IMPROVING ADVISORY SERVICES FOR SUSTAINABLE AGRICULTURE

Some reflections on the early stages of the AgriLink project's Living Labs

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"Two there are, who are never satisfied; the lover of the world and the lover of knowledge." Jalaluddin Rumi

Abstract
The H2020-project Agrilink aims to strengthen the contribution of advisory services to innovation in order to help realize more sustainable agriculture. AgriLink investigates the changing role of advisors and seeks to design improved tools and innovation support services for farmers. Within the project, the method of 'Living Labs' is used to explore how new tools can be made to work in practice, especially to stimulate the type of radical changes that are needed for a sustainability transition. Living Labs have been initiated in six different countries (Italy, Latvia, Netherlands/Belgium, Norway, Romania, Spain) to facilitate a multi-actor participatory design process. The Living Labs and the resulting improved innovation support are expected to contribute to the shift in knowledge regimes and design practices that are needed to realize more sustainable agriculture (Barbier and Elzen, 2012).

The European Network on Living Labs (ENoLL) defines Living Labs as user-centred, open innovation ecosystems based on a systematic user co-creation approach integrating research and innovation processes in real life communities and settings. In an attempt to bring some structure to the wide variety of Living Labs that have been created in the past decade, Enoll has defined the following five characteristics of Living Labs: real life setting, co-

creation, end user involvement, multi tool, multi stakeholder participation (EnoLL website, 2018). In an Agrilink Living Lab, researchers, farmers and advisors and other actors work together to develop and test new tools and services for better connecting research and practice. Thus Living Labs may help to address the apparent mismatch (as identified in the Sisa call 2018) between insights developed in research and the more detailed practical issues that are at stake in the real life setting.

In operationalizing the Living Lab concept Agrilink has built on the principles of Design thinking, Systems thinking and Reflexive monitoring. Principles of efficiency, efficacy and effectiveness (often used in soft systems methodology) and the five characteristics of a living lab as defined by ENoLL are translated into a reflexive monitoring approach for the Living lab process. Contextualising these principles to six different real life settings provides a rich empirical basis for understanding how this type of participatory design takes shape and functions under different local contexts (eg Klerkxs et al (2017).

The authors are some of the researchers involved in the AgriLink Living Labs and the inquiry process is at a relatively early stage. This paper will address the following issues:

- How to operationalize the Living Lab approach using the principles of design thinking, systems thinking and reflexive monitoring in the early stages of the Living Labs?
- What do we learn about the participation of different stakeholders in the design process during the early stages of the Living Labs?
- What are initial insights in on key issues that influence the development and functioning of the Living Lab?

The creation of the Living Labs started mid-2017 and the process will continue until 2021. From the exploratory phase it seems that the following two characteristics are key to determine an appropriate arrangement of a Living Lab: 1) the mix of public and private good issues involved and 2) the advisory challenge at stake. For example in some labs such as the one in Romania the sustainability challenge is quite straight forward: to improve access of a specified group of producers to available agricultural knowledge and market information. The advisory challenge is to best serve the farmers private interest to improve their farm livelihoods. Advisors are likely to be change agents in this situation. Other labs, for example the joint Dutch Belgian lab, focus on situations where ecological sustainability is a much larger public and political issue. This leads to a more complex dynamic in the lab and raises different issues than in the Romanian example. Our first experiences suggest that it makes sense to distinguish between Living Labs concept that focus on public good issues and those that focus on private good issues. These distinction seems to have consequences for the stakeholder field, the advisory challenge and the reasons to search for participation and thus the functioning of the Living Lab for participatory design of advisory services.

KEY-WORDS : SUSTAINABLE AGRICULTURE, LIVING LAB, ADVISORY SERVICE, PARTICIPATORY DESIGN, DESIGN THINKING, REFLEXIVE MONITORING

INTRODUCTION

The development of the agricultural sector across Europe is supported by various agricultural knowledge innovation systems (AKIS) that supply information and develop knowledge to support innovation. Of relevance to science, farmers and other stakeholders, one component of such knowledge and information systems is the advisory subsystem. Its goals is to support farmers in the overall farm management which covers several specific topics like soil management, pest management but also financial management (Jansen and Klerkx, 2010). Most governments in Europe at varying times during the 20th century had a leading role in the formal development of advisory systems and the main focus was to ensure sufficient food production to feed the population (PROAKIS, 2014).

