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Directorate B. Quality, Research & Innovation, Outreach
B.2. Research and Innovation

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NOTE FOR THE FILE

Subject: **Exploring potential synergies between Horizon Europe and the CAP on living labs and lighthouses applied to agriculture.**

1. CONTEXT AND OBJECTIVES

The European Commission, together with Member States, stakeholders and experts, is developing several new large-scale initiatives under its research and innovation framework programme for 2021-2027 "Horizon Europe" that plan to use living laboratories, or "living labs" (LL) and/or "lighthouses" as instruments. These include:

- The proposed **mission on soil health and food**;
- The candidate **partnership "accelerating farming systems transition: agroecology living labs and research infrastructures**".

Beyond these two, other missions and partnerships (e.g. food systems, Water4ALL) plan to use living labs or lighthouses that could have connections with farming, forestry and/or rural development.

Several Member States have raised the question of how to operationalise the synergies between Horizon Europe initiatives preparing agricultural living labs and the common agricultural policy (CAP), in particular in elaborating the CAP strategic plans and their chapter on agricultural knowledge and innovation systems (AKIS).

The objectives of this note are to:

- explain DG AGRI's understanding of living labs and lighthouses i) in general and ii) under the proposed mission on soil health and food and the candidate agroecology partnership;
- explore options that could be used to fund living labs or living lab projects or lighthouses for Member States and regions who would be interested to do so, under the CAP or other national or European funding sources; and
- contribute to the dialogue with Member States and regions on possibilities to operationalise synergies between EU funds.

2. UNDERSTANDINGS OF LIVING LABS

Since the concept emerged[1] , living labs have been used under different formats, in a multiplicity of sectors across the world. They represent a wide community of stakeholders, including scientists using living labs to conduct research but also as an object of research. DG AGRI does not plan to define living labs or decide what "are" living labs. However, to use this approach in the agricultural sector for programming and support purposes, we see the need to agree on a set of criteria that can help us identify **what types of living labs we would be willing to support**.

2.1. Definitions & "components"

DG AGRI, in dialogue with Member States and stakeholders mainly in the context of the aforementioned initiatives (e.g., mission on soil health and food and partnership on agroecology), has so far used mainly two definitions of living labs as departure points:

- the definition developed by the European network of living labs (ENoLL) for all sectors; and
- the definition developed specifically for agriculture by the working group on "agroecosystem living labs" (ALL) of the G20 Meeting of agricultural chief scientists (MACS), in which several Member States and the European Commission took part.

We recall these definitions and their various components in detail in the annex. We focus here on the commonalities of living labs and the specificities of agroecosystem living labs that are the most relevant for DG AGRI to consider in the context of the above-mentioned initiatives.

2.1.1. Common components of living labs in general

Although both definitions have differences, they clearly build on common components:

- **active involvement of the users so that they are empowered** to thoroughly impact the innovation process;
- testing and experimentation in **real-life communities and settings**;
- **participation of a multiplicity of stakeholders** (i.e. the involvement of technology providers, service providers, relevant institutional actors, professional or residential end users);
- use of a **combination of a multiplicity of methods and tools** originating from a range of disciplines and domains; and
- **co-creation**, co-design and co-development using **iteration of ideation or design/implementation/evaluation cycles** with different sets of stakeholders.

[1] In 2004 at the Massachusetts Institute of Technology according to Wikipedia (https://en.wikipedia.org/wiki/Living_lab) but others date it back to the 1990s.

2.1.2. Distinctive characteristics of agroecosystem living labs (ALL)

In addition to the common elements above, the MACS agroecosystem living lab working group has emphasised a **sense of purpose**, which relates to the aim of these ALL: "**improve the effectiveness of practices and their early adoption**". It also listed the following elements, which need to be implemented simultaneously with co-creation and user-driven innovation in order to maximise the transformative potential of agroecosystem living labs:

- the **scale** at which these living labs should operate: "**working landscapes**" (which means at the level of the ecosystem and not only at farm level);
- the key role of **research**, **monitoring and evaluation** on the impact of these practices on ecosystems at farm and working landscapes; and
- the importance of **transdisciplinarity,** in particular the role of social sciences.

