

ROADMAP

Rethinking of antimicrobial decision-systems in the management of animal production

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Guidance Document for implementing Living Labs and data collection in the Case Studies

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About the ROADMAP research project

The overall aim of ROADMAP is to **foster transitions towards prudent use of antimicrobials (AMs) in animal production in different contexts to manage antimicrobial resistance (AMR). Prudent antimicrobial use (AMU) will be achieved by enhancing antimicrobial decision-systems along the food and drug supply chains.** ROADMAP will focus on supporting animal health and welfare through prevention and health promotion actions.

AMR is recognized as a significant threat to global public health and food security. Overuse and improper use of AMs in many parts of the world contribute to the emergence and spread of AMR. Although human and animal health require AMs, it has been estimated that two thirds of the future AMU growth worldwide will be in animal production. Improving the management of AMU in farm animals is therefore a critical component of dealing with AMR and optimizing production in the livestock sector. Nevertheless, the variety of contexts of AMU in the livestock sector is a major challenge to managing AMR. **There is no “one-size-fits-all” solution to improve AMU and strategies must be contextually developed** (for instance, strategies used in the Danish pig industry are difficult to adapt and adopt in the French free-range poultry farming). Successful solutions must be combined and tailored to the production systems and the social and economic context in which they operate.

ROADMAP will meet three general objectives, in line with the EU AMR Action plan: i) **Rethink AM decision-systems and animal health management;** ii) **Develop options for encouraging prudent AMU in animal production;** iii) **Engage all actors in the food and drug supply chains in fostering a more prudent use of AMs.**

Project consortium

Part. N°	Participant organisation name (acronym)	Country
1	Institut National de recherche pour l'agriculture, l'alimentation et l'environnement (INRAE) **	France
2	Association de coordination technique agricole (ACTA) ***	France
3	Centre de coopération internationale en recherche agronomique pour le développement (CIRAD) **	France
4	University of Liverpool (ULIV) *	United Kingdom
5	Cardiff University (CU) *	United Kingdom
6	James Hutton Institute (HUT) **	United Kingdom
7	Alma Mater Studiorum - Università di Bologna (UNIBO) *	Italy
8	Aarhus Universitet (AU) *	Denmark
9	Eigen Vermogen van het Instituut voor Landbouw en Visserijonderzoek (EV-ILVO) **	Belgium
10	Research Institute of Organic Agriculture (FiBL) **	Switzerland
11	Stichting Wageningen Research (WR) *	Netherlands
12	Swedish University of Agricultural Sciences (SLU) *	Sweden
13	Southern Agriculture and Horticulture Organization (ZLTO) ***	Netherlands
14	European Forum of Farm Animal Breeders (EFFAB) ****	Netherlands
15	Fundacion Empresa Universidad Gallega (FEUGA) ****	Spain
16	Dierengezondheidszorg Vlaanderen (DGZ) ***	Belgium
17	INRAE Transfert (IT) ****	France

* *Universities/veterinary schools*

** *Research institutes specialized in both fundamental and applied agricultural and veterinary sciences*

*** *Public and private advisory services Organisations*

**** *Knowledge transfer and Innovation organisations*

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List of acronyms and abbreviations

AgriLink is an H2020 project (www.agrilink2020.eu) to stimulate transitions towards more sustainable European agriculture by furthering the understanding of the roles played by a wide range of advisory organisations in farmer decision-making and enhancing their contribution to learning and innovation.

AM Antimicrobial

AMU Antimicrobial use

C@R Collaboration at Rural (C@R) is a project that aims to enable people in remote and rural Europe to fully participate in the knowledge society as citizens and as professionals. (<http://www.c-rural.eu>)

ICT Information and communication tools

LIVERUR The LIVERUR project identifies Living Labs as innovative business models that are currently being developed in rural areas, and will conduct socio-economic analyses to identify, describe and compare the differences between the new approach of Living Lab and more entrepreneurial traditional approaches (mass production, development of prices, optimizing cost structures with companies, rationalization). <https://liverur.eu/>

LL Living Labs

WP Workpackage

Summary

ROADMAP researchers will develop Living Labs (LLs) in order to foster transitions towards prudent antimicrobial use (AMU) in animal production in different contexts. Prudent AMU should help with management of antimicrobial resistance. This challenge is addressed by a “test product” (such as a concrete implementations, for example a more robust animal breed, a herb feed product or new management routines on outdoor access or new milking techniques) or “test service” (such as new dialogue tools for advisory service, or new communication or collaboration platforms between food industries and animal farming sectors for transparency on AMU), which is developed and implemented within each context together with multiple stakeholders.

Living Labs enable the development and testing of solutions that are *(i)* adapted to the local ecological, cultural, economic and sociological factors that are connected to the AMU, *(ii)* accepted by the involved actors potentially including a wide range of end-users, and *(iii)* tailored to the users in each given context. Involved stakeholders contribute to the process with their creativity and knowledge.

D4.1 provides partners in ROADMAP a set of robust guidelines and templates to plan, implement LLs and the conduct, document and evaluate LL meetings.

Moreover, these guidelines describe the role of the partners implementing LLs, the case specific data collection processes that will take place during the lifespan of LLs. Beyond this, D4.1 illustrates a range of options for partners to implement and test solutions and covers potential financial or other risks for a partner connected to implementation. This information should be given to all partners at an early stage so that they can plan the LL accordingly and collect qualitative/quantitative data before any change is made.

Despite this, each LL will be unique. During ROADMAP, we will observe, understand, reflect on and learn about LL processes in order to come up with recommendations on how to use LL in a food system context.

The framework presented here has been developed jointly by FiBL, Aarhus University (AU), INRAE, and ZLTO. It builds on the first exploratory work in MS23, further developed by WP3 in M14 (January 2020) and discussions with partners in Roadmap implementing in Living labs.

1 Introduction

A Living Lab is a user-centered, open-innovation research approach, development tool or ecology of practices. LLs are responsive to their specific territorial context (e.g. city or region). They often involve a private-public partnership in order to integrate research and innovation processes in a systematic co-creative environment. The history of the approach is described in Box. 1

A LL is a 'lab' because it combines and integrates processes of co-creation, exploration, experimentation and evaluation of innovative ideas, scenarios, concepts and technologies. However, a LL takes place in 'real life cases' or 'real life environments,' involving user communities as a source of creation of something which is useful for them in their context. This approach allows all involved stakeholders to consider both, the global performance or usefulness of a product, service or strategy, and its potential adoption by a wider range of end-users. This can lead to considerations which may form the earlier stage of research and development.

“A **Living lab** is a physical or virtual space in which to solve societal challenges, especially for urban areas, by bringing together various stakeholders for collaboration and collective ideation. Although the notion has received increasing attention from scholars, practitioners and policy makers, its essence remains unclear to many”. (Hossain et al., 2019)

“**Living labs** are defined as user-centered, open innovation ecosystems based on a systematic user co-creation approach integrating research and innovation processes in real life communities and settings.” (ENoLL; <https://ec.europa.eu/digital-single-market/en/news/introducing-enoll-and-its-living-lab-community>).

“A **Living lab** is an inquiry process.” (EIP-AGRI <https://www.agrilink2020.eu/our-work/living-labs>, Practice abstract nr. 5)

“When the goal is to **co-create and develop innovative solutions to complex problems** or challenges in a given setting, and solutions necessarily have to involve multiple stakeholders, LL will be a relevant option to consider”.

This interactional aspect of LLs enables participants to gauge the impact and development of these products (in terms of strategies as well as concrete outputs) throughout its life-cycle, and across different contexts.

This report will first introduce the theoretical framework that informs LLs, including how it has been used in different contexts. Next, this report will discuss the concept of LLs specifically in relation to ROADMAP. We address the relevance of LLs as a way of minimizing the use of antimicrobials in agriculture. Then the report provides concrete and robust guidelines to the actual implementation of LLs in the context of diverse animal farming scenarios in Europe and elsewhere.

We will consider which data is needed to verify the results of the improvements which are implemented as results of LLs and finally, we will position LLs in relation to the other elements in ROADMAP: how it can be used in relation to different case studies and developments in the ROADMAP project to strengthen the robustness of the outcomes and increase the impact.

This Deliverable has two parts. The first part is about the theories connected to LL and the experiences made with LL in different contexts. The second part is connected to the LL in ROADMAP. Together with the forms in the Annex of this document, this second part should give you the needed guidance to implement and start the process in you LLs.

1.1 Living labs according to the project description

During ROADMAP, Living labs are connected to WP3 and WP4. So, the partners in the two WPs (Aarhus University, INRAE, FiBL and ZLTO) will guide and support you in the course of ROADMAP. Formally, the main activities in LL during the first 1,5 year of ROADMAP are connected to WP3 whereas all the activities in the second part of the project are more connected to WP4.

The Definition of LL from the Grant Agreement section 1.3.2 Methodology says: ‘A living laboratory is a gathering of public, private partnerships in which businesses, authorities, citizens and other relevant stakeholders work together to create, validate, and test new services, business ideas, markets and technologies in real life contexts (see the statement in purple below for examples how ‘test’ and ‘testing’ is understood in the context of Living Labs in ROADMAP).

ROADMAP will organize living labs between partners and animal health professionals and stakeholders to develop new tools and services within action-research programs, conceived in five steps: i) engaging actors by demonstrating the relevance and usefulness of the project; ii) interrogating existing knowledge; iii) creating new tools and knowledge to address challenges; iv) applying new tools and knowledge to particular contexts; v) assessing these experiments (Macken-Walsh, 2017). Through the use of this participatory methodology, the role of farmers and other actors moves from being a subject of a final test into contributing to the creation, experimentation and evaluation of new tools and services to foster prudent use of AMs.’ (Project description P. 12).

In Living Labs focusing on the agri-food sector, a challenge can be articulated by end-users (e.g. farmers, advisors, consumers) involved in a problematic situation, or by policy-makers looking for new solutions. This challenge is addressed by developing a “product” (e.g. support services or advice products) through e.g. **the design thinking process** - problem analysis, generating ideas, concept development or other methods given in Fig. 3. The “implementation part” in the Living Lab process involves end-users actively in the development and test of the “product” or process.

In Living Labs in ROADMAP we use the term ‘testing’ when we either work with a concrete innovation or implementation - for example a more robust animal breed, an herb feed product, a new management routine like outdoor access or new milking techniques. It can also be testing a service, such as new dialogue tools for advisory service, or new communication or collaboration platforms between food industries and animal farming sectors for transparency on AMU. These can be either completely new strategies or implementations, or they can be re-designed and brought into new contexts in new forms, or it can be combining existing strategies from different stakeholder groups and trying them off in new settings.

Box 1: History of Living labs

The concept of Living Labs was developed in relation to technological invention and innovation e.g. like at Eindhoven University, where temporary residence was provided for some weeks ('vacation on campus'), and the participants were literally exposed to different challenges and technological innovations e.g. for use in homes, and they tested and developed them further (Markopoulos & Rauterberg, 2000), and in the 1990s there seem to be many similar 'test-in-real-life' initiatives connected to inventions.

Leminen and Westerlund (2019) described how Prof. W.J. Mitchell of the Massachusetts Institute of Technology (MIT) was acknowledged as a pioneer to form LLs for 'urban design for smart cities' and home environments. Leminen and Westerlund (2019) also note how the current forms gradually developed into many different fields and types of innovations, and they point to the formation of a 'Living Lab worldwide movement', where the concept were taken up more and more in Europe, where the earliest developments were in USA.

The fifth EU framework program enabled multidisciplinary and multi-contextual research and implementation leading to the European Network of Living Labs (ENoLL) in the early-mid-2000s. Leminen & Westerlund (2019) refer to 400 recognized LLs in 2018. However, the LLs take different forms, and move from innovation of technological inventions, they develop social and societal constructions and solutions to challenges, and the concept is defined in numerous ways (Hossain et al., 2019). LLs were employed across many different contexts as a way of innovating new technologies in real-life settings and analyzing how people interact with these technologies.

Early uses of LLs included 'demo-homes' and technologies 'for the future' demonstrated in real-life settings. Later on, the concept was developed and taken up by IT companies and research organizations to include the users into innovation processes and product development (Almirall and Wareham 2008). European approaches appear to be more focused on developing and interacting with innovations in 'real environments.' LLs are usually set up in a defined territory such as a house, a village, an urban area or within an organization (FISSAC, 2019). However, the innovations may also be replicated elsewhere or developed to further innovations (Bijsterveldt, 2016).

LLs are of participatory nature as end users are directly involved in developing innovations, and every person's expertise actively brought into the process. Although the keyword 'users' was found frequently in a recent systematic literature review (Hossain et al., 2019), the 'users' are not only participants in testing or implementing the innovations in question, but have power to influence the system (Pralhad & Ramswamy, 2004). The so-called users can be citizens, consumers, farmers, workers, etc. and can assess the proposed tool, measure or product in their daily routine. There is a constant strong emphasis on co-creation in LL literature.

The approach is fundamentally different from an approach where innovations or novel ideas are only tested in the end of a development phase (Mirijamdotter et al., 2006). Instead LLs require that innovations and ideas are continuously validated and iteratively developed. In conclusion, the LL method was developed as a process which differs from top-down development processes (Steen & Bueren, 2017). Furthermore, Moore (1999) also describes LLs as an approach which takes place in an innovation and action space between publicly funded fundamental research and launching of start-up/product/service funded by investors. Moore refers to this emphasis on partnership and participatory innovation as "crossing the chasm".

2 Part 1: Living Labs in theory and practice

A compilation of Living labs established in the agri-food sector is given in the Annex of this document. Hossain et al (2019) point to the fact that the number of publications about LLs has increased significantly since 2015, and several journals are very active in publishing articles on the topic. The authors made a systematic review of a sample of 114 scholarly articles about LLs to understand the central facets discussed in LL literature, and emphasized that the author-team found numerous definitions of the concept. A list of LLs conducted in the agri-food sector and analyzed to develop D4.1 is given in Annex 8.1 of this document.

Where many innovation processes take place in single and controlled contexts, e.g. in labs or the facilities of companies, LL experimentation takes place in multiple sites and contexts, and the innovation is developed to fit the context, but the contexts is also developing partly in response to the impact of the innovation. Stakeholders participate in various constructions, but often in co-creation processes. The time frame in which LLs take place can reach from several months to years (Person & Lievens, 2005). Throughout this time, various stages can be defined, see for example Table 1 and Figure 2. Continuous monitoring and evaluation throughout the whole research process are (especially for long-term LLs) crucial.

