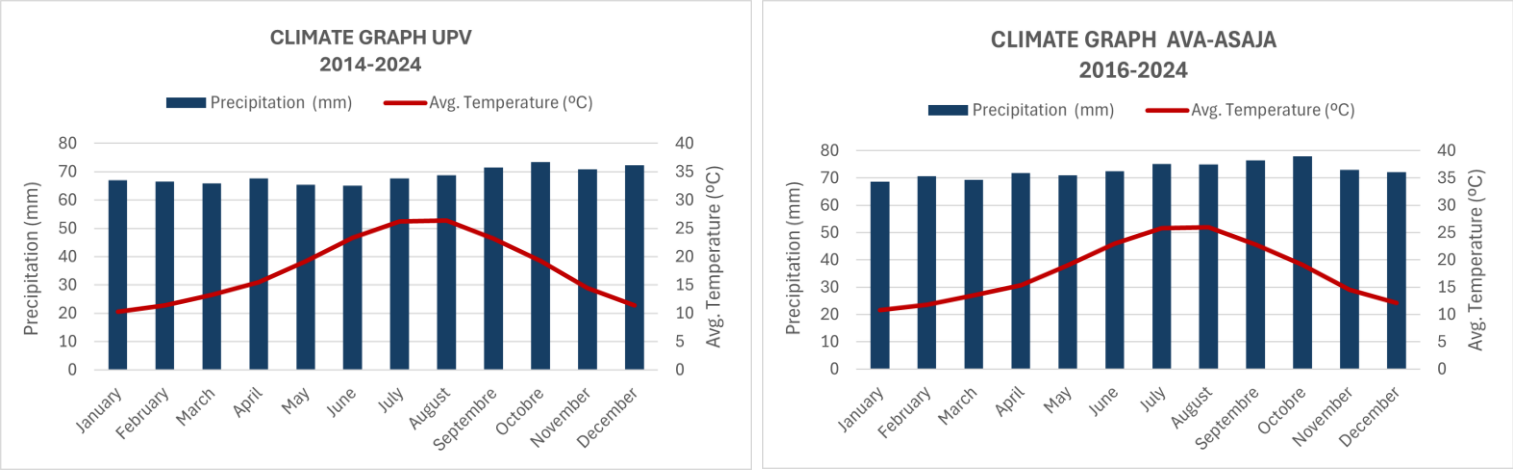

Figure 3 Climograms of temperatures and precipitation of the pilot area in Spain

Based on the preliminary study on the field and the surrounding factors (social or environmental) it has been concluded that one of the limiting factors that may appear during the development of the trials is the limitation of useful water available for the crops.

5. Stakeholders

Every project involves different SH whose interests, influence, and level of involvement can significantly impact its development. Identifying and managing SH effectively helps to ensure smooth collaboration and successful outcomes. The following sections outline key concepts and approaches for SH identification.

5.1. What are stakeholders?

SH (SH) are the parties interested in the project, either from influencing or being affected by it. An open environment often generates interest groups that must act as a SH. These groups are divided into four main areas: public administrations such as municipalities and politicians; private companies such as cooperatives or companies; academic centers such as teachers, universities or scientists; and finally, people outside these three groups who show interest in the LL. For example, for a LL that aims to solve the problem of a group of workers in a specific sector and a particular place, the employees of the mentioned sector, labor unions, companies, lawyers, politicians, etc., will act as SH. SH can come from all hierarchical levels, as well as from different sectors. Their importance is vital for the proper functioning of a LL, and their identification is key to the project's success.

The crucial items to identify and select SH are as follows:

- **Relationship with the project**

  Generate a list of potential SH according to the purpose of the project and the primary and secondary objectives. These should be classified based on the relationship and affinity with the achievements of the LL.

- **Quadruple helix model**

  This model derives from the triple helix model, where the new field, **people**, is incorporated.

  This innovation model (Figure 4) originates from a broader framework of collaboration where the different SH, such as public administrations, academic institutions, companies, and individuals, work as a team, fostering collaboration and the exchange of ideas. In the end, the LL should include SH from the fourth part of the helix model.

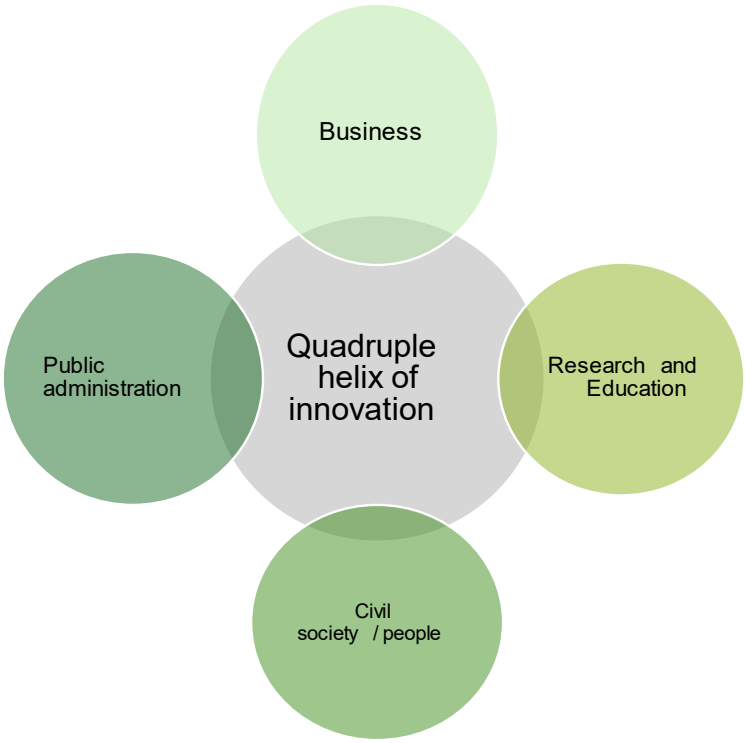

Figure 4. Parties to consider when choosing SH.

5.2. How do you identify and classify stakeholders?

There is a key issue in SH identification: the process is often not well-documented or clearly outlined in literature [20]. In addition, methods for identifying SH are seldom discussed and can be challenging to recognize, as they are typically not referred to as formal processes and are sometimes mislabeled as methods [21]. In this context, methods refer to the specific techniques used to identify SH, such as literature reviews, brainstorming, checklists, interviews, and focus groups. Each method has strengths and limitations and requires particular resources, so combining them is often recommended. For instance, brainstorming and checklists are low-resource methods, while interviews and expert consultations are better suited for understanding more complex situations. Several authors also suggest that a literature review helps identify SH and understand relevant organizational processes, as it can help categorize SH [22]. However, while valuable, a literature review alone is insufficient, as it may not capture all potential SH.

A structured four-step approach to SH identification based on a literature review of various LLs can be constructed from the literature [20]: pre-identification, identification of potential SH, SH validation, and SH review (Figure 5).

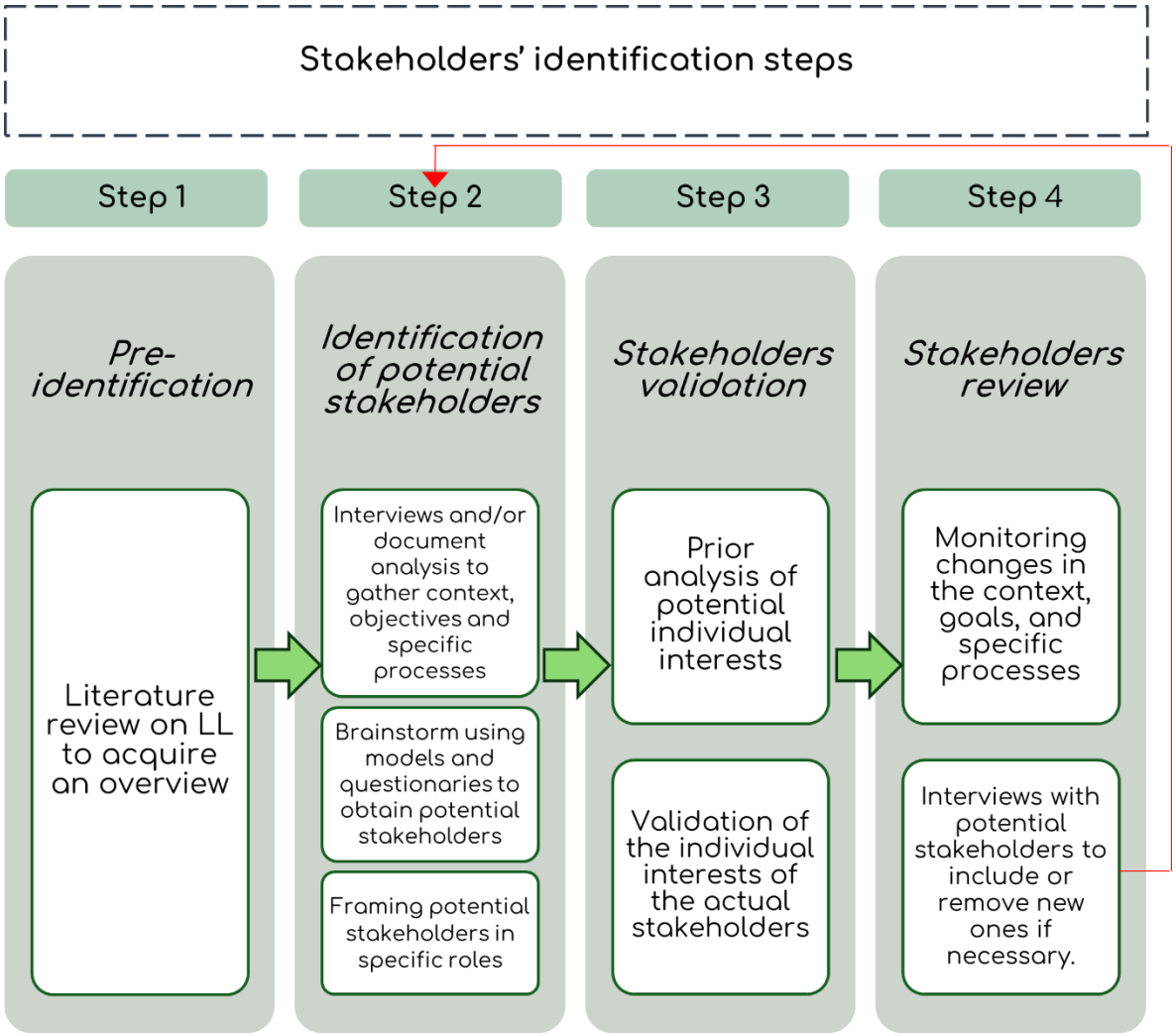

Figure 5. Process for identifying SH in a LL [20].

Typically, the SH identification process involves three main stages: defining the context and identifying initial SH, gaining a deeper understanding of the context from the SH' perspectives, and validating the SH identified. However, many researchers and organizations emphasize the need for ongoing SH monitoring, coordination, and motivation. As a result, adding a step focused on reviewing the SH framework and identifying additional potential SH for tested solutions may be beneficial.

It's also worth noting that several methods for identifying and ranking SH, outlined in the next section, can help establish criteria for weighing and prioritizing SH. Some of these methods offer an integrated process for identification, classification, and prioritization, which is particularly useful when the number of SH exceeds the project's capacity to manage them.

5.2.1. Pre-identification stage

A literature review is commonly conducted as the first step in the pre-identification stage. This review helps develop a general understanding of the LL and its potential SH. Based on the information gathered, a reference model for identifying possible types of SH can be created. The inclusion of these SH in the initiative will largely depend on the specific nature and type of the project.

The pre-identification is beneficial in some cases where the responsible for implementing the LL lack prior experience with the model. Therefore, it is recommended that at least one person involved in the identification process have prior experience with LL. In such cases, this step can be especially valuable. Including at least one person with previous experience in this area is advisable [20], [23].

5.2.2. Identification of potential stakeholders's stage

The second step is to study a specific scope, objectives, processes, and key activities. Based on this analysis, the next task is to identify SH from the initial list. To achieve this, it's essential to outline the issues that must be considered clearly. Some of these issues are intrinsic to this model and can be identified through the literature review conducted in the first step. However, defining the various potential objectives and contexts for analyzing real-world cases is crucial, as these definitions are strategic. They can be gathered through interviews with the managers and document analysis.

The identification of the potential SH list should be based on the following questions:

- **Who will be affected by the LL?**
- **Who has the resources, knowledge, or influence to contribute to the project?**

- **Who will use or benefit from the innovations?**
- **Who might oppose or create barriers?**

Once this information is gathered, a brainstorming (group work where new ideas on a topic are contributed. However, this is defined in more detail in section 5.4.1 below) is conducted together with the managers to identify potential SH; as an advantage, this method requires few resources and helps in complex situations.

Once the potential SH have been identified, which could be based on a reference model from the examples of SH used in the literature (previously obtained during the literature review conducted in the pre-identification phase), they should be framed in different roles using figures or diagrams proposed by other authors, such as the Chevalier and Buckles rainbow diagram, the Savage Model, the Gardner Model, the Mitchell, Agle and Wood Model or the Quadruple Helix Model [24], [25], [26] . The nomenclature of these SH roles or functions may vary according to the model applied or the author describing it. For example, suppose the Mitchell, Agle and Wood Model (Figure 6) is performed. In that case, depending on the power, legitimacy and urgency (since these are the analysis attributes used in this model) of each SH, they can be classified into different roles or groups called latent, dominant, discretionary, dangerous, definitive, dependent or demanding.