Recent research on agroecosystem living labs (McPhee et al., 2021) based on case studies in Europe and Canada further elaborated on characteristics that differentiate these ALL from living labs in other domains and confirmed specific points made by MACS ALL:

- the aim of the living lab usually includes **meeting a societal goal** (sustainability and resilience), **various types of innovation** (not only technology but also practices and processes) and the **sharing of knowledge** and creation of knowledge networks alongside production of **knowledge**;
- the importance of **monitoring and evaluation** in the work; the specificity of **innovation cycles** that are long and uncertain and the character or need to impact the agriculture and food systems at **territorial scales**;
- the **larger role played by public actors**, including public authorities and public-funded researchers compared to other living labs and the **diversity** and **complexity** of relations between different **partners**, closely related to embeddedness in places, that call for complex governance; and
- the fact that the living lab is "space-bound" or operates at **landscape scale** or the scale of **agroecosystems** while being connected more widely to the agrifood system.

Table 4. Defining characteristics of agroecosystem living labs.

Dimension	Characteristics
Aims	• Aimed at sustainability and resilience of agriculture and agri-food systems • Innovation can be expressed through technology, best management practices, or processes • Knowledge production and knowledge network creation
Activities	• Exceptionally high level of evaluation and data management • Long/seasonal innovation cycles with high uncertainty due to external factors • Scaling up and out to outcomes at the level of agriculture and agri-food systems
Participants	• Emphasis on public sector researcher participation • User roles may be diverse and can evolve • Often driven by the public sector or academic institutions • High diversity and number of partners, interests, and values requiring complex governance schemes
Context	• The living lab is embedded within and examined at the scale of agroecosystems

2.1.3. *How does this compare to the multi-actor approach and why is it interesting?*

There are many commonalities between living labs and the multi-actor approach implemented under both Horizon 2020 and the CAP (in operational groups of the EIP-AGRI). The approach to innovation under the EIP-AGRI already includes systematically:

- user-centred innovation, empowering farmers to be on the driving seat of innovation;
- assembling several types of knowledge, skills and competencies to solve the problem identified or answer to the needs of the farmers into joint innovation activities (usually at least scientists, advisors and farmers, with up and downstream industry also frequently present);
- collecting research and innovation needs from practice; and
- co-creation of knowledge.

A dimension that is stronger in the multi-actor approach is the key and clear requirement to **share knowledge at all geographic levels**. This is something that has not been so explicit in the definitions of living labs or even of agroecosystem living labs so far. However, the recent above-mentioned research shows that the creation of knowledge networks is common to the reviewed agroecosystem living labs. It is therefore easy to add this requirement to the future calls supporting living labs. DG AGRI sees it as essential to **respect all requirements of the multi-actor approach in the future living labs**.

The interest in living labs comes from the following potential additional features identified by the MACS Agroecosystem living labs working group as essential to achieve transformative change or seen in a variety of inspiring examples. These may be possible and already implemented by current instruments but not as clearly required and could introduce novelties strengthening the current approach in some situations:

- the "**ecosystem**" dimension that corresponds to the macro-level in the living lab approach (see annex). This requires the creation of a partnership established to last in the long-term at the innovation ecosystem level[2], in close connection with local or regional actors and policies;
- the sense of purpose that extends the **pursuit of sustainability at territorial scale**, with the aim to embark all actors in that territory in the transition through co-creation, adoption, scaling up and out of beneficial innovations;
- conducting R&I activities at field, farm and **landscape or agroecosystem level**, to measure and achieve the impact of local practices and innovations on the ecosystems, such as watersheds (Canadian living labs) or river basins, or other types of territories.

[2] Experimental work in multi-actor projects is most often limited in duration (with a typical duration being 3-4 years, covering maximum 3 crop cycles) and there is no requirement to operate at a scale wider than the farm. Living labs are expected to ensure better medium term/long-term experiments, which are necessary for working at the agroecosystem level (for instance for agroecology) or on issues which imply long-term experiments (e.g. soil or biodiversity).

- involving a potentially **wider range of actors**, including citizens, NGOs, local authorities, in connection with place-based approaches, and developing adequate governance to steer complex relations between these actors; and
- transdisciplinarity, or the **prominence of systems approaches and social sciences next to natural sciences**, such as behavioural science and psychology to understand the barriers and enablers of adoption and make sure economic, social and environmental aspects are addressed simultaneously.