2.1 Key characteristics of Living Labs

Multidisciplinary: LLs are a multidisciplinary phenomenon. They encompass various research domains despite typically being discussed under open and user innovation paradigms. As will be presented and discussed below, the LL process integrates user-centered research and open innovation, and is based on a maturity spiral quite similar to a classical learning cycle, involving a multidisciplinary team in the following four main activities, bringing about **an iterative development process**, as described for example in the following example from LL development in rural settings:

- **Co-creation:** brings together multiple stakeholders in a common landscape, ecosystem or process, where high-level questions meet different forms of technology push or social innovation potentials or urgent transition needs, and brings onboard a diversity of views, constraints and knowledge-sharing, which leads to a development of new scenarios and concepts. Co-creation should be introduced as early as possible in the process, and the focus and questions of the LL should be defined or refined and adjusted (if already given) in a co-creation process, engaging all the involved actors.
- **Exploration:** engages all the stakeholders, who are identified as relevant first by the initiators of the actual LL, and then by the LL group members themselves. Especially user communities should be involved at the earliest possible stage of the co-creation process. Emerging scenarios, innovations and behaviors are explored through live scenarios, preferably in real-life environments.
- **Experimentation:** implements the proper level of technological artefacts or innovations to experience live scenarios with a large number of users while collecting data, which will be analyzed in their context during the evaluation activity.
- **Evaluation:** assess new ideas and innovative concepts as well as related technological artefacts in real life situations through various dimensions, using data and making observations on the potentiality of a viral adoption of new concepts and related technological artefacts through a confrontation with users' value models.

Much existing literature views living labs simultaneously as **landscapes** or **ecosystems**, in that they are real-life environments, which constantly react and contribute to the innovations.

It is paramount that the LL processes take place in what is often called ‘**real-life environment**’, without being very precise and specific about the definition of what ‘real-life environment’ actually means. Hossain et al. (2019) emphasize the surprising fact that the concept of ‘real life environment’ is not explained in literature. Furthermore, it seems that many studies focus on ‘end-users’, ‘stakeholders’ and ‘feed-back’ as if this seems more in focus than the mutuality in ‘co-creation processes’.

Living labs are used to structure **user participation in real-life settings** (Schuurman and De Marez, 2012). In so doing, LLs involve users in the innovation process by providing cohesion, offering support, developing competencies and promoting participants (Almirall and Wareham, 2008). They can be open or closed in terms of participation. It is important to notice that two fundamentally different types of LLs are described in literature: open and closed. Open LLs imply that anyone can participate, while in closed LLs, participating users are pre-selected (Dell’Era and Landoni, 2014). The open approach is simple to implement, and it helps gather diverse feedback. The closed approach, in contrast, enables LLs to remain highly focused, and this approach requires engaging appropriate participants to solve problems.

2.2 Structuring the process in Living Labs

Living labs can take place through short experiment cycles or longer ongoing network development. Different authors describe the process of LL as cycles of common innovation, development, change inductions and/or learning. As illustrated in Figure 1 below, there is a general emphasis on co-creation of innovation, based on an (agreed or commonly developed) identification of the focus areas, the problems, causes and potential actions. Hossain and co-authors (2019) describe the activities of LLs as illustrated in Figure 2 with green text and arrows: 1) Co-creating, 2) Testing, 3) Validation, 4) Experimentation, 5) Innovation, 6) Sensing, Prototyping, and Refining Complex Solutions. Regarding testing, see the statement in purple in section 3.1 for examples how ‘test’ and ‘testing’ is understood in the context of Living Labs in ROADMAP.

Table 1: Process of a Living Lab according to Gutzmann et al., 2013 and TRAGSA, 2008

Steps	Comment	Content
1	Setting the scene and networking	In a first step, it is crucial to establish a network with the farmers, organization, decision makers and other stakeholders that influence the system. Commonly the work plan and priorities should be defined. Feasibility of such must be considered.
2	Diagnosing	Identify key challenges or weaknesses of the current practice. Develop hypotheses for improvement.
3	Action planning	Set the strategy and detailed plans for implementation, e.g. physical infrastructure, material, assessment techniques, social change, new practices.
4	Implementation	Design, introduce, apply, prototype, validate and monitor decision-making throughout the process.
5	Evaluation of practice	Evaluate the performance and effectiveness of the lab and assess to what extent the implication has relieved the key challenges or weaknesses.
6	Specify and further planning	Use feedback to continue adapting, specifying or expanding practices as appropriate.

The processes in the LL must be facilitated at all steps of the process. According to Hossain et al.’s review of the literature on LLs it is important that ‘living labs are facilitated rather than managed, because they do not assume any authority over the individual participants (Westerlund and Leminen 2011).’

Throughout the research process, participants must be kept motivated, and the stakeholder engagement has to be maintained to stay active and motivated (U4IoT, 2019), which is also part of the facilitators’ responsibility through a careful and active facilitation.

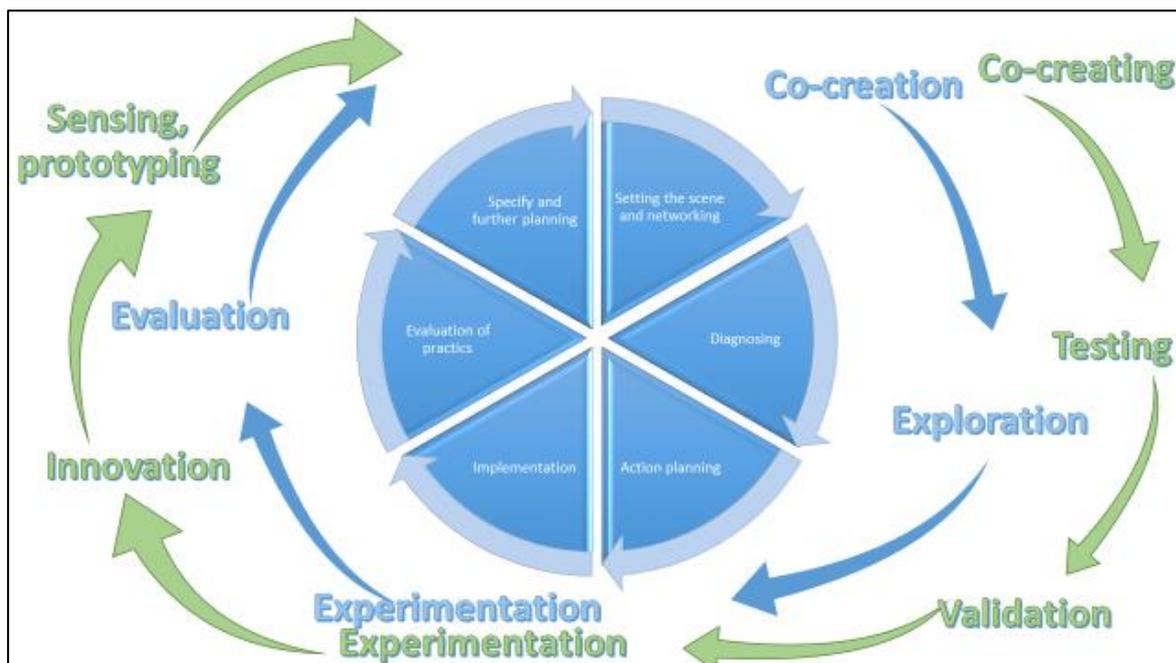


Figure 1. The process of a Living Lab according to different authors or author groups. The green text and arrows are described of activities (Hossain et al., 2019) which can happen in a cycle, but also parallel as agreed activities at different levels, conducted by different participants. They differ slightly, but all emphasize the co-creation of knowledge by multiple stakeholders in real-life environments, and there is action, which can lead to an outcome that can be evaluated. The learning from this cycle brings knowledge and experience among all participants and inform the next cycle.

2.3 The participants in a Living Lab

It is absolutely fundamental that LLs take a multi-stakeholder approach (Figure 2), and the group of participants or ‘stakeholders’ is heterogeneous and positioned differently in relation to a given issue or problem. Stakeholders may include for example, academics, industry representatives, citizens, public agencies, non-profit organisations, consultants, advisors, entrepreneurs, public authorities, universities, various institutions, end-users, and companies (Almirall and Wareham 2011; Bergvall-Kåreborn et al. 2009; Feurstein et al., 2008; Veeckman et al 2013). See Table 2 for a further suggestions on how the participating actors can be involved.

Usually, a LL will include public-private-citizen partnership (Dube et al, 2014). The set-up of a LL needs to represent actors who have experience, knowledge and interest in the focus area and the questions of a LL, and who can contribute to co-creation. According to Westerlund and Leminen (2011), there are four main groups of actors who need to be represented in a LL (see Table 2). In other words, it has

to be carefully considered who should be invited to participate, both as representatives for certain groups or categories of actors, but also as individuals with personal experience and backgrounds which could be of potential importance for the co-creation process.

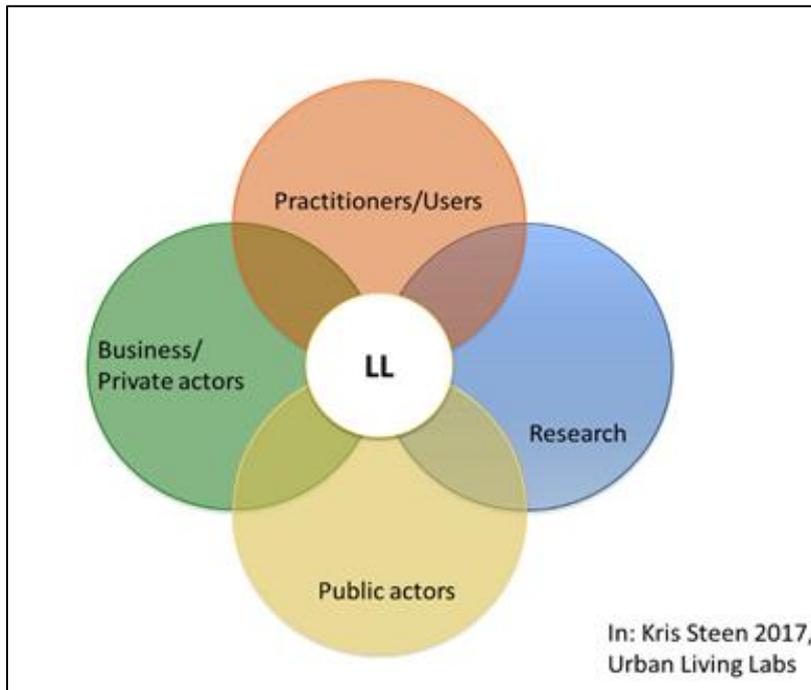


Figure 2. Groups of actors in a LL according to Kris Steen 2017.

In the Living Lab Methodology Handbook (U4LoT, 2019) it is suggested to consider the following points:

- Participation should be voluntary
- Maximization of diversity among categories of users/actors including public actors (Zavratnik et al, 2019).
- Involve users who are flexible, open for change and have a strong social competence
- Socio-demographic variation in gender, age or education (respective to the context)
- During the research process, new stakeholders may be identified that are relevant for inclusion (U4LoT, 2019). On the other hand, stakeholders who do not bring any added value to the living lab should stop their participation (Petruska and Kovacs 2016).

Table 2. Four categories of participants in a Living Lab.

Enablers	Organizations that enable the activities of LLs and support them by promoting them or allocating financial backing or space for LLs. Enablers could be public actors, financiers, or non-governmental organizations (such as towns), municipalities, and regional development organizations (Leminen et al., 2012).
Providers	Development organizations, e.g. educational institutes, universities, or consultant. Providers bring knowledge and expertise, as well as innovation support activities (Leminen et al., 2016).
Users	Users represent the citizens or end-customers. They can be active or passive actors, and they can participate in LLs taking various roles. Leminen et al. (2014) identify four user roles in living labs: informant, tester, contributor and co-creator. Users may participate in activities, such as technological services, training sessions and conversion meetings (Guzman et al., 2013).

Utilizers	Utilizers are understood as the public or private organizations that will benefit from the results and outcome of innovation activities in various ways (Leminen et al., 2012). They will initiate and promote 'living tabbing' (Mulder, 2012) to advance their own activities.
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2.4 Methods used in the processes of Living Labs

Many different methods are used at the different stages of a LL, to facilitate the dialogue between multiple stakeholders of diverse backgrounds, and to stimulate innovative thinking and constant considerations of practice relevant issues which should be considered. The examples in Figure 3 is taken from a context of LL which is clearly focused on technology development.

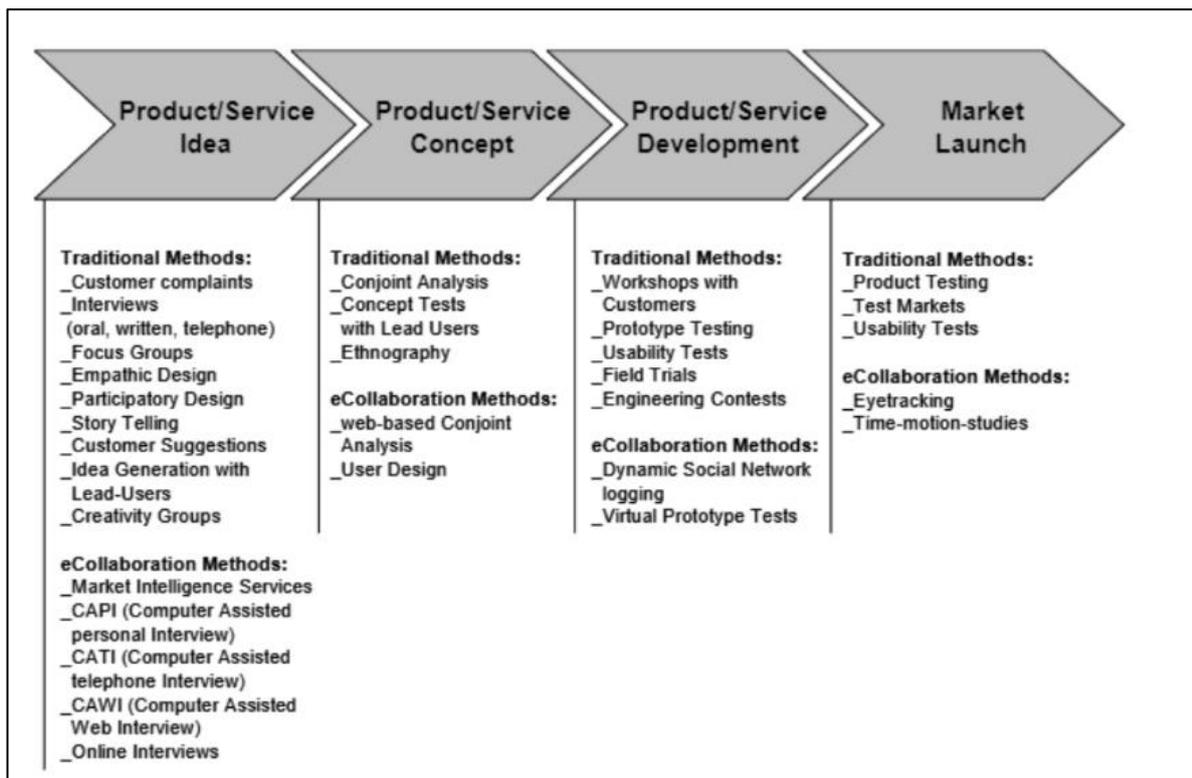


Figure 3. A list of methods used in Living Labs in a context of product development, where public-private-civic partners go together to develop products like energy solutions or mobile phones. Copied from Feurstein et al., 2008.

