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D2.1
Guidelines for Living Lab constitution and stakeholder engagement

Project Acronym: COSMOS

Project name: Coordinated Optimization for Sustainable Mediterranean Agroforestry with Truffles and High-Value Species

Call: Multi-Topics. Thematic Area 2-Farming Systems in the Nexus

Work Package: WP2. Promotion of innovative practices in agroforestry systems: practical demonstrations

Task Number: Task 2.1. Regional living labs: Stakeholder engagement

Lead beneficiary: University of Siena (UNISI)

Contributing beneficiary: All partners

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List of Abbreviations

Agrotecnio: Center of Research in Agrotechnology.

Ç.Ü: Çukurova University.

CFRI: Croatian Forest Research Institute.

CNRS: Centre National de la Recherche Scientifique.

COSMOS: Coordinated Optimization for Sustainable Mediterranean Agroforestry with Truffles and High-Value Species.

CTFC: Forest Science and Technology Centre of Catalonia.

Demirsoy Tarim: Demirsoy Tarim company

DS: Demonstration site

IDForest: Biotecnología Forestal Aplicada S.L.

LL: Living Lab

MAPs: Medicinal and Aromatic Plants

RBI: Ruđer Bošković Institute.

SFI: Slovenian Forestry Institute.

UNISI: University of Siena.

Dissemination Level

[X] PU- Public: must be available in the COSMOS's website

[ ] CO- Confidential: Only for members of the Consortium and the Commission Services

[ ] CI – Classified. As referred into Commission Decision 2001/844/EC

Document History

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1. Introduction

1.1. What are Living Labs?

Living Labs (LL), or Living Laboratories, are collaborative, multi actor environments designed to foster innovation through the active involvement of diverse stakeholders. They promote multi stakeholder collaboration and the exchange of ideas for planning, designing, and testing new solutions across different fields of research. LLs are characterised by real world experimentation and iterative processes that involve citizens and end users, ensuring that innovations respond to local needs and aspirations.

They are user centred spaces built on in depth participatory methods and strong stakeholder engagement, with the aim of developing sustainable and smart solutions, generating multiple benefits, and producing new knowledge[1]. This inclusive and collaborative approach—encouraging continuous adaptation and validation of solutions across domains—is widely supported and recognised by the European Union.

The implementation of a Living Lab typically follows three generic phases. First, the context must be clearly defined, and the appropriate stakeholders identified and engaged, ensuring that end users and beneficiaries of the proposed actions are included. The second phase focuses on co creation: jointly developing scenarios, defining problems and solutions, and gathering data and insights. Finally, the third phase centres on outcomes and conclusions, where the actions or solutions tested are evaluated, innovations are assessed, and future perspectives are outlined.

1.2. What is the COSMOS project

COSMOS (*Coordinated Optimization for Sustainable Mediterranean AgrOforestry with Truffles and High-Value Species*) is a project designed to address major challenges affecting Mediterranean rural areas—such as climate change, urbanisation, industrialisation, and over-tourism—by improving existing agroforestry practices and testing innovative ones. The project promotes the integration of high-value species such as truffles, medicinal and aromatic plants (MAPs), or pollen/honey-producing species among others, within the same agricultural

[1] Lupp, G., Zingraff-Hamed, A., Huang, J. J., Oen, A., & Pauleit, S. (2020). Living labs—a concept for co-designing nature-based solutions. Sustainability, 13(1), 188.

landscapes. This diversification aims to strengthen rural economies, open new opportunities for sustainable tourism, and enhance ecosystem resilience.

The **overall objective** of COSMOS, implemented across six countries, is to identify and optimise innovative agroforestry strategies that combine truffles, MAPs, vineyards, fruit bearing trees and pollinator-friendly species, while addressing the barriers that limit their adoption and expansion in the Mediterranean region. The development of each agroforestry practice will take into account local social challenges, traditional knowledge, the use of native species, and appropriate establishment methods.