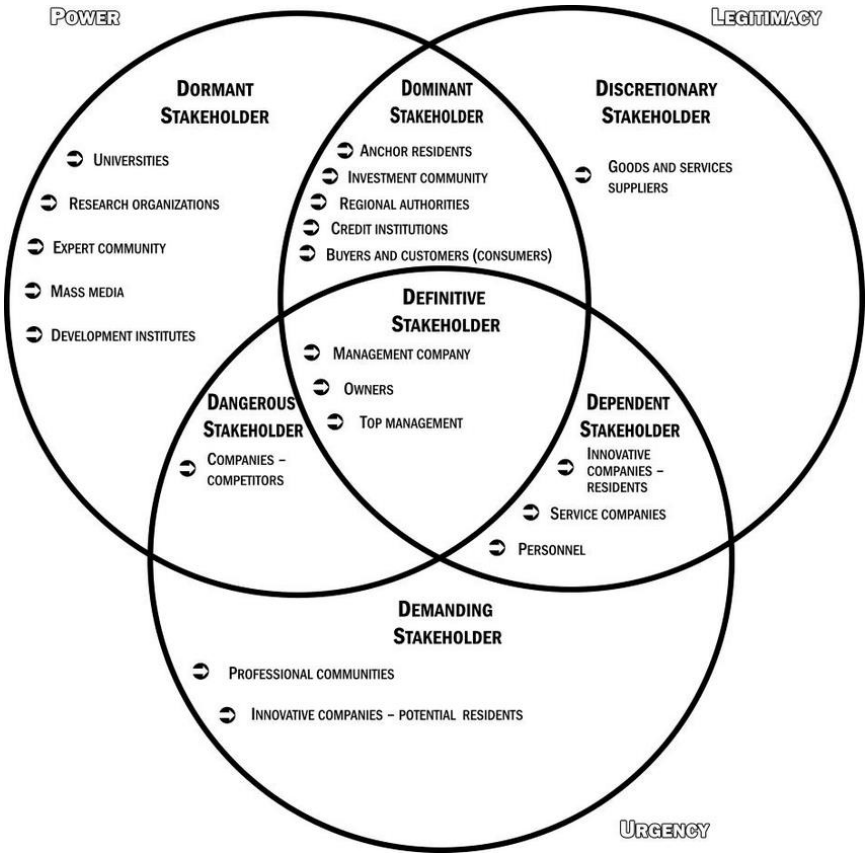

Figure 6. Example of universal Mitchell's model for SH analysis in the context of technology park structures.

The purpose of these figures/diagrams and models is to visually and quickly identify potential SH and help to highlight those who fit multiple roles to verify if their interests match with what is expected from each one of them.

Currently, the ECOLOOP Soil LL is in this phase, where a preliminary list of potential participants has already been drawn up and will be validated in the next phase by confirming their engagement.

5.2.3. Stakeholder validation stage

In the third step, it is essential to analyze each potential SH's interests identified in the previous step. While some authors [27] perform the interest analysis separately from the identification, evaluating each SH's relationship and expected outcomes is essential before reaching out or inviting them to participate. By doing this, it is possible to determine if their interests align with

LL's key objectives and activities or if any conflicts of interest might emerge, which will allow to discard such SH before participating, saving time and resources.

After pre-analysis, the interests should be validated in person with the SH. During the outreach, attention should be paid to whether the interests match the expected ones and whether they are committed to the expected role. Otherwise, a lack of full engagement of all relevant SH may lead to more discussions than to developing and testing the relevant solutions.

5.2.4. Stakeholder review stage

Since a LL is a dynamic environment, objectives, activities, and SH interests can change. Therefore, reviewing all the changing situations during the process and adapting to the new framework is necessary. Additionally, because this type of open environment works in cycles and validates solutions at regular intervals, possible SH must be updated to determine whether their responsibilities have changed or if they can be added to or deleted from the list of validated SH after changes. This group of SH is known as temporary or transient because managers may decide to include them at different periods [23].

The managers also can adjust their strategies based on the availability of resources and LL capabilities. Changes in solutions to potential problems may create the need for new SH, so identifying the interests of potential SH based on their role allows participants to get a general idea of who might be involved.

5.2.5. Methodologies: information needed

It should be noted that each method has strengths, weaknesses, and resource requirements, so a combination is recommended in several cases. For example, brainstorming and checklists are resource-efficient, while methods like interviews and expert consultations provide deeper insights into more complex situations [21]. Some authors highlight literature reviews as a valuable tool for understanding organizational processes and identifying SH by categorizing them effectively [22]. However, while literature reviews are a strong starting point for SH identification, they are insufficient, as not all SH may be captured through this method [21].

An easy method to use at the beginning, after the literature review and brainstorming, is the so-called “snowball sampling analysis”, which consists of a non-probabilistic analysis technique in which each participant nominates another until a group of SH is mentioned ten times, then it would be selected [28].

The interviews and focus group methods help to understand SH perspectives. When implementing one of these two methods, it is essential to involve the right SH. For selecting them their knowledge and previous experiences should be considered, as well as their roles in the project, and positions within their respective organizations [23]. The identification of SH is influenced by their roles and status. The more elevated their role in an organization, the larger the number of SH impacted. Due to this, for cost or practicality reasons, it is not always feasible to include affected groups (e.g., the community) directly but only their representatives [29].

Using particular checklists or matching them with established groups or roles (such as users, developers, policymakers, and decision-makers) in a specific context can assist in recognizing local SH [20].

However, according to several authors, the primary identification methods are as follows:

- Brainstorming
- Snowball sampling
- Semi-structured interviews
- Expert consultation

5.2.6. How to classify the actors

SH are often analyzed or classified according to their relevance (e.g., power and legitimacy), criteria (e.g., geographical location), roles (e.g., customer or supplier), or types (e.g., involved or affected). These examples define SH primarily from a social and economic point of view. From a social perspective, it is also possible to describe them based on social identity (gender, age, race, religion, nationality, etc.). In addition, there are mixed approaches, suggesting the attribute of status (e.g., reputation, visibility in the media, and other customers possessed by the SH). As can

be seen, depending on the context, nature, and objectives of the LL and other factors of interest, it is possible to analyze and classify SH using several approaches.

5.2.7. What data is necessary?

SH identification is usually an iterative process, during which new SH are added as the analysis progresses, using the methods mentioned above or a combination of them. If the boundaries of the phenomenon itself are clearly defined, it will be relatively easy to identify SH. However, there is a risk that some SH are accidentally omitted, and not all relevant SH of the phenomenon are identified. On the other hand, it is often not possible to include all SH, so at some point, a dividing line must be drawn up based on well-founded criteria established by the research analyst. These criteria may be, for example, geography, such as the boundary of a national park, or demographic, such as nationality or age, depending on the focus of the analysis [26].

To address this issue, a wide variety of SH identification and selection methods can be developed based on iterative processes, as indicated by several authors. These may include scoping interviews, focus groups, and follow-up interviews to identify the organizations, interventions, or issues under investigation. Self-selection processes can also be used through advertisements or announcements through different means of dissemination. Alternatively, written records or census data can provide information for sorting by age, sex, religion, and residence through oral or written accounts of important events (identifying those who participated) or by using a checklist of possible SH categories. Once classified, it is recommended that these SH be prioritized by scoring or weighing the selection criteria to establish an order of priority and thus draw a working margin from which to choose if there are too many SH (see point 5.4)

Analytical categorizations are a set of methods in which the classification of SH is conducted by those performing the analysis based on their observations of the phenomenon in question and embedded in some theoretical perspective on the functioning of a system. Examples of analytical categorizations already mentioned include those using levels of interest and influence (Interest-Influence Matrix), cooperation and competition, cooperation and threat (Savage Model), and urgency, legitimacy, and impact (Mitchell, Agle, and Wood Model). These analyses typically use matrices or Venn diagrams and are popular among users in the policy and development fields.

For example, in the case of interest-influence matrices, it is possible to classify SH into “Key Actors”, “Context Creators”, “Subjects”, and “Crowd”. This can help to specify how SH can be involved, e.g., for instrumental purposes. Key Actors, for example, should be actively engaged because they have a strong interest and influence on a particular phenomenon. Context creators are highly influential but have low interest. As such, they can pose a significant risk and need to be monitored and managed. Subjects have high interest but low influence, and although supportive, they have a low impact and can only become influential by forming alliances with other SH. They are usually the marginal SH that development projects seek to empower. Crowds are SH with little interest or influence on desired outcomes, so they do not need to be considered in detail or engaged.

5.3. How to involve the actors?

More outstanding commitment and participation can be ensured by organizing group activities that affect the decision-making process, allowing for a participatory process with all SH [30].

To achieve this, it is necessary to carry out several key points, which are defined below:

5.3.1. Facilitating regular and early communication

Use a mix of face-to-face meetings and virtual tools like video conferencing or instant messaging platforms to maintain engagement, especially when SH are geographically dispersed.

5.3.2. Design effective communication channels

- **Digital platforms**: Create online spaces like forums, social media groups, or collaborative platforms.
- **Regular meetings**: Host in-person or virtual workshops to exchange ideas.
- **Newsletters**: Provide regular updates on progress and next steps.

5.3.3. Foster co-creation and active participation

- **Joint goal setting**: Let SH help define objectives and metrics.
- **Workshops and hackathons**: Conduct hands-on sessions to ideate and test solutions.

- **Shared prototypes**: Involve SH in testing and refining the developed solutions.

5.3.4. Build trust and commitment

- **Transparency**: Share data, progress, and decisions openly.
- **Active listening**: Ensure concerns and suggestions are heard and valued.
- **Clear benefits**: Communicate how the project positively impacts each group.

5.3.5. Monitor and evaluate the process

- **Continuous feedback**: Implement mechanisms to collect opinions throughout the process.
- **Adaptive adjustments**: Modify activities and strategies based on SH' emerging needs.

5.3.6. Avoiding stakeholder fatigue

- **Schedule meetings thoughtfully** to avoid redundancy. Tailor sessions for specific groups based on their interests or roles in the project to ensure meaningful engagement

5.3.7. Creating value for stakeholders

- **Highlight tangible benefits** such as skill development, networking opportunities, or direct contributions to solutions. For example, showcasing results at public events or engaging SH in collaborative tasks fosters a sense of achievement

5.3.8. Celebrating successes

- **Public recognition**: Acknowledge the participation and efforts of collaborators.
- **Share results**: Disseminate achievements and lessons learned to inspire others.

5.4. Stakeholder prioritization methodologies

The main methods used during the SH selection and prioritization phase, according to current literature, are as follows:

1. Establishment of brainstorming criteria
2. Semi-structured interviews
3. Q methodology
4. Mitchell, Agle, and Wood Model
5. PESTEL analysis
6. Analytic Hierarchy Process (AHP)
7. Multi-criteria decision analysis (MCDA)

5.4.1. Brainstorming

The idea-generation phase of brainstorming is based on four rules:

1. Criticism is ruled out.
2. Freedom is welcome (the wilder the idea is, the better).
3. Quantity is desired.
4. Combination and improvement are sought.

From the set of rules, perhaps the most important is the first one. One of the secrets of successful brainstorming lies in the ability of group members to defer judgment and separate the generation of ideas from their evaluation. Unfortunately, this is not the case in all groups. As a result, brainstorming is not always successful and has become less prevalent (during the 1950s and 1960s). Regardless of its status, brainstorming has several advantages that make it more recommended than other methods. For example, it allows for many ideas in a relatively short time, provides a stimulating experience for most participants, and accommodates social interaction needs. However, these advantages can only be obtained when Osborn's procedure is followed [31]: a qualified group leader is available to facilitate the process, and the group members have some experience and training in using the method. When these conditions are met, brainstorming can produce less satisfactory results [32].

5.4.2. Semi-structured interviews

The semi-structured interview serves as an exploratory method commonly utilized in the social sciences for qualitative research or to collect clinical information. It adheres to a predefined guide or protocol established before the interview and centers around a main topic to offer a broad structure. The semi-structured interview facilitates exploration, providing room to pursue relevant topics as the discussion progresses [33].

A defining feature of the semi-structured interview is the interviewer's capability to explore and pursue various paths as information arises, allowing for adaptability in the order of questions while preserving the pre-established organizing focus [34].

Semi-structured interviews offer adaptability and versatility, which contribute to their popularity in gathering qualitative data [35]. These are discussions where the researcher is clear about their topics, possesses inquiries, and has a knowledge base to facilitate the dialogue. The aim is to establish a secure environment in which participants can comfortably reflect on their experiences. Furthermore, the methodology provides the researcher with a comprehensive insight into a specific area of interest. This necessitates that the researcher permits reciprocity with the participant, which is accomplished via open-ended and spontaneous follow-up inquiries [36]. Unlike a structured interview where questions are asked in a specific sequence and remain the same for all participants, the semi-structured interview's format can change in both order and substance based on the participant's answers. This indicates that although not all questions will pertain to every participant, the inquiries included in the semi-structured interview are predetermined and crafted using a framework [33].

5.4.3. Q Methodology

Q studies explore correlations between individuals or whole aspects of individuals. The methodology neither tests participants nor imposes a priori meaning. Participants are asked to decide what is meaningful from their perspective. They do this through what is known as Q-sort. From this process, an essentially relative set of evaluations is produced. The data from several people are then factorially analyzed; this reveals groups of individuals who have ranked characteristics in the same order. As the intended research target, these overall configurations

(not test results or measures) are inter-correlated and factor-analyzed in a Q study. It produces a set of factors (onto which participants load based on their configurations) that are exemplified and represented, not by different subsets of the presented items but by all the existing items configured in different but characteristic ways. The meaning/significance of these configurations must be attributed posteriorly through interpretation rather than a priori postulation [37].

5.4.4. Mitchell, Agle, and Wood model

The method is also known as the SH salience model. It combines three attributes to develop the prioritization strategy: power, legitimacy, and urgency. This can identify which SH are more essential and, therefore, need more attention from the organization. SH with only one attribute have low prioritization, and those with all three have high prioritization, which is the definitive. It should not be considered if no SH have an attribute.

- Power indicates the SH's ability to influence the organization. The SH, with the highest power strongly influence the project's results.

- Legitimacy is how SH assess and perceive the actions as correct, acceptable, and valuable for the organization. Depending on the evaluating party, this may be based on moral or legal principles.

- Urgency is the prioritization's speed and importance to SH' demands or requests.

Less relevant SH are those with a single attribute: latent, discretionary, and demanding. These groups can be annoying but not dangerous. Latent SH possess only power and can be ignored in principle; discretionary SH possess legitimacy and are the least hazardous of the three; demanding SH have only urgency; their demands are the loudest but lack leverage and a moral basis.