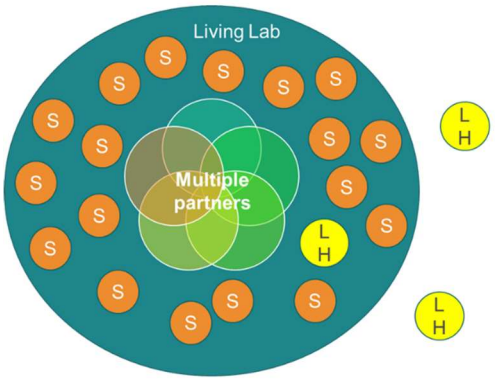
Hence, living labs set collaboration between actors and co-creation in a timeframe that goes beyond the usual timeframe of a project. They complement the "project" approach with an "**ecosystem**" layer whereby relations are organised between partners in order to last beyond the end of each project and contribute to steer a transition process that lasts in time. In a more time-bound way, multi-actor projects and operational groups contribute to reshaping of the whole Agricultural Knowledge and Innovation System (AKIS) by changing the way actors create, disseminate and exchange knowledge. They also contribute to build trust and social capital between actors and to create a fertile ground for longer-term collaboration.

Hence, to sum up, the living lab approach builds on the multi-actor approach requirements and extends them in the dimensions of time (beyond time-bound project), geography (landscape) and content (agro-ecosystems and transdisciplinarity). Those three dimensions are particularly relevant in order to achieve the objectives of the large-scale R&I activities under Horizon Europe mentioned above on agroecology and soil health that require a long-term approach to farming systems transition to sustainability.

2.2. Understandings of living labs and lighthouses under the proposed Horizon EU mission on soil health and food

In the draft implementation plan and for purpose of the mission, "soil health living labs" are defined as "*user-centred, place-based and transdisciplinary research and innovation ecosystems, which involve land managers, scientists and other relevant partners in systemic research and co-design, testing, monitoring and evaluation of solutions, in real-life settings, to improve their effectiveness for soil health and accelerate adoption*." Living labs are therefore understood as collaborations between multiple partners that operate at **regional or sub-regional level** and coordinate experiments on several sites within a regional or sub-regional area (or working landscape).

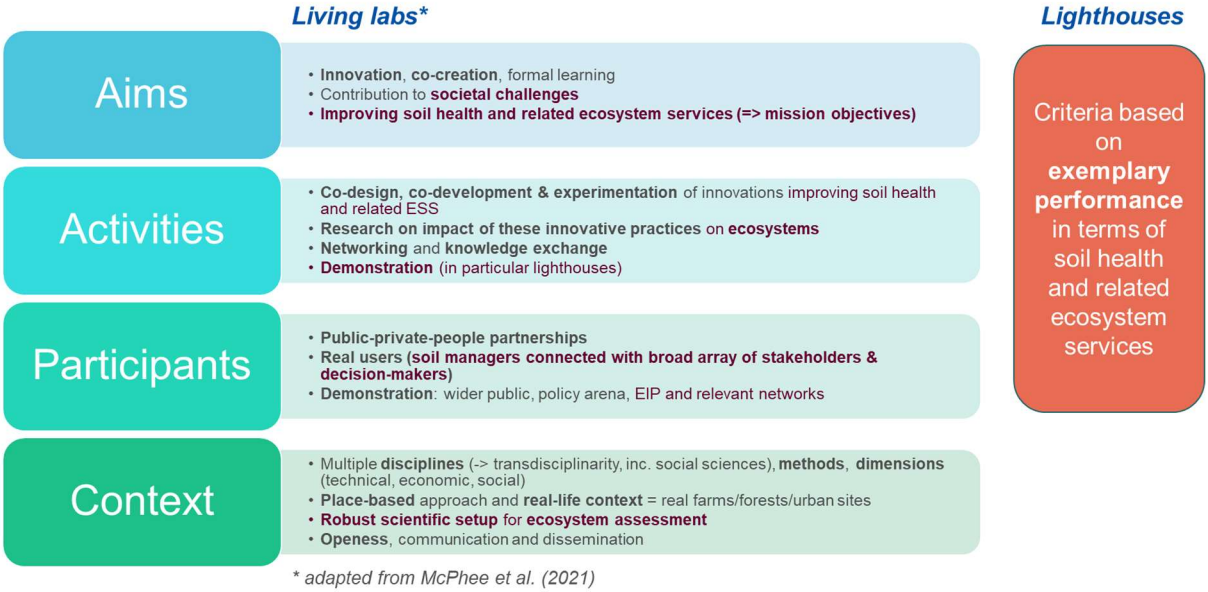
The mission also uses the concept of "lighthouses", defined for this purpose **as places for demonstration of solutions, training and communication that are exemplary in their performance in terms of soil health improvement**. They are local sites (one farm, one forest exploitation, one industrial site, one urban city green area, etc.) that can be included in a living lab area or be located outside a living lab area.