The **specific objectives** can be summarised as follows:

- Identify and develop innovative practices, models, and strategies to revitalise agroforestry systems based on truffles, MAPs, and pollen/honey species, ensuring sustainability, resilience, and productivity.
- Investigate market access and value chains for a wide range of agroforestry products, to increase the market penetration with the above mentioned products, including certification schemes, branding initiatives, and business model development, complemented by emerging activities such as mycology/truffle tourism and gastronomic tourism.
- Analyse the regulatory and institutional framework governing agroforestry in the Mediterranean, identifying technical, political, and socio-economic barriers that hinder the adoption of sustainable practices and provide directions to solve them.
- Raise awareness and strengthen stakeholder capacities through gender-sensitive training programmes, awareness-raising activities, and educational materials tailored to the needs of women farmers.

COSMOS is organised into six interconnected work packages. The project adopts a strong multi-actor approach, establishing twelve Demonstration Sites (DS) and at least six Living Labs (LL), one in each participating country, although a country may host more than one LL (sub-LLs), as is the case of Spain. These serve not only as research and testing environments but also as platforms to bridge knowledge gaps and engage a wide range of stakeholders, including researchers, farmers, SMEs, public authorities, and civil society groups such as women's associations and cooperatives.

In addition, COSMOS explores economically viable alternatives—such as myco-tourism, gastro-tourism, and health-related tourism—to increase income generation and improve farm

productivity within agroforestry systems. In alignment with EU policies, the project contributes to the development of resilient farming models, enhanced biodiversity, improved soil health and water efficiency, and more diversified and sustainable rural livelihoods.

1.3. Vision of COSMOS

The vision is to create a collaborative and experimental environment that drives innovation in sustainable agroforestry systems, enhancing biodiversity, soil health, and rural economies through the integration of truffle production, medicinal and aromatic plants (MAPs), pollinator-supportive species and other options, involving a wide range of actors and stakeholders, with a focus on women's inclusion. Moreover, the attempt is to accelerate the adoption of agroforestry practices aligning with policies such as the Common Agricultural Policy (CAP) and seek build synergies the Soil Deal for Europe, as well as other PRIMA and EU initiatives, including the European Green Deal and Horizon Europe missions.

Specific tasks of policies to achieve:

- Identify and co-develop innovative practices and business models for diversified agroforestry, aligning with policies such as the Common Agricultural Policy (CAP) and the New post-2020 (2022) CAP.
- Promote ecosystem resilience through soil regeneration, biodiversity enhancement, and pollinator health; seek build synergies with Soil Management and Resilience Directive, the Water Reuse Regulation, the Biodiversity Strategy, EU Forest Strategy for 2030.
- Strengthen rural value chains and short supply chains linking truffles, MAPs, vineyards, fruit bearing trees and beekeeping, to make the entire food system fair, healthy, and environmentally friendly, aligning with the Farm to Fork Strategy.
- Ensure economic and ecological sustainability by testing viable models of multi-crop integration; seek build synergies with Economy Action Plan, the Farm to Fork Strategy,
- Foster knowledge exchange among farmers, researchers, Small and Medium-sized Enterprises (SME), policymakers, and citizens.

2. Regional Living Labs in COSMOS project

2.1. Work Package 2 Objectives and tasks

Work Package 2 (WP2), "*Promotion of Innovative Practices in Agroforestry Systems*: *Practical Demonstrations"*, focuses on advancing sustainable agroforestry across the Mediterranean through a combination of stakeholder engagement, field-based experimentation, and collaborative knowledge creation. Its overarching goal is to promote, test, and validate innovative agroforestry practices that enhance productivity, resilience, and diversification of farming systems. To achieve this, WP2 integrates four core components: the activation of regional Living Labs (LLs), the establishment of Demonstration Sites (DS), the implementation of action-oriented research supported by robust data management, and the development of practical guidelines to facilitate the adoption of sustainable agroforestry practices.

The work is structured into four main tasks. **Task 2.1** establishes regional Living Labs as participatory hubs where farmers, businesses, researchers, policymakers, and other actors co-design solutions, exchange knowledge, and contribute to the innovation process, with particular attention to women's inclusion. This task will produce **Deliverable D2.1 (Guidelines for Living Lab constitution and stakeholder engagement)** — which corresponds to the present report — and **Deliverable D2.2 (Report on the LL sessions)**.