When SH possess two attributes, they are dominant, dependent, and dangerous. This is because, through their dominant character, they possess high power and legitimacy, receiving much attention. Dominants have power and legitimacy, being potentially influential and with an established relationship with the organization; Dependents have urgency and legitimacy but do not have the power to influence, so they depend on other SH to have their demands considered;

finally, the Dangerous have power and urgency, they use their power in an unethical way to put pressure on the organization or project.

One must be responsible and inclusive with this group of individuals because it recognizes that the priority given to them goes beyond influence. The problem with such groups is that they can be dangerous if they have urgency and power, as they can use formal channels but lack legitimacy.

Ultimately, when all three of the above attributes are present in SH, this is the highest priority, being the definitive one. They are the most important SH and should be given attention, as they can directly influence the project or organization.

5.4.5. PESTEL analysis

The PESTEL analysis is a strategic tool used to evaluate the various macro-environmental factors that can influence a project. The name of this analysis is an acronym for the six factors that comprise it: Political, Economic, Social, Technological, Environmental, and Legal. Therefore, this analysis only considers the external factors that can affect the project or organization [38].

The factors that make up this analysis are detailed below:

- **Political Factors (P).** This factor covers the intervention of the state in the country's economy. As a factor that intervenes in the organization's environment, it can affect in the achievement of the set goals.

- **Economic factors (E).** This refers to the changes that can occur in the economic structure that influence or affect the organization. This factor relates to economic growth, inflation, and employment rate. It is the factor with the most significant impact.

- **Social factors (S),** demographic aspects, such as cultural or social aspects that may affect the demand for the service or its consumption, and, in this case, those social factors that may intercede with the project.

- **Technological factors (T),** technological change, cost, or access to technology and its innovations can influence a company's competitiveness and in achieving the set goals.

- **Ecological factors (E),** aspects related to environmental concerns and waste management, are the study of what an organization can generate regarding both ecological impact and the pollution it generates. Factors to be considered include natural resources, environmental regulations, and liability.

- **Legal factors (L).** The organization's legal framework, from regulations to those concerning occupational safety. This is essential to avoid future penalties.

All the relevant information from the mentioned factors and appropriate to the project or organization must be compiled for this identification analysis. A detailed analysis of each factor follows the methodology described above, including whether this positively impacts the project, how to take advantage of these opportunities, or, on the contrary, how to mitigate the risks if they have a negative impact.

5.4.6. Analytic Hierarchy Process (AHP)

AHP is a quantitative process created by Thomas Saaty to assist in decision-making. It is used to solve and analyze complex decisions, decomposing a problem into a hierarchical structure or network of simpler sub-problems, which can be studied independently.

The strength of this method is the organization, as it offers a structured solution that facilitates decision-making when faced with problems by decomposing them from the largest to the smallest, being able to make comparisons among the more minor issues and the larger ones.

The AHP consists of a series of steps to be applied [39]:

1º Define the problem and determine its objective, definition of the central question that will determine its objective.

2º Structure the hierarchy, with the primary objectives at the top, the criteria on which the following sub-levels or alternatives depend on the intermediate levels, and the list of options at the bottom. This decomposition facilitates the understanding of the main problem.

3º Pairwise comparison through a matrix. Each criterion and sub-criterion are compared in pairs, considering their importance to the main objective. The pairwise comparison scale (Table 1) is used for this purpose.

Table 1 Pairwise comparison scale

NUMERICAL RATING	VERBAL JUDGMENTS OF PREFERENCES	EXPLANATION
9	Extremely preferred	Evidence favoring one activity over another is of the highest possible order of affirmation.
8	Very strongly to extremely	When commitment is needed
7	Very strongly preferred	Activity is highly favored, and its mastery is demonstrated in practice.
6	Strongly to very strongly	When commitment is needed
5	Strongly preferred	Experience and judgment favor one activity over the other
4	Moderately to strongly	When commitment is needed
3	Moderately preferred	Experience and judgment favor one activity over the other
2	Equally to moderately	When commitment is needed
1	Equally preferred	Two activities contribute equally to the objective

4º A comparison matrix is made where each criterion is evaluated concerning the others, reflecting the relative importance of each criterion.

5º Calculate each criterion's weight to determine each criterion's weight vector. The normalization of the sum of weights must be equal to 1.

6º Verification of the consistency through calculating the Consistency Index (CI); see attached formula.

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

Where:

λmax: Largest eigenvalue of the comparison matrix.

n: The number of elements being compared and the size of the matrix.

This calculation demonstrates the degree of compatibility deviation, which can lead to inconsistency and unreliable results. The consistency index (CR) is used to check the consistency of the criteria. The consistency index's value is acceptable when not higher than 0.10; the matrix is inconsistent at higher values.

$$CR = \frac{CI}{RI}$$

Where:

CI: Consistency index

RI: Random average index or consistency

The random index is obtained from the following formula:

$$RI = \frac{1.98(n-2)}{n}$$

7º The criteria weights are combined, and an overall score is obtained. The alternative with the highest score is the best option.

The advantage of this method is the ease with which the problems can be approached since the fundamental pillar is decomposing the issues into simpler hierarchies. In addition, it helps to have a better overview of the issues that may arise and to facilitate decision-making.

The main disadvantage is that it is a complex method that makes the calculations more complicated if there are many criteria or alternatives. This is why projects or organizations that use this method do so through software.

5.4.7. Multi-Criteria Decision Analysis (MCDA)

Multi-Criteria Decision Analysis, abbreviated as MCDA, is a method used for decision-making where several factors or criteria are involved and must be considered simultaneously. This method is used when evaluating different alternatives in terms of various quantitative or qualitative factors.

It is used because it combines different approaches that consider multiple criteria to facilitate decision-making. It is used in various social, economic, and engineering areas.

The purpose of each method used is to evaluate and correct the choice of alternatives through analysis and decision-making, both group and individual, reaching a balanced and transparent decision.

The main types of problems considered as the basis of MCDA are the following:

- Decomposition of the problem into several levels, thus simplifying the analysis. Subdivision of the main objective into criteria

- Ranking of alternatives, prioritization. Each criterion is given a category/weighting, making it possible to identify the most decisive criteria.

- Eliminate alternatives that do not contain the best alternative to the proposed objective.

- Management of uncertainty, ease of decision making despite incomplete data, but helps to meet objectives

Before explaining the methods to be used, it is worth mentioning that MCDA presents a slight difference concerning MCDM (multi-criteria decision making). These terms are closely related but with a difference in their approach.

As each of the names indicate, MCDA is an analytical and methodological process that focuses on the analysis and structure of the problem. On the other hand, MCDM is a process that focuses more on choosing alternatives and is more decision oriented. Both are multi-criteria analyses that complement each other.

In most projects, MCDM refers to MCDA, as using decision methodologies requires prior research and analysis.

Both multi-criteria methods are used within a process, as the first step is to analyze before making the final choice. In practice, a combination of both methods is used, which is why some of the techniques mentioned below can be used mainly for MCDM but are also used in the MCDA.

Depending on the nature of the problem or approach, several methodologies are used in multi-criteria analysis.

- **Choquet Integral**

  A mathematical tool represents contexts with interactions and dependencies between criteria. This method allows for capturing the joint influence of criteria and assigning weights that reflect interdependence.

  This integral is based on a fuzzy measure, i.e., this measure is assigned to a value or importance at the individual level and in conjunction with the different criteria groups.

  With this, the interaction between them can be visualized. It is possible to visualize whether the presence of one criterion increases the influence of another criterion because of its high relationship, creating synergies, or, on the contrary, whether there is redundancy and overlapping in the decision-making process.

  Considering the different influences the criteria can have, the weights are assigned not individually to each criterion but by subsets. This makes it possible to show the cumulative impact or the extra value of considering specific criteria.

  For the calculation of the integral, the criteria must be computed together with their value according to their importance. Then, the fuzzy measure is applied to each group of criteria using the formula shown.

$$C_\mu(f(x)) = \sum_{i=1}^{n} (f_{(i)}(x) - f_{(i-1)}(x)) \cdot \mu(A_i)$$

Where:

f(i)(x) represents the value of the ordered criterion iii,

μ(Ai) is the fuzzy measure of the subset of the first i criteria.

- **ELECTRE method Elimination and choice translating reality.**

It deals simultaneously with several criteria without losing the integrity of each one. It is a peer-to-peer comparison between the different alternatives, allowing for ranking and selecting the most acceptable ones.

As it is a method based on the weighting of values given to each criterion, a concordance indicator and a discordance indicator are developed, indicating whether the alternative is acceptable.

As mentioned, this method starts with the pairwise comparison, and they are ordered and compared in pairs. Preferences between the alternatives presented are then expressed as physical or threshold values.

The next step is the assignment of weights to the different factors and criteria, with all solutions being evaluated. This indicates the order of importance of each set of criteria, facilitating the ranking and ending the method with a set of prioritized alternatives.

- **Simple Additive Weightage method (SAW)**

A simple method is known as the weighted linear combination or scoring method. It is used in environments with less complex problems.

It mainly determines the priority of each alternative by multiplying the value assigned to each alternative by the relative importance weights gained by the decision-makers to each attribute. It then sums up all the results obtained for each criterion. This method is based on the weighted average.

Unlike other methods, in the SAW, the weights for each alternative are given directly as a percentage value, which will later indicate how important or unimportant that criterion is or is not; no ranking is used.

- **Analytic Network Process (ANP)**

It is an extension of AHP (mentioned above), as they share the same basic concepts [40].

The main difference between the two methods is their proposed structure. While AHP uses a hierarchical structure, ANP uses a network structure designed to handle dependency and intra-dependency within the same group or interdependence between different groups. This network offers a more precise solution with greater flexibility by considering the relationships between various elements.

Both methodologies use pairwise comparisons to measure weights, with the only difference being that in ANP, the dependencies between groups are considered.

- **Technique for Order Preference and Similarity to Ideal Solution (TOPSIS)**

It uses an aggregation approach to determine the best alternative or option among the proposed choices.

This method is based on the idea that the best alternative should be the one with the shortest distance to the positive ideal solution (PIS). At the same time, the one furthest away corresponds to the negative ideal solution (NIS).

To apply this method, a matrix containing the alternatives and values for each criterion must be weighed according to its importance, and both the matrix and criteria must be normalized.

Then, the positive and negative ideal solutions are determined. For the positive solution, higher values are applied to the most beneficial criteria and lower values to the costliest; for the negative perfect solution, it is reversed, with lower values for the valuable and higher for the costly criteria.

Once the ideal solutions are set, the distance of each alternative is calculated using Euclidean distance, and the closeness of each option to the perfect solution is determined.

- **Preference Ranking Organization Method for Enrichment Evaluations (PROMETHEE)**

This is one of the more recent methods in multicriteria analysis. It is primarily based on identifying the best alternatives by ranking them using preference functions.

Like other methods mentioned above, it uses pairwise comparisons and calculates the preference between them for each criterion. In addition, each alternative's strengths and weaknesses are calculated, generating a positive and a negative flow, with the alternative with the highest net flow being the best option.

Primarily, multicriteria analysis is made up of two parts. It begins with defining the objective to be achieved or the problem to be solved, the alternatives available, and the criteria for the analysis (Figure 7).

The first part of the multicriteria analysis is what is known as analysis and structure creation, known as MCDA, where the most relevant criteria are identified, and different weights are assigned to each, considering the chosen method, which can be direct weighting, Mitchell, AHP, or PESTEL. If there is an interaction between the criteria, that is, interdependence between them, it is recommended the Choquet Integral method to be used.

The second part focuses on decision-making, hence the final decision. This part is known as MCDM, where the focus is on the final decision process and the best alternative considering the analysis previously conducted in MCDA. This second part aims to select the most appropriate final option, using prioritization and selection methods such as TOPSIS, PROMETHEE, or AHP.

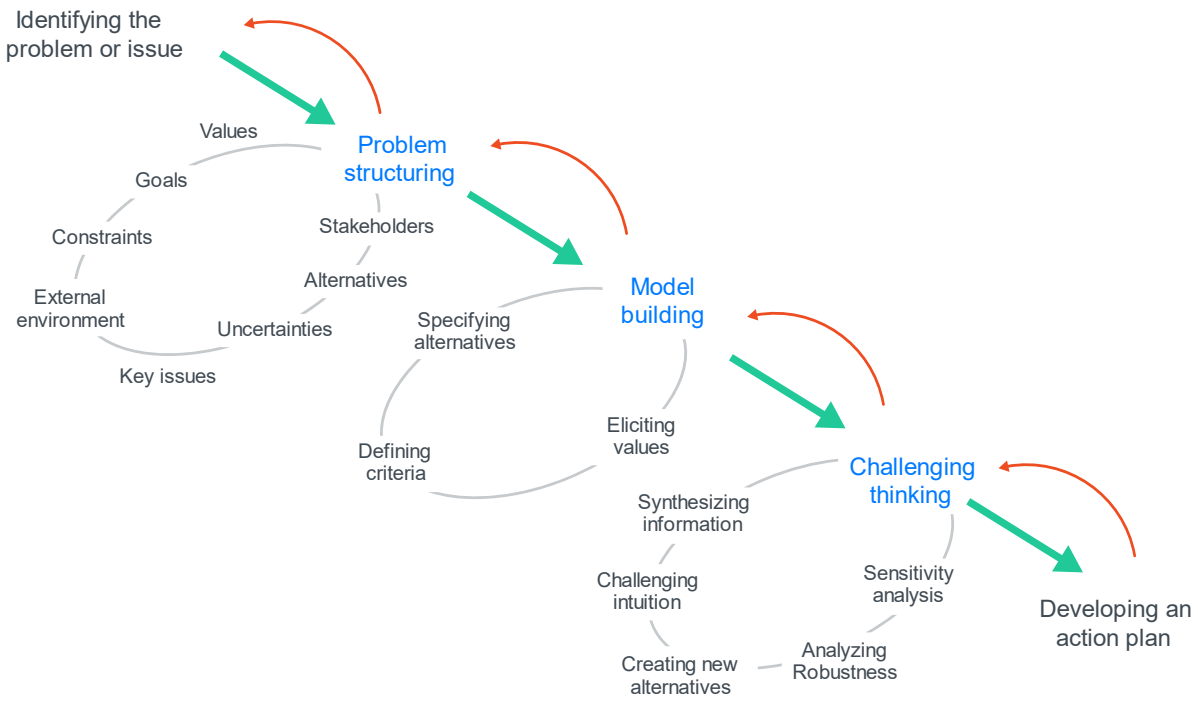

Figure 7 Process of MCDA [41].

