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11. Ethical considerations of Living Labs

Julia Nevmerzhitskaya

Do ethics matter to Living Labs? How can Living Labs ensure that the solutions they develop are in line with applicable laws and contribute to the responsible conduct of research? What are the challenges of involving diverse stakeholders and users in the innovation process in a fair way? These questions form the basis for this article, which aims to discuss ethical considerations related to projects involving Living Labs.

Living Labs is a concept used mainly in the context of collaborative development aimed at solving complex societal needs. According to Björklund et al. (2017), collaboration can be defined as the transfer of knowledge from one party to another in an open and safe environment where all actors give and receive valuable information and ideas. This process may also be referred to as co-creation, which is understood as defining and solving shared problems with a systematic approach in close cooperation with multiple actors of diverse backgrounds. Despite there being no generally accepted definition of Living Labs, it is agreed that Living Labs are based on a systematic user co-creation approach, integrating research and innovation processes in real-life communities and settings, as stated by the European Commission (2016). Different definitions of Living Labs include Labs as spaces or environments (Almirall et al. 2012), Labs as networks (Leminen et al. 2012) and Labs as methodologies for user engagement (Eriksson et al. 2005). From a research point of view, Living Labs utilize participative research methods and experimental design.

Ballon and Schuurman (2015) argue that European Living Labs are based on five key elements: active user involvement, a real-life setting, multi-stakeholder participation, a multi-method approach, and co-creation. From an ethical point of view, these elements represent a number of challenges. Ethical challenges related to Living Labs are usually associated with participatory research ethics, emphasizing participant engagement and ethical codes of conduct related to participant privacy and consent, i.e., the user involvement element. However, ethical considerations of Living Labs go far beyond that of user involvement and include more complex issues such as the choice of actors in a Living Lab ecosystem, reliability and validity of Living Lab

methodology, and the ethics of decision-making (see, for example, Sainz 2012, Schaer 2017; Chasanidou & Karahasanovic 2016). In this article, we address ethical considerations based on key Living Lab elements and use examples from an ongoing EU-funded project to illustrate the complexity and importance of ethics in Living Labs.

ETHICAL ISSUES RELATED TO LIVING LABS

Active user involvement

The involvement of users in Living Labs is a complex and ethically challenging task. In any type of development activities that involves human participants, it is important to consider ethics. The European Commission developed guidelines for ethics self-assessment for projects addressing human participants (EC, 2019). The guidelines apply to Living Labs, as Labs are based on the participation of humans and often involve collection of personal data from Living Lab actors, interviews, observations, tracking and the secondary use of information provided for other purposes.

The key aspect when involving users in Living Lab activities is to obtain informed consent, meaning that all users taking part in Living Labs are fully informed about and agree to the purpose of the activity, types of data collected, how these data will be used and by whom and what happens to their data after an activity is completed. In addition to consent, it is also essential to ensure that all volunteers participate of their own free and that everyone has the right to refuse to take part and to withdraw their participation or data at any time without consequence. If Living Lab activities require participation of children or other user groups who are unable to give informed consent, a legally authorized representative such as parent should provide consent.

In addition to consent, an ethically important issue in user involvement is related to the role of users, i.e., whether they are perceived as objects (which are needed in order to make better business) or subjects (who are real change-makers in society). In Living Labs, end-users are, or should be, considered actors, not factors of participatory RDI processes, and everyone is considered able to and allowed to innovate and therefore has the opportunity to participate in co-creation and trial activities. For inclusive solutions, the involvement of non-users may be needed.

Another ethically notable aspect is whether or not users should be aware that they are a part of a Living Lab. Some studies report that Living Lab actors may consider it acceptable to not notify the users or to only notify them after the experiments have been carried out. A recommended code of conduct is to always inform all actors.

A real-life setting

Living Labs are not closed, controlled laboratories but rather real-life situations so development and testing activities and the actual use of products take place in various operating environments during practical everyday work and life. From an ethics point of view, it is important to create a safe operational environment and a confidential atmosphere to encourage organizations and individuals to share risks and resources needed for innovation and at the same time not impact real-life setting with Living Lab activities. In addition to these issues, the solutions, products or services to be used during Living Lab activities must fulfill the minimum ethical and legal requirements defined in the GDPR.