Task 2.2 focuses on selecting and setting up twelve Demonstration Sites across participating countries, where diverse tree–crop–fauna combinations and truffle-mycorrhized species will be tested under different conditions using a harmonised methodological framework. This task will result in **Deliverable D2.3 (Report on the characterization and experimental setup design of the Demonstration Sites)**.

Task 2.3 implements action research and precision-based management trials within the DS, generating data to evaluate innovative practices, reduce resource use, and support evidence-based recommendations. The results from these activities will feed into dissemination materials and culminate in guidelines that promote the wider adoption of sustainable agroforestry systems. This task will produce **Deliverable D2.4 (Report on innovative practices carried out in the Demonstration Sites)** and **Deliverable D2.5 (Guidelines for adoption of sustainable agroforestry practices and diversification of farming systems)**.

Finally, **Task 2.4** strengthens the innovation dimension of WP2 by identifying and developing new products that enhance resource-use efficiency in agroforestry systems through precision agriculture techniques. Leveraging the complementary strengths of public and private partners, this task, led by IDForest, monitors project progress to detect innovation opportunities, accelerate development processes, and deliver at least one prototype by the end of the project. The outcomes of this innovation scouting effort will be compiled in **Deliverable D2.6 (Report on prototypes and other innovative products derived from the project)**.

2.2. Regional Living Labs and Stakeholder Engagement

WP2–Task 2.1 focuses on the establishment and activation of the COSMOS Regional Living Labs (LLs), which serve as the core participatory mechanism of the project. These LLs directly contribute to the EU Mission “A Soil Deal for Europe”, which aims to create at least 100 Living Labs by 2030. Within COSMOS, six LLs—at least one in each participating country, with the possibility of creating additional regional LLs when this supports the achievement of the WP objectives—will operate as open, collaborative environments where stakeholders jointly explore challenges, test ideas, and co-develop innovative agroforestry solutions.

Each LL will organise at least three participatory sessions throughout the project, resulting in a minimum of 18 LL sessions overall. These sessions will include:

- Discussions on sector challenges and opportunities
- Collaborative action research linked to the Demonstration Sites (DS)
- Knowledge exchange among farmers, researchers, SMEs, policymakers, and civil society
- Co-design of training materials

The number and structure of LLs may be adapted to national contexts (e.g., Spain may host two or three LLs (sub-LLs); France may consider additional structures). Importantly, each LL is directly connected to its corresponding DS, ensuring that stakeholder insights feed into the design, testing, and refinement of the innovative practices implemented on the ground. The LLs also support other work packages by facilitating data collection (WP1, WP3, WP4) and identifying training needs (WP5).

Deliverable D2.1 (Guidelines for Living Lab constitution and stakeholder engagement) — the present report — produced during the first year of the project, provides the methodological framework for implementing the LLs and engaging stakeholders. It defines the operational guidelines, roles, and processes that will guide LL activities throughout the project.

2.3 Living Labs Core Principles

The COSMOS Living Labs operate according to a set of core principles that guide collaboration, experimentation, and learning across all regions:

- **Co-creation:** Engage all relevant stakeholders—farmers, researchers, local authorities, beekeepers, truffle growers, SMEs, and others—in jointly designing, testing, and refining innovative solutions.
- **User-centred innovation:** Prioritise the needs, experiences, and feedback of practitioners and end-users to ensure that innovations are practical, relevant, and adoptable.
- **Real-life experimentation:** Implement and test solutions directly in operational agroforestry environments through the DS, ensuring that results reflect real conditions.
- **Open knowledge:** Promote transparency, data sharing, and replicability to support collective learning and broader uptake of successful practices.
- **Sustainability and resilience:** Integrate ecological, social, and economic considerations to strengthen long-term viability and adaptability of agroforestry systems.
- **Iterative learning:** Use continuous feedback loops to refine practices, adjust interventions, and support adaptive management throughout the project.

2.4 The Three Phases of the COSMOS Living Lab Process

The COSMOS Living Labs follow a structured three-phase approach that guides stakeholder engagement, co-creation, and evaluation. These phases ensure that innovations are grounded in local needs and tested in real conditions. The three phases are described in more detail below.