During the late 20th and early 21st centuries both the organisation of the advisory services and the challenges to the agricultural systems have changed considerably. Awareness, concern and attention to sustainability challenges grew and governments have gradually withdrawn from actively supporting advisory services. It is interesting to observe how these two developments have taken place simultaneously, without directly being related in a causal or intentional manner. Privatisation and commercialisation in agricultural advisory systems have been fed by liberal market thinking and have become ongoing processes for over 30 years now in some parts of Europe. The EU SCAR group (2015) has made an analysis of this process. The expected benefits of privatisation are greater efficiency of service provision in terms of costs and resource allocation, increased provider accountability, a demand-driven elaboration of contents, and an emphasis on benefits and results. Competition is assumed to ensure constant improvement in the quality and diversification of goods (Klerkx *et al*., 2006). However, in practice there have also been some potentially more negative implications of privatising or commercialising advisory services described by the EU SCAR-group (EU-SCAR, 2015, p.104) as:

1. "the tendency toward a reduction of linkages both among organizations and among farmers in the exchange of agricultural and other relevant information;

2. the tendency to enhance advice for large-scale farms and to emphasize less on small-scale or less commercial farming;
3. the advancement of knowledge as a saleable commodity which makes it prone to interest biases of the advisor (Rivera and Cary, 1997) and
4. the diminishing emphasis on public-good information regarding for example environmental issues, mostly dealt with in a rather short-term perspective (Labarthe, 2009; Klerkx *et al*., 2006)."

With hindsight it is rather ironical that these developments took place at the same time. The sustainability challenges need profound changes in the knowledge systems and require exactly those knowledge processes and content that have been weakened by privitisation. As Koutsouris (2008, p205) highlights the changes that are needed, 'the shift from conventional farming to more sustainable forms of agriculture concern a systemic change and thus involves .... a profound change in assumptions and strategies underlying subsequent actions'. Jansen and Klerkx (p.150) cite Leeuwis and Van den Ban (2004) and Nettle and Paine, (2009) in describing what changes this implies for the role of the advisor: "Instead of being mere technical experts prescribing solutions, advisors must take on the role of coach, sparring partner and facilitator from a reflexive and adaptive position." This situation calls for innovative advisory services to better face the knowledge needs of the farmers and other stakeholders to deal with the sustainability challenges in their specific contexts. The AKISs and the advisory systems and the agricultural and sustainability challenges are very diverse from one context to another. This diversity requires a participatory design of such innovative advisory services in order to take multiple perspectives into account.

Inquiry processes known as Living labs, that have largely emerged in the early 2000s, seem to have potential to provide an appropriate space for such participatory design process. Living labs are broadly defined as user-centred, open innovation ecosystems based on a systematic user co-creation approach integrating research and innovation processes in real life communities and settings (EnoLL website, 2018). EnoLL identifies five characteristics of Living Labs: real life setting, co-creation, end user involvement, multi tool and multi stakeholder participation. Their rationale for using Living Labs in the context of agricultural advisory services is discussed in the next section.

In this paper we will explore how participatory design for improving advisory services can work in practice. To this end we introduce the case of the Horizon 2020 project 'AgriLink' and more specifically an inquiry

process that has been designed and initiated through Living Labs in Italy, Latvia, Netherlands/Belgium, Norway, Romania, Spain.

In operationalizing the Living Lab concept Agrilink has built on the principles of Design thinking, Systems thinking and Reflexive monitoring. Principles of efficiency, efficacy and effectiveness (often used in soft systems methodology) and the five characteristics of a living lab as defined by ENoLL are translated into a reflexive monitoring approach for the Living lab process. Contextualising these principles to six different real life settings provides a rich empirical basis for understanding how this type of participatory design takes shape and functions under different local contexts (eg Klerkxs et al (2017). Further details of these principles, characteristics and settings are elaborated in later sections.

Overall, this paper aims to contribute on the one hand to the insights on improving the capacity of advisory services to face the challenges of sustainable agriculture and on the other hand to understanding the value of using participatory design in a living lab setting as an effective tool in such processes. Since the inquiry process is at a relatively early stage, this paper will focus only on issues that we feel able to comment on at this stage, namely:

- How to operationalize the Living Lab approach using the principles of design thinking, systems thinking and reflexive monitoring in the early stages of the Living Labs?
- What do we learn about the participation of different stakeholders in the design process during the early stages of the Living Labs?
- What are initial insights in on key issues that influence the development and functioning of the Living Lab?

The authors of this paper are all involved in the Living Labs work package of AgriLink along with many others. One of the roles of the lead author is as the monitor of the Dutch/Belgian Living Lab.