Finally, real-life settings pose unexpected risks that can result in major adjustments or even cancellations of Living Lab activities. The recent situation with COVID-19 is a good example of the many ethical issues arising from changing real-life settings. These issues include the inability of some actors to carry out expected tasks, which impacts the overall development process, a lack of commitment from the actors to continue with collaboration, and changing roles within an ecosystem.

Multi-stakeholder participation

The complexity of multi-stakeholder engagement in Living Labs arises from the diversity of participants, the fact that every participant has their own expectations and perspectives and that their individual experiences of the same situations differ. In Living Labs, multiple stakeholders share resources and risks to jointly create novel innovation; with such diversity, mutual understanding is needed, and it can be found through shared meaning creation, common visions, shared learning and joint-value co-creation.

To ensure that stakeholders are involved in accordance with ethical guidelines it is important to use transparency and equality in the selection of Living Lab actors. Since Living Labs follow open innovation principles, participation should be open to all interested stakeholders. Competition should be avoided, and each stakeholder should be treated equally in the co-creation and innovation processes. In order for trust to be built among actors, they must be interested in each other's practices and goals. A well-executed development phase is based on collaborative sense-making, mutual understanding and respect for the stakeholders' needs, goals and values. Often, ethical dilemmas are related to the decision-making processes of Living Labs (Sainz, 2012). Conflicts of interest between participants often occur due to a lack of shared goals or understanding of the implementation process, or both.

The multi-method approach

Living Labs activities are designed to systematically co-create and test novel products, services and solutions and to shorten the time from research and product design to market. This implies that the ethical compliance framework for solutions should systematically drive Living Lab activities throughout the innovation process, from idea generation to conceptualization and testing. In practice it means that ideation, concept development and testing, prototyping and real-life testing have to follow the same ethical code of conduct, which defines participation, information sharing, inclusiveness and data privacy and follows ethical principles of experimental and participatory research.

Co-creation

Co-creation requires systematic but also flexible operating principles and methods. A detailed specification of the co-creation and experimentation process should be developed and managed by each Living Lab. Living Labs should guide, with the help of social sciences, arts and humanities, the technological and business design processes leading to ecologically, socially, and ethically sustainable solutions. Ethical guidelines are needed for Living Labs involving experimentation for commercial gain. As a rule, Living Lab actors perform activities without compensation; they include the costs of the activities in their normal development work. Thus, all partners are expected to participate *pro bono* in co-creation activities.

Living Lab co-creation activities should benefit from open access, transparency and continuous feedback. Therefore, principles of fairness and open information and knowledge sharing should be applied while protecting the intellectual property rights of individual actors. Living Labs should follow the principles of open innovation, open science and open data.

EXAMPLES OF ETHICAL ISSUES OF LIVING LABS IN THE HORIZON 2020 CIRC4LIFE PROJECT

Living Labs can be developed and implemented using public funding, such as in the Horizon 2020 program in which Living Labs are mentioned in the scope of the calls under Industrial Leadership, Research Excellence and Societal Challenges. This chapter describes how Living Lab ethics have been addressed in a Horizon 2020-funded project, CIRC4Life: A circular economy approach for lifecycles of products and services (Grant agreement No 776503). The project aims to develop and implement a circular economy for products and services through value and supply chains in four industrial sectors: domestic and industrial lighting products, vegetable farming and food, the meat supply chain, and recycling and reuse of computer tablets. Three circular economy business models covering the lifecycle of a product have been developed in the project and will be demonstrated by the industry partners in the later stages of the project.

Living Labs are used in the project as a methodology for systematically engaging end-users and stakeholders in the innovation process throughout the project duration and as the key tool to ensure user acceptance of developed solutions. It is therefore vital for the project success that the Living Lab results are reliable, trustworthy, socially acceptable and ethically compliant.

To ensure the ethical compliance of Living Lab activities, an ethical clearance checklist was completed in the beginning of Living Lab activities, primarily addressing issues related to participants' consent and data privacy. At the time of this writing, more than twenty events involving over 350 external participants were conducted. For each event, informed consent was collected from the participants and the privacy policy was published to ensure the activity is ethically compliant. In addition, issues related to the ethics of the solutions, such as the CIRC4Life mobile application, were raised and partly addressed in relation to data privacy of the app users.