5.5. ECOLOOP Soil Living Lab

Once the essential key points about SH and the different prioritization and identification methodologies have been defined, the next step to follow is the proper identification and classification of the SH (SH) participating in the ECOLOOP LL.

During this process, a series of criteria will be considered to guarantee that the participating agents will be the beneficiaries of this collaboration, both indirectly and directly, as well as obtaining results that favor the fulfillment of the proposed objectives.

Following the process of identification of the SH shown in Figure 5, once the pre-identification process has been carried out, where a bibliographic process has been carried out to have an overview of an LL, the second step is continued.

In the second step, where the potential SH are identified, the quadruple helix model has been chosen, which incorporates four major key actors. This model includes public administrations, academic institutions, companies and individuals, as shown in Figure 4.

Even without having defined the SHs, in order to achieve an efficient model, a survey has been conducted among the other partners to determine which group will have a greater importance, in addition to making the interaction and collaboration dynamic.

The survey raised the question of which SH should have the greatest relevance in the ECOLOOP Soil LL.

The academic communities are represented by the academic institutions and scientific communities; the administration is represented by public organizations; the local population or individuals, representatives are the NGO's, farmers and agricultural cooperatives; and finally, the private companies.

The results obtained are shown in Table 2. First, the results were analyzed and represented in percentages in order to have a vision of which groups should have a higher weight.

Table 2. Total ranking of votes obtained in SH types.

	Nº votes	**% Total**	**% of 100%**
Foresters and Farmer's organizations	2	17%	3%
NGOs	5	42%	8%
Freelance agricultural technicians	5	42%	8%
Public organizations (e.g. Regional or local administrators, authorities...)	9	75%	14%
Scientific communities	9	75%	14%
Private companies	11	92%	17%
Academic institutions (e.g. Universities, primary and secondary schools...)	11	92%	17%

Agricultural cooperatives and farmers (local population, individuals)	12	100%	19%

A power-interest matrix was then developed. It was estimated that the groups with the highest percentage weight are those with high power and interest, being those the agricultural cooperatives, academic institutions and private companies. The ones with high power but low interest are scientific communities and public organizations. Foresters and Farmer's organizations and freelance agricultural technicians have low power but high interest.; At the latest level are those with low power and interest, such as NGOs.

Taking into account the four groups of the quadruple helix, the percentages of relevance for each of the actors would be as follows:

- Local population or individuals 37.57%.
- Academic communities 31.22%.
- Private companies 17.20%
- Public administration 14.02%.

With the results obtained, the next step is to search for possible SH that could be part of the ECOLOOP Soil LL. Different groups belonging to the four groups of actors have been extracted.

Local population or individuals:

- Livestock farms
- Agricultural and livestock farms
- Agricultural associations

Academic communities:

- Primary and secondary schools
- Universities
- Research institutes

Private companies:

- Compost or fertilizer companies.
- Companies dedicated to the fruit and vegetable market.

Public administrations:

- City councils
- Technical officials in the agricultural or environmental sector

Continuing with the identification phase, criteria were established to identify potential SH.

To obtain the criteria, the LL coordinators held a brainstorming session, during which they contributed ideas or questions that they considered essential for the project participants to consider.

The criteria that were established as the most important/significant to be taken into account when determining the potential of a SH are the following:

- Size of SH.
- Proximity to the study area
- Crops managed (agricultural management)
- Number of project objectives interested
- Crops managed (varieties)
- Circular economy
- Level of political influence.
- Previous knowledge about soil.
- Interest level
- Capacity
- Impact that the project generates on them (SH).

For the types of SH, a survey was conducted among the project SH. They were asked to rank each criterion from least to most important. The aim is to find out which value they give to that criterion out of 5.

Table 3 Final ranking of criteria for SH analysis

	Score over 5
Size of SH	2,92
Proximity to the study area	3,08
Crops managed (agricultural management)	3,08
Number of project objectives interested	3,17
Crops managed (varieties)	3,50
Circular economy	3,67
Level of political influence.	3,75
Previous knowledge about soil.	4,00
Interest level	4,17
Capacity	4,17
Impact that the project generates on them (SH)	4,67

As can be seen (Table 3), the criterion with the highest value, and therefore the most important to take into account when interviewing or selecting the definitive SH, is the impact that the project can have on them. On the other hand, the criterion less valued is the size of the SH.

For prioritization, the Mitchell, Agle and Wood model (section 5.4.4) has been used, where the criteria is classified considering power, legitimacy and urgency.

As can be seen, Mitchel's model bases the choice on these three attributes. For the SLL, an adaptation has been made between the criteria established during the brainstorming and those of the initial model.

The bases proposed by the model have been followed, but adjusting the methodology to that proposed in the SLL.

It has been established that the criteria with a high score are the definitive ones, presenting the three attributes (power, legitimacy and urgency). They should be the ones that mark the final choice.

SHs that meet these three criteria will continue on the list of final SHs.

- Impact that the project generates on them
- Interest level
- Capacity

Followed by the dominant ones, those that only possess power and legitimacy, but not urgency.

- Previous knowledge about soil
- Political influence

Dependent, have legitimacy and urgency, but lack power. These criteria should be considered when debating among participants who can influence project development in the local area.

- Number of Project objectives interested
- Proximity
- Circular economy

These attributes will be used as a tie-breaker in case there are several SH with similar opinions.

The choice of whether a dominant or dependent SH is preferred will depend on the LL coordinators, who will decide.

Finally, there are the latent criteria, those that fulfill a single attribute, these criteria should not be decisive in determining whether a SH is selected or not.

- Crops managed (varieties)
- Crops managed (agricultural management)
- Size of SH

This completes step two on the identification of potential SH.

For step three, on the validation of the SH's, a series of interviews will be conducted to analyze the individual interests of each participating SH. Their interests will be analyzed, considering the classification previously made with Mitchell's model.

In this way, once there is a previous analysis of the relevance that each one of them may have for the ECOLOOP Soil LL, an evaluation panel is carried out to analyze if there is any failure or if there has not been enough consideration in any aspect. As a result, a preliminary list of possible SH is obtained, considering the quadruple helix model and which groups are the most relevant.

Next, the members of the list will be individually interviewed in greater detail about the project and what is expected to be achieved with it, as well as their availability or interest. The result obtained will be finally the real and definitive list of the SH that will integrate the LL.

Finally, and joining the group dynamics, before proceeding to the general meetings with all the members of the LL , individual meetings will be held independently with each of the groups that make up the quadruple helix so that they can establish relationships between them.

6. Dynamization activities

Group dynamics are activities where several people interact to accomplish a specific objective through various fictitious situations. They are activities in which the people involved in the project aimto succeed in achieving a goal, strengthening their relationships along the way.

6.1. Objectives

The objective in a dynamic group concerns cooperative and relational competencies. Productivity contributes to the dynamics, promoting each person's work individually and as part of a community.

Cognitive skiLL such as attention, problem-solving, and decision-making are implemented. In addition, they allow relationships to be established, and a leadership position is created in tasks that are distributed with equal importance, which means that each person will have the same responsibility as all the others to achieve the proposed objectives [42].

After a brief introduction to the implementation of a LL, this section gives an overview of the steps for group dynamics where all SH are considered. That is why meetings are organized, where different activities can be carried out according to the objective being pursued, and they can be conducted online or face-to-face, according to their needs.

6.2. Before the meeting

The meetings are part of an ongoing learning process that addresses opinions through continuous dialogue and SH trust-building. Successful participation requires trust building, capacity building, and social learning, which can be facilitated by skillful moderation and adaptations of the methods chosen in each meeting to each situation. That is why before the meeting is held, it is essential to plan certain organizational aspects to ensure that the objectives are achieved and that the meeting is productive and successful.

At this stage, it is essential to define and/or adjust the focus and objectives of the meeting, choose the appropriate communication channel for the invited participants, determine the location of the meeting (either face-to-face or virtual), and decide how the event will be organized. Identify team members' roles and responsibilities and consider other logistical details. The steps before the meeting are divided into four categories to provide a clear and structured overview.

- To communicate the meeting to participants to determine the number of attendees.

- To organize the logistics needed to conduct the meeting.

- To review all preparations before the meeting.

6.2.1. Design of the meeting

When organizing a meeting, the management process can be divided into three phases: before, during, and after. To achieve a productive exchange of ideas with the SH involved in the project, it is necessary to have a clear idea of the objectives to be achieved in and how to approach each one of the meetings to accomplish them. This can range from fine-tuning the approach to properly preparing the supporting materials and the facility to contribute with ideas that will help partners to achieve the set objectives.

Below are different activities and techniques to help to design an effective meeting in order to achieve the proposed objectives.

Key points to consider

- The scope and objectives of the LLs are already defined. However, any changes that may occur should be considered when preparing the meetings to minimize ambiguity that may affect the planning. Ideally, the adjustment and improvement of the approach should consider the local context and the needs of the participants, as well as the challenges, opportunities, and interests of the parties involved.
- Setting a meeting date will not only encourage greater SH participation but will also allow a deadline to be set by which all work must be completed for the meeting. This date should be communicated to all participants as soon as possible, no less than 6 weeks before the meeting is held through the different communication channels, and the attendance of the other participants should be confirmed when preparing the meeting.

  Considering the objectives of each meeting, it is necessary to weigh up the most appropriate approaches to achieve the final aim of the LL and, thus, generate the required content for each meeting. Therefore, different factors must be considered:

  - The meeting format (online or face-to-face) will determine how the meeting will be developed.
  - To correctly organize the distribution of the sessions about the goals and objectives of each one, the duration of which will be related to this purpose. Each meeting should have at least: 1. A welcome and introduction. 2. An interactive session among the participants. 3. A closing session, where feedback on the session is received from the participants.
  - Depending on the format of the session and the goals, to think about techniques that facilitate the active participation of the all themembers.
  - Considering the previous steps, prepare a preliminary agenda for the meeting and identify any gaps or inconsistencies so that it can be reviewed and refined to formulate an optimal plan to help achieve the objectives.

- When the agenda is prepared, communicate it with the SLL coordinator. The main objective is to ensure consistency of the laboratory meetings at the different sites participating in the project.
- This is necessary to respect the participants' privacy (data privacy and photo release) and to be able to process and use the contributions generated.
- When planning the meeting, it is necessary to identify different roles and responsibilities that need to be fulfilled. Some roles to consider are the lead facilitator, focus group moderators, note-takers, event and logistics manager, photographer, and social media communicator. Each role doesn't need to correspond to different people; they can be combined.
- Considering the format and purpose of the meeting, materials should be prepared to support and facilitate the understanding of the meeting.

Presential meeting

- If the meeting is face-to-face, prepare a detailed document explaining the various ways to get to the venue, whether by car, bicycle, or public transportation. Include maps, estimated travel times, and parking options. It is also a good idea to point out nearby landmarks and share information on accessibility for people with reduced mobility.

- Create a questionnaire to gather attendees' opinions on various aspects of the meeting. This should include feedback on the objectives, the session structure, logistics, catering, the organizers' performance, and suggestions for improving future meetings. The questionnaire should be available physically and online to accommodate participants' preferences.

Online meeting

Online meetings should have the same principles as face-to-face meetings in terms of organization, but in this case, other aspects should be considered, such as:

- To provide participants with a detailed guide to join the videoconferencing platform (Table 4). The guide should include step-by-step instructions on downloading the application,

joining the meeting, connecting audio and video, and using key functions (such as raising a hand, using the chat, etc.). It is also critical to include contacts' information for a technical support person in case problems arise.

Table 4 Virtual environment tools for online meetings.

Virtual environment tool	Brief Description	Price	Features
Zoom	Videoconferencing platform widely used in virtual events and meetings. It offers group rooms and integration options.	Free (limited) / Starting at $14.99 per month	Group rooms, session recording, virtual background, screen sharing, integration with apps.
Microsoft Temas	Collaboration and video conferencing tools with integrated chat, meeting, and task management features.	Included in Office 365 or from $4.00 per user/month.	Work channels, real-time document collaboration, recording, and integration with Microsoft applications.
Google Meet	Google video conferencing solution ideal for G Suite and Google Workspace users.	Free (limited) / From $6 per month with Google Workspace	Screen sharing, Google Calendar integration, automatic captioning, intuitive interface.
Miro	A collaborative platform for teamwork with a focus on virtual boards and the visualization of ideas.	Free (limited) / From $8 per user/month	Collaborative boards, templates, sticky notes, voting and timer, integration with tools like Slack and Jira.
Slack	Business messaging application that allows to organize communications into channels, make caLL, and share files.	Free (limited) / From $6.67 per user/month	Themed channels, integrations with multiple apps, audio and video caLL, files, and messages.

Hopin	Virtual event platform with options for networking, workshops, and conferences.	From $99 per month for small events	Networking spaces, multiple stages, sponsor booths, detailed analysis, and session recording.
Wonder. me	In a virtual environment, attendees can move and interact as in a face-to-face event.	Free (limited) / Contact for corporate pricing.	Interactive map, flexible meeting rooms, environmental customization, text and video chat.
Spatial	Augmented reality meeting platform for more immersive virtual meetings and events.	Free (limited) / From $20 per month	3D environment, personalized avatars, 3D screen sharing, interaction with virtual objects, and visual collaboration tools.

- If necessary, to send relevant documents or materials before the meeting so participants can get ready before the meeting. In addition, a (digital) scrapbook should be ready to set out the key points of the meeting so that participants can refer to the most critical parts and be guided in taking notes.
- To prepare a form on the participants' impressions of the meeting. This can consist of a questionnaire covering aspects related to the objectives and topics for discussion, the approach to the meeting, the logistics and catering, the role of the organizers, and suggestions. This questionnaire can be online or face-to-face, regardless of the meeting format.

Tips

- To include breaks in long meeting for attendees to rest and recharge, offering coffee, tea, or refreshments if face-to-face. In virtual meetings, encourage participants to take a few minutes to unwind before continuing.