2.5 Positioning Living labs in relation to other participatory approaches to innovation

As this review of LL literature and examples shows, LLs can be used in many different contexts and with different aims and goals, according to the context and setting. It is therefore relevant to try and differentiate LLs from other participatory approaches to – in our context – reducing AMU and promoting animal health. We focused on different advisory service models (such as Stable School, farm board, experience exchange groups), research methods (such as Field Lab) and roundtable councils (such as 'Animal Ethical Council'), and briefly describe the differences and similarities below in Table 3.

Table 3. Outlining the concept of LL by positioning it in relation to other initiatives to participatory innovation, change and development.

Participatory method	Description	Similarities (S) and differences (D) to Living Labs
Stable School	Farmer group where farmers advice farmers and the group set a common goal (e.g. reduced AMU), using a special facilitated dialogue method. https://link.springer.com/article/10.1007%2Fs13165-015-0101-y ; https://benthamopen.com/contents/pdf/TOASJ/TOASJ-7-118.pdf ; https://www.sciencedirect.com/science/article/abs/pii/S1871141312000066?via%3Dihub ; http://orgrprints.org/19397/1/Vaarst2011_aniplan_AHWP.pdf https://pure.au.dk/portal/files/1140290/djfhus78.pdf https://www.sciencedirect.com/science/article/pii/S0022030207717526?via%3Dihub	(S) co-creation on context relevant solutions to identified problems in real-life environments in stepwise processes (D) Limited to farmers and a facilitator, and focused on farm implementation (although sometimes innovations).
Farmer Action Groups	Groups of dairy producers from 4-10 businesses meet on each other's farms and make action plans through a process involving 5 steps: 'Around the farms', 'Medicine audit review', 'Facilitated farm walk', 'Review' and 'Action planning' Lisa Morgans et al.; Bolt et al.; e.g. https://www.researchgate.net/profile/Sarah_Bolt3/publication/318725825_Effecting_change_on_far	
Farm board / farm council	Many farms have a board with a broad range of participants who are paid to spend time giving advice and opinions to strategic development of the farm. It can be in cases where the farm is owned by a fund, a company or a holding, but it can also just be a private farmer family who owns a farm and wants inputs from a closed and continued appointed group of stakeholders. (Example: offering management of farm board as advisory service in Dk: https://www.landbosyd.dk/radgivning/virksomhedsradgivning/gardbestyrelse)	(S) The board often has a multi-stakeholder composition. (D) The focus is the development of one farm, and it can be innovations but also just strategic management. (D) In most cases, the board does not have definitive decision power over the farm but just give their inputs (depends on the construction).
Experience exchange groups	A farmer group which meets regularly, most often with a theme per meeting, to exchange experiences and opinions, and in some cases with invited inputs from an external person e.g. advisor or company.	(D) Not focusing specifically on innovation or development, but on improved knowledge. (D) No commitment or binding engagement to change anything. (D) Only farmers and maybe an advisor.
Field Lab	A research-farmer partnership, where farmers participate in research processes involving one or more farms in the lab-group. https://www.nature.com/articles/509025a https://www.soilassociation.org/our-work-in-scotland/farming-for-the-future/field-labs/ https://farming.co.uk/news/farmer-led-research-key-innovation-for-the-future-of-food	(S) real-life environment, sometimes co-creating research questions (S) often conducted in cycle/steps (D) Limited stakeholder group: farmers and a research team, in SA organized by an advisor.

Testbed	A platform for conducting tests of new inventions, in a transparent, systematic and replicable way. Can also be testing of scientific theories or tools.	(S) tests in real-life environments with different user groups (D) Often determined by a company, and benefits the developer; not co-created.
Roundtable councils such as the Danish 'Animal Ethical Council' (AEC)	Danish council set up by the Ministry of Food, with a multi-stakeholder composition, meeting 6-8 times/year. The participants respond with ethical considerations to legal issues, changes of laws and directives. The council develop position papers and reports on issues with potential animal ethical implications to bring it to public concern.	(S) Private-public-citizen engagement in multi-stakeholder approach. (D) Bringing about debate and give critical inputs to current issues, but not action, and no commitment to implement changes.

A LL is not similar to a testbed as its philosophy is to turn users, from observed subjects for testing modules against requirements, into value creators contributing to the co-creation and exploration of emerging ideas, breakthrough scenarios, innovative concepts and related artefacts. 'Testing' is understood broadly in ROADMAP, see the statement in purple in section 3.1 for examples how 'test' and 'testing' is understood in the context of Living Labs. Hence, a LL rather constitutes an experiential environment, which could be compared to the concept of experiential learning, where users are immersed in a creative social space for designing and experiencing their own future. LLs could also be used by policy makers and users/citizens for designing, exploring, experiencing and refining new policies and regulations in real-life scenarios for evaluating their potential impacts before their implementations (Steen & von Bueren 2017).

2.6 Theoretical frameworks of potential relevance and importance

After having evaluated scientific literature and literature reviews on Living Labs, and looked at practical examples from reports and websites, we have summarized some of the theoretical frameworks which we found useful for understanding the potentials, dynamics and approaches of LL. Some of these theories are mentioned or discussed in literature about Living Labs (e.g. by Schaffers et al. 2010 and Hossain et al. 2019), and some of them are brought forward by the author team based on our research experience and background.

Table 4: Short introduction to theoretical frameworks of potential relevance for the development of LL in ROADMAP.

Theoretical Frame/ concepts	Explanation of elements which may make it relevant to Living Lab development in Roadmap
Innovation theories	
Diffusion of innovation	Diffusion of innovations is a theory (Rogers, 1962; last: 2003) of how, why, and at what rate innovations (ideas, technologies, tools etc.) spread. This is influenced by the innovation itself, communication channels, time and social systems, and five categories of adopters: innovators, early adopters, early majority, late majority, and laggards. At a certain moment a 'critical mass' is reached and the innovation becomes more self-sustained. The adoption itself happens through at least five steps: awareness, persuasion, decision, implementation and continuation.
Sociotechnical transition pathway theory	A conception of innovation and transition based on a multi-actor perspective, which address how multiple scales of transitions can interact. This theory is particularly relevant when reflecting at a more meta-level and globally on the various constructions and impacts of LL within ROADMAP. The theory

Theoretical Frame/ concepts	Explanation of elements which may make it relevant to Living Lab development in Roadmap
	described by Geels and Schott (2007) outlines four transition pathways, which are relevant to explore in a LL context (transformation, reconfigurations, technological substitution and de—alignment/re-alignment. Furthermore, the theory on niche-innovation commonly aligning into a larger transformation could be interesting to explore in the context of ROADMAPs multiple and diverse ‘niche innovations may bring about new developing landscape and towards a new regime regarding AMU.
User innovation	A bottom-up approach where users innovate according to their needs in-situ, and where the LL with the multi-stakeholder approach can help by engaging partners and structure the process. However, in user innovation processes, also passive users can be necessary (to test / give feed-back), and the innovations are often ‘towards the end-users’ although co-creating with them too.
Open innovation	The idea of open innovation is often based on the perceptions that companies cannot rely only on their own sources of research to innovate new products and therefore initiate processes which involve end-users, stakeholders and even rival companies. There is a dispute about the connection between LL and open innovation, because open innovation is often company driven and top-down based on the company’s defined needs, whereas LL is more public-private-people-partnerships with common interests and all influencing goals and benefitting from outcomes of the process.
National Innovation Systems [6]	Focuses on the role of sector networking, home base advantages. Living labs as rural innovation ecosystem, basis for rural development interventions. Policies are part of the innovation system.
Systems theories	
Systems theory (in general)	Systems theory is broadly understood the interdisciplinary study of systems understood as interrelated and interdependent parts which work together in a synergetic way: the system is more than the sum of its parts. A system is contextual and changing with space, time and environment, and defined through purpose, structure and functions by its structure and purpose, and expressed through its functioning. In relation to ROADMAP, farming systems (understood as biological + human / management systems) and food systems are of particular interest.
Socio-technical systems	Living lab as socio-technical system allows to focus on actors, technologies, tasks and structures and their interactions, and on CWE and business information systems change as underlying the innovation
Learning and practice development	
Situated learning, experiential learning, and legitimate peripheral participation	LLs ability to create tacit knowledge and experiential learning in different contexts.
Communities of practice	When groups of people build up experience, skills, knowledge and situated learning (basically understood as learning being developed in the same environment as where it should be used), they become members of communities of practice, because learning happens in a social situation. Although not discussed much in literature on LL, the common understandings and rationalities which are developed in LL will lead to action, in different ways along e.g. a supply chain or in a sector, or in the interplay between farmers, advisors and authorities. We leave it as an open research question whether different levels of action also contribute to forming communities of practice.

Theoretical Frame/ concepts	Explanation of elements which may make it relevant to Living Lab development in Roadmap
C-K theory	C-K theory identifies concepts and knowledge and interrelationships within the innovation process. It then contributes to analyze the innovation process as well as the respective learnings of stakeholders.
Others	
Mutual shaping Sense making	Technologies are outcomes of social action, creating new structures. Focus on appropriation process of technologies and on mutual shaping of technologies and practices, as well as tailoring and adaptation
Sustainability	Is mentioned as a key principle by different authors, e.g. Bergvall-Kåreborn et al. (2009).
Self-Determination Theory	Self Determination theory is about intrinsic and extrinsic motivation. Focus is on advancing intrinsic motivation by competence, autonomy and relatedness.
Theory of Planned Behavior	In psychology, the theory of planned behavior (abbreviated TPB) is a theory that links one's beliefs and behavior. The theory states that intention toward behavior, subjective norms, and perceived behavioral control, together shape an individual's behavioral intentions and behaviors.
Research approaches	
Action Research	Cycles of (joint) diagnosis, action planning, implementation, evaluation and learning. Fits very well the living labs approach of open and user driven innovation.

3 Part 2: Establishing Living labs in ROADMAP

3.1 First consideration: When is a LL relevant as part of a ROADMAP Case Study?

Each research team and CS should decide at national level whether a Living Lab is relevant for their CS to reach the goals set out for this particular CS.

A Living Lab (LL) is a method to co-create and implement innovation by including the users actively. In a real-life setting, the main challenges of the system in focus are analyzed. Through active participation from the LL participants (the main actors within the system), new innovative solutions or innovations are co-created, iteratively developed and tested. Through this method, innovations can be fostered based on an authentic setting (Mirijamdotter et al., 2006).

In ROADMAP, LL are used to develop, discuss and test comprehensive approaches at different levels (individual farms, production systems, supply chains, sectors, advisory services) in a participatory way involving different kinds of actors, knowledge and skills.

When is the establishment of LL not relevant? If the focus is on implementing strategies or practices, which only involves one group of stakeholders (e.g. farmers), or which are already defined by the research team and where the co-creation is more about adjusting certain strategies or practices to the context (e.g. different farms or veterinary practices), it could be more relevant to establish a farmer group where experience and idea exchange on the implementation is in focus. However, if two or more groups of actors have pre-existing strategies that they want to pool together and redesign to make them work all together, then a LL will still be a relevant option to consider.

However, especially the following points need to be addressed when self-assessing the use of the LL in the different countries:

- Is it a 'lab', meaning that it is not only a discussion forum, but actually testing different social or technical interventions to reduce AMU? Which types of innovations, experimentations and implementations does the country team foresee?
- Does it have multi-stakeholder participation? Each CS team needs to carefully analyze the relevance of recruiting participants, and to think through the roles of each invited participant / organization / institution.
- Is the focus on one group of stakeholders needed? If yes, are there plans to work with more actors in a later phase of the project?
- Is it realistic to go through one of more cycles of the different steps? No matter whether the focus area is AMU reduction at farm, sector, industry or other levels, the cycle illustrated in Figure 2 should be applied, maybe in a modified form
- Which data will the LL provide? And which data will it need to conduct informed and relevant analyses and discussions? Exchange and production of data should be considered, including the data which documents the process.

3.2 The LLs planned in ROADMAP

We conducted a partner consultation in the period from October to December 2019, where all ROADMAP partners were asked about their plans to establish on or more LLs, although the concept of LL was not fully outlined. Two countries did not plan to establish a LL: Mozambique and Sweden. The summaries of the responses can be found in Table 5. A more detailed list of Living labs and involved actors is given in Annex 8.1.

Table 5. Summary of responses on how different partners plan to use LL as part of their research in ROADMAP. In addition, the organization of the LL often involves more than one partner institution. This allows to include different perspectives during the planning and organization of a LL. An update of the Living Labs is given in Annex 8.1.