However, a number of issues related to all elements of Living Labs discussed earlier have been encountered by the project partners. As CIRC4Life is ongoing, some of these issues have not been solved at the time of writing; moreover, additional issues are expected to emerge during the demonstration stage. These issues, as well as available solutions and considerations, are presented in Table 1.

DISCUSSION

Living Labs are based on two requirements: the systematic involvement of users and stakeholders, and real-life settings. Both requirements cause a number of ethical questions and dilemmas common to other types of user research but also specific to Living Lab projects. This is especially relevant when Living Labs are conducted in a commercial context by a business consortium or one actor, since it is hard to compose an ethical code of conduct in commercial projects as compared to scientific, well-structured methodologies. User and stakeholder involvement in Living Labs can create challenges but can also improve the ethical conduct of Living Labs, provided that participants are not only aware of the goals and activities but also motivated

Table 1. Ethical dilemmas and solutions in CIRC4Life Living Labs

LIVING LAB ELEMENTS	DESCRIPTION OF ETHICAL ISSUES	EXAMPLES OF ETHICAL DILEMMAS IN CIRC4LIFE	CIRC4LIFE SOLUTIONS OR CONSIDERATIONS
User Involvement	Informed consent Data privacy Role of users awareness of users	<ol style="list-style-type: none"> 1. Can you reward users for taking part in Living Labs? 2. How to approach "active non-users"; for example, vegetarians in a meat-supply-chain-related Living Lab. 3. A "we are professionals in our field, we know better than users" attitude. 	<ol style="list-style-type: none"> 1.1 In ideation stage lead users, and active non-users participate without rewards. 1.1 As a part of an LL awareness campaign, the first 20 users to test a solution are offered cinema tickets. 2.1 Non-users are invited to early stages of the innovation process but excluded from testing phase. 3.1 Awareness-building among industry partners about user-centered innovation process; communicating benefits of user-centered design and innovation process.
Real-life setting	Uncontrolled environment Safety Unexpected changes in the environment	<ol style="list-style-type: none"> 1. Can internal tests at company premises count as Living Lab testing? 2. Is it allowed to adjust real-life settings (by, e.g., choosing a focus group not represented by actual users)? 3. How to deal with risks associated with changes in real-life settings due to unforeseen events like COVID-19. 	<ol style="list-style-type: none"> 1.1 In the case of the specific LL context of an industrial LED light, a solution owner is also a user; therefore, installation and usage of new LED solutions internally can be an LL setting 2.1 In certain cases, so-called convenience samples (e.g., students) were used to receive feedback and new ideas but as an add-on, not as a substitute for actual users. 2.2 In the later stages of LL (small-scale testing and validation), only actual users are included. 3.1 The CIRC4Life Living Lab concept was designed to include physical participation of the stakeholders, and while some activities could be implemented virtually, others were cancelled, which poses an issue related to reliability and validity of Living Lab results; moreover changes in environments forced the partners to re-think their original plans.