The rationale for the AgriLink Living Labs and their approach

The H2020-project Agrilink aims to strengthen the contribution of advisory services to innovation in order to help realize more sustainable agriculture. AgriLink investigates the changing role of advisors and seeks to design improved tools and innovation support services for farmers. The

project has seven interconnected work packages as shown in Figure 1, The Living Labs comprises work package 3.

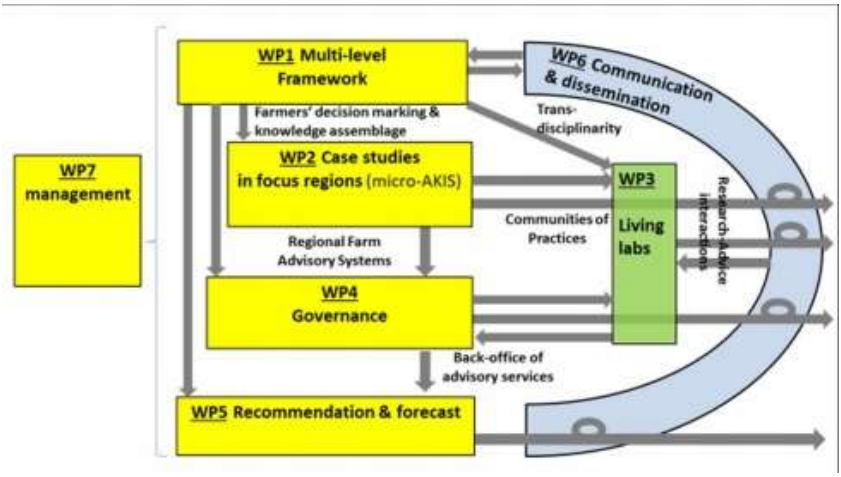

Figure 1 AgriLink work packages structure. Source: AgriLink conceptual framework p.14

Within the project, the method of 'Living Labs' is used to explore how new tools can be made to work in practice, especially to stimulate the type of radical changes that are needed for a sustainability transition. The aim of the AgriLink Living Labs is to develop and test improved innovation support services with potential to stimulate transitions towards more sustainable agricultures. The assumption is that doing this in a Living Lab setting leads to better results. A Living Lab setting as characterised by ENoLL means involving stakeholders and end users in a co-creation process in a real life setting. A further assumption is that multiple tools and methods can enhance the process and support Living Labs. At the end the Living Labs and the resulting improved innovation support are expected to contribute to the 'shift in knowledge regimes and design practices' that Barbier and Elzen (2012) argue is needed to realize more sustainable agriculture. Agrilink Living Labs have been initiated in six different countries (Italy, Latvia, Netherlands/Belgium, Norway, Romania, Spain) to facilitate a multi-actor participatory design process.

As mentioned earlier design thinking, systems thinking and reflexive monitoring are key aspects of AgriLink's Living Lab approach. *Design thinking* is a method for practical, creative resolution of complex and ill-

defined problems (Bootcamp,2010). The recommended stages in design thinking are *empathise, define, ideate, prototype*, *test and implement*. These stages are used in an organic, non-linear way to organize the support to the living lab teams. The stages are used as building blocks of an iterative process, going back and forth through them. *Systems thinking* is an approach to thinking about and acting in the world that recognises interconnections and contexts by creating systemic (holistic) representations of what 'we' perceive about situations. It is very suited to participatory, action-oriented research and is complementary to more systematic, reductionist methods embodied in the scientific approach. It complements design thinking in the way that it approaches the understanding of messy or complex situations for some purpose, usually to effect some changes. Systems thinking in practice deals with: understanding inter-relationships, engaging with multiple perspectives and reflecting on boundary judgements (Lane, 2017). *Reflexive monitoring* involves active reflection on the part of researchers and practitioners, to critically look at their own practices, their views and their ways of doing things. Reflexive monitoring offers tools to stimulate reflexivity in co-creation processes whilst also collecting relevant data on the processes that can later be used to compare and contrast the Living Labs.

Design thinking, systems thinking and reflexive monitoring have been identified by the AgriLink Living Labs work package team as aspects of particular relevance to AgriLink's aims and context. The processes involved in all three enable multiple perspectives of stakeholders to be appreciated while recognising that researchers have their own perspectives and make their own assumption which need to be made explicit in order for co-creation of knowledge to occur. The three conceptual pilars have all emerged from a wide diversity of practitioner and academic traditions that offer a range of tools to help facilitate such group processes and improvements in complex and messy situations.