<p>Switzerland: Living lab 1: veal calves; connected to the case study on <i>organic or label production systems (CS2)</i></p>
<p>Focus on veal and beef in organic and possibly also in conventional farming. Participants will be farmers, vets, advisors, and there will be a main focus on prevention of disease and improvement of health, and possibly on complementary therapies.</p>
<p>Switzerland: Living lab 2: pigs; connected to the case study on <i>organic or label production systems (CS2)</i></p>
<p>The LL will involve farmers, vets and advisors, and the focus will be mostly improving animal health, and taking a very farm-level oriented approach. Meetings will take place twice a year. Financial compensation for participants planned. Data will be collected by farmers via electronic data systems / ear tags.</p>
<p>Italy: Living lab 1 /2: poultry and pigs; connected to the case study on <i>intensive livestock production systems (CS1)</i></p>
<p>These LLs will focus on reducing risk of bacterial infectious diseases at all stages of pig production and for broilers, mainly <3 weeks of age. The LLs will meet 4 times during ROADMAP, in a kind of ‘Roundtable’ type of meetings. Participants will be veterinarians, farmers, feeding and zoo-technic experts, slaughterhouses and processing industries, retailers, researchers and representatives of the regional government; There will be a focus on independent producers.</p>
<p>United Kingdom: Living lab: veal calves; connected to the case study on <i>marginal care / marginal voices (CS3)</i></p>
<p>Focus on identifying potential areas of interventions – and later on implementation. The CS is the marginal voices in calf care, and linked to other studies. LL should help ‘giving them voice’ The LL will involve ‘different types of farmers’, vets, retailers, pharmaceutical companies, agricultural advisors and policy makers. Process on starting point in interview results and debates; factors and actors. This team plans to do video ethnography if possible.</p>
<p>The Netherlands: Living lab on pigs and turkeys; connected to the case study on <i>intensive livestock production systems (CS1)</i></p>
<p>Focus on testing the currently used coaching method in the poultry sector and possible technical interventions, and testing in pigs if more enrichment leads to better welfare and health, and which types of enrichments. Organizations (sector, vets, and feed industry), and meetings 1-2 times per year. The basis will be already existing groups that meet regularly, and then adding more stakeholders. WUR will lead data collection (from LL / case study).</p>
<p>Denmark: Living lab 1: on organic pigs (Pure Pork) connected to the case study on <i>organic or label production systems (CS2)</i> Living lab 2: on organic dairy connected to the case study on <i>intensive livestock production systems (CS1)</i></p>
<p>Two LLs are planned to be established. The main focus of a pig-focused LL will be how to reduce AMU and the use of medical zinc oxide, and the main focus of a dairy-focused LL will be how to reduce AMU without conflicting issues on disease handling. The participants in both are planned to be conventional and organic farmers, au-</p>

thorities, researchers (housing and feeding especially), veterinarians (each vet will be connected to two participating farmers), advisors and representatives from slaughterhouse (Danish Crown; pigs) or dairy companies (dairy). They will meet four times per year in a 2-year period, and the meetings should be held in ‘real life environments. There might be an interaction between two levels: the LL and some stable schools or other types of farmer groups, which work on actual implementations of improvements on farms, where the LL is focused on implementations across the sector.

France:
 Living lab 1: pig and poultry; connected to the case study on *intensive livestock production systems (CS1)*
 Living lab 2: dairy, connected to the case study on *intensive livestock production systems (CS1)*

Plan to conduct a LL, which is still under development. It would likely focus on indicators and reporting about antimicrobial consumption. The LL is expected to involve stakeholders from several sectors to prevent the LL from mimicking already existing action arenas and help provide open innovation. The stakeholders would meet 2 or 3 times a year in order to build enough trust and interaction.

Belgium:
 Living lab 1 on pig; connected to the case study on *intensive livestock production systems (CS1)*
 Living lab 2 on veal, connected to the case study on *intensive livestock production systems (CS1)*

Selection/invitation is still ongoing. As in Belgium there is an expertise center for AMU & AMR in which all relevant actors are member, it is currently investigated if this center may actively collaborate, since this may be considered as already a LL within Belgium. Within ROADMAP it is aimed that also actors downstream are involved (retail, consumers, governmental bodies, farmers union, vets, slaughterhouses, farmers associations).

3.3 What are the characteristics of a LL in the course of ROADMAP

Looking broadly at the initial thoughts expressed by each individual CS team, a broad range of different LLs seem to be formed. This shows how flexible the concept needs to be to fit into the many different contexts and situations, e.g. where a given sector in a given country finds themselves and sees itself in relation to the AMU debate and the possibilities to significantly reduce AMU.

A LL is a ‘lab’, meaning **that strategies and practices are tested, evaluated and documented** in accordance with the agreement between participants, who commit themselves to tasks. Regarding testing, see the statement in purple in section 3.1, where examples on how ‘test’ and ‘testing’ is understood in the context of Living Labs in ROADMAP. Nothing is forced upon anybody in the LL, as a successful implementation and outcome is only considered possible when the full ownership and commitment is present. **This makes a LL distinct from a mere ‘discussion board’, ‘think tank’ or ‘council.’**

Based on the review in chapter 2, and matching it to the overall goals of ROADMAP, we foresee LLs to be characterized by the following to serve the specific aims of the project:

- The ROADMAP LL will run for **about 3 years**, preferably throughout the project period, from the establishment in May 2020.
- The ROADMAP LL will be **multi-stakeholder groups** e.g. farmers, traders, retailers, vets and other extension service providers, authorities, industry partners, consumers, researchers, working in a structured way to find strategies and practices at different levels of and/or across an animal production sector. The composition will vary depending on the context and the thematic areas of the LL and ROADMAP, and there are no requirements to involve all of these groups. On the other hand, it should be ensured that each LL consist of the relevant types of stakeholders.

- LLs can be closed or open. Both models are possible and of potential relevance in ROADMAP. The advantage of a closed LL is the atmosphere of trust which can be built up, and the disadvantage is the vulnerability of being dependent on the same group of people throughout a 2-3 years period, and that it can probably not be stable anyway, since people change job positions and leave the LL. The advantage of open LL with different and changing stakeholders is that it is possible to gather a wider and flexible group of stakeholders. During ROADMAP, we **suggest a closed LL ‘core-group’ with a structure allowing invited participants** e.g. consultants, or guests with special knowledge to be part of one or more of the stages of the process.
- A Living lab could be of different sizes, but based on our literature review and in combination with evaluating our purposes and financial possibilities in ROADMAP, we estimate **that a size around 15 +/- a few, will be appropriate and allow lively discussions**, different representations and angles to the subject area, as well as a rich exchange of ideas, and yet able to build an atmosphere of dialogue and trust. The distribution of persons does not have to be balanced in terms of professions; e.g. if the weight of the LL is to find ways towards prudent AMU at practice level, it is acceptable that various types of practice representatives participate.
- The commitment of the group members and the organizations that they represent, should be ensured. Basically, every member should express interest and a willingness to invest time and effort because AMU reduction is relevant for this organization and/or participant. We assume that the individual **budgets will cover meeting facilities and meals for participants, and possibly transport refunds**. If a structure of invited temporary guests is chosen it can be relevant to offer them a fee, as they may not have the benefits of participating in the whole process
- **The LL can operate at all levels**, either in parallel, to address a cross-cutting issue related to AMR and fostering transitions towards prudent AMU, or in consecutive steps. This means that innovations and implementations can be of the following types:
 - Technical – either focused on promoting health or preventing / handling disease in a certain sector by e.g. improved housing, vaccination, phytotherapy...
 - Social at more levels: Mutual learning processes and training about prevention of diseases? How do we articulate responsibility between several groups of actors? How is it articulated in relation to for example our thinking of ‘responsibility’? Improved access to knowledge via e.g. via APP or improved extension services.
 - Institutional and structural level: who pushes the development and use of antibiotics? How is legislation supporting the phasing out of antibiotics?
 - Any of the above in combinations.
- The facilitator(s) together with the person(s) responsible for the LL have a central task in organizing the process at the meetings and between the meeting and make a strong alliance with the group. The facilitator conducts the processes and takes the main lead during the LL meetings, when introducing dialogue tools, bringing up new sub-questions or making contact to individual group members between the meetings. **We recommend two facilitators or one trained facilitator supported by the person responsible for the LL, for each LL to support and help each other carry out the tasks:**
 - Ensuring the overall process and make sure that it is transparent and every participant is conscious and respectful about own and others roles, agendas and contributions.

- Facilitate the meetings and choose the appropriate methodologies and prepare each meeting to ensure the most efficient conduct of each step. During the meeting, a dialogue culture should be introduced, e.g. buzz followed by structured rounds, work in smaller groups to solve specific problems or other methods.
- Together with the facilitator, the person responsible for the LL should keep the process going between the meetings in the LL. This can imply investigating certain issues which is questioned by the group, contacting potential guests for the next meeting, and keeping in contact with individual members if relevant and/or necessary, (e.g. to address critical points or discuss details or backgrounds for things brought up in the LL).
- The person responsible for the LL should ensure data collection and management. Specific forms are provided by the WP3 and WP4.
- Some suggestions on methods, structure and procedure of the meetings can be found in the appendix of this document.
- Data is collected via the LL to the extent agreed by the participants. At least two types of data are collected:
 - Data which relevantly document innovations, implementations and/or change within the focus area and in the ‘real environment’ which is represented in the LL, and
 - Data documenting the discussions and outcomes of the process in the LL itself. Both types of data consist of two layers: one which is confidential and kept within the group, and one which can be used in the data collection in ROADMAP.
 - Also, data relevant for another WP could be collected and validated in LL. However, the main focus and activities in LL are connected to WP3 and WP4.
 - In addition to this, data collected in the Case Studies can be brought in for discussion if relevant and all procedures regarding GDPR etc. are followed.
- **Dissemination/communication from the LL activities and results should be agreed on.** Following the above-mentioned point, some data will be shared and some not, and this should on one side be respected, and on the other side the participants also have to accept that some of the processes and results will be communicated from the LL to the surrounding world. In addition to this, there will be a communication between LLs, Case Studies and WP7 regarding issues and disseminations that are more either more generic or aligned with the WP7 strategy including the stakeholder community management.
- **The Pillar-2 core team will facilitate exchange between facilitators on LL and conduct skype-meetings as agreed with everybody to support the ROADMAP LLs.** The Pillar-2-team thinks of this as a platform to establish a meta-reflection process about the general potentials of Living labs. Here, we would like to focus on the following questions:
 - What triggered change during the LL process?
 - Which relevant learning processes took place within the LL at a broader scale?
 - What factors in LL are relevant for the lasting collaboration (e.g. Autonomy, Social Learning, Competences, Relevant information)?

4 Robust guidelines to establishing and practicing Living Labs in ROADMAP

“No matter whether you are fast or slow, whether you work with existing or new groups, or whether you focus on small or big innovations, the emphasis on co-creation, sharing and exchanging ideas, and networking is important”.

4.1 Preparing the establishment of a Living Lab

First, make sure, that there is a good match between the overall aim and questions of the focus area for a LL, and the composition of the group. The initial aim and questions in the LL are partly given in ROADMAP, but should be adjusted so that it is relevant in the given context. It is recommended that the co-creation should start as early as possible, so the group itself should refine and develop the more specific focus and research questions, and reach consensus on whether the group itself is suitable or should involve more / other stakeholders. However, in some cases, the LL work with already given Case Study partners in ROADMAP, and even though it might be relevant to invite more stakeholders, it will not be possible to make major changes of the group composition.

The Living Lab can be established ‘from scratch’ (meaning that it does not take the starting point in any established group), or it can take the starting point in already existing groups, which are maybe enlarged to fit the aim and processes of LL, e.g. involving more types of stakeholders. These two situations require different preparations and ways of initiation.

The process in each LL can differ according to the purpose and angles of the LL group, but the development and learning cycle can be sketched out as follows: (1) Setting the scene and networking, 2) Diagnosing, 3) Action planning, 4) Implementation, 5) Evaluation of practice, and 6) Further planning.

Be aware, when planning and implementing a LL, all rules of GDPR as outlined in WP7 will be applied.

All steps of the LL will be agreed among partners involved, and every interview, visual or digital recording will happen after informed consent, and the information products from the LL will be confirmed by every participating member.

We expect that the Living labs coordinators to collect the feedback forms/questionnaires at the end of the workshop. Moreover, the organisers of the LL should also reflect on the LL and fill in a question-

A LL

- *has an initial question / a question which they focus on connected to the aim of ROADMAP.*
- *is planned and facilitated*
- *has about 10 – 20 participants,*
- *will co-develop, implement and evaluate a tool or strategy*
- *will meet at least 4 times*
- *The process in a LL is documented and there is a reflection process at the end of each LL*

We expect from ROADMAP partners involved in the LLs in WP3 and WP4 to

- *Decide about the stakeholders involve*
- *Organise the meetings and the compliance with the legal and ethical requirements illustrated in D9.4*
- *Take care of moderation/facilitation of LL meetings*
- *Feel responsible for the progress and quality of LL process*
- *Plan data collection about the impact of the LL*
- *Make sure, that the all rules of GDPR as outlined in WP7 will be applied.*
- *Monitor and document the meetings and the process / Forms in the annex*
- *Keep in touch with WP3 and WP4*

naire. The forms/questionnaires are then electronically recorded/digitised/photographed by the organisers. The digitised feedback (or copies of the original documents) is then forwarded to the WP3/WP4 leaders.

4.1.1 Establishing a Living Lab based on a new group of actors

If a LL is completely newly established ‘from scratch’, and involving a group of stakeholders and actors, who have no prior experience of collaboration, the following considerations are relevant for the planning:

- Think carefully through the recruitment of participants, both in terms of persons (backgrounds, experience and interest areas) as well as the present representations. Go through who can be relevant for the focus areas: farmers, traders, retailers, vets, extension service providers, consumers, citizens, NGOs, industries, authorities, decision makers, etc. You could use the stakeholder map from WP 1.
- For the selection, the following aspect could be relevant
 - Powerful actor: direct interaction desired, put potentially to powerful and able to block, overrule other participants
 - Influential actors: no active role in testing phase, but positive/negative influence e.g. consumers, policy makers
 - Impacted actors: actors who are positively or negatively impacted by the intervention process, e.g. farmers, traders, manager of slaughterhouses.
 - Are they suitable in relation to the implementation which is in focus in the foreseen LL?
 - Are they suitable in relation to the processes (dialog, exchange, openness) that will take place in the foreseen LL?
 - Is the combination broad and complementary and yet representing different viewpoints on the same issues?
 - Who would take financial risk, respectively benefit from the LL (either technical, political, marketing issues)?
 - Who determines ether the objectives are accomplished?
 - Will the stakeholders benefit from or contribute to a potential spin off? (Johansen et al., 2014)
- Plan first meeting very carefully. It is important to introduce the concept of LL and the foreseen procedures and processes in sufficient detail to allow everybody to be co-creators. It is important that everybody think through their own and others roles, competencies and agendas, and these are made explicit. Be very precise when outlining the aim and first questions of the group, and make very sure that everybody understands the concept of a ‘lab’ although nobody will be pushed to do something they do not feel that they can take ownership of. **Guidance is given in the Annex of this Deliverable and support is provided by the team of WP3 and WP4**

4.1.2 Starting a LL based on an already existing group

The partners in a given Case Study may already participate in an established working group, which focus on e.g. disease management, health promotion, and/or medicine use. If the focus of the group

and the background of the participants fit with the purpose of a LL, it could be a good option to shape it into becoming a LL. One advantage could be that there is already established a good dialogue, agreed collaboration and mutual trust between participants (or a big part of them in case others are added to form a multi-stakeholder LL). This could make the process of developing and implementing new strategies faster. The disadvantage could be to shift focus – even slightly – and take up the agenda and processes of LL, including e.g. practices of data collection. The following points should be considered when basing a LL on an existing group:

- The LL is multi-stakeholder and multi-disciplinary; involving additional members to the LL should be carefully considered, see Table 2,
- The original group may continue with other tasks, using other procedures and aiming at other outcomes, parallel to the LL process. This is of course possible, but it requires attending to ‘when the group is acting as a LL, and when not’. This should be discussed and agreed on at the LL-kick-off meeting.