- Limited duration of online sessions. Online meetings should be limited to avoid digital fatigue and possible loss of concentration. Keep sessions dynamic and organize several short breaks if necessary.
- Whether in face-to-face or virtual meetings, it is advisable to start with a brief introduction or icebreaker activity so that participants get to know each other better and feel more comfortable with each other.
- In virtual meetings, it is essential to have someone in charge of managing any technical problem or doubt related to the platform so that the organizers can concentrate on the development of the meeting without interruptions.

6.2.2. Communication with participants

It is critical to manage communication with participants effectively to ensure that the meeting is productive, as their engagement begins before, peaks during, and continues after. Therefore, it is essential to keep the following points in mind:

- Inform the purpose of each meeting so that participants understand its importance. Keeping participants informed of key details will help maintain their interest and ensure their participation. It is advisable to send a minimum of two rounds of communication (usually by mail) to those who have confirmed attendance.
- The first round focuses on sharing practical information about the meeting (where the meeting will be held, how to get there, time, date, etc.), which should be sent two weeks before the meeting. The second round should be sent 3-5 days prior and focuses on reminding people of the meeting and clarifying details as needed.
- In all communications, include the start time and estimated duration of the event. If participants are in different geographic locations, indicate the corresponding time zones to avoid confusion. Provide an agenda that describes the order of the topics to be discussed, thus helping attendees prepare adequately.
- Confirmation of attendance should be requested to determine the number of participants and assess whether any adjustments to logistics are necessary. A reminder should also be sent the day before the meeting or a few hours prior, including the link and agenda.

- To create a registration list or attendance record to track who joined the meeting. This record is helpful for logistics, and still, it will also allow to take note of relevant input or questions during the event, thus facilitating personalized follow-up with participants in subsequent communications.
- Don't let communication end once the meeting is over. Send a thank you email to participants with a summary of key points discussed, conclusions reached, and next steps. If there are relevant materials, such as slides or recordings, be sure to share them with everyone. This is also an excellent opportunity to include a link to the evaluation questionnaire to gather feedback and suggestions.

6.2.3. Organize the logistics

Properly organizing the logistics of each meeting is essential to create a comfortable environment for participants. Proper preparation ensures that everything flows in an organized and efficient manner, and depending on whether it is face-to-face or online, there are several aspects to consider.

Keys to consider (in person)

- The venue should be easy to find and accessible to all participants. Consider transportation options, parking, or possible access difficulties. Ensure the space is large enough to accommodate everyone, with a position facilitating interaction. Also, verify that the venue has the necessary technology, such as screens, projectors, microphones, Wi-Fi connections, etc.
- To confirm the number of participants so that the right amount of food and beverages can be planned, considering a margin so there is no shortage. To make sure to know the attendees' dietary restrictions, such as allergies, intolerances, vegetarian, vegan, halal, kosher, etc. Offering variety is essential to make everyone feel comfortable. In addition, it is crucial to provide healthy alternatives such as salads, fruit, and low-sugar or low-fat snacks. If possible, choose suppliers that use local produce, minimize food waste, and use recyclable or biodegradable materials in packaging and utensils.

Keys to consider (online meeting)

- To choose a platform that fits the needs of the meeting (Zoom, Microsoft Teams, Google Meet, etc.). To consider the number of participants and features needed (screen sharing, work rooms, chat, recording). To check that the platform supports the number of people who will be connected and that access to all necessary features is available (e.g., more than 40 minutes of free Zoom time).

6.2.4. Final preparation

Before the LL meetings, the last step includes confirming with the organizing team that everything is properly planned and prepared to ensure proper execution.

Key points to consider

- To ensure that the meeting runs smoothly, it is advisable to design an internal outline from the general program that allows the team in charge to understand the steps to be followed clearly. This internal plan can detail: 1) The development of each part of the meeting, specifying the time allocated to each activity; 2) The techniques to be used, as well as how they will be applied; 3) The people involved, along with their specific roles and tasks. Also, be sure to provide alternatives in case unforeseen events arise during the meeting (e.g., a second option for group activities in case of time constraints).
- To use the internal work agenda as a reference and schedule a meeting with the team members involved. During this session, review the procedures to be followed at the meeting and confirm each participant's roles. This is also the ideal time to resolve any outstanding questions or doubts and final review the planned development of the meeting.

- **Specific activities for face-to-face meetings.**
    - The day before the meeting, to gather everything that is needed and transport it to the meeting site or keep it on hand. To use this time to make sure nothing is missing. Some essential items to consider are the attendee list, consent forms, copies of the primary and internal agenda, identification cards for each participant, facilitation materials, evaluation forms, camera, etc.

  - On the meeting day, to arrive at the site early enough to prepare the space. To arrange the tables and chairs, distribute the work materials, and put the flip charts or whiteboards in place. To take advantage of this time to check that all technical equipment is in perfect condition and make necessary last-minute adjustments. Also, to ensure access and logistics for attendees with special needs and that water, coffee, and other comfort items are available for participants.

- **Specific activities for online meetings.**
  - As in a face-to-face meeting, to ensure that everything is ready the day before the event. To gather all the necessary resources and keep them accessible. To use this time to check that nothing is missing. Some items to consider are the list of participants, consent forms, copies of the primary and working agenda, facilitation materials (mainly digital, so it is important to compile the corresponding links), and the link to the evaluation form.
  - It is advisable to conduct a rehearsal with everyone involved before the meeting (the day before or a few hours before the event). This allows for verifying the technical aspects' functioning and ensures no problems, especially with the organizing team. This practice provides the opportunity to make any necessary adjustments at the end.

6.3. During the meeting

After completing the LL's planning and organization stage, it is time to hold the meeting. On that day, it would be good to make sure of the following:

- **Greetings to attendees with a welcome**. First impressions are crucial and often influence how the rest of the experience is lived, so offering a warm reception and making participants feel valued from the start is essential. Consider preparing a brief introduction explaining the goals of the meeting, the value of attendee participation, and the collaborative approach of the LL.
- Depending on the meeting format, there will be different steps. See below for specific activities:

- **Conduct the session**. Follow the plan, prior preparations and the outline to ensure a good outcome. In LL, the idea is to involve all SH and allow them to express themselves freely. If something doesn't go according to plan, don't worry, dialogue should be facilitated and the exchange of ideas encouraged. Keep a flexible attitude, listen actively and adapt the pace of the session according to the dynamics of the group.
- **Involve attendees.** While participants may be willing to collaborate, the level of openness and participation will vary by group and its dynamics; some will want to share more than others. It is vital to receive contributions from all attendees and SH equitably to ensure a wide range of learning, so that everyone feels respected and valued. Use group dynamics or participation rounds to encourage everyone to contribute their point of view and make sure everyone feels included.
- **Exposure is fundamental**. The aim is to show this work and these experiences to the world, so an online presence is essential. Don't forget to take pictures, post them on social networks, and share them later with attendees. It is a good idea to delegate this task to a member of the organizing team. After the meeting, broadcast the highlights on your own and the project's channels. Be sure to get participants' consent before taking or sharing any photos and respect their decision if someone prefers not to appear in the posts.
- **Feedback, feedback, feedback.** As the meeting draws close, it takes 10 minutes to conduct a brief feedback activity with participants. This allows everyone (even those uncomfortable speaking in front of a large group) to feel heard and valued. Should use tools such as Table 5 (for both virtual and face-to-face meetings), or a quick ZOOM survey (for online events), where they are asked to answer short questions such as:
    - Which part was most beneficial to you?
    - What topics would you like to explore in the future?
    - Which session should last longer or shorter at the next meeting?

Table 5 Examples of online questionnaire tools.

Virtual environment tools	Brief Description	Price and features
Mentimeter	Interactive presentation tool that allows live polling, quizzes, and word clouds to engage the audience in real-time. Ideal for classes, meetings, and events.	**Free**: limited features, allows two questions and five quizzes per presentation. **Fundamental**: $11.99/month (unlimited audience interactions) **Pro**: $24.99/month (advanced customization and branding)
Slido	Q¬A and polling tool that enables live audience engagement in meetings, webinars, and presentations, with easy integration into platforms like Microsoft Teams and Google Slides.	**Free**: limited version **Basic**: $10/month (increased engagement features) **Professional**: $50/month (advanced reporting and customization)
SurveyMonkey	Tool for creating online surveys with analytics and custom branding options. Widely used for feedback collection and data-driven decisions.	**Free**: limited to basic survey types **Team Advantage**: $25/user/month (advanced survey options and analytics) **Team Premier**: $75/user/month (more features and customization)

Also, consider a brief round of closing remarks in person or online for spontaneous input, and take note of attendees' recommendations and suggestions for future meetings.

Welcoming participants (in-person meeting)

- Assign a team member to greet attendees as they arrive. This is the perfect time for participants to sign the attendance list and complete the consent form. Be sure to allow enough time to address questions about the form and its implications, as everyone must understand their rights and responsibilities satisfactorily.

  - A sample list of participants can be found in the Templates section to serve as a guide. It would also be helpful to set up a small space where attendees can review the documents

at their leisure and, if possible, provide additional copies of the forms in case anyone needs them.

Welcoming participants (online meeting)

Managing the signing of the participant list and consent form in online meetings can be more complicated than in face-to-face meetings. To make this process easier, divide it into two phases:

- When sending participants critical information about the laboratory organization, include a specific registration link. This link can take them to a registration form where they can also give their consent electronically. This form should make clear the conditions of participation, the use of information generated during the meeting, and permission to share images, if applicable.
- On the meeting day, conduct an attendance check based on the registration list and complete the participant summary. It is advisable to briefly remind attendees that, by participating in the meeting, they agree to the established terms and consent to use the information generated and any photographs taken during the event according to the approved privacy policies.

***Additional tip**: For events requiring more detailed consent, consider using digital signature tools, which allow for an electronic signature before the meeting and simplify the process.*

6.4. After the meeting (Following up and maintaining momentum)

Meetings often include several sessions spread over different dates, so building long-term relationships with participants is vital to ensure LL's success and the SH' ongoing commitment. Ongoing communication helps to maintain interest, motivation, and ownership of the project.

Key points to consider

- One week after the meeting, send a thank you email to express your appreciation for the participation. Use this message to share some key outcomes, such as action items, next steps, and the date of the next meeting. Include relevant documents and mention

participation channels (such as social media or collaborative platforms) to strengthen the link to the project. If possible, add a group photo or collage of meeting highlights to foster a sense of community.

- Consider creating an online space, such as a LinkedIn group, where participants can share ideas and interesting news and stay in touch between meetings. This space can help generate a constant flow of communication and reinforce a sense of community, allowing participants to interact more closely.

Additional tips

- Create a routine of updates. After each meeting, share a summary of the established communication groups. This keeps participants informed and allows them to recall accomplishments and progress made together.
- Invite feedback. In each email or update, please provide a link to receive additional feedback, allowing them to feel that their voice and opinions are valued at every project stage.

This continued attention and follow-up at each meeting will go a long way in maintaining engagement and interest in upcoming LL sessions.

6.4.1. Internal review

Just as important as learning from the participants is learning among the members of the organizing team and the SLL coordinator. So, shortly after the meeting, organize an internal review session to discuss:

1. What aspects worked well?
2. What areas need improvement?
3. Performance regarding assigned roles and responsibilities. Hold LL meetings and SH engagement processes; these are continuous learning processes that vary depending on the group and the topic, offering opportunities for improvement at every phase: before, during, and after the meeting.

6.4.2. Results of the meetings

After the first meeting, the planning of subsequent SLL sessions will be based on and adjusted based on the results of the previous meetings. Therefore, capturing and thoroughly documenting the results of each meeting is essential. This ensures proper documentation, recording, and achievement of LL procedures and decisions.

Key points to consider

- Organize the notes and transcribe the discussions. Structured discussion notes provide a clear overview of the topics discussed and help identify points that may have been overlooked during the meeting. An organized note format helps maintain context and facilitates future reference.
- Prepare the meeting report. Based on the notes and transcripts, spend time writing the meeting report, which describes how the session went and one of the main lessons learned. Work on this report as soon as possible to avoid forgetting relevant details and to keep the information fresh.
- Organize and archive the documents. After completing the post-meeting actions, file all records in the designated project folders. A well-organized file makes it easier to track procedures in the future and ensures that documentation is ready for reference or reporting.

6.5. ECOLOOP Soil Living Lab

The initial meeting will take place face-to-face at the Polytechnic University of Valencia (UPV), aiming to familiarize participants with the SH, promote a cooperative atmosphere, and gather essential insights into which analogous products to the vegetable digestate, generated in the ECOLOOP Project, they find most appealing for field testing. For this purpose, a preliminary Dynamic activity will be conducted at the start, where each participant will introduce themselves by stating their name, occupation, and reasons for being interested in taking part in the LL. Before the meeting, attendance will be verified four weeks ahead, followed by an initial message sent two weeks before that includes logistical information such as the location, date, time, and

transportation or parking alternatives. A reminder will be dispatched three days before the meeting, including the agenda and links to pertinent documents.

The meeting will start with a greeting from the organizing team, emphasizing the significance of the meeting and the involvement of every SH. The format of the session will be outlined, and the approach for choosing the products to be evaluated in the field will be detailed. Subsequently, a session will take place where participants, divided into small groups, will analyze these products for application in the field. Every group will share its findings, and a forum for discussion will be created to collect feedback and potential modifications. A pause for lunch or snacks will be provided, depending on the meeting's timing. After the meeting, a brief survey will be conducted to assess the view of the dynamics and to collect feedback for upcoming sessions. A week after the meeting, a gratitude email will be dispatched containing a summary of key points addressed and the list of products chosen for field testing.

The upcoming meeting will take place online, aiming to inform SH about the advances in field experiences and the effectiveness of the products chosen during the last meeting. An email will be sent one week before, containing the date, time, and link to join the Microsoft Teams virtual platform, as well as a summary of the progress made until the moment. A reminder will be dispatched three days prior, including the session's agenda. The session will begin with a short welcome and a display of the initial data collected from the tests. Relevant details will be displayed through charts and visuals illustrating the performance of the field products.