The three aspects of AgriLink's Living Labs approach have been brought together in both design and practice of activities at the level of these individual Living Labs and at the level of the work package where the Living Lab teams work together. Figure 2 shows how reflexive monitoring (M) and evaluating (E) is intended to help link the stages of design thinking and how these stages are contextualised and part of an iterative process.

Figure 2 Contextualised and iterative design thinking with monitoring and evaluation. Source: Adapted by Hanne Leirs, based on Bootcamp, 2010 and AgriLink discussions.

DEVELOPING THE LIVING LABS: SOME INITIAL FINDINGS

The creation of the Living Labs started in mid-2017 and the process will continue until 2021. Two criteria were important in selecting the topic and setting of the living labs. The first was relevance to sustainable agriculture, the selection of a topic with a clear sustainability challenge in which the potential role of advice was expected to be significant. The second was more pragmatic: ease of implementation. The topic and setting of the different Living Labs was selected in such a way that good relations pre-existed with the relevant stakeholders and the living lab was in some cases embedded in a wider project or program. Table 2. provides an overview of the six Living Labs, the main topic and the sustainability and advisory issues at stake. Important to note that these selection criteria were the implicit starting point but have been further developed and made explicit iteratively through the Living Lab process.

Country	Topic	Sustainability challenge	Advisory challenge	Advisory service in development
Italy	Local food production on common land and development of local value chain	Improve **income** situation, communal strength and **environmental** sustainability	Facilitate community development and provide knowledge on a broad range of topics to a diverse stakeholder group.	To be determined: an advisory service able to support multi-actor groups in the sustainable management of common land
Latvia	Processing and marketing of horticultural products	Improve the **profitability** of horticultural production and the **living standard** of small producers	Make relevant knowledge available to small scale producers	Online information platform for processing and marketing
Netherlands - Belgium	Sustainable soil management in maize cultivation	Improve maize **production** and reduce **environmental** impact of maize cultivation. Leaching, pesticide pollution of surface waters.	Stimulate and enable farmers to apply more sustainable soil management in maize cultivation	Three different tools: • Decision support tree on catch crops • Nitrate tour to increase awareness • Kitchen table talk between farmer, contractor and advisor
Norway	Crop rotation on farm and between farms	Strengthen use of local **natural resources** and improve **income** for farmers	Stimulate and enable farmers to apply crop rotation on farm and between farms.	To be determined: an innovation support services and tools that facilitate crop rotation
Romania	Professionalization of food producers cooperative	To improve **income security** of food producers	Improving the access to reliable, timely information for one cooperative	Design training and informational materials to suit their needs OR identify relevant experts with key knowledge
Spain	Integrated pest management	Reduce **pesticide use** to increase food safety and reduce air pollution, contamination of agricultural land and loss of biodiversity.	Improving the knowledge and skills of farmers and advisors to apply IPM. Development of new roles of advisors, as supporters of digital services and ICT specializations.	• Warning Digital System and collaborative monitoring of pests (Agrointegra) • IPM Thematic group of farmers for innovation and demonstrations.

Table 1. Overview of the six Agrilink Living Labs

The table shows a great variety of producers is involved in the Living Labs ranging from small scale horticultural producers in Latvia and Romania to commercial vegetable, dairy and arable farmers in Spain, Norway and the Netherlands and a variety of community level stakeholders in local communities in Italy. In the objectives of the labs two groups can be distinguished. On the one hand the labs that aim to stimulate the development of a specific part of the value chain for a certain product and stakeholder group. On the other hand the labs that aim to stimulate the application of specific sustainable practices like crop rotation, IPM and sustainable soil management. For the further understanding of the dynamics in the labs it is important to note that the first group focus on sustainability challenges where predominantly a private good issue is at stake, the living labs in the latter group focus on public good issues.

The overview of the advisory challenges and 'advisory-services-in-development' highlights some differences and trends. Some labs aim to improve the availability of relevant knowledge to the stakeholder groups, this type of advisory service tends to be about traditional knowledge transfer with the advisor in the role of expert. This strategy is being developed in Latvia, and Romania. These labs operate in situations where the advisory system for the topic is weakly developed and the end user has a relatively low level of professional formation. Other labs aim to support a certain sustainable practice by stimulating and enabling stakeholders to apply it, on their farm or in their community. This tends to be the case in the Netherlands/Belgium, Norway, Spain. This latter approach implies a more facilitative role of advisory services and strategy. In these situations the advisory systems and associated professions tend to be rather well developed. The Italian living lab is still in the exploratory phase so it is too early to make statements about its strategy.