4.1.3 Action Labs

An Action Lab describes a group of actors who carry out experiments on their farms (Figure 4). The group is closely linked to the LL and is also part of the case study. Action labs make sense if one group of actors wants to test one solution and another group wants to test another solution. But also, when not all actors in the LL can / want / are allowed to act.

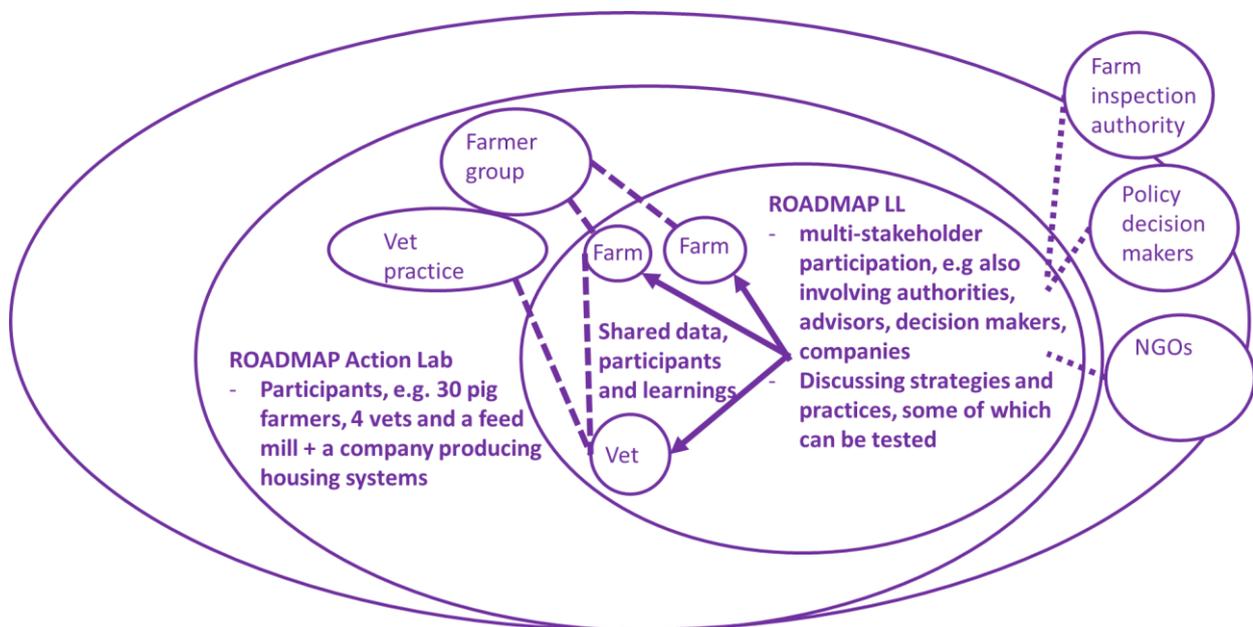


Fig. 4: An illustration of a LL which is connected to an Action Lab, where certain things are tried out in collaboration with the LL. However, both LL and Action Lab are part of a wider case study, which is for example ‘the sector’. The actors mentioned in the illustration are just examples – it can be completely different groups.

4.2 Agreeing and refining the connections between Case Studies and Living Labs

Each CS is unique and based in a certain context of time and space, and so is each LL. Depending on resources, collaboration platforms and other factors, each country and case study will form bonds, links and collaboration spheres between the Case Study and the LL. To be close to practice there is a possibility to establish contacts between various forms of advisory services, farmer groups and citizen groups, and involve them in the CS. As stated above in Section 3.2.1-point D, a number around 15 will be fine. Figure 4 gives one example of a possible construction where a larger community of farmers, vets and researchers are expected to conduct the case study following the farms during the project period in the CS, and where a couple of the farms and vets will be invited into the LL along multiple actors, among these also authorities and NGOs which are not participating in the CS otherwise.

4.3 Agreeing on the initial questions for the first Living Lab meeting

Living Labs need a joint starting point or an initial question to start with. For ROADMAP, these questions come from the proposal. The overall aim of ROADMAP is to foster transitions towards prudent use of antimicrobials (AMs) in animal production in different contexts to manage antimicrobial resistance (AMR). Reduced antimicrobial use (AMU) will be achieved by enhancing antimicrobial decision-systems along the food and drug supply chains.

The initial question for the LL could also be developed by the country team by using the ImpresS tool used WP 6 (further information is given in the Annex).

The **initial questions for Living Labs** in ROADMAP, depending on the context, could be:

- How can the AMU in animal production/in our case study become more prudent? And what do we understand by ‘more prudent’ in our case?
- What new practices, new understandings of the core challenges and ways to support the prudent use of AM that are emerging, could be tested in ROADMAP (see the statement in purple under section 3.1 regarding the understanding of ‘testing’ in Living Labs)?
- In what ways does the strategy/ the tool need to be adapted so that its potential to reduce the use of AM can be better exploited?

For Living Labs in ROADMAP, we expect suggested potential improvements to be carefully examined and chosen on informed basis, and we expect selected types of improvements to be considered and implemented in the contexts where they should be used, and followed up using concrete measures and relevantly discussed in the LL. These improvements can be of widely different types and nature:

- Technical or management related factor(s) in the primary production system,
- Updated knowledge which leads to new strategies and practices, in a farm, veterinarian practice, advisory service, authorities or in larger parts of the sector,
- Approaches such as different scenario outlines, where the LL work on some proposed changes and outline the scenario for the context in question, where they include other relevant levels and actors beyond the change itself. This means that ‘the change’, which could potentially be implemented to address AMU reduction, will require or lead to more or less profound changes in the production system or value chain at a wider scale, and this need to be considered by making a ‘scenario’ involving more levels and actors,

- Social learning, communication practices or decision pathways based on improved and/or shared knowledge about the important contextual issues, in the process of reducing AMU.
- Some data might be relevant to collect across countries and/or CSs, and this will be part of the CSs and not the LLs. Furthermore, and as described above, data collected in relation to experiments or implementations can also be handled by the wider CS, and codes of conduct and regulations regarding GDPR for CSs will apply in those cases. Here, it might be relevant to make an agreement, how data collected in CS or across the entire project can be used and potentially inform the debates in the LL.

4.4 Evaluate potential (economic) risks of your new tool or strategy

The Living Labs in ROADMAP should work together for almost 3 years. There is a risk, that participants (busy farmers and stakeholders) lose interest, trust, focus on the needs of end users and engagement. Beyond this aspect, there could be an economic risk for actors involved in ROADMAP, e.g.

- Monetary losses at each level of the value chains, if the implemented solution is not working reliably, or unexpected outcomes occur, see below about financial risks
- Increased transaction costs for different actors along the supply chain
- That the participation in LL and doing additional data collection (either in relation to the LL or in relation to the case study) takes more time than expected; in some LL the partners plan to compensate for the time consumption for example to data collection, and there are increasing pressure from many actors for being able to justify and compensate working hours.

Table 6. Each Living Lab has to clarify as part of the process, which types of risks are connected to which types of experiments or implementations, and it should be emphasized that all interventions should be driven and owned by the actors directly involved in the activities or organisations (e.g. owners of herds, farms, organisations, veterinary practices depending on which level the implementation takes place).

Examples of outcome of the LL process	Risks when tested
How the use AM in animal production/in our case study can become more prudent?	
Improved advice services for livestock farmers	x
eLearning/Podcasts for farmers/vets	?
Improved education for vets	?
Farmer stable schools	x
Vet stable schools	x
Label for AM-free meat	
Price premium for AM free meat	
Support animal health with phytotherapy	
Support animal health with homoeopathy	
Technical leaflets about practices to reduce AM for target audiences	
Marks/Tattoos for animals treated with AM	
Redesign the stable to increase animal welfare	
Concept for a new stable to increase animal welfare	
Fresh air supply or feed supplementation	
What new practices, new understandings of the core challenges and ways to support the prudent use of AM that are emerging, could be tested in ROADMAP?	
Building new ICT knowledge platforms for improved advisor-practitioner	
Develop a new app for animal health	
Testing an existent app	
Vaccination	

Moreover, Living labs actors, which plan to implement measures, should assess the connected financial risks in advance. Risk assessments could be done jointly during the Living Lab process. It is important to state that it is not a part of the LL approach to encourage or force anybody to do something which they are not ready to do (Table 6). Step should be done because it is driven by the persons who initiate change towards lower AMU, and in Living Labs, nobody should be ‘under pressure to carry through initiatives’ that they are not interested in, or that they do not believe in. However, if doing something innovative, the outcome may be different than expected, and unexpected risks may occur.

Table 7 compiles different potential strategies which could be carried out as part of the Living Labs, and which potentially could help farmers, vets and other in particular on the levels of farms and veterinary practices.

Table 7: Examples and ideas about data which could be relevant to collect in LL. This table shows examples where the LL focuses on implementation of innovations at farm level.

Goal	Indicator	Parameter
Technical measures to use less AM per animal/flock	The use of AM before and after an intervention/change	Kind of AM used/rotation (list) Costs for AM/year Number of individual/flock treatments with AM/year Number of individual/flock treatments with AM/year Days under AM treatment/year
Technical measures to increase animal health	Animal health status before and after change	Kind of diseases/rotation Number of diseases/rotations Costs for AM/year Days of individual/flock illness/rotation Days under AM treatment, Performance eggs/day/ weight increase (kg/d,
Improved animal health through access to knowledge and extension	Participation	Number of ICT Logins/farm Number of farmers field schools attended
	Feedback from farmers on the services offered	Qualitative feedback on pros and cons, satisfaction

4.5 Data collection in LL

In the ROADMAP project, we foresee data collection as part of the activities in the Living Labs. The following three types of data is considered:

- **Data collected by participants in the LL with the aim of supporting the discussions or documenting outcomes of changes or implementations of innovations agreed on in the LL.** These data belong to the LL, and agreements on how they should be used in relation to the CSs and research in ROADMAP should be made.
- **Data which documents the discussions and developments in the processes of LLs.** As outlined in MS23, we foresee that the Living Lab processes in ROADMAP will consist of these different stages that are common in all LL, despite all the individual differences. The stages will be implemented for each of the LL resulting in focused reports in English that follow a common format.

- Data collected by researchers as part of the Case Studies (e.g. on-farm observations, registrations or herd data, or data on medicine use within a certain sector but also data like farmers satisfaction with the implemented strategies) **to be validated, complemented, supplemented in the LL**. Some of this data could be useful for the discussions and developments within the LL, and agreements about presentations or sharing of this data should be made in such cases.

4.5.1 Data collection about the impact of LL

Data collection in the implementation of LL should **start before the implementation of measures/approaches takes place and continue during and after implementation of a measure** (Table 3). Data collection needs to be adapted to the case and the resources available. Further Templates will be provided by WP3 and WP4 and could be adapted as to be case-specific. Moreover, consider requirements illustrated in D9.4.

The involved partners in implementing new strategies should assess that it is doable, and avoid high financial risks due to the implementation. During implementation, data about the impact of change should/will be collected (see chapter 6). Each of this type of improvements is linked to a risk for the involved partners.

The follow-up and monitoring can be done in the following ways:

- 1) Researchers can collect data and monitor changes due to the implementation or experiment, as part of the CS, and / or in relation to a project or study with which the case study collaborates. The data shared between the CS researchers and the members of LL will be agreed on, and appropriate GDPR measures will be taken.
- 2) A process of participatory monitoring can be established (e.g. inspired by the processes described in ‘Framework and catalogue of tools for Participatory Monitoring ... ‘ <https://or-gprints.org/30157/1/Frameworkand-tools-for-participatory-monitoring-final-version-last-7th-Feb-2016.pdf> but several different approaches are described e.g. by Estrella et al., 2000).

4.6 Some word about facilitating the meetings

‘Facile’ originally means ‘easy’, and the basic role of the facilitator is to make it easy for the LL to go through the process that they have agreed on, and to stimulating the whole group to remember the goals and frameworks of the whole concept of Living Labs and the goals that they have set and hopefully all keep being interested in. This also includes the goals and norms that the group has agreed on from the start. During the meeting in the Living Lab, the facilitator concentrates on the agenda, the methods, the group dynamics and writing notes for the minutes.

It is very important to establish a mutual understanding in the whole group that the role of the facilitator is to facilitate the meeting and the process in between the meeting. The facilitator does not participate neither as an expert nor as a decision-maker, otherwise stakeholders may feel manipulated (Engels et al. 2019).

Some facilitators will have a history as advisor or consultant, and it can be a big challenge to change that role to a facilitating role, especially if they have professional knowledge in the focus area and want to lead the process in the direction which they personally find most suitable.

Basically, the facilitator’s role and tasks are:

- Prepare the meetings together with the LL manager of ROADMAP, e.g. elaborate the agenda according to the cycle and the agreement among members at the end of the previous meeting,

- Plan the dialogue processes at the meetings, among others by creating a climate of trust, bringing issues into the open in case something needs to be solved,
- Keeping the process in a LL going between meetings
- Contribute to keeping up the motivation among participants, including ensuring that everybody feels okay with the process and outcomes, and that new participants are integrated and feel welcome and in control of their tasks and roles,
- Networking, exploring opportunities for new angles and ways of dealing with the focus areas, bridging the living lab with external parties e.g. by communicating about what the group has agreed should or could be communicated,

During the meetings, which can be 3-6 hours, the facilitator has the following tasks:

- Keep focus on the agreed agenda and the goals of the meeting, as well as stick to own preparations and time planning, so that the meeting finishes according to the set time,
- Take care that everybody has the possibility to talk, e.g. by structured dialogues and shift between different dialogue methods.
- Remind the group members to keep their word and take care that all agreements remain clear.
- Make sure that the group does not get stuck in any discussion or exchange of opinions. If something needs further clarification to be properly addressed, this may have to be pushed to next meeting.
- Write notes during the meeting in order to be able to prepare the written minutes. It can be necessary to digitally voice record the meeting,
- Help making the conclusions as precise and concrete as possible, and that tasks for next meeting are agreed and clear.
- Take care that everybody agrees on the time and place for next meeting.
- Make sure, that there is an evaluation at the end of the meeting.