Next, there will be a question-and-answer activity during which SH can give voice to their concerns, share feedback, and propose enhancements to the process. A brief pause will be incorporated to give participants a chance to step away briefly and rejoin the session revitalized. Subsequently, interactive surveys will be carried out using digital platforms like Mentimeter or Slido to understand the participants' view on the assessed products and collect feedback for potential adjustments. In conclusion, the date of the final meeting will be noted, and an email will be sent a week later containing the key takeaways, links to the shared materials, and a form for anyone waiting to give further feedback.

The third and final meeting will be conducted in person and will serve to showcase all the data collected from the field test as well as to reach final conclusions. A notification for the meeting will be issued two weeks before, specifying the venue, date, and overall agenda. A few days in advance, a notification will be dispatched containing essential documents to ensure participants get ready. The session will start with an overview emphasizing the significance of this phase for concluding the process. Subsequently, comprehensive results will be displayed, highlighting the strengths and areas that need enhancement.

Following the presentation, there will be a roundtable discussions arranged for SH to talk about the findings and express their opinions on the effects of the assessed products. Time will be allocated to collect suggestions for upcoming initiatives and potential enhancements in the product selection and testing procedure. A pause for lunch or snacks will occur, fostering a more laid-back environment for sharing ideas. To conclude the meeting, there will be a final round of comments and a short survey to assess the overall experience of the process.

Subsequently, a thank you email will be dispatched containing the final report of the findings, and the option to maintain communication via digital platforms will remain available to enhance collaboration among SH.

7. Evaluate and monitor a Living Lab

7.1. What is an indicator?

An indicator is a variable that provides monitoring information on a project or part of it to check its compliance and progress. It serves as a mean of control to see if the proposed objectives are being achieved and if the project's evolution is as expected.

Evaluation indicators are part of the evaluation framework. This framework helps to establish an order of objectives and targets through monitoring and evaluation. It provides a structure where the basis for analyzing and using the information gathered is well established, ensuring a correct assessment of the project or LL.

There are two essential functions in indicators: the descriptive function, providing information on the actual state of the project, and the evaluative function, explanatory information, as objective as possible, to see if the performance or evolution of the objectives or project is adequate. For example:

For the correct formulation of an indicator, it is necessary to know:

- The specification of the objective or aspect to be measured. The objectives and goals must be clear, as they are the basis for the indicators.
- Specify what it is going to be measured, whether in quantity, quality, or time.

These two points are essential to generate indicators that provide helpful information on the evolution of objectives.

As mentioned above, the role of the indicator is not only to help define and understand the project objective, but also to locate where the project is in the project and the progress it is making.

To generate indicators that provide sufficient information, a series of characteristics or attributes must be considered as SMART indicators:

- **Specific**: it must be defined precisely so that it does not give rise to errors regarding the information to be obtained.
- **Measurable**: it must be quantifiable so that the result is as objective as possible.
- **Achievable**, the indicator must be realistic. Constraints and availability of resources must be considered.
- **Relevant**: it should measure essential aspects of the project.
- **Defined time frame (Timely):** it must be framed in a time frame. A deadline must be established to meet the proposed objectives.

Generating a SMART indicator ensures that the indicator created is acceptable and will provide what is necessary to evaluate that objective or evolution.

If generating a direct indicator for the objective is impossible, 'proxy' or substitute indicators are used. These indicators are proposed as approximations to a variable that is difficult to measure,

either because limited information is insufficient to make a correct measurement (abstract measurements make it difficult to quantify) or because they can be costly.

These indicators are less precise than direct indicators. For this type of proxy to be valid, it must connect what is to be measured and what is being measured.

Once the prior aspects that must be considered to establish accurate and complete indicators have been established, the next step is to prepare and choose the indicators.

7.2. Steps to create an indicator

To design an effective indicator, it is important to follow a structured process to ensure its relevance and applicability. The steps may include:

- **Description:** Clearly define what is to be measured. The objective or aspect to be measured should be specified (e.g., solution performance, environmental impact, etc.).
    - "Reduction rate of waste generated by the project".
- **Type:** classify the indicator according to its nature and purpose (e.g., performance, sustainability, risk, etc.).
- **Rationale:** Explain why that indicator is selected and how it relates to the LL objectives. This justifies the relevance of the indicator and its usefulness.
    - "Waste reduction is a key indicator of the LL's sustainability and contribution to the circular economy".
- **Acceptance criteria:** Set threshold values that define whether the indicator has achieved the target. This may include minimum, maximum, or baseline levels.
    - "A significant reduction will be considered significant if the waste generated falls by 20% compared to the previous year".
- **Indicator measurement:** define the methodologies and tools to measure the indicator, ensuring that they are objective, reliable, and fit for purpose.
    - "A monthly waste audit will measure the waste generated".
- **Timeframe:** establish a period over which the indicator will be measured.
    - "Waste reduction will be evaluated every quarter".

For this section, see point 9.16, where there is an example of a template that can help create consistent indicators for evaluating the LL.

7.3. Typology of indicators

The assessment of upstream aspects ensures that the indicators are most effective and appropriate for monitoring the project. This provides the correct alignment of the indicators with the stated objectives.

According to various analyses, four assumptions about the formulation of indicator types are made when developing the evaluation framework [43].

- The indicator depends on the challenge or problem to be solved.
- It depends on the type of solution. The indicator must be aligned with the solution to be evaluated.
- The reference values or thresholds used to assess the indicators are influenced by the magnitude, size, or level of the problem to be solved.
- The criteria used to evaluate a project vary according to the phase of the life cycle in which the solution is found.

Once the key aspects have been taken into consideration, the following types of indicators are identified according to the needs of the LL. These are classified according to the purpose and the variable they measure.

- **Purpose indicators** measure the results to be achieved to obtain the objective.
    - “Percentage of prototype adoption by end users within six months of implementation”.
- **Risk indicators** evaluate the possibility of a potential risk event that may originate during the project, whether it is a compliance, operational, or strategic risk that the project may have.
    - “Percentage of project tasks delayed beyond their deadline”.

- **Performance indicators** measure the quality of the work carried out, resource efficiency, and effectiveness, measuring the fulfilment of the objectives and the impact that the results generated.
    - "Percentage reduction in energy consumption after implementing a new smart grid system."
- **Sustainability indicators** measure the environmental impact of the LL or project, such as waste generation. This indicator also includes the social implications and how the project affects the community or people involved.
    - "Reduction in CO_2 emissions (measured in tons) due to sustainable transportation policies".
- **Process indicators** assess the degree of execution of the project concerning the established timeframe and compliance in terms of budget.
    - "Percentage of project milestones achieved on schedule".
- **Management indicators** allow detailed monitoring of the processes, resource use, and tasks to achieve a policy or program's expected results.
    - "Number of interdisciplinary team meetings held monthly to ensure collaboration".
- **Outcome indicators** allow for the evaluation that training generates by measuring the new products or services that emerge due to the learning process.
    - "Number of innovative solutions adopted by local businesses as a result of project initiatives".
- **Component indicators** assess and monitor the evolution of the activities carried out in the project, as well as the contribution of each element to the objectives.
    - "Number of sensors deployed in a smart infrastructure project and their operational effectiveness".
- **End indicators** measure the final impact or desired result.
    - "Percentage increase in the quality-of-life index in the community benefiting from the project".
- **Activity indicators**: the actions carried out in the project must be in line with the stated objectives.
    - "Number of training sessions conducted for SH and community members".

7.4. ECOLOOP Soil Living Lab

Within the framework of the LL focused on soil health at UPV, the subsequent indicators have been developed using this methodology:

- **Indicator**: Proportion of SH applying recommended practices.

  Description: Assesses the degree to which SH have embraced the recommended practices in the ECOLOOP LL.

  Type: Objective.

  Rationale: The execution of practices is crucial for assessing the true effect of the LL on circular economy and sustainable soil management.

  Acceptance criteria: Deemed successful if at least half of the SH have embraced one or more practices within six months following the initial meeting.

  Measurement of indicators: Surveys carried out with SH.

  Duration: Assessed at the 3rd and 6th month mark following the initial meeting.
- **Indicator**: Degree of enhancement in soil quality.

  Description: Evaluate alterations in the physicochemical characteristics of the soil following the application of plant digestate and other recommended products.

  Type: Efficiency/Environmental responsibility.

  Rationale: One of the main goals of the LL is to improve soil health using products derived from circular economy concepts.

  Acceptance criteria: A positive outcome is recognized if there is a 10% rise in organic matter along with enhancements in at least two essential physicochemical parameters (e.g., pH, water retention capacity).

  Measurement of indicators: Laboratory tests conducted before and following application.

  Duration: Assessments will be conducted at the start, after six months, and after the project.
- **Indicator**: Decrease in the production of agricultural waste.

  Description: Assesses the extent to which agricultural waste has been decreased in the LL via the valorization and use of products.

  Type: Sustainability.

Rationale: The circular economy seeks to minimize waste by finding new uses for it.

Acceptance criteria: At least a 20% decrease from the starting values.

Measurement of indicators: Waste assessments are carried out before, during, and following product implementation.

Duration: Quarterly assessments throughout the project.

- **Indicator**: Count of meetings conducted with SH.

  Description: Monitoring of the meetings held for project planning and oversight compared to those scheduled.

  Type: Process/Administration.

  Rationale: Engaging with SH is crucial for gathering perspectives and evaluating the progress of the LL.

  Acceptance criteria: Deemed successful if at least the 3 scheduled meetings take place within the designated timeframe.

  Measurement of indicators: Attendance logs and meeting summaries.

  Duration: Assessed following every meeting.

- **Indicator**: Enhanced productivity of treated soils.

  Description: Assesses the increase in agricultural productivity of the soils where LL products have been utilized.

  Type: Result.

  Rationale: Improved soil should lead to increased productivity.

  Acceptance criteria: Deemed successful if there is a minimum 15% rise in productivity relative to control plots group.

  Measurement of indicators: Measurement of agricultural outputs in trial regions.

  Duration: Evaluation performed at the project's start and finish.

8. Transferability

8.1. How to transmit the results of a Living Lab to society:

8.1.1. Digital communication tools

- Create a **website** or a specific section on an institutional page where the results are shared in accessible formats (infographics, videos, blogs).
- Publish results on **social networks** using **attractive content** (images, interactive stories, short publications).
- Use **open data** platforms to make data available for consultation and reuse.

8.1.2. Public events

- Organize **workshops**, talks, or fairs open to the community to explain findings.
- Conduct **webinars** or virtual presentations to engage broader audiences.
- Invite local media to cover activities related to the LL.

8.1.3. Scientific and outreach publications

- Publish in **scientific journals** and, in parallel, create simplified versions for the press, local newsletters, or outreach blogs.
- Elaborate documents such as **best practice manuals** or guides for implementing the developed solutions.

8.1.4. Involve key stakeholders

- Work with local **NGOs and associations** to become ambassadors of the results.
- Collaborate with **educational centers** to incorporate the LL's learnings into educational programs.

8.1.5. Continuous feedback

- Use **surveys and forums** to gather feedback from citizens, which encourages their participation and trust in the project.
- Establish an **ongoing communication channel,** such as a periodic newsletter, to keep the community informed.

8.2. How a Living Lab contributes to society

8.2.1. People-centered innovation

- Promote solutions designed and validated by the communities that will use them, ensuring **greater acceptance and practical utility**.
- **Increases inclusivity** by incorporating the perspective of diverse social groups.

8.2.2. Promoting sustainable development

- **Integrates environmental, social, and economic aspects** in creating solutions.
- Promotes projects that **improve quality of life**, such as circular economy initiatives, sustainable mobility, or energy efficiency.

8.2.3. Education and awareness

- **Involves citizens in the innovation** process, which improves their knowledge about local issues and possible solutions.
- **Promotes a culture of participation** and social co-responsibility.

8.2.4. Boosting the local economy

- Help local companies to **develop and test innovative products**.
- **Promotes job creation** by generating new services or products from the project.

8.2.5. Strengthening participatory governance

- **Improves decision-making** by incorporating the citizen perspective in the design of public policies.

  Build trust among SH by relying on a collaborative and transparent approach.

8.3. ECOLOOP Soil Living Lab

The sharing of the findings from the LL on soil health is crucial to enhance its influence and guarantee its relevance in different settings. For this purpose, various strategies have been developed to spread the knowledge produced and promote the uptake of innovative methods in sustainable soil management.

Initially, platforms like Twitter, LinkedIn, and YouTube will be utilized to disseminate updates and testimonials from SH, employing appealing formats that enhance comprehension and captivate the general audience's interest. The promotion of open data platforms will enable researchers, companies, and administrations to access and report the information produced in the LL.

Besides digital communication, in-person and online events will be held to connect the outcomes with various sectors of the society.

Conferences and workshops will be held at the UPV and various institutions to present the project’s findings, fostering discussion among researchers, farmers, and waste managers. Along with event communication, the publication of the findings in both scientific and general formats will be significant. Papers will be presented to specialized journals focused on agronomy and sustainable soil management.

An essential element in knowledge transfer is ongoing feedback with the community. For this purpose, surveys and discussion panels will be introduced, allowing citizens and SH to share their views and recommendations regarding the execution of the outcomes. Moreover, regular newsletters will be distributed containing updated project information, guaranteeing ongoing two-way communication.

The influence of the ECOLOOP Soil LL on society will be considerable across various domains. From an innovative standpoint, the project will promote the creation of solutions crafted and approved by the communities that will utilize them, guaranteeing their relevance and efficiency. This will enhance the involvement of various SH in the research process and guarantee that the solutions produced address genuine needs.

Regarding sustainability, the LL will incorporate environmental, social, and economic standards in assessing its products, fostering the utilization of agro-industrial byproducts and minimizing reliance on chemical fertilizers. Furthermore, the initiative will encourage methods that enhance the circular economy and elevate soil health over the long term.

Ultimately, this collaborative strategy will enhance participatory governance. The engagement of scientists, farmers, and policymakers will enhance decision-making in soil management, making public policies in this domain more inclusive and transparent. It will foster open communication and collaboration among various SH, promoting the development of agreed-upon solutions grounded in scientific evidence.

In summary, the Soil LL will create cutting-edge knowledge while also setting up a transfer model to guarantee its influence on social, economic, and environmental dimensions. By utilizing digital communication, hosting public events, producing scientific and informative publications, engaging SH, and implementing feedback systems, it will guarantee that the project outcomes are available, comprehensible, and practical, aiding in the shift towards improved sustainable and effective soil management.