LIVING LAB ELEMENTS	DESCRIPTION OF ETHICAL ISSUES	EXAMPLES OF ETHICAL DILEMMAS IN CIRC ₄ LIFE	CIRC ₄ LIFE SOLUTIONS OR CONSIDERATIONS
Multi-stakeholder engagement	Diversity Transparency Equality	<ol style="list-style-type: none"> How to select Living Lab participants. How to ensure equal participation of diverse stakeholders. What to do if core stakeholders are not interested? Can stakeholders be paid to engage in Living Labs 	<p>1.1 Systematic stakeholder management is essential for Living Lab success, and Santonen et al (2019) developed a model for stakeholder engagement based on cultural, organizational, user-driven, cross-functional, disciplinarily and cross-industry criteria.</p> <p>2.1 Living Labs are not a solution that fits all, but in CIRC₄Life we used approaches to communicate the benefits of co-creation to all core stakeholder groups.</p> <p>3.1 The rule is, all stakeholders participate pro-bono; however, in exceptional cases, CIRC₄Life involved paid consultants to engage in conceptualization of proposed solutions, a decision justified if core LL actors lack some specific knowledge for making decisions</p>
Multi-method	Participatory design ethics Reliability of Living Lab methodology	<ol style="list-style-type: none"> What to do if survey results contradict user observations. Is it possible to combine a waterfall model and an iterative Living Lab approach? 	<p>1.1 Multi-method approach helps avoid biases in results associated with use behavior; in CIRC₄Life a theory of planned behavior (TPB) by Ajzen (1991) was used as the basis for consumer surveys to link attitudes of consumers with actual behaviors.</p> <p>2.1 It has been found that a combination of a waterfall model for software development does not match the iterative methodology of Living Labs and can cause major gaps in user acceptance.</p>
Co-creation	Ethically sustainable solutions Shared goals Shared ownership Win-win	<ol style="list-style-type: none"> Is it ethical to co-create new meat products when meat is not sustainable? Is it ethical to incentivize recycling by providing discounts for new purchases? How does one ensure that all ideas, including the ones not in favor of ideas of a solution owner, are taken into consideration? 	<p>1.1 An ethical framework for solutions is a key in any innovation process: each solution in CIRC₄Life follows an ethical code of conduct developed by the project and international, European and national laws.</p> <p>2.1 While it has been a challenge in CIRC₄Life to incorporate all stakeholders' views, we recommend that a clear procedure for collecting stakeholder ideas and presenting them in a concise form to decision-makers is a must in Living Labs, and we recommend that it be the role of an LL orchestrator to collect and analyze all ideas.</p>

to take part in the innovation process, knowing that their views are respected and that they can influence development outcomes.

In addition to users, other stakeholders have to be engaged in the collaborative processes; to enable ethical decisions in Living Labs requires trust and learning. A key to successful implementation is agreeing on common quadruple helix objectives, based on win-win thinking. Agreeing on common values in Living Labs should involve debate about rules and ethics in experiments. There are a number of issues related to industry-driven innovation processes and commercial innovations, which tend to focus on industry-favorable solutions and economic gains rather than societal impact. In an ethically-driven Living Lab, every stakeholder group must “win” to stay engaged in the long term. As well, societal acceptance of the solutions is key to ethical implementation.

Living Labs are formed by actors pursuing a common development goal. With external funding available through means such as EU innovation funds, new Living Lab partnerships are formed to earn funding, and selection of participants is often based on the maximization of the chance to get such funding instead of creating self-sustainable partnerships for scaling of innovations. An opportunity-driven approach to forming new partnerships is needed to ensure openness and creativity in the co-creation process. Living Lab partnerships and ecosystems should be open to everyone, i.e. should be inclusive and should apply diversity as part of the innovation process. This means that ideas “outside the box” are welcome.

Experimentation in the real world aims at scaling up acceptable solutions. This means that a Living Lab approach might not be suitable for “extreme” innovations; instead this approach allows for testing of scaling. As real-life settings are often associated with large-scale experiments, market acceptance is key to ensuring sustainability of the results of an innovation process. For these reasons, some radical ideas (such as to stop meat production completely) are not suitable for Living Lab testing, as these ideas also put industry partners in a “looser” position.

Finally, co-creation as a key Living Lab process is only successful in an open and safe environment, one in which all actors understand and share a common goal, feel respected, understand the benefits of Living Labs on individual, organizational and ecosystemic levels, and are ready to contribute to a common effort to develop ethically acceptable sustainable solutions.

CONCLUSIONS

Developing and implementing Living Labs in a responsible manner requires sensitivity to ethical issues and a motivation to strategically include ethical considerations in Living Lab processes. These issues are associated with the key elements of Living Labs and include user and stakeholder involvement, a multi-method approach, challenges related to real-life settings and the ethicality of co-creation. A prerequisite to ethically driven Living Labs is a shared understanding by all LL actors of common goals, creating a “win-win” approach on an ecosystem level and including all quadruple helix actors. This is only possible in an open and safe collaborative environment based on trust and shared inputs, in which diverse actors can creatively co-create new solutions for complex societal challenges.

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