4.7 The Living Lab meetings during ROADMAP

The process in Living Labs may follow the outline in Annex A, or it can be modified to the context and be agreed on among participants. An agenda for each meeting is provided in the Annex of this document.

Every time, the LL meets, a goal for the specific process is set. The activities to reach this goal are planned, and the indicators (time and type) are agreed. At every meeting, the group will go through a session where they monitor to a relevant degree on whether agreed activities are met. This reflection process is part of the research about LL. Questions addressed here are e.g. *What has changed? Why did this change happen? Is the process convincing? Am I happy to be part of this?* A form to evaluate the meetings is given in the Annex.

At the last meeting in the Living Lab – or every time a cycle has ended - the whole course should be properly evaluated, with focus on the process and what has been achieved in the different farms.

4.7.1 The first meeting

The first meeting is essential to set the frame for the LL meetings and atmosphere, and make agreements which makes everybody feel comfortable and take ownership. Also, the project ROADMAP and its aims should be presented as well as the LL approach.

The tools developed by WP 6 (Impact assessment see in the Annex of this documents) could be used or the stakeholder map developed in WP1 could be validated.

At the first LL meeting, there should be allocated time for

- Sufficient introduction of the LL concept, and how it is envisioned in this particular context by the facilitator team and the CS leaders, at the overall level as well as in the daily practice e.g. the democratic processes and dialogue forms in the LL,
- Appropriate introduction of all participants, where their roles, motivations for their participation, and considerations regarding their interests and agendas are brought up,
- Clarifications of mutual expectations, including the general expectations to the participants about development of an atmosphere of confidentiality, openness and mutual trust, but also that they are part of a research project, in which the processes are reported and/or published to a certain degree. Property of innovations is also to be agreed on.
- Even if all or most of the members of a LL know each other, this process is needed, because the frame within which they meet, is new.

4.7.2 Preparation of the next meeting and the time between the meetings

Depending on the work mode of the LL, the group will meet at least 4 times over the 3 years period, but they can also meet more times, e.g. 4 times per year, if it is relevant for the process. The facilitator will spend time to carefully prepare the next meeting and refine the agenda to send out some weeks before the meeting.

- Prepare the agenda according to the cycle and stage of the LL, and in accordance with the agreed brain storm on agenda at the end of the previous meeting.
- If different participants have different tasks, follow up with them what should be on the agenda, and if any material related to their task, should be distributed with the agenda,
- If the LL takes place in different locations with different hosts (e.g. ‘authority office’, ‘a farm’, ‘a vet practice’, ‘a research institute’, ‘an NGO office’ ...) the host should be guided to make sure about the practical arrangements such as space, presence of projector or other equipment if needed, lunch etc., depending on the practices of the LL.
- Send out the agenda and the written minutes from the previous meeting together with the data and updates, material for reading and other things which are agreed among participants.

4.7.3 Following up on agreements and disagreements

Since a Living Lab is a ‘lab’, it is most likely that one, more participants have (maybe everybody has) tasks between the meetings. It is the facilitators’ task to assist in case of difficulties.

- Follow up if there is a need to clarify something for the group before next meeting, e.g. some legal matter or information about products, activities, developments or other matters,

- Call group members who did not attend in order to keep them updated, hear why they did not attend and let them know about time and place for the following meeting, and maybe if relevant their reactions to certain issues.
- If there is an underlying or open conflict of interest or disagreement between group members, the facilitator should call, and maybe meet with the relevant parties between the meetings.

5 Challenges related to Living Labs

Looking broadly at the first considerations on LLs expressed by each individual CS team and presented in Table 5, we see a broad range of different LLs. The concept of LL should be able to encompass this range. As become apparent from the list of points given in Section 3.2.1, the concept is flexible and can fit with many different contexts and situations, depending on how a given sector in a given country perceive themselves and their own roles and responsibilities in relation to the AMU debate and the options to significantly reduce AMU in their own setting. The benefits of using LLs for development of strategies and practices in real-life environments include tangible and intangible innovation and a broader diversity of innovation. However, LLs also come with some challenges, which need to be addressed. Below we give short points to the points raised in relation to the results of Table 5. Many of these challenges should be addressed already at the establishment of the LL, e.g. thinking carefully through which stakeholders are necessary, useful and valuable to involve and allowing the first circle of stakeholders to appoint additional stakeholders, and making it very clear that the purpose of this is that experimentation is actually supposed to take place.

In section 5.4.1 we address general challenges specifically mentioned by different CS groups, and in section 5.4.2, we address specifically economic or financial risks.

5.1 General concerns and challenges mentioned by ROADMAP partners

In the consultation of ROADMAP partners, as well as in the literature review on LLs, some concerns came up. The following is mostly a list of such concerns, which are still to discuss along getting more experience in different countries. The various points are commented using some literature sources touching on these challenges.

- Participant / user recruitment: Good guidelines and transparent selection of participants to invite or recruit are needed, and each context may require or wish for something special. Argones-Beltran and co-authors (2017) set up four types of criteria:
 - 1. The knowledge: do stakeholders have either expert knowledge, professional skills or experience useful to the LL?
 - 2. The assets: do they offer financial security? Do they provide resources or financial support to activities?
 - 3 The social skills: do they represent a broader set of stakeholders, are they affiliating to others? On the negative side: are they potentially manipulating / influencing others?

- 4. The external: Are they dependent of external factors? Do they have a public image and in such case, as what? Or are they representing certain aspects of a hierarchical position?
- Temporality versus sustainability: The LL can be open or closed to serve certain purposes, and therefore quite temporary. In some cases, LLs will be built on existing stakeholder groups, which are expected to last, even though the ‘shape as LL’ may only exist during the ROADMAP project or shorter.
- Governance: Facilitators are expected to be decided for each individual CS, as well as the participation from the CS leader, and reporting as described above. Two facilitators will make a perfect match. Facilitators should be neutral and help the tested users to “speak back”, even “to disrupt preconceived test designs and implementation pathways and to inject their own visions of a desirable future into the innovation process.” (Engels et al, 2019) It is crucial that facilitators are accepted and trusted by all stakeholders as such.
- Scalability: The scale of the LL may vary a lot according to the context and issues addressed. In ROADMAP, LL will more or less match with CS and will serve as such, but may overlap several CS. The scale of the LL also refers to the potential (and expected) generalization, which should not be overestimated (Engels et al., 2019).

Unpredictable outcomes: The risks and potential ways of ensuring that no participants take risks which they are not willing to take, is discussed in section 4.4.2. It is a condition of every experiment is a certain risk, and it should be clear who takes the risks, and how it is handled, among LL participants. Engels et al (2019) discuss the “tension between lab-like open-ended experimentation and pressures to demonstrate success”, although risk is an intrinsic part of innovation process. The outcome also depends on the degree of innovation, whether stakeholders test emergent technologies or demonstrate the superiority of a new technology with path dependency criteria. One of the outcomes may also lie in the way stakeholders envision the world; a very narrow issue or innovation process at the beginning of the LL may lead to assimilate a multi-level perspective for instance (for instance, from animal physiology to co-modification of products – see LL in project COTRAE).

Making it a ‘lab’: It can be a challenge to initiate actual interventions, experiment, implementations and innovations, to make it a lab. The learning happens in loop structures or cycles.

The recruitment of multi stakeholders: Does it have multi-stakeholder participation? Each CS team needs to carefully analyze the relevance of recruiting participants, and to think through the roles of each invited participant / organization / institution.

How far will the LL reach? Is it realistic to go through one of more cycles of the different steps showed in Figure 2? Maybe not, and some innovations and processes take time. However, it is important that irrespective of the level of the interventions (farm, sector, vet service, farmer education, industry or other levels), the cycle illustrated in Figure 2 should be applied, maybe in a modified form.

Which data will the LL provide? And which data will it need to conduct informed and relevant analyses and discussions? Exchange and production of data should be considered, including the data which documents the process.

Rivalry and competition: It is pointed to by a number of authors of LL reports and articles that rivalry and competition between stakeholders participating in the same lab can occur. This may especially be the case if an innovation can be expected to have favorable financial or marketing

outcomes. Therefore, trust might be quite an issue for the management and free-riders behaviors may occur. An alternative, especially when dealing with firms within the same value chain, may be to recruit stakeholders whose activities are complementary and not in competition (Petruska and Kovacs, 2016). Therefore, a special attention must be paid to secrecy agreements and on property rights.

6 Living Labs and dissemination with emphasis on working with stakeholder communities and international exchange

With regard to dissemination, the results of implementation and testing of innovations in Living Labs as well as the processes themselves within LLs have a special position, compared to fundamental scientific results. The ROADMAP partners have agreed to release information without delay, and LL provides a kind of ‘workshop’ which is constantly developing initiatives and in process discussing and trying new things. Procedures for an open diffusion of knowledge from Living Labs will be developed and agreed on for each LL, and intellectual property rights about the service innovation will be discussed for each Living Lab. Generic knowledge and tutorials will be diffused on an open basis from each Living Lab, when the LL members have approved the way in which the knowledge is presented and the tutorials are framed. All ethical and data protection concerns should be seriously addressed from LLs, and data access should be organized in ways so that there is no doubt about which parts are public versus restricted.

Collaboration is expected with WP7, which has the commitment to engage stakeholders and work with stakeholder communities, such as farmers, vets, industry partners, authorities etc. WP7 aims at stimulating the maximum possible level of stakeholder engagement in order to facilitate the tasks of developing integrative strategies in Pillar 2. Furthermore, WP7 will participate in the development of guidelines on how to implement Living labs and conduct the data collection during implementation, in agreement with each individual LL. One of these collaborations will be the 3 co-learning events for farmers, vets and advisory services organized by WP4 as cross-country events, targeting farmers from Switzerland, France, Denmark and Italy, and this will be facilitated by WP7. These co-learning events aim to explore, what strategies farmers and vets implemented to reduce AMU.

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8 Annex

8.1 Living labs and stakeholder communities addressed in Roadmap Living labs (updated on May 2021)

Living Lab	Coordinators and facilitators	Stakeholders representing
Belgian pigs Belgian veal	Erwin Wauters, ILVO Stefaan Ribbens, DGZ	Different farmer Unions, veterinary practitioners, Animal Health Care Services, Federal agency of the Safety of the Foodchain, Federal Agency for medicines and health products, Expertise Center for Antimicrobial Usage and Resistance, Academic Research centers and universities, pharmaceutical companies, Centre for Agro-and fisheries marketing, National Federation of slaughterhouses, cutting plants and wholesalers, retailers, National feed association, feed and nutrition companies, Sector guide organisations for primary production, Agricultural research, innovation and information centers, Department of Agriculture and Fisheries, Belgian Veal Calve Association
Danish pigs	Hanne Kongsted, ICROFS Line Kollerup, AU Merete Studnitz, ICROFS	Producers, extension services, vets, industry (R&D, extension, export consultant), slaughterhouses, researcher, retailer
Danish dairy (cows and calves)	Line Kollerup, AU Mette Vaarst, AU	Veterinary practice and advisory service, university education of vets and ag scientists, The Danish Vet. Society, 3 companies involved in the dairy or calf sectors (a dairy company with conventional and organic milk, a meat trading company and a company for calf feed and equipment), The Agricultural Advisory Service Centre, SEGES, under the Danish Agricultural Agency (the Danish farming sector's organization)
Dutch poultry (turkeys)	Fleur Hoorweg, WR Annick Spaans, ZLTO Heleen Prinsen, ZLTO Anne Marie Rebel, WR	Veterinary practice, Animal Health service, 3 farmers' board members of the branche organisation (AVINED), branch organisation (AVINED), Dutch farmers' organization, Feed organization, Wageningen University and research.
French poultry & pigs	Catherine Belloc, ONIRIS Nantes Mathilde Paul, ENVT Christian Ducrot, INRAE,	French Ministry of Agriculture, Veterinary practitioners (pig and poultry sectors), Interprofessional councils (INAPORC for pig and ANVOL for poultry), development institutes (IFIP for pig and ITAVI for poultry)
French dairy	Eleonore Pommier, Idele Manon Fuselier, Idele Mathilde Paul, ENVT Marlene Guideur, Idele Aurore D. Wache, Idele	(LL not started yet, so here are the stakeholders we would like to invite): farmers, veterinarians, milk industries, federation of health protection groups, French livestock advisors
Italian poultry	Massimo Canali, UNIBO Frederique Pascoli, UNIBO	Big integrator industrial groups, industry association, regional animal health/ environmental/ agricultural services, public animal epidemiological services, public veterinary health data management, pharmaceutical

	Caetano Luiz Beber, UNIBO	companies, veterinary associations, feed producer association, big retail companies, consumer organizations, academia & research institutions
Italian pigs	Massimo Canali, UNIBO Paolo Trevisi; UNIBO Roberta Ruggeri, UNIBO Costanza Romaneli, UNIBO	Producer organizations, big integrator industrial groups, industry association, regional animal health/ environmental/ agricultural services, public animal epidemiological services, public veterinary health data management, pharmaceutical companies, veterinary associations, feed producer association, big retail companies, consumer organizations, academia & research institutions
Swiss pigs	Barbara Früh, FiBL Bernadette Oehen, FiBL Mirjam Holinger, FiBL	Animal welfare organization, Slaughterhouse / meat production company, Organic farmers association, Veterinary university, Livestock traders, Farmers, Association of Swiss organic pig farmers, Pig health service, Organic research institution, Organic certification body
Swiss veal	Michael Walkenhorst, FiBL Bernadette Oehen, FiBL	Vets, Advisory service (veterinary: Swiss calf health service), organic producer organization (Bio Suisse), veterinary and socio-economic researcher (FiBL), Swiss organic farmers (dairy, beef and veal).
UK calves	Orla Shortall, HUT Claire Hardy, HUT Lee-Ann Sutherland, HUT Carol Kyle, HUT Gareth Enticott, CU Kieran O'Mahony, CU	Farm technicians involved in calf care (Calf-carers / rearers). In addition, based on the development in the LL, a wider group of stakeholders will be invited e.g. consultancies, milk buyers, milk companies, Woman in Dairy-group.