9. Templates

9.1. Study area description

To ensure an accurate and consistent description of the LL study area, the person responsible for the LL coordination must ensure that the appropriate experts complete the following templates:

9.1.1. Soil properties

Table 6. Experimental area specification.

Experimental plot ID (reference)	
Name	
Short description	

Table 7. Soil classification of the area.

Soil Classification	

		Version or reference
Type of Soil Classification	World Reference Base	
	Soil Taxonomy	
	National Soil Classification System	

Table 8. Soil chemical properties.

pH_X	
Cation exchange capacity (meq/100g)	
Total nitrogen (%)	
Electrical conductivity (dS/m)	
Organic matter (%)	
Organic Carbon (%)	
Other	

Table 9. Soil physical properties.

Bulk density (g/L)	
Porosity (%)	
Aggregate stability (%)	
Available water capacity (%)	
Texture	
Clay fraction (%)	
Silt fraction (%)	

Sand fraction (%)	
Other	

Table 10. Soil biological properties.

Soil respiration (mg CO_2/g dry soil)	
Soil Enzymatic activity	
Other	

9.1.2. Landform

Plot/study zone data

Table 11. Geographic information of the study area.

Reference/number of the pilot site	

GEOGRAPHIC COORDINATES

Altitude (m):	
Latitude:	
Longitude:	

UTM coordinates

X (m):	
Y (m):	

Zone:	

Table 12. Slope of the area.

Slope	Indicate the slope of your plot with an "x."	
		Flat 0-2%
		Gentle 3-5
		Moderate 6-10%
		Rolling 11-15%
		Hilly 16-30%
		Steep 31-60%
		Very steep 60-100%

Table 13. Typology of topography.

Topographical positions	At this point, it is necessary to know the shape of the relief of the plot or area.	
		Mountain
		Plateau
		Valley
		Hill

		Plain
		Slope
		Lake or near to
		River or near to
		Other: explain here

Land use/land cover

With this point, the type of soil or the use of that soil should be described.

First, specify the current land use. Next, information is requested in the same table for previous uses.

Tick the land used which corresponds with the area (can mark one or more).

Land use

Please put "x" in the grey box/es corresponding to the area's land use.

Table 14. Land use information.

Grazing	Wildlife	Cereal/herbaceous crop (corn, cereals, alfalfa…)	Garden
Forest	Village/city	Barren, no vegetation or structures	Shrubland

Grassland	Crop trees (fruit trees, horticultural crops...)	Rotational cultivated	
Other land use/land cover: *explain here briefly*			

Regarding the market uses, explain the state of the soil, such as what crops predominate on the plot (vegetation, plantations...) or if it is grazing, how it is done, what animals and vegetation it has, as well as the soil management and the type of irrigation (if it is rinsed or if it is dry land).

Below is an example of what should be written:

*-If mark **Crop trees or Cereal/herbaceous crops**, explain:*

- *Crop Species and Variety*
- *Type of irrigation or if fertigation is used*

*- If mark **Rotational cultivated**, explain:*

- *Rotated Crop Species (List of crops involved in the rotation, rotation cycles (annual, biannual, etc.).*
- *Rotation Sequence (The order in which the different species are grown and the duration of each crop in the rotation cycle).*
- *Type of irrigation or if fertigation is used*

*-If it is a **forest,** explain:*

- *What does it look like (density, vegetation cover), and what vegetation and animals does it have? If it is an area with a high presence of wild animals, it is also recommended to mark wildlife.*

*-If it is a **grassland,** explain:*

- *What it looks like (density, vegetation cover), vegetation (e.g., grasses, leguminous plants such as trefoils or other wildflowers), whether wild or artificial….*

*- If mark **grazing**, explain:*

- *Type of grazing being done, what the soil is like, and the area where grazing is taking place*
- *Type of vegetation the meadow possesses.*

9.1.3. Climate

The **monthly average over a minimum period of 10 years** is requested.

Weather station data

Altitude (m):

Latitude:

Longitude:

Please insert the climate data in the following table for a minimum period of X years.

Table 15. Climate data.

Insert here the years of the period **YEAR – YEAR.**

Month	Avg. Temperature (ºC)	Min. Temperature (ºC)	Max. Temperature (ºC)	Precipitation Rainfall (mm)	Humidity (%)	ET_0
January						
February						
March						
April						
May						

June						
July						
August						
September						
October						
November						
December						
Year						

**Avg. Temperature- Average temperature; Min. Temperature- Minimum temperatures; Max. Temperature- Maximum temperatures; ET_0 - Evapotranspiration*

9.2. Rotating questions activity

A facilitator or moderator should be responsible for organizing and guiding the session to ensure the effectiveness of the Rotating Questions Activity in a LL. This person should have experience in group dynamics, collaboration techniques, and critical thinking facilitation. Ideally, the facilitator should be a researcher, project coordinator, or innovation manager familiar with the objectives of the LL and the topics being discussed.

In a room, the participants are divided into different groups, and each group is assigned a question.

Each group analyses, discusses, and answers the assigned question for a defined period. After that, each group rotates its question and responds to the next group, which now receives a question with an already elaborate answer.

The groups then read the new question with the answer and add new information and/or correct mistakes.

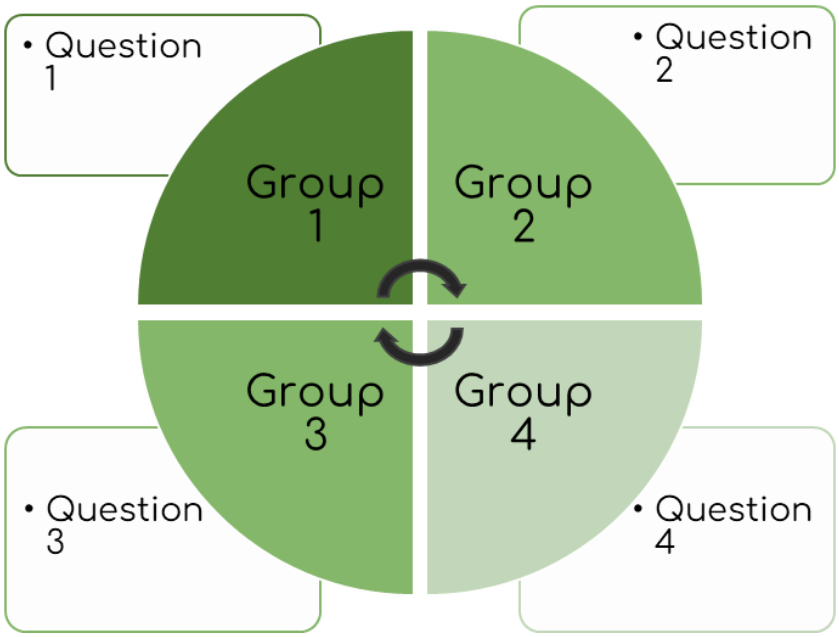

Figure 8 Example of the rotating questions activity.

Question No: Text *of the assigned question*.

Initial Answer: *First group answer*.

Additions/corrections to the answer:

Group 2: Details *or modifications added*

Group 3:

Group 4:

Final Answer: *Compilation of all responses. Organized/structured by the organizer.*

9.3. Business Model Canva

The development of the Business Model Canvas for a LL should be led by a multidisciplinary team that understands both the strategic vision and the operational needs of the initiative. This team should ideally include:

- **Project coordinators or managers** who oversee the LL's goals and direction.
- **Innovation and business strategy experts** to ensure a sustainable and viable model.
- **Representatives from key SH**, such as companies, researchers, and community members, to provide diverse perspectives.
- **Facilitators or consultants** who can guide the process and ensure structured discussions.

By involving these key actors, the Business Model Canvas becomes a collaborative tool that effectively aligns resources, activities, and partnerships to maximize the impact of the LL.

VALUE PROPOSITION

Define the unique mix of products and services that create value for their customer segments

- What unique value does the LL offer to the community, companies, researchers...?
- What specific problems does it seek to solve? Whether territorial or sector specific.
- What differentiates it from other initiatives?

KEY PARTNER

List the network of suppliers and partners that help your LL operate effectively.

- Who are the primary users of the LL?
- What are their needs or expectations?

KEY USERS

- What kind of relationship will be established with each customer segment (collaboration, co-creation, consultancy)?
- How will user participation and engagement be encouraged?
- What tools will be used to manage customer relationships?

KEY RESOURCES

Identify the assets essential to making your business model work.

- What resources are necessary for the functioning of the LL?
- What resources are unique or difficult to replicate?
- How will these resources be managed and optimized?

KEY COSTS

List all significant costs involved in operating your LL.

- How will the LL generate revenue?
- What will the pricing structure of the services offered be?
- How will the financial sustainability of the LL be ensured in the long term?
- What are the main costs associated with operating the LL?
- How will costs be optimized without compromising the quality of services?

KEY ACTIVITIES

Outline the most important actions your company needs to take to operate successfully.

- What are the key activities of the LL?
- How will the different activities be coordinated?
- What metrics will be used to measure the progress and impact of these activities?

Table 16 Business Model Canva Template

Key Partners	Key Activities	Value Proposition
• What unique value does the Living Lab offer to the community, companies, researchers...? • What specific problems does it seek to solve? Whether territorial or sector specific. • What differentiates it from other initiatives?	• What are the key activities of the Living Lab? • How will the different activities be coordinated? • What metrics will be used to measure the progress and impact of these activities?	• What unique value does the Living Lab offer to the community, companies, researchers...? • What specific problems does it seek to solve? Whether territorial or sector specific. • What differentiates it from other initiatives?
	Key Resources • What unique value does the Living Lab offer to the community, companies, researchers...? • What specific problems does it seek to solve? Whether territorial or sector specific. • What differentiates it from other initiatives?	
Key Users • What kind of relationship will be established with each customer segment (collaboration, co-creation, consultancy)? • How will user participation and engagement be encouraged? • What tools will be used to manage customer relationships?		
Key Costs • How will the Living Lab generate revenue? • What will the pricing structure of the services offered be? • How will the financial sustainability of the Living Lab be ensured in the long term? • What are the main costs associated with operating the Living Lab? • How will costs be optimized without compromising the quality of services?		

9.4. Participation list

The person responsible for the organization of the LL must ensure that the Participation List of a meeting is completed correctly. This task usually faLL to the event coordinator or the LL facilitator, who must ensure that all relevant participants are registered, including their roles, affiliations, and contact details. This allows for better event management and facilitates tracking of interactions and outcomes.

Table 17. Sample list of participants.

First Name	Last Name	Organization	Email	Phone	Signature

9.5. Consent form

The LL organizer or meeting facilitator must ensure that all participants complete and sign the Consent Form before participation. This guarantees compliance with ethical and legal regulations, ensuring that attendees understand and accept the conditions of their participation, the use of data, and any other relevant implications.

Table 18. Information necessary to identify the participant.

PROJECT ACRONYM	
PROJECT FULL NAME	
STUDY TITLE	
PRINCIPAL INVESTIGATOR	
CO-INVESTIGATOR	

STUDY DURATION	
FUNDING AND GRANT GRANTEE	

INTRODUCTION

We appreciate your interest in participating in the meeting for the Soil LL project. This initiative focuses on collaborative research and innovation to improve soil health, sustainability, and resilience. Your expertise and input are valuable to achieve the goals of this project. Please take the time to review this document thoroughly. We encourage you to ask any questions you might have, as it is essential that you fully understand the procedures, as well as any potential risks and benefits. We always ensure compliance with the current EU General Data Protection Regulation (GDPR).

PURPOSE OF THE PROJECT AND LLS

The Soil LL is designed as a collaborative space where researchers, policymakers, farmers, and other SH collaborate to co-create and test innovative solutions to soil-related challenges. The lab will use real-world environments to study and implement practices that enhance soil productivity, biodiversity, and ecosystem services.

During the meeting, we will discuss the project's objectives, methodologies, and expected outcomes. Participants can share insights, contribute to shaping the project's activities, and identify potential collaborations.

PROCEDURES, BENEFITS AND RISK

- **Procedures**: During the meeting, participants will engage in discussions, brainstorming sessions, and breakout groups. Contributions may be documented for internal use and project reporting.
- **Benefits**: By participating, you will help shape the future of soil management practices, network with other experts, and gain insights into innovative approaches to soil health.

- **Risks**: Participation involves minimal risks. However, discussions may include differing viewpoints, which will be managed respectfully.

CONFIDENTIALITY AND ANONYMITY

All personal data collected during this meeting will be treated with strict confidentiality and used only for project-related purposes. Anonymized data may be included in reports or publications to protect individual identities.

During the meetings, you will be asked to sign the participants' list, which collects information related to you (first and last name, age, gender, profession, and e-mail). The discussions will be noted down and transcribed digitally afterwards. The transcriptions will be depersonalized and stored without any reference to you. These will be stored securely on the PROJECT cloud server and destroyed at the project's end. The collected data will be used for research and project purposes only and always while protecting the identity of participants.

CONFIRMATION

You are invited to participate in this activity by signing this consent form, which authorizes us to use the information you provide while ensuring confidentiality and anonymity.

Declaration

I hereby confirm the following:

I am at least 18 years old and legally capable of giving consent.

I have been fully informed about the project's objectives and the activity's details. I understand that my participation is voluntary and that I can withdraw without consequences.

I have read and understood the information about this research and this consent form. All my questions have been addressed to my satisfaction.

I consent to use my data and contributions (e.g., gathered during this meeting) for scientific purposes. I agree that my data may be included in project publications and reports, provided that my identity remains anonymous.

I irrevocably grant the project partners all rights to use and publish any video or photographic materials produced during the LL meetings in [*INSERT REGION NAME HERE]*. These materials may be used solely for public presentations and other activities within the project's scope. I waive any claims for compensation or fees and agree that the naming of individuals in such materials will be at the discretion of the project partners.

I acknowledge receipt of a copy of this consent form and understand that it adheres to relevant national and European data protection regulations, including obligations for the proper handling of personal data.