	Scale	Activities	Performance in soil health improvement
Living lab	Regional/sub-regional landscape	Coordinate experimentations & partners	In progress at landscape scale
Living lab experimentation site	Local (one farm/forest, one urban site, etc.)	Co-create knowledge and innovations	In progress on the site
Lighthouse	Local (one farm/forest, one urban site.)	Experiment and/or demonstrate	Demonstrated high performance

Visualisation of scales and activities of living labs and lighthouses

The draft implementation plan of the proposed mission on soil health and food also establishes criteria that list the important dimensions proposed as conditions to fund soil health living labs, reflected in the slide below, where grey criteria would be common to all living labs and criteria in purple refer to specific requirements for soil health living labs. Criteria for soil health lighthouses would be closely related to those used to characterise soil health within the mission's monitoring programme.



** adapted from McPhee et al. (2021)*

2.3. Understanding of living labs under the candidate partnership on agroecology living labs and research infrastructures

The understanding of "living labs" and "agroecology living labs" under the partnership is being discussed by the SCAR strategic working group on agroecology created in January 2021 (SCAR AE), with the support of the Horizon 2020 projects ALL-READY and AE4EU, and should be stabilised by autumn 2021. The future partnership may also use the concept of lighthouse farms. As an input to steer discussions, DG AGRI organised a series of webinars in May-October 2020 that provided space to discuss conceptual definitions and conceptual frameworks based on the elements described above (ENoLL and MACS) and to showcase examples of existing initiatives - several of which are part of Horizon 2020 multi-actor projects - that have some components of this living lab approach. The SCAR AE also takes into account the work on the proposed mission on soil health and food, with the objective to optimise common ground and involves as well the SMS project supporting the mission's preparation.

3. HOW WILL LIVING LABS BE SUPPORTED UNDER HORIZON EUROPE

3.1. Mission on soil health and food

The draft implementation plan proposes to fund **transnational clusters of 3-5 living labs located in 3-5 different regions and countries, each living lab including at least one lighthouse ultimately**. In the beginning, this will be done through Research and innovation actions, funded 100%. As the network expands, we would move towards funding via Innovation actions (funded 70% except for non-for-profit partners). Applicants would then need to come with co-financing. These projects will fall under the multi-actor approach, and require respecting the criteria for soil health living labs mentioned above. These soil health living labs can be new or existing living labs. But if they are existing ones, they would have to comply with all specific mission criteria.

In addition, the mission would support **one EU-wide network of living labs and lighthouses** (through a long-term coordination and support action), that will be able to engage not only with the living labs and lighthouses set up by the mission but also with other living labs or lighthouses active on soil health, within the limits of available capacities. This network would work in close connection with the EIP-AGRI network at EU, national and regional levels as well as with other networks (e.g. INTERREG, smart specialisation platform etc.).

3.2. Candidate partnership on agroecology living labs

Representatives of the Member States and Associated Countries, potential partners, stakeholders and the European commission are currently discussing in the context of the SCAR AE which activities the partnership would support and the funding modalities. More details should be known by the end of 2021.

4. OPTIONS FOR SUPPORTING LIVING LABS UNDER THE CAP

4.1. Living labs and the AKIS

The discussion on living labs under Horizon Europe started in summer 2020 in the context of the webinars on the partnership on agroecology living labs and research infrastructures, largely after the elaboration of proposals on the future CAP and the debate on its AKIS component. Hence, there is no mentioning of living labs in the legal basis and in official documents included in the policy. The current concept of EIP Operational Groups (OGs) has many characteristics of living lab projects, and could have all of them if they follow the criteria or components mentioned above. The situation is similar for lighthouses, which have many characteristics of on-farm demonstrations as supported under the CAP but will need to make proof of the exemplary state of their ecosystem services, based on the criteria mentioned above.

Innovation ecosystems are needed because new combinations of knowledge and actors drive innovation. Therefore, the CAP post 2020 puts ample efforts in interconnecting people with different expertise, knowledge and competences who together are able to solve the challenges we face. Agricultural Knowledge and Innovation Systems (AKIS) encompass all people and organisations (farmers, foresters, farmers' and foresters' organisations and cooperatives, advisors, researchers, businesses, NGOs, citizens, etc.) that generate, share, and use knowledge and innovation for agriculture and interrelated

fields: rural areas, value chains, environment, climate, biodiversity, society, consumers, etc.