The Living Labs are being developed through close cooperation between a small international work package team and the six living lab teams. The work package team is responsible for coordinating and supporting the creation of and learning in the Living Lab teams, and to provide guidance and support to the learning in and between the Living Labs. Each national living lab team includes a facilitator and a monitor. The two work closely together and share the responsibility for creating the living lab, but have a different focus in their activities. The facilitator is more focused on running the lab and the monitor on data collection and reflecting on the process.

During the first year the focus was on the formation of the Living Lab teams, the selection of topic and setting, assessing the context of the living lab and entering the dialogue with the stakeholders in order to define the focus of the Living Lab. Table 2 details the early activities of Agrilink Living Labs that have provided opportunities for developing knowledge and understanding. These were also occasions for the data collection on which this paper is based.

Activities	Content	Date
Workshop during kick off	Mapping the setting of the six LL	June 2017
Start-up skype with each of the LL teams	Initial ideas for the LL	September 2017
Follow up skype	Outline of the living lab stakeholder dialogue	October 2017
Articulation of core challenges for providers of new Innovation Support Services	Perspectives of the different stakeholders	December 2017
2-day workshop	Training, context appreciation, exchanges and LL design	February 2018
Workshop during annual meeting Aberdeen	Exchange experiences and define monitoring questions	June 2018
M&E plans of the living labs	Questions and method of data collection	July 2018
Reflection memo's of quarterly progress	Progress, lessons learned and challenges	September 2018
Update conversation with each of the LL teams	Progress lessons learned and challenges	September 2018
Workshop Leuven with all the LL teams	Training and first analysis of experiences	September 2018

Table 2. Early activities of AgriLink's Living Labs used to develop knowledge, understanding and data.

Participatory design of the Living Labs took place at two main levels – across the Living Labs at the level of the work package and within each Living Lab. The principles of co-creation and multi-stakeholder participation were enacted in a range of different ways. Across the Living Labs, the workshops were designed in ways that facilitated participation of all attendees using a range of tools such as diagramming and small group work with feedback to the whole group to help understand multiple perspectives. The design of workshops tailor-made to the processes in the Living Labs was largely the responsibility of the central work package team, but attendees from the Living Labs were asked for their interests, ideas and feedback throughout the process. Within each Living Labs, facilitators and monitors with others in their teams took responsibility for the design process. Although all involved a range of different stakeholders, the ways in which this was done varied, with the ideas of co-creation and participation being introduced at different stages, some from the outset and some after some of the initial scoping and design work had been done. In part this reflected other starting conditions and trajectories of each Living Lab. Some built on previous projects, others started new processes in a range of different systems of interest. This participatory design process is still ongoing and it is too early to give full details so they will be discussed in a later paper.

DISCUSSION

In this paper we set out to consider

- How to **operationalize** the Living Lab **approach** using the **principles** of design thinking, systems thinking and reflexive monitoring in the early stages of the Living Labs?
- What do we learn about the **participation of different stakeholders** in the design process during the early stages of the Living Labs?
- What are initial insights in the **key issues** that influence the development and functioning of the Living Lab?

In the following paragraph we discuss each question in turn.

Operationalising the Living Lab approach and the principles

The building blocks of design thinking, systems thinking and reflexive monitoring for the Agrilink Living labs as explained in the rationale have so far provided inspiration to the Living Lab teams in developing a participatory design process of advisory services. Furthermore they are used to provide support to the living Lab teams, to create a common language and enable a mutual learning process. Reflexive monitoring and systems thinking have been used respectively to maintain a holistic view on the situation and to create a culture of learning and reflexivity. A range of tools and techniques have been used for these purposes, such as systems diagramming, a conceptual framework for reflexive monitoring and various templates that make explicit relevant measures, questions and processes. A monitoring and evaluation plan has been developed and agreed for the work package as a whole with accompanying monitoring and evaluation plans for each Living Lab. The very process of formulating the monitoring and evaluation plan was an opportunity for making the own assumptions, monitoring questions and learning objectives more explicit, share and discuss them within the Living Lab team and between the Living Labs. The steps of design thinking are being used in an organic way to organize the support to the living lab teams. Although we are using them in a non-prescriptive way, they have so far proved quite useful in sharing methods and lessons learned in the process.