Selection of participating stakeholders in the ROADMAP Living Labs: The stakeholders were purposively selected based on initial stakeholder mapping through interviews, to fulfill the multi stakeholder approach and be relevant to stakeholders for the purpose and focus of each Living Lab. In the Deliverable report 4.1 we provided the guidelines as given below. The Living Labs always have the possibility to involve and include new stakeholders, when the need is identified.

When inviting stakeholders to participate in Living Labs, it has been and still is a challenge for some teams to deal with competing companies, and the choice had to be made to cover and focus on the problem area of the ROADMAP project, and the context has been evaluated and taken into account. However, many stakeholders have also potentially conflicting interests in relation to development of the farming sector involving animals (e.g. conflicts between low prices for animal products versus animal welfare concerns), and we consider it a potentially important function of the Living Lab to facilitate processes that bring stakeholders together and can change conflicts of interest to commonalities of interest, when it comes to overall societal concerns, such as antimicrobial resistance, through facilitation and dialogues in the Living Labs by creating rooms of confidence and confidentiality.

Guidelines given in Deliverable Report 4.1 regarding selection of stakeholders for the Living Labs:

It is absolutely fundamental that LLs take a multi-stakeholder approach (Figure 2), and the group of participants or ‘stakeholders’ is heterogeneous and positioned differently in relation to a given issue or problem. Stakeholders may include for example, academics, industry representatives, citizens, public agencies, non-profit organisations, consultants, advisors, entrepreneurs, public authorities, universities, various institutions, end-users, and companies (Almirall and Wareham 2011; Bergvall-Kåreborn et al. 2009; Feurstein et al., 2008; Veeckman et al 2013). See Table 2 for a further suggestions on how the participating actors can be involved.

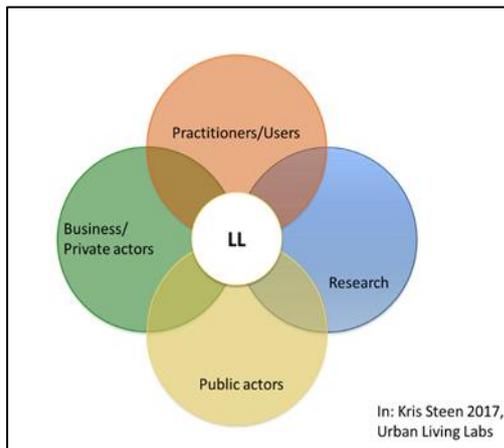


Figure 2. Groups of actors in a LL according to Kris Steen 2017.

Usually, a LL will include public-private-citizen partnership (Dube et al, 2014). The set-up of a LL needs to represent actors who have experience, knowledge and interest in the focus area and the questions of a LL, and who can contribute to co-creation. According to Westerlund and Leminen (2011), there are four main groups of actors who need to be represented in a LL (see Table 2). In other words, it has to be carefully considered who should be invited to participate, both as representatives for certain groups or categories of actors, but also as individuals with personal experience and backgrounds which could be of potential im-

portance for the co-creation process.

In the Living Lab Methodology Handbook (U4LoT, 2019) it is suggested to consider the following points:

- Participation should be voluntary
- Maximization of diversity among categories of users/actors including public actors (Zavratnik et al, 2019).
- Involve users who are flexible, open for change and have a strong social competence
- Socio-demographic variation in gender, age or education (respective to the context)

During the research process, new stakeholders may be identified that are relevant for inclusion (U4LoT, 2019). On the other hand, stakeholders who do not bring any added value to the living lab should stop their participation (Petruska and Kovacs 2016).

8.2 LL examples from reports, articles and websites about LL in different settings

Most projects in the networks of LLs including the European Network of Living Labs are linked to the development of new ICT concepts and solutions adapted to the specific needs and aspirations of local contexts, cultures, and creativity potentials. They describe Living Labs as “*user-centered, open innovation ecosystems based on a systematic user co-creation approach integrating research and innovation processes in real life communities and settings.*”

Schaffers et al. (2010) used Living labs in a rural development context and link this with the development of a specific IT platform. Other examples are Living Labs as advisory boards in policy making or as part of an innovation process.

A potential role model for ROADMAP is the H2020 project AgriLink. With the use of LLs, the project aims to stimulate sustainability transitions in European agriculture through better common understanding of the roles played by farm advisory services to support farmer decision-making. The main outcome developed in these LLs are improved access to extension services and access to knowledge, innovation and advice, partly by using social media. See Table 3 for examples of LLs in the agrifood sector.

Table 3: Examples of Living Labs, which have been used in practice in the Agrifood Sector.

Project	Initial questions	Cases studies
AgriLink	Which advisory skills, knowledge and structure in order to supply the diversity of knowledge and information required to rebuild a local food community?	New advice services for diversified, organic farming systems
	Improved engagement of farmers and producers with (agricultural) advisory system	Building platforms for improved advisor-practitioner communication: the Latvian Living Lab, Latvia
	Improve access to reliable, timely information for 1 cooperative within Romania	Increase the value of an advisory service for vegetable producers in Romania
	Improve the environment and value added for farmers through crop rotation between farms	Developing innovation support services and tools through Living Labs, Norway
	To involve different stakeholders (farmers, cooperatives, agribusinesses, agro food industry, technology providers and policy maker) to improve the current advisory service, solving farmers’ real needs and achieving a more sustainable use of pesticides	Improving the advisory service on Integrated Pest Management, Spain (IPM) (INTIA)
	Making maize cultivation more sustainable	Improving innovation support to sustainable soil management in maize cultivation, Wageningen, Netherlands
C@R	Fishing industry – supporting traditional small vessels fishing	Fishermen experimented with laptops installed in their boats, with broadband connectivity onboard, with a good practices’ guide to handle the fish and with new working processes for the quality label establishment.
C@R	How can mobile direct sales be promoted for tourists?	Farmers were invited to define and validate the mobile sales service. Tourists did validate the proposed sales service further. The LL has been implied since 2006 and is going on

		up to date. It has helped to launch IT services for mobile direct sales for the farming sector. (Gutzman et al, 2013)
FISSAC	Belgium - How can key challenges of urban mining be addressed?	Civil servants, experts from the construction sector and researchers discussed key challenges commonly. The focus was on the processing of small sites, the importance of co-operation along the chain and the role of policies and regulations (FISSAC, 2019).
ENoLL	Australia- Modern Ageing Development of solutions and reflect opportunities of Modern Ageing	Creation of an ecosystem that empowers people, businesses, researchers and governments to develop better products, services and solutions to meet the needs of the growing and changing older community (ENoLL, 2019).
ENoLL	India - Small Village Living Lab in Odisha, State in Eastern India. Focus on education, water, energy, environment and affordable housing.	The LL is led by local students. The aim was to address local skill development, local entrepreneurship and creation of science and technology knowledge empowered workforce (ENoLL, 2019).
SocialLab	Germany – Livestock farming	This LL was aiming at the creation of evidence-based parameter to assess the acceptance of the society for livestock keeping. Concrete policy recommendations should be derived from the results (Christoph-Schulz, 2018).

The C@R project partners pointed out that a joint effort to test improvements facilitates and speeds up the creation of public and private partnerships which lead the rural LL and support its sustainability. The creation of public-private partnerships made the rural LL community more capable of making decisions and diversifying the fishing sector. Moreover, based on open innovation, a higher degree of collaboration was enabled, enhancing understanding and confidence among government and fishermen for sustainable fishing practices.

8.3 A cyclic structure which potentially can represent the process in a Living Lab, inspired from ideas of impact pathways.

Preparation of the focus area in the ROADMAP's LLs:
<ul style="list-style-type: none"> - Define the scope of the focus area in temporal and spatial terms, and identify the different actors and research and development projects involved in the innovation, experiment or discussion which is going to take place, - Develop impact hypotheses based on the expectation of change formulated by the research team involved, - Draft a first “narrative of the innovation” (or focus area of other types) that leads to the impacts
Dialogue with the actors:
<ul style="list-style-type: none"> - Define and fine-tune hypotheses with actors through discussions on the narrative of the innovation - The nature of the impacts (1st participatory workshop where the impact assessment person/team/procedure is involved), and agree on the indicators,
Construction of the narrative of the innovation and of the impact pathway:
<ul style="list-style-type: none"> - Systematically document the inputs, outputs and outcomes, - Pay special attention to learning situations and interactions with public policies;
Characterization and measurement of the impacts:
<ul style="list-style-type: none"> - Describe and quantify the 1st level impacts using a multi-criteria method based on surveys and/or focus groups, - Characterize and quantify some 2nd level impacts using various methods and through collecting secondary data, if possible and time allows to have this potential impact,
Validation with the actors:
<ul style="list-style-type: none"> - Validate all the results with the actors (2nd participatory workshop where impact assessment is on the program in the LL), - Conclude the focus area in a participatory process (narrative of the innovation, impact pathway, quantification of impacts). The results are fed into a generic database to <ol style="list-style-type: none"> i. harmonize and archive the data collected in each LL and regarding every focus area, ii. allow a cross-analysis across these, and iii. facilitate the construction of ex ante evaluations approaches (those undertaken before the start of the implementations / experiments / innovations).

8.4 Draft Agendas to plan the Living labs meetings 1 – 4

Agenda Living Lab ROADMAP

This is a format/example of a Living Lab agenda. The components/methodology/duration can be adapted to your own situation.

- | | |
|---|--|
| <ul style="list-style-type: none">• # Participants Living Lab:• Duration Living Lab session:• # Living Lab sessions: | <ul style="list-style-type: none">• 10-20 persons• 3-5 hours• 4 or more |
|---|--|

Preparation by LL coordinator: review data WP1/WP2

1. Delimit the perimeter of the LL (e.g. organic pig farming of cooperation x in area x)
2. Identify stakeholders and establish the network: use stakeholder map. Who are the:
 1. Major partners: direct interaction desired
 2. Influential actors: no active role in intervention process, but positive/negative influence
 3. Impacted actors: actors who are positively or negatively impacted by the intervention process
3. Identify possible desired impacts of stakeholders: based on the review of data (legislative framework, current state of AMU, LL members' knowledge and perception of AMU reduction)¹.
4. Before the first meeting, ask participants to reflect on (1) what the sector has achieved in recent years and (2) what the main challenges the sector is currently facing in terms of animal health.
5. Build a first narrative: construct a compelling and plausible impact narrative.¹

Meeting 1: Start the Living Lab process, to get to know each other and to diagnose starting point

<u>Step</u>	<u>Components</u>	<u>Methodology</u>	<u>Materials</u>	<u>Du- ra- tion</u>	<u>Who?</u>
1. Networking	<ul style="list-style-type: none"> - Roles, motivations for their participation, and considerations regarding their interests and agendas are brought up for each participant. 	E.g. by having 5 minutes to introduce each other in couples and presenting the partner you have met to the rest of the group in 2 minutes.		30 min ²	Whole LL
2. Engaging stakeholders	<ul style="list-style-type: none"> - General introduction of the project. - Introduce the concept of a Living Lab and the foreseen procedures. Allow everyone to be co-creators. - Clarify mutual expectations in terms of the project itself, but also about confidentiality, openness and mutual trust. - Stakeholder map validation 	<p>E.g. demonstrate the relevance and usefulness of the project.</p> <p>Brainstorm about expectations</p>	<p>Power-Point Presentation</p> <p>Flipchart, post-its</p>	40 min ²	Whole LL
Break				15 min	
3. Broadening	<ul style="list-style-type: none"> - Interrogating of state of the art 	Ask each participant to present his/her reflection on achievements and challenges the sector faces, which is prepared in advance, in 5 minutes.		40 min ²	Whole LL

6. Closing and preparation next meeting	<ul style="list-style-type: none"> - Evaluation of this session - Set agenda together and divide tasks 	Evaluation can take place individually or in groups	Evaluation form	20 min	Whole LL
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²May take less time with an existing LL/already identified intervention.

Meeting 2³: Action planning (and implementation)

<u>Step</u>	<u>Components</u>	<u>Methodology</u>	<u>Materials</u>	<u>Dura- tion</u>	<u>Who?</u>
1. Networking	<ul style="list-style-type: none"> - Small talk and summary of first meeting 			20 min	Whole LL
2. Validation impact assessment	<ul style="list-style-type: none"> - Validate results of impact assessment (first meeting functions as main input).¹ 	PowerPoint presentation	Refined narrative, impact pathway and indicators	30 min	Whole LL
2. Action planning	<ul style="list-style-type: none"> - Set the strategy and detailed plans for implementation <ul style="list-style-type: none"> o E.g. physical infrastructure, material, assessment techniques, social change, new practices. - Define measures, choose between: <ul style="list-style-type: none"> o The effect of a technical factor in the production system; o The impact of improved knowledge and practices; o Approaches aiming toward changing the production system; o The social learning in the process. - Risk assessment: how are potential economic losses covered within the project? 	Groupwork	Flipchart, post-its	60 min	Selected indispensable stakeholders by step 5



3. Closing	<ul style="list-style-type: none"> - Evaluation of this session - Set agenda together and divide tasks. Next step: implementation of action 	Evaluation can take place individually or in groups	Evaluation form	20 min	Whole LL
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¹More information about the impact assessment can be found in MS31.

³This meeting may also be combined with the first meeting (especially with an already existing LL).

Meeting 3 and 4: Evaluation of practice and further planning

<u>Step</u>	<u>Components</u>	<u>Methodology</u>	<u>Materials</u>	<u>Duration</u>	<u>Who?</u>
1. Networking	- Small talk			10 min	Whole LL
2. Evaluation of practice	- Evaluate the performance and effectiveness of the lab and assess to what extent the implication has relieved the key challenges or weaknesses. Make use of the observations and the measured data. - Are there new ideas or innovative concepts?	Group discussion		50 min	Whole LL
Break				15 min	
3. Specify and further planning	- Use feedback for continue adapting, specifying or expanding practices as appropriate. - In case of final meeting: What lessons have been learned? What are we going to do with it in the future?	Group discussion		20 min	Whole LL
4. Action planning⁴	- If needed, adapt the strategy and detailed plans for implementation. <ul style="list-style-type: none"> o E.g. physical infrastructure, material, assessment techniques, social change, new practices. 	Group work	Flip-chart, post-its	20 min	Selected indispensable stakeholders in first meeting
5. Closing	- Evaluation of this session - Set agenda together and divide tasks. Next step: implementation of (adapted) action.	Evaluation can take place individually or in groups	Evaluation form	20 min	Whole LL

⁴Not needed at final meeting.