Living labs and the actors that cooperate in them are producers and users of agricultural knowledge and innovation and therefore can be considered as part of the AKIS. Living labs created under the proposed Horizon EU mission on soil health and food would be multi-actor hence part of the EIP-AGRI. These living labs will be able to use the EIP-AGRI dissemination and knowledge sharing mechanisms like other multi-actor projects. Likewise, operational groups and multi-actor projects working on soil health will benefit from the activities of the "European soil health and lighthouse network", that will greatly expand the scope and scale of networking and knowledge sharing capacities in the domain of soil health. A lot of capacity-building material will be developed to manage open innovation processes in living labs and measure their impacts, building on European and international experiences in the domain, that could be of interest also to multi-actor projects and operational groups. The same types of synergies are being discussed for the partnership on agroecology living labs and research infrastructures. Finally, living labs and agroecosystem living labs are concepts discussed internationally.

The current performance of the AKIS varies greatly from one Member State to another, and often from one region to another within the same Member State. This will be essential when assessing CAP plans and the necessary efforts and budgets. Each Member State now needs to strengthen its AKIS and organise it in a structured way to ensure regular and broad knowledge flows and to foster innovation processes. Living labs are a type of approach that could prove useful under some conditions, in synergy and complementarity with all other components of the EIP-AGRI innovation approach.

4.2. How to support living labs?

There are two levels to distinguish when considering living labs:

- The **ecosystem level** (living labs): the cooperation between multiple partners, established to analyse the challenges of the territories, identify innovation needs and organise the generation of concrete R&I projects and their funding. This is also an important layer of knowledge sharing within the region and beyond.

- The **project level** (living lab projects): the realisation of concrete innovation projects mobilising actors and using the components of the living lab methodology in a project with a start date and end date. These projects can include multiple types of activities.

4.2.1. Living labs (ecosystem layer)

The approach for EIP Operational Group projects will be continued, overall strengthened and allowed to have a duration of more than seven years for environmental and climate purposes, which means operational groups could be used also to support the first years of a living lab with a clear aim for environmental sustainability. Integrating advisors in such OGs as well as within the whole AKIS will ensure an offer of more competent and qualitative advisors working in synergy. It will increase their interaction within innovation projects and improve the communication of project results, making them widely used.

As part of the innovation ecosystem at regional or sub-regional levels, the creation and animation of living labs could also be funded at regional level in the framework of Smart

specialisation for sustainability, where the research and innovation smart specialisation strategy for sustainability (RIS4) includes relevant priorities, e.g. in the domain of agrifood.

4.2.2. Living lab projects

EIP Operational Groups (OG) can fulfil the function of living lab projects, and can be funded under the type of intervention Art. 114, through a call for OG projects in particular in the field of soil health and/or agroecology and using the criteria defined for these initiatives.

Where the living lab is part of a transnational cluster of living labs funded under Horizon Europe (soil mission) or of an action funded under the partnership on agroecology, the EAFRD could provide co-financing for innovation activities that would not be 100% funded (for example innovation actions funded by the EU up to 70% under the soil mission or activities funded by the EU up to 30% for the partnership on agroecology). Innovation only is eligible, research is not eligible under EAFRD.

The type of intervention Art. 72 (demonstration farms) may support lighthouses as exemplary sites with a particular interest for public engagement. The demonstration of exemplary performance on ecosystem services, using the monitoring and indicators developed under the mission on soil health and food's monitoring programme (or similar indicators that would be developed for the Partnership on agroecology would lighthouses or demonstration farms be considered there too), is possible under such interventions.

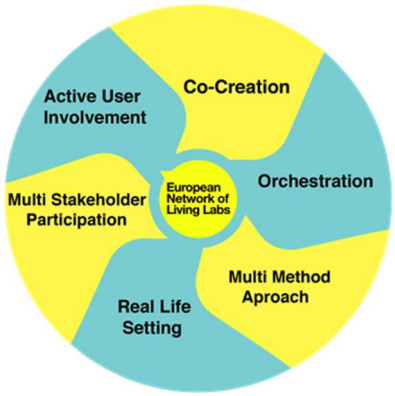
The supported lighthouse would then be in capacity to join the European network of soil health living labs and lighthouses to benefit from the knowledge exchange activities organised under this scheme, while at the same time profiting from the regular AKIS and EIP-AGRI networking activities.

Annex – Definitions of living labs

ENOLL – European nework of living labs
Source: www.enoll.org – Webinar on 6-7 May 2021 report.