All living labs have started the ***empathise*** phase with an analysis of the context in which the Living Lab is taking place and a stakeholder

analysis. They have entered into a dialogue with the main stakeholders about their perceptions of the situation, their interests, the challenges, the role of advice and possible solutions. A checklist and some guidance was provided for 'semi-structured' interviews. During the ***define*** phase the Living Lab teams defined the outline of their lab, specifying, amongst others the focus of the lab, the sustainability and advisory challenge and the need for additional knowledge and skills. During the ***ideate*** phase the aim was to set the boundaries of the innovative advisory service and to come up with different possibilities of advisory services that could help to make progress on the sustainability challenge. Besides workshops and informal conversations the information collected during the initial stakeholder interviews was an important source here too. Currently, the living labs are moving towards the last three steps of design thinking: prototype, test and implement. Most Living Labs have roughly demarcated the advisory service they are going to develop (the last column in table 2) and some have started making a first prototype indicating the content and form.

During the first year of running the labs, the ENoLL characteristics of a living lab were introduced and discussed. The following interpretation of these characteristics has been used as starting point:

- Real life setting: The advisory service is developed and tested in the setting it is going to be applied in thus making it applicable in practice.
- Active end user involvement: The end users of the advisory service are actively involved in the Living Lab process in a meaningful way, thus ensuring the quality and the implementation of the advisory service.
- Co creation: The advisory service is created building on the skills, experience and knowledge of all relevant stakeholders, to who share ownership of the process and the result.
- Multi tool: In the design process different tools are applied as relevant to facilitate the creation process and involve the stakeholders.
- Stakeholder participation: A variety of relevant stakeholders participate in the development and testing in accordance to their interest and capacities.

Again the intention was not to use these characteristics prescriptively but for guidance, building on their use by others in the ENoLL network. The definition of these characteristics as outlined above were the result of a mutual learning process between the Living Labs. The challenge how to apply these characteristics has been left to the judgement of the Living Lab teams, giving them space and room to find their own way and adapt them

to their context. However, guidance has been given both in training sessions and in the work package monitoring and evaluation (M&E) plan. In their own M&E plans each lab started to indicate how they are using these different aspects.

At the September 2018 workshop (see Table 2) the importance of the ENoLL characteristics in the different phases of the design thinking process was assessed, shared and discussed between the Living Lab teams. This resulted in the following impressions. In the ***empathise*** phase of the design process especially the 'real life setting' and the 'user involvement' was given importance. The main task at this stage was to understand the problem perception of the users and the context. The LL teams have also found the participation of the broader stakeholder group important, but less so than the involvement of the end user, in most cases the farmer. During the ***define*** phase of the process the end user involvement is still very important but the real life setting was seen as less important. Several, but not all, labs are involving the end user as co-creator in defining the scope of the living lab. This is justified by refering to the notion that that the definition of the scope of the Living Lab should be in accordance with the views of the end user. Others perceive the definition of the scope of the Living Lab more as a back office task based on the insights gathered during the emphatise phase, and decided not to bother the stakeholders with this. During the ***Ideate*** phase the end user and real life situation are still important but the most importance is given to the wider stakeholder group. The ideate phase is organised as a co-creation process in half of the Living Labs, the other half use the ideas from the empathise phase as a basis to make a list of possible advisory services and discuss this with the stakeholdersThough various tools have been used in the earlier phases, only at this stage the Living Lab teams give explicit importance to the use of multi tools to stimulate creativity and facilitate the input of ideas from the broad stakeholder group. Following this logic one could perhaps expect that in the **prototype** phase the end user involvement, co creation and stakeholder participation becomes more important and in the **testing** the real life setting and the end user are the most important aspects to facilitate. However also in these phases the different Living Labs will give different meaning and implementation to the characteristics thus providing a rich basis for learning.

It is too early to draw conclusions on the consequences of these differences in the way these characteristics and principle are used. It seems however that the initial vagueness of the Living Lab concept and the choice to abstain from prescriptive instructions and use the characteristics as inspiration created a rich space to learn about the methodological choices to be made and the relevance and form given to these characteristics.

Observations on stakeholder participation

Some initial observations on participation in the design process in the Living Labs can be shared. The Living Lab thinking distinguishes between end users and stakeholders and co-creation. Of course these are overlapping categories, since the end user holds a stake and co-creation is a way of participating. Nevertheless, in our experience so far it does appear to make sense to put an extra focus on the end user and co-creation to avoid the creation of a general multi-stakeholder process in which the end user is merely absent or only consulted. The ENoLL characteristics in the context of reflexive monitoring are being used in the Living Labs as a reminder to ask from time to time whether the right stakeholders are involved in the appropriate way.