2.4.1. Phase 1 – Establishing the network (Exploration & Engagement)

This initial phase focuses on building the foundation of each LL. It includes identifying, mapping, and engaging the relevant stakeholders who will participate in the innovation process. The goal is to create a shared understanding of the DS, the challenges to be addressed, and the opportunities for innovation.

Key elements of this phase include:

- Mapping stakeholders relevant to truffle production, MAPs, pollinator-friendly species or other DS targeted groups and local agroforestry systems.
- Introducing the COSMOS project, the objectives of WP2 and the DS as innovative activity.
- Establishing trust and communication channels among actors.
- Collecting baseline information and local knowledge to inform the DS setup.
- Identifying needs, expectations, and potential barriers to innovation.
- Preparing LL report and recommendations.
- Any other questions that could be of interest of the LL participants

This phase sets the social and technical groundwork for co-creation and ensures that the LL is rooted in real-world needs and local priorities.

2.4.2. Phase 2 – Co-creation and development of the innovation

The second phase is the core of the LL methodology. It focuses on collaborative design, experimentation, and iterative refinement of the innovation action implemented at the DS.

Key elements of this phase include:

- Jointly defining problems, opportunities, and innovation pathways.
- Co-designing management practices, pilot interventions, or new agroforestry models (based on the DS results, when available).
- Integrating scientific knowledge with farmers' and practitioners' experiential knowledge.
- Collecting data for WP1, WP3, WP4, and WP5 when relevant.
- Identifying training needs and capacity-building priorities.
- Iteratively testing and adjusting the DS activities based on stakeholder feedback.
- Preparing LL report and recommendations

This phase ensures that the innovation is not only scientifically sound but also socially acceptable, economically viable, and aligned with local realities.

2.4.3. Phase 3 – Conclusions, validation, and future perspectives

The final phase focuses on evaluating the outcomes of the innovation action, validating the results with stakeholders, and identifying pathways for scaling, replication, or long-term adoption.

Key elements of this phase include:

- Presenting results from the DS and other relevant WPs.
- Assessing ecological, economic, and social impacts of the innovation.
- Gathering stakeholder feedback on the process and outcomes.
- Identifying lessons learned, best practices, and remaining challenges.
- Discussing opportunities for long-term continuation, policy alignment, and funding.
- Preparing final LL reports and recommendations (D2.2)

This phase consolidates the LL's contribution to COSMOS and supports the broader mission of revitalising Mediterranean agroforestry systems.

2.5 Stakeholders involved in Living Labs and developing the Demonstration Sites

The composition of stakeholders will need to be adapted to the specific situation of each country and to the context of the Demonstration Sites, but the following categories are typically relevant for COSMOS:

Primary Producers

- Farmers and landowners
- Truffle growers and truffle associations
- Beekeepers and honey cooperatives
- MAPs producers and processors

Research and Technical Actors

- Universities and research institutes
- Soil scientists, ecologists, agronomists
- Extension services and advisory bodies
- Technicians specialised in irrigation, soil monitoring, or agroforestry

Economic and Market Actors

- SMEs involved in MAPs processing, essential oils, or truffle products
- Food industry representatives
- Local gastronomy networks (restaurants, chefs, culinary associations)
- Tourism operators (myco-tourism, eco-tourism, rural tourism)
- Certification bodies and quality-label organisations

Civil Society and Community Actors

- Women's associations and cooperatives
- Local community groups
- Environmental NGOs
- Consumer associations

Public Sector and Policy Actors

- Municipalities and regional and sectorial authorities
- Rural development agencies
- CAP implementation bodies
- Forestry and environmental agencies

This non-exhaustive list of stakeholders collectively ensures that the LLs and the innovations tested in the DS are technically robust, socially grounded, economically viable, and aligned with relevant policy frameworks.

2.6 Steps to Implement the LL Process: Workshops and Objectives

The implementation of the Living Labs follows a sequence of structured workshops linked to the 3 phases of above, designed to guide stakeholder engagement, co-creation, and evaluation throughout the project. Each workshop has a specific purpose and contributes to the development of the DS and the overall LL process. The different workshops and their objectives are described in more detail below.