EnoLL defines living labs as "***user-centred***, ***open innovation ecosystems*** *based on* ***systematic user co-creation approach****, integrating* ***research and innovation processes*** *in* ***real life communities and settings*****".** They further specify that "*LLs are both practice-driven* ***organisations*** *that facilitate and foster open, collaborative innovation, as well as real-life* ***environments*** *or arenas where both open innovation and user innovation processes can be studied and subject to experiments and where new solutions are developed. LLs operate as* ***intermediaries*** *among* ***citizens***, ***research organisations***, ***companies***, ***cities*** *and* ***regions for joint value co-creation***, *rapid prototyping or validation to scale up innovation and businesses. LLs have common elements but multiple different implementations*."

In his presentation of the living lab approach at the webinar organised on 7 May, **Koen Vervoort** (European network of living labs - EnoLL) provided more detailed elements that help to see how living labs are understood in this community. He presented the European network of living labs, that has been created in 2006 in the framework of the first wave of European Commission large-scale support to living labs under the 6th Framework programme for R&I (2002-2006), and includes 135 active members, 85% in Europe and 15% outside. He recalled that living labs are not a new thing and that over 450 globally have been certified along the life of the network. He then introduced the definition and key principles of the living lab methodology from a cross-sectoral point of view. For EnoLL, a living lab is an "**open innovation ecosystem where a multi-stakeholder approach - or multi-actor approach- is in place and acts in a real-life environment**". The difference with a test-bed or fab lab, he explained, is that instead of taking the end-user to the company's environment, you experiment in the **real environment of the end-user**. Two other important aspects are **co-creation**, which means creating innovation or services together with all users, and **iteration,** which means experimenting in an agile way, starting small, adapting and scaling-up, using **a cycle ideation, design, experimentation and validation.** Living labs are open and user-centred and mostly **intermediaries within the "quadruple helix",** a term that refers to the cooperation between **government**, **industry** (farmers here), **citizens** and **academia**. He then nuanced that there are very different kinds of living labs in the world and there is no common definition of what a living lab is that would apply to all. But there are 6 elements that come together, as illustrated in the diagram:



- **Real-life setting**: that is crucial to being a living lab;
- **Multi-method approach**: living labs combine many different types of activities (quantitative, qualitative, bottom-up and top-down etc.);
- **Multi-stakeholder participation**: "it is very important that every type of stakeholder has an equal voice over the development of the services";

- **Active user involvement**: it is not just a matter of asking feedback from stakeholders but actually doing this together with the user;
- **Co-creation**: developing innovation with all actors;
- **Orchestration**: every living lab needs to be managed and facilitated by someone who organises the activities.

He then introduced the **3-layered approach** of living labs. "A living lab is not something that you can hold in your hands; it is not a place or a person" he said, "it is an organisation based on the three layers". The top "macro" level corresponds to the **organisational level** of the ecosystem where the role of the stakeholders and how activities will be organised is decided. The middle or "meso" level is the **living lab project** level. The micro level is just one **innovation activity** within a living lab project.

Level	Definition	Research paradigm
Macro	Living lab constellation consisting of organised stakeholders (PPP-partnership)	Open innovation: knowledge transfers between organisations
Meso	Living lab innovation project with living lab methodology	Open & user innovation: real-life experimentation, active user involvement, multi-method and multi-stakeholder
Micro	Individual research steps and activities, linked to the stakeholders assets and capabilities	User innovation: user involvement and contribution for innovation

A living lab focusses on a well-structured **organisation** on the macro level, with living lab **projects** in the meso level, consisting of co-created **activities** in the micro level.

The three-layered approach to a living lab – Presentation by EnoLL (7 May 2020)

<u>G20 Meeting of agricultural chief scientists (MACS) working group on "agroecosystem living labs" (ALL)</u>
Source: MACS executive report (2019) – Webinar on 6-7 May 2021 report

Exploring the application of the living lab concept to innovation on agroecosystems, the ALL working group, came up with the following definition: "***transdisciplinary*** *approaches which involve farmers, scientists and other interested partners in the* ***co-design***, ***monitoring*** *and* ***evaluation*** *of new and existing* ***agricultural practices and technologies*** *on* ***working landscapes*** *to improve their* ***effectiveness and early adoption***." This definition is unpacked into three components:

- **transdisciplinary** approach;

- **co-design** and **co-development** with participants (where "participants" refer to all individuals and groups involved in an ALL, including producers, scientists, citizens and other interested partners); and,

- **monitoring**, **evaluation**, and/or research on **working landscapes**.

In its report, the MACS ALL noted that participating countries were already applying parts of these components but not necessary all at the same time and that their combined use is what is likely to bring most benefits.