Another observation that seems relevant to mention, is a difference between the types of stakeholders who are participating in the different phases. Whereas in the early phases participation of a wide range of stakeholders that influence the sustainability challenge was sought. In the define and ideate phase specific stakeholders are invited for their knowledge or skills contributions. These same stakeholders are likely to be involved in the prototyping. Whereas in the early testing it would be important to focus on the end user and invite the original wider range of stakeholders to provide feedback. In summary, the initial experiences in the Living Labs indicate that sometimes the separate characteristics are overlapping, and distinction is merely a reminder not to forget important focus points and on other occasions it seems relevant to make more distinction within the characteristic of stakeholder participation. With the progress of the participatory design processes we will continue to observe how these characteristics are most useful in developing improved advisory services.

One key issue that has arisen regards what stakeholders are invited to participate and in what way. Were stakeholders mainly consulted, invited to discuss a proposal or to co-create? What boundaries were set before the stakeholders were invited? For example in some of the Living Labs the topic was established before the process started. Besides the preference, assumptions and values of the Living Lab team the possibilities to invite participation also depends on the active interest on the topic and the level of formation of the stakeholders. For example in the Dutch-Belgian lab it is quite a challenge to actively involve farmers in thinking about improved advisory services. Firstly because the farmers' sense of urgency around sustainable soil management in maize is not so high and secondly because their expectation of the contribution of advisory services was moderate. The Living Lab team dealt with this situation by listening

carefully to the concerns of the farmers and out of that understanding identified different smaller topics that had the interest of some farmers and identified some other stakeholders that shared that interest. This way three smaller living lab were created around smaller topics.

Another issue that we will take forward is the capacity, ability and permission to participate in a meaningful way in the design process. The Living Lab concept as with other participatory design methods seems to be based on the premise that the design objective is clear and shared and all stakeholders are equally able to take part. In the reality of designing advisory services for sustainable agriculture this is often not the case. In many contexts, the distribution of power, capacity and resources is generally imbalanced (Hiemstra et al, 2013). Also in the Living Labs the meaningful participation of end users and other stakeholders is a key issue. For example in the case of Romania the Living Lab team experienced that the end users were uncertain about articulating their needs since they were not aware of the possibilities. What the Living Lab team did was to try to first fully understand the perspective and values of the end user and then to involve other stakeholders in the ideate and prototype phase to formulate the information supply. Another important option could be to invest time and attention to assist the end user to articulate their needs. In this case it requires some creativity to find meaningful ways to involve the end user in the development of the prototype.

The questions raised in the above section illustrate the different aspect of participation that will be explored in the further development of the Living Labs in order to understand how meaningful participation in the design of advisory services can take shape in different contexts and for challenges.

Key issues for the development of the Living Labs

In this section we zoom out and attempt to link the initial experiences in the Living Labs to the original sustainability challenges in agriculture and the advisory system as they were introduced in the first section of the paper. As stated earlier it is too early to provide answers or definite conclusions, however it makes sense to identify some key issues and raise follow up questions at this stage. The question we would like to contemplate in this final section of the discussion is what issues seem to be relevant in describing the differences between the Living Labs and share the initial observations on the consequences for the Living Lab process.

The difference between public good and private good issues that was mentioned earlier seems to be an important criteria here because it seems to relate to other aspects of the advisory challenge and the Living Lab process. We cannot be too precautious in mentioning that these are initial ideas and observations. We would like to bring them into discussion for the sake of learning and further assessing the Living Lab experiences. Below an attempt to specify some differences between the labs that focus on public and the ones that focus on private good issues. On the one hand the Latvian and Romanian Living Lab are dealing with private good issue. The aim is to increase income by processing and marketing of their produce. These challenges are rather straightforward, the producers lack the connection to the market to create added value. Though the various stakeholders involved in the market chain may differ in their interest, there is not so much conflict to be expected between interest. The challenge directly serves the interest of the farmer as the end user and the client of the advisor. As we saw earlier the advisory challenge is to improve the producers access to information and skills to be able to connect to the market and create extra value. The advisor is one of the change agents and can remain in the traditional role of expert.