8.5 The use of ImpresS ex ante to build impact in ROADMAP

In short, the LL will interact in ROADMAP with the WP6 activities of building impact of the research using the method called 'ImpresS', which is an acronym of 'IMPact of RESearch in the South'. It is an approach developed by CIRAD. As the title indicates, the methodology was developed to be applied particularly in the Global South.

It is possible to adopt a culture of impact before (ex ante) or after (ex post) the implementation of the intervention. In the case of the ROADMAP project, we will use the ex ante approach of the ImpresS method in order to formulate a shared vision. The ImpresS ex ante approach (<https://impres-impact-recherche.cirad.fr/ex-ante>) has been developed since 2017 and is based on ex post experiences, literature reviews and different workshops. It is a participatory, iterative and adaptive process focuses on stakeholder. Indeed, to build the most plausible impact pathway, the main protagonists are involved in the construction.

The ImpresS *ex ante* approach relies on three main principles:

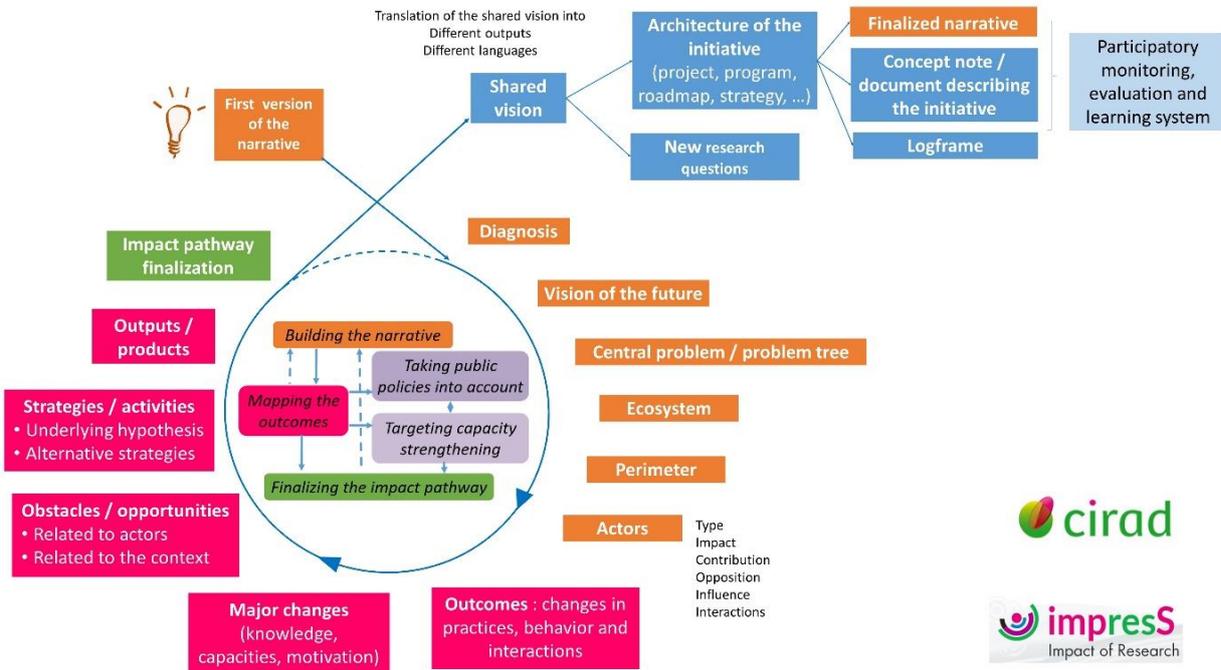
1. The generation of outcomes which is an appropriation (use, adoption, transformation, adaptation) of the intervention outputs by actors;
2. The impact is generated in the long term, hence, it is important to take into account clusters of past, present or future projects participating in the same innovation trajectory;
3. The construction of the plausible impact pathway must be built on the basis of a common vision of the future shared by the actors taking part in the intervention.

The approach is based on the perception expressed by involved actors and focused on how they perceive or experience the impact of research. The method is based on six phases, which will be described in short below, and touch on how we imagine that it can be used in LLs in ROADMAP across multiple contexts.

Steps of ImpresS according to the guidelines pp. 12-44:

1. Building a first hypothetical impact pathway, based on the initial diagnosis and need assessment;
2. Mapping outcomes ;
3. Taking into account public policies;
4. Strengthening capacities among stakeholders;
5. Finalizing the main impact pathway and designing alternative scenarios;
6. Design a participatory monitoring, evaluation and learning (MEL) system.

Impress ex ante: a participatory, iterative and adaptive process to better take impacts into account when building a research intervention



8.6 Integrating the impact culture into the living laboratory

The impact ex ante method will have to be built into the LL in the countries where case studies include work on impact (Belgium, Denmark, France, Italy, Vietnam). This means that participants to LL will have to commonly identify their vision of the future, the impact they intend to have and the central problem they want to work on. From there the Impress ex ante methodology will allow them to identify outcomes, major changes, obstacles and strategies. Among the desired major changes identified, the participants to the LL will choose the interventions they will co-create and test within the LL. The impact pathway and the contribution to the impact of the intervention will then be detailed. Indicators allowing to measure the contribution to impact will also be co-identified and monitored throughout the LL.

-
- 8.7 Forms to evaluate the progress in the Living labs (You will find this documents also on the collaborative platform)

WP3/WP4: Forms to report about progress in LL and to evaluate the

Background

In the H2020 project Roadmap, we use the approach of LL to develop measures to support prudent use of AM. For the project, leaders of WP3 and WP4 expect you to report about your LL meetings and the progress achieved.

The evaluation should also allow a “before and after” evaluation, where the “before” is about expectations, and the “after” is more an evaluation.

In parallel, we aim at evaluating the potential of LL for a sustainable and healthy transition of the agrifood system. This is why we would like to have a systematic evaluation of the meetings and outcomes by participants.

If you are scheduling a LL meeting, please also plan time for a joint **evaluation and documentation**. You could also think about using online tools like [mentimeter.com](https://www.mentimeter.com) or [kahoot.it](https://www.kahoot.it). This could become more relevant when the meetings take place virtually.

On the following pages, you find

- a form to report your LL activities and to document the meetings
- a form to evaluate the LL meeting and to conduct the evaluation

WP3

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What is an evaluation of Living Labs

At the end of each Living Lab, participants are given an opportunity to **reflect, discuss, and think**. This step should be included in each agenda of a LL meeting.

Moreover, also the Roadmap Team involved in WP3 and WP4 should evaluate the process after each LL meeting.

There are **several topics** to be addressed and covered in the evaluation of a Living Lab meeting:

- Motivation to attend the LL (only at the first LL meeting)
 - *Why did you attend this event*
 - *E.g. Interest in changing the production system, learning and access to knowledge, exchange with other people, because I know the organisers....*
- Quality of the process in the LL:
 - *What do you take from the Living Lab meeting today?*
 - *In what way do you perceive that the LL process is different from other processes?*
 - *In what way do you feel involved in the development of new strategies for prudent use of AM?*
 - *What did you like*
 - *What would you like to change with respect to the process in this LL:*
 - *What must we continue/keep doing?*
 - *What do we need to intensify/need more of?*
 - *What do we have to leave back/abandon?*
 - *What must we start doing? What do we need less of?*
 - *Do you think, Do you think that you view something different after today's meeting, and in case yes, please describe*
- Impact of the LL – behavioural change
 - *Interest to put into practice*

This process can be performed **individually or in small groups**. Often, people prefer an evaluation performed in small groups. This approach needs more time.

Each LL meeting should be evaluated. In the appendix to this document, you will find questionnaires for the evaluation of Living lab meetings either individually or in small groups. The evaluation of the first and the last Living lab meetings is slightly different! More information is given in the annex.

Feel free to add additional questions, but be aware, that this will need more time.

Methods for an evaluation

Option 1: Questionnaire for the evaluations of events by individual participants.

Here each person evaluates the event individually. Time needed to fill in the form about 10-15 minutes at the end of the event. You find a respective form in the appendix to this document.

Option 2: Evaluation of the LL by groups of up to 4 participants.

Divide the attendees into small groups up to 4 persons. The groups discuss first and write topics to be relevant, down, either on the cards or on a piece of paper.

The questions to be discussed are:

What did you learn today?

What would you like to implement in your daily practice?

What kind of support would you need s to implement what you have learned today on your farm?

The feedback is collected on a flip chart – all contribute, but only the new topics are added to the compilation

In case you work with cards: collect the cards and group or cluster similar topics. Try to find major headings for each group or cluster.

Time needed for the process about 30 minutes.

Questionnaire for the evaluation of Living Lab meetings by individual participants

Evaluation of the first Living lab meeting

Date:

Location:

Dear Participant,

Your feedback is essential to continually improve our dissemination activities during the EU-funded project ROADMAP. Please complete the following evaluation form and hand it to the group leader/workshop leader at the end of the course..

By filling in this form, you agree, that the information given is analysed.

Male	<input type="checkbox"/>	Female	<input type="checkbox"/>		
Your age		Profession			
Why did you attend this event?					
What do you take from this event (e.g. knowledge, inspiration, contact to other farmers and experts?)					
<i>What did you like today - What should be kept? What do we need to intensify?</i>					
<i>What would you like to change for the next meeting?</i>					
Regarding the meeting today, were your expectations regarding collaboration and involvement met?	<i>very well</i>	<i>well</i>	<i>Partly yes, Partly no</i>	<i>sufficient</i>	<i>insufficient</i>
<i>Could you explain, why?</i>					

Questionnaire for the evaluation of Living Lab meetings by individual participants

Evaluation of the 2nd/3rd Living lab meeting

Date:

Location:

Dear Participant,

Your feedback is essential to continually improve our dissemination activities during the EU-funded project ROADMAP. Please complete the following evaluation form and hand it to the group leader/workshop leader at the end of the course..

By filling in this form, you agree, that the information given is analysed.

Male	<input type="checkbox"/>	Female	<input type="checkbox"/>		
Your age		Profession			
What do you take from this event (<i>e.g. knowledge, inspiration, contact to other farmers and experts?</i>)					
<i>In what way do you feel involved in the development of new strategies for prudent use of AM?</i>					
<i>What did you like today- What should be kept? What do we need to intensify?</i>					
<i>What would you like to change for the next meeting?</i>					
Regarding the meeting today, were your expectations regarding collaboration and involvement met?	<i>very well</i>	<i>well</i>	<i>Partly yes, Partly no</i>	<i>sufficient</i>	<i>insufficient</i>
<i>Could you explain, why?</i>					

Questionnaire for the evaluation of Living Lab meetings by individual participants

Evaluation of the last Living lab meeting

Date:

Location:

Dear Participant,

Your feedback is essential to continually improve our dissemination activities during the EU-funded project ROADMAP. Please complete the following evaluation form and hand it to the group leader/workshop leader at the end of the course..

By filling in this form, you agree, that the information given is analysed.

Male	<input type="checkbox"/>	Female	<input type="checkbox"/>		
Your age		Profession			
<i>In what way the LL process is different from other processes? What ist the added value of the process for you?</i>					
<i>What would you recommend for other Living labs? What should be kept? What do we need to intensify?</i>					
<i>What did you like today?</i>					
Regarding the meeting today, were your expectations regarding collaboration and involvement met?	<i>very well</i>	<i>well</i>	<i>Partly yes, Partly no</i>	<i>sufficient</i>	<i>insufficient</i>
<i>Could you explain, why?</i>					

Evaluation of Living Labs by groups

Evaluation of the first Living lab meeting

Date:

Location:

Dear participant,

to improve Living lab activities continually during the EU-funded project ROADMAP, your feedback is essential.

Please discuss in your group the following questions:

- *Why did you attend this event?*
- *What did you learn today? What do you take from this event (e.g. knowledge, inspiration, contact to other farmers and experts?)*
- *Were your expectations regarding collaboration and involvement met?*
- *What did you like today - What should be kept? What do we need to intensify?*
- *What would you like to change for the next meeting?*

Share your thoughts on the questions asked above. For each question, please write down the 2-3 thoughts that seem most important in the group.

Evaluation of Living Labs by groups

Evaluation of the 2nd/3rd Living lab meeting

Event:

Date:

Location:

Dear participant,

to improve Living lab activities continually during the EU-funded project ROADMAP, your feedback is essential.

Please discuss in your group the following questions:

- *What did you learn today? What do you take from this event (e.g. knowledge, inspiration, contact to other farmers and experts?)*
- *In what way do you feel involved in the development of new strategies for prudent use of AM?*
- *Were your expectations regarding collaboration and involvement met?*
- *What did you like today - What should be kept? What do we need to intensify?*
- *What would you like to change for the next meeting?*

Share your thoughts on the questions asked above. For each question, please write down the 2-3 thoughts that seem most important in the group.

Evaluation of Living Labs by groups

Evaluation of the last Living lab meeting

Date:

Location:

Dear participant,

to improve Living lab activities continually during the EU-funded project ROADMAP, your feedback is essential.

Please discuss in your group the following questions:

- *What did you learn today? What do you take from this event (e.g. knowledge, inspiration, contact to other farmers and experts?)*
- *In what way the LL process is different from other processes? What is the added value of the process for you?*
- *What would you recommend for other Living labs? What should be kept? What do we need to intensify?*
- *Were your expectations regarding collaboration and involvement met today*
- *What did you like today - What should be kept? What do we need to intensify?*

Share your thoughts on the questions asked above. For each question, please write down the 2-3 thoughts that seem most important in the group.

9 Evaluation of Living Labs by groups by the country team

Form to document and evaluate the Living lab meeting

Living Lab Meeting Nr. (1-6)	<input type="checkbox"/>	Date			
Leader of the LL		Location			
Number of Participants		Number of women			
Main aim of this LL Meeting					
Describe the steps in the LL, the methods you used					
What was the result of the meeting					
What do you as an organiser/team of organisers take from this event (<i>e.g. knowledge, inspiration, contact to other farmers and experts?</i>)					
<i>Did you notice any relevant change in the process? Did you detect a relevant change in the process? Has there been a step forward in improving AMU or raising awareness?</i>					
<i>What did you like today - What must we continue? What do we need to intensify?</i>					
<i>What would you like to change for the next meeting What do we have to go back? What must we start with? What must we stop?</i>					
Were your expectations regarding collaboration and involvement met today?	<i>very well</i>	<i>well</i>	<i>Partly yes, Partly no</i>	<i>sufficient</i>	<i>insufficient</i>
<i>Could you explain, why?</i>					