Confirmation

- Participant's Full Name: _____
- Place and Date: _____
- Participant's Signature: _____

Investigator's Statement of Responsibility

I have provided the participant with a clear explanation of the project's goals, the activity procedures, and any potential risks or inconveniences. I answered all the participants' questions thoroughly and ensured they understood the information. I confirm that the participant has willingly given their informed consent.

- Investigator's Name and Surname: _____
- Location and Date: _____
- Investigator's Signature: _____

9.6. LL meeting reporting template

The LL note-taker or meeting coordinator must complete the LL Meeting Reporting Template. This person must ensure that the key points discussed, decisions made, and the next steps agreed upon are collected and documented, ensuring effective follow-up and traceability of the meeting results.

Table 19. Data for the meeting report.

Meeting Date	
Time	
Location	
Facilitator	
Participants	

9.7. Summary of the LL meeting

The designated note-taker is requested to provide a comprehensive summary of the LL meeting in this section. This summary should capture the most significant aspects of the discussion, ensuring that key points, decisions, and action items are documented.

It is recommended to do it in a Word, Google documents or LibreOffice file, with a legible text font at size 11 or 12 and with the headings highlighted in bold.

(add space for this section as needed)

9.8. Key action points

The LL facilitator or meeting coordinator should be responsible for completing this section. This record must include a clear summary of the agreed action items, specifying, where possible, the organization and person responsible for each task. This will ensure adequate follow-up and proper implementation of the commitments made during the meeting.

Table 20. Identification of the person in charge of following up on each action(s) point(s).

Action(s) point(s)	Follow up by

9.9. Organizational learning

The LL note-taker or meeting coordinator is responsible for completing the Organizational Learning section. He or she should collect and document the lessons learned during the

meeting, identifying best practices, challenges, and opportunities for improvement. This information is key to optimizing future sessions and strengthening collaboration within the LL.

Table 21. Table to determine apprenticeships.

Learning

9.10. Checklist of returning materials

The LL coordinator or meeting logistician should be responsible for completing the Checklist of Returning Materials. This person must ensure that all materials used during the meeting are returned in good condition, verifying that no items are missing and that everything is properly stored for future meetings.

Table 22. Follow-up of the material provided.

Material	Provided	Not provided
Meeting Minutes		
Agenda		

Participant list		
Consent forms		
Photos or visual documentation		
Decision summary		
Action points overview		
Supporting documents (if any)		
Other relevant materials		

9.11. Swot analysis template

The LL facilitator or meeting coordinator should be responsible for completing the SWOT Analysis Template. This document should reflect the strengths, weaknesses, opportunities and threats identified during the meeting, ensuring that key participant

perspectives are captured to guide the LL's decision-making and strategic planning.

Table 23. SWOT analysis table.

Internal	Provided	Weaknesses

External	Opportunities	Threats

9.12. Checklist

The person in charge of completing the checklist is the event coordinator or logistics manager, who must ensure that all tasks are appropriately assigned and completed within the established deadlines and that comments or progress are recorded for each section. In addition, he/she must be able to identify the people responsible for each task and verify the progress of each activity, ensuring that the meeting runs smoothly and efficiently.

Table 24. Check list of tasks, responsible people, period and comments.

Item	Responsible	Deadline	Status/Comments
Define the main goals and objectives.			
Establish key topics			
Develop the overall			
The WHO			
Identify and confirm potential external speakers/panelists.			
Select Participants			

Assign moderatos(s)			
Distribute roles and responsibilities.			
Communicating with participants and logistics			
Decide a meeting format (in-person/online/hybrid)			
Develop a preliminary agenda.			
Send a save-the-date e-mail to participants.			
Arrange technical support (if virtual)			
Organize catering or refreshment logistics (if in-person)			

Share preparatory materials with participants.			
Final Preparation			
Send a reminder about the event.			
Review and finalize the agenda.			
Print or prepare materials for distribution.			
Develop a feedback questionnaire.			
Conduct the final technology test.			
Send last-minute reminders to participants.			

Organize a brief meeting with all team members.			
During the meeting			
Welcome and register participants.			
Ensure time management during sessions.			
Document key discussions and decisions			
Facilitate QandA or interactive sessions.			
Provide the link to the feedback questionnaire or the paper document for participants at the end of the meeting.			
After the meeting			

Organize notes and transcribe discussion outcomes.			
Share the meeting outcomes.			
Conduct a debrief with the organizing team			
Send a 'thank you e-mail' with the next steps.			

9.13. Save-the-date template

The LL coordinator or the person in charge of event communication should be responsible for sending and preparing the Save-the-Date Template. This person should ensure that all key participants receive the notification well in advance, providing essential details about the date and theme of the meeting to facilitate planning and attendance.

Here is an example of two emails for a "Save-the-Date" invitation related to a LL meeting.

Email Template (1/2)

Subject: Save the Date! Join an Expert Meeting on Soil Health and Sustainable Management

Dear [Insert Name],

We are delighted to invite you to the upcoming **LL Meeting on Soil Health and Sustainable Practices**, designed to foster innovation and collaboration in soil management strategies. This initiative aims to bring together experts, practitioners, and SH to exchange insights, align strategies, and promote sustainable agricultural practices.

The meeting will take place on **[Insert Date]** at **[Insert Venue/Platform]**, focusing on solutions to enhance soil resilience and productivity while mitigating environmental impacts.

Key Benefits of Participation:

- Gain insights into cutting-edge research and trends in soil health and sustainable management.
- Collaborate in shaping actionable strategies and innovative practices for soil restoration.
- Engage with experts and organizations committed to advancing sustainable land use.
- Network with peers to share experiences and solutions for soil challenges.

We are eager to see you join this essential dialogue to help drive impactful solutions for soil health.

Best regards,
[Your Name and Organization]

Email Template (2/2)

Dear [Insert Name],

To confirm your participation in the LL Meeting, kindly reply to this email or register through **[Insert Link]** by **[Insert Deadline]**. A detailed agenda will be shared closer to the event.

Please note that participation is **by invitation only,** and spaces are limited. If you would like to recommend other relevant SH or organizations, please email us at **[Insert Email Address]**.

We look forward to welcoming you to this collaborative event and joining forces to create innovative soil management practices that ensure a sustainable future.

For more details on the project and ongoing activities, please visit [Insert Project Website].

Kind regards,
[Your Name]
[Your Position]

9.14. Invitation e-mail

The LL coordinator or the meeting communication manager is responsible for sending and preparing the invitation email. This person must ensure that the invitation contains all the necessary information, such as date, time, agenda, and logistical details, and send it to all invited participants well in advance.

Subject: Invitation to Participate in the LL Meeting on Soil Health Innovation

Dear [SH's Name],

We are excited to invite you to our upcoming **LL Meeting on Soil Health and Sustainable Practices**, a collaborative event to foster innovative solutions for soil management and promote sustainable agricultural practices.

The meeting will occur on **[Insert Date]** at **[Insert Location/Platform]**. This initiative brings together key SH, researchers, and practitioners to share insights, strategies, and actions that enhance soil health and resilience.

Why Joining?

As a valued SH, your participation will:

- **Provide Access** to the latest research and advancements in sustainable soil practices.
- **Facilitate Collaboration** with industry leaders, academics, and policymakers.
- **Help Shape Solutions** by contributing to discussions and decisions on innovative tools and approaches for soil restoration.
- **Strengthen Your Network** within a multidisciplinary community committed to sustainable soil health.

-

Participation is **complimentary** but requires registration due to limited capacity.

How to Register

Please confirm your attendance by replying to this email or registering at **[Insert Link]** by **[Insert Deadline]**. A detailed agenda and additional information will follow up with confirmation.

We look forward to your valuable input and hope you will join us in shaping a sustainable future for soil health.

If you have any questions or wish to recommend a colleague or another relevant organization for the invitation, please contact us at **[Insert Email Address]**.

Kind regards,
[Your Name]
[Your Position]
[Your Organization]

9.15. Feedback Questionnaire

The LL facilitator or meeting coordinator is responsible for sending the questionnaire feedback to participants after the meeting. In addition, he/she must ensure that all attendees complete it, provide appropriate deadlines for submission and ensure that the responses are effectively collected to evaluate and improve future events.

1. Questionnaire Introduction

The document begins with an introduction that provides general guidelines on how to use and adapt the questionnaire to the objectives of the LLs. The main points include:

- Adaptability: Questions marked in red should be tailored to the specific context of the LL.
- Format: The questionnaire can be implemented on paper or digital platforms like SurveyMonkey.
- Question types: It is recommended to prioritize rating questions and limit open-ended questions to 2-3.

2. General Information

This section gathers optional basic information about participants:

- Name: Allows identifying the participant (optional).
- Organization: Name of the institution or group the participant belongs to (optional).
- Previous attendance: A question to determine whether the participant has attended similar previous meetings.

3. Rating Questions

This section includes a list of questions designed to evaluate specific aspects of the meeting using a scale. These questions cover:

- Usefulness and clarity:

  - Overall usefulness: Assessment of the meeting's relevance and utility.
  - Clarity of objectives: Whether the goals were well-defined and understood.
  - Achievement of objectives: Perception of whether the established objectives were met.
- Logistics and agenda:
  - Agenda: Clarity of the topics covered.
  - Session durations: Whether the time allocated to each topic was sufficient or excessive.
- Interest and relevance:
  - General interest in the topics discussed.
  - Relevance to the participant's work.
  - Quality of presentations (speakers, panels).
- Interaction and information exchange:
  - Other participants.
  - Organizers.
  - Relevance of the information provided by organizers.

4. Use of Methods and Exercises

The questionnaire includes specific questions to evaluate participatory methods used during the meeting, such as:

- Specific exercises: Examples include SWOT analysis, PESTEL Analysis, World Café, etc.
- Effectiveness: Opinions on the impact and utility of these activities.

5. Open-Ended Questions

This section is limited to a few questions, allowing participants to express broader ideas or comments. Examples suggested in the document include:

- Additional topics that should have been discussed.
- Suggestions for improving future meetings.
- Opinions on the clarity of the information provided.

- Aspects participants enjoyed themselves the most.
- General feedback.

6. Additional Comments

A final space for participants to leave any additional observations or suggestions not covered in previous questions.

7. Customization Instructions

The document emphasizes that the questionnaire should be tailored to the specific context of the LL, with practical recommendations such as:

- Adjusting questions to match the focus of each meeting.
- Using digital tools to facilitate data collection and analysis.

8. Rating Scales

The questionnaire uses scales to facilitate the quantification of responses:

- Likert scale: To measure levels such as "Not at all," "Slightly," "Moderately," "Very," "Extremely."
- Binary scales: Questions with "Yes" or "No" answers.

9.16. Dynamic discussion table

The "Dynamic Discussion" table outlines the structure and logistics for a structured group discussion. Below is a description of each section in the table:

1. Objectives

This section describes the purpose of the discussion, which is to provide a structured platform for SH to share feedback, opinions, and challenges regarding specific topics. The goal is to ensure these contributions are recorded systematically.

2. Time Needed

This section specifies the recommended duration of the discussion. It suggests a time frame of 1 to 1.5 hours, with the time depending on the number of topics chosen for discussion.

3. Number of Participants

This section highlights the recommended group size for practical discussions. It suggests a flexible approach, with 6 to 10 participants per discussion group, to ensure active engagement and meaningful dialogue.

4. Materials

The materials required for the discussion include:

- 4 large posters or flipcharts.
- Pens/markers.
- Sticky notes and colored dots for visual representation and categorization of ideas.

5. Moderators and Note Takers

This section outlines the human resources needed to facilitate the discussion effectively:

- 1 main moderator to lead the session.

- 1 moderator and one note-taker for each discussion topic, ensuring all inputs are documented.
- It supports online discussions, if applicable.

This table concisely guides the organization of a productive and structured dynamic discussion.

9.17. The creation process of indicators

Table 25. Data for the creation of indicators.

Indicator ID	
Indicator Name	
Strategic Objective(s)	
KPI Description	
KPI Formula	
Variables explanation	
Unit of measurement	
Baseline	
Target / Thresholds	
Other comments	

10. Conclusion

The creation of a Living Lab is a structured process from its initial definition to its evaluation and transfer to society. In this document, all the key stages of this process are detailed, with a specific focus on the implementation of the Soil Living Lab within the European ECOLOOP project. In D2.2 all the activities and progress made until M18 regarding the ECOLOOP Soil LL are presented and described in detail. Also, the next steps thar will be taken for its correct implementation in the Spanish pilot site are indicated.

First, the fundamentals of the LL are established, defining its purpose and scope in the context of soil and the improvement of its quality as a natural resource. Then, the main objectives are presented, aimed at experimentation and validation of real solutions, promoting the active participation of multiple SHs from different fields. In addition, the importance of these actors is highlighted, who play a fundamental role in the co-creation of innovative solutions, sharing knowledge and experiences from different perspectives. The dynamic activities implemented in the Soil Living Lab include field experiments, participatory workshops and knowledge sharing sessions. These initiatives aim not only to generate scientific data, but also to integrate sustainable soil management practices at the local and regional level. To ensure the success of the LL, an evaluation and monitoring process is detailed to measure the impact of the actions carried out and adjust strategies as needed. Another key aspect addressed in the document is the transferability of the Soil Living Lab, exploring how its model can be adapted to other agricultural and environmental contexts. Finally, several templates for operational management are included, from meeting formats to sample welcome mailings, ensuring an efficient and structured implementation.

In conclusion, this document provides detailed guidance on the creation and management of a LL, using the experience of the ECOLOOP Soil Living Lab as a practical reference. The implementation of this model not only allows testing and developing innovative solutions in real situations, but also fosters effective collaboration between various SH, ensuring its impact and long-term sustainability. Further progress and updates will be presented on D6.2. *Demonstration activities results (Spanish Pilot Site).*

11. Acronyms

Table 26. Table of acronyms.

Acronym	Description
AHP	Analytic Hierarchy Process
AVA-ASAJA	Asociación Valenciana de Agricultores
ENoLL	European Network of Living Lab
EU	European Union
LL	Living Lab
MDCA	Multi-Criteria Decision Analysis
PESTEL	Political, Economic, Social, Technological, Environmental, and Legal
SH	Stakeholders
SLL	Soil Living Lab
UoRLL	Urban or rural Living Labs
UPV	Universitat Politècnica de València

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