On the other hand the Norwegian, Dutch-Belgian and Spanish Living Labs are dealing with public good issues. The aim is to reduce the environmental impact of agricultural production. These are quit complex challenges where different solutions exist and need to be developed and different stakeholders involved have different interest that do not naturally point in the same direction and may even conflict. For example in the case of the Dutch Belgian Living Lab the water board has a strong need for more clean agricultural production to meet the EU regulations for water quality. Many farmers do not seem to have strong perception of the need to change maize cultivation practice and some advisors feel tension between the long term needs and the short term interest in maintaining a good relation with the farmer or selling agricultural inputs. Attention is needed to create a common ground, a sense of urgency or negotiate an agreed objective of the Living Lab. This situation requires a strong facilitative role of the advisor, however the motivation or interest to take that role is not always clear. In these cases of public good issues it remains a question whether an advisor acts as change agents or more as defender of the status quo.

These differences seem to influence the development and functioning of the Living Lab. For the private good issue the motivation for searching participation seem to be born from the desire to better serve the needs of the end user and the desire for high quality input in the process. All the features above contribute to a quit straight forward setting for organizing a

Living Lab for participatory design of advisory services. In the case of public goods issue participation of different stakeholders is more serving the need to negotiate the interests of the different stakeholders, get buy in from them and create a shared perspective. In this setting involving the end users and different stakeholders in the Living Lab proves to be quite a challenge since interest diverge and the benefits for the end user are not always clear. Table 3. Provides an overview of the initial ideas how the nature of the issue involved in the lab influences the Living Lab process.

Focus of the Living Lab =>	**Private good issue**	**Public good issue**
Complexity of the challenge	Relatively low	High
Level of congruence in interest between stakeholders especially the end user and advisor	High since the issue is directly serving the advisor client ie the end user	Lower since the issue serves not only the end user but also the public good.
Nature of the knowledge process	Transfer of knowledge is often sufficient	Awareness raising and Co-creating knowledge and balancing interests is often needed.
Role of the advisor	Expert or trainer	Sparring partner, facilitator
Reason for participation	Participation serves the quality of the developed technology	Participation of different stakeholders is needed to negotiate the interests of the different stakeholders
Ease of organising a Living Lab	Relatively easy since the stakeholders have a common interest and challenge	Relatively difficult to get the stakeholders together since interest diverge and the benefits for the end user are not always clear.

Table 3. Initial ideas how the nature of the issue influences the Living Lab.

In the follow up in the Living Labs it seems relevant to further explore how these and other differences and issues influence the of the Living Labs and the participatory design process.

Finally it is important to keep a broad scope. Next to the participatory design of improved advisory services it is important to look into alternative causes of suboptimal functioning of the advisory systems. As was indicated in the introduction it is often the commercialization of the advisory services and the drawback of the government from extension that contributes to the reduction of knowledge exchange and hampers the spreading of sustainability information and weakens the access to knowledge by small scale farmers. Next to a focus on the design of innovative advisory services it is important that public institutions take

their responsibility in supporting the full agrarian population and the public good. Maybe involving these public institutions in the Living Lab process could be a way to start to make this point.

CONCLUSIONS

This paper describes and reflects on the initial stages of design and implementation of the AgriLink project's Living Labs. It is too early for in-depth analysis of outcomes but is intended to illustrate the thinking that is underpinning our process and some of the challenges that are emerging. For instance we cannot yet comment on the efficiency, effectiveness and efficacy of AgriLink's living lab approach but we do expect to able to do so in time.

So far, our experience shows that setting up a living lab is quite an intensive and costly process to undertake but seems likely to have a range of benefits to different stakeholders. The extent to which we will be able to compare and contrast these Living Labs, which are in diverse contexts with different emphases, also remains to be seen. Our first experiences suggest that the Living Labs concept seems to be more appropriate and relevant to apply in complex sustainability challenges, then in straight forward development support. However, the process of working across as well as within the Living Labs is already providing valuable opportunities for learning. The approach of using the ideas of design thinking in the context of systems thinking and reflexive monitoring is also providing a supportive structure and framing for the Living Lab inquiries for those involved.

The ENoLL characteristics have provided a useful starting point though we expect there to be some variations across the Living Labs regarding which are found most useful and appropriate. We anticipate that further or revised characteristics of these Living Labs are likely to emerge. Key issues that have arisen so far include how which stakeholders get involved in what, how to value and build on the Living Labs similarities and differences and how a focus on public or private goods influences the Living Lab process. We already have many questions that we are investigating, for example When is the innovation of advisory services the appropriate intervention and when is a living lab a good setting to do so? What kind of participation is required in what situation? But also when do other interventions more effective in improving the advisory system. As the project progresses we hope to be able to address these and many

other questions in order to help improve a range of AKIS situations in our Living Lab countries.

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