2.6.1. First Workshop – Establishing the Network (1st LL Session)

Timing: Until June 2026

Objectives:

- Introduce the COSMOS project and the WP2.
- Present the Demo Site and its characteristics.
- Present the planned innovation action and gather initial reactions.
- Identify and engage key stakeholders; expand the LL network.
- Collect baseline data and local knowledge relevant to WP1, WP3, WP4, and WP5.
- Identify challenges, needs, and expectations related to agroforestry innovation.
- Establish communication channels and agree on next steps.

This workshop marks the formal launch of the LL and sets the collaborative tone for the following years.

2.6.2. Second Workshop – Co-Creation and Development (2nd LL Session)

Timing: January–April 2027

Objectives:

- Co-design the innovation action implemented at the DS.
- Discuss management practices, pilot interventions, and monitoring strategies and DS results (when available).
- Review and interpret available results, including their implications and potential adjustments.
- Integrate scientific and local knowledge to refine the DS setup.
- Identify training needs for WP5 and potential synergies with other WPs.
- Collect additional data if needed.
- Strengthen collaboration and ensure stakeholder ownership of the innovation.

This workshop is the heart of the LL process, shaping the DS activities through participatory design.

2.6.3. Third Workshop – Conclusions and Validation (3rd LL Session)

Timing: January–March 2028

Objectives:

- Present results and outcomes from the DS.

- Validate findings with stakeholders and discuss their relevance.
- Identify lessons learned, best practices, and remaining challenges.
- Explore opportunities for scaling, replication, or long-term adoption.
- Present relevant results from other WPs when appropriate.
- Prepare final LL conclusions and recommendations.

This workshop closes the LL cycle and supports the transition toward long-term sustainability.

2.6.4. Training Session (WP5)

Finally, in addition to the previous LL sessions, a dedicated training session will be implemented in each LL during the second half of the project. These training programmes are primarily addressed to farmers, with particular emphasis on women. They will include three national-level agroforestry courses, with at least one course specifically designed for women. The training sessions aim to strengthen farmers' capacities in sustainable agroforestry practices through technical seminars and consultations, developed through a co-participation process during targeted Regional LL sessions.

This activity is closely linked to WP5 (*Gender-sensitive capacity building, communication, and outreach*), and specifically to Task 5.1. Deliverable D5.1 will provide the detailed training programme guidelines.

Timing: January 2027–May 2028

Objectives:

- Provide targeted training based on needs identified during the LL process.
- Strengthen capacities in agroforestry management, MAPs cultivation, truffle production, pollinator-friendly practices, or business models.
- Promote gender-sensitive approaches and ensure inclusion of women farmers.
- Support knowledge transfer and long-term adoption of innovative practices.

Training sessions complement the LL workshops, can overlap or can be done separately, and reinforce the project's impact.

2.7 Calendar Overview

Activity	Timing
1st Workshops (LL Session 1)	Until June 2026

Activity	Timing
2nd Workshops (LL Session 2)	January–April 2027
3rd Workshops (LL Session 3)	January–March 2028
Training Session – linked to WP5	January 2027–May 2028

2.8 Reporting Requirements

Each partner must prepare four reports documenting the progress and outcomes of the LL activities and submit them to the lead partner (UNISI) ensuring consistency across countries.

2.9. Tools

A set of complementary tools will support the design, monitoring, and evaluation of the Living Labs and Demonstration Sites:

- Participatory Design Workshops: Facilitate co-creation, joint problem-solving, and stakeholder engagement.
- GIS & Remote Sensing: Map land use, vegetation, and environmental changes to guide planning and monitoring.
- Biodiversity Surveys: Assess plant, pollinator, and soil fauna diversity to track ecological impacts.
- Soil and Carbon Monitoring: Measure soil health, organic matter, and carbon stocks to evaluate environmental performance.
- Agro-Economic Analysis: Analyse costs, profitability, and market opportunities for truffles, MAPs, and honey.
- Citizen Science: Engage local actors in collecting field observations and supporting data generation.
- Digital Data-Sharing Platform: Ensure transparent, accessible exchange of information, results, and best practices.

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