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European Green Deal: the Living Lab for Codeveloping Digital Energy Solutions

Working paper from the first co-design workshop

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Abstract

In the context of the European Green Deal, engagement of all stakeholders seems key to succeeding in the energy transition. The Living Lab has been identified as one of the potential tools to support engagement as well as empowerment of the key stakeholders.

Within the Living Lab, emerging technologies and user-codesigned solutions are tested in a real-life context, producing evidence of their societal impact and thus helping the development of smart-city policies at larger scale, in line with the Living Lab mission.

The Living Lab Integrative Process has been tested on a smart campus dedicated to digitisation of energy. A milestone of the project was a co-design workshop held in January 2020. This paper describes the outcomes of this event and seeks feedback from the readers on possible ways forward.

Keywords

Green Deal, Living Lab, Digital Energy, EU policy, Smart Campus

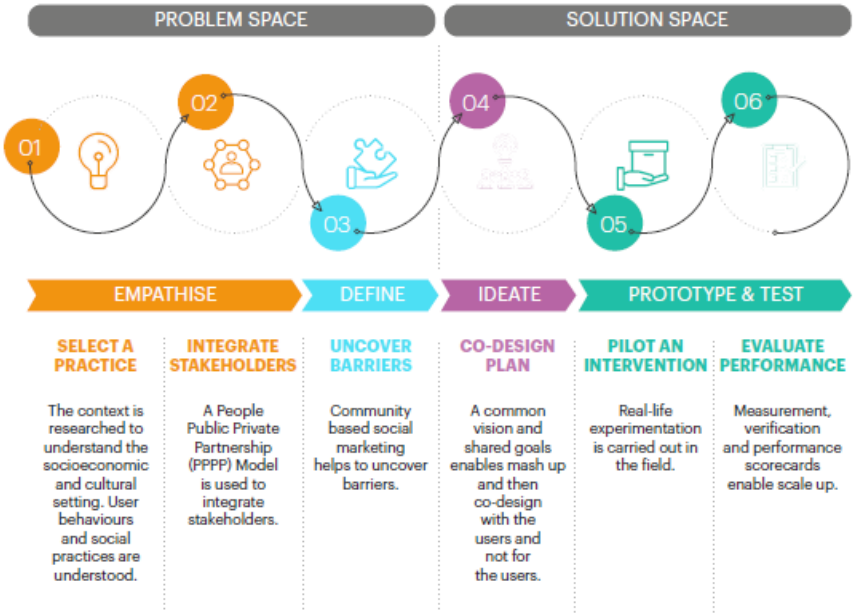
Background

The European Commission announced in December 2019 the introduction of a plan supporting the decarbonisation of energy called *The Green Deal*. This plan provides for investments in various fields, in particular in the building sector, which consumes 40% of Europe's energy and is highly carbonated (EC, 2013). The plan includes the renovation old buildings and also the reduction of energy consumption of more modern buildings (energy efficiency). One of the challenges of this reduction in consumption is the mobilisation of all stakeholders in the process, and in particular the users of the buildings in complex sociotechnical systems (Geels, 2004). A PhD thesis of the co-author has shown that Living Labs can help, especially in the co-design of energy efficiency plans with stakeholders through a public, private, people partnership as described in the quadruple helix model (Mastelic, 2019). In this article, we describe an experimentation of the co-design of an action plan, based on the *Living Lab Integrative Process (Figure 1)*. It is a work in progress because the results of the experimentation are not yet known. The authors request constructive feedback from the Living Labs' community.

Method: Case study applying the Living Lab Integrative Process

In order to test the Living Lab method in real life environment, the *Living Lab Integrative Process* was applied in a smart campus dedicated to energy and mobility.

Figure: the Living Lab integrative process (Mastelic, 2019)



This article focuses on phase 3 of the *Living Lab Integrative Process*: Codesign the Plan shown in Figure 1. A codesign workshop has been held in January 2020. The methodology adopted for the workshop is inspired by Community Based Social Marketing (Mc Kenzie-Mohr, 2000), in which open discussion and confrontation of ideas on barriers and drivers are encouraged as a mean to ultimately agree on a common vision of the challenge and build trust among the actors (Dupont et al, 2019).

The codesign workshop aimed at:

- **engaging the main stakeholders**, and setting a common vision and objectives for the implementation of the Living Lab's pilot projects;
- **empowering the participants**, in fostering a "*practice what we preach*" approach;
- **understanding the different individual perspectives, needs and barriers** to enable the co-design of solutions closer to these needs, and to enable their better uptake.

The co-design workshop focused on three key social practices which emerged from a previous ideation workshop (1) **Smart charging systems for electric mobility**, (2) **Energy efficiency and savings**, (3) **Open data and visualisation**.

The workshop was organised in three sessions.

- **In session I**, the audience was provided with clear information on the context, on current activities and main objectives of the Living Lab project, along with data, facts and figures related to the present situation of the site's infrastructure and future development plans.
- **In session II**, participants were asked to work in groups on specific pilot use cases, to identify drivers to the development and acceptance of the use cases' solutions, as well as barriers that may preclude their uptake.
- **In session III**, participants worked in groups on the same use cases. The session was divided into two types of activities: (1) Co-design a solution and its features, (2) Evaluate the proposed solution and modify it, using a model based on seven questions, i.e. the "seven step-stones to innovation", originally developed by Human Centricity at EPFL, Switzerland.

Results of the Workshop

For the scope of this paper, we focus on one of the three cases: Smart energy monitoring system. The site has a system for monitoring both energy consumption and renewable energy production. Workshop participants were encouraged to discuss: the monitoring and evaluation of energy consumption in offices and common areas (both indoors and outdoors); future charging points for electric vehicles; and new installations for renewable energy production.

The objective was not only to propose solutions for providing energy monitoring and reporting at site level, but also to maximise energy savings, while maintaining comfort, and increasing energy efficiency. The main barriers and drivers identified by the working groups in session II are shown in the following Table.

Table 1: Main barriers and drivers identified in Session II

Reporting of Group		
Questions	What is the target user group?	
	What is the social practice to be targeted?	
	What drivers and barriers do you foresee for the implementation of a smart energy management system?	
Target group: Staff		**Social practice**: Reduce energy consumption levels in buildings
SUMMARY The main issue is the massive energy use in buildings, especially old ones, and the presence of large experimental facilities that can be demanding in terms of energy. To achieve the results, a key element is the segmentation and targeting of specific users' groups. The participants proposed to target staff (researchers, administrative staff, management team, etc.) and external energy providers. An internal Energy Monitoring System exists in the institution, but users are not informed about the site's energy consumption.		
BARRIERS		**DRIVERS**
Lack of financial resources devoted to the subject		New "European Green Deal"
Little staff awareness of changing social practice; Lack of communication regarding energy consumption		Willingness to keep up with the rapidly evolving technology
Personal data protection		Information, training and raising awareness initiatives
Heterogeneity of the site and its infrastructure (old/new buildings, and offices/laboratories)		Scientific interest of staff in the topic
Cultural differences among the international staff (e.g. subjective concept of comfort)		Economic savings
Management buy-in, rigid governance and regulation		Improvement of wellbeing and reduction of environmental pollution
Partial availability of energy-related data		

Table 2: Outcomes of Session III part I: co-designing a solution

Questions:	How would you like to design such a system?
	What benefits would you see from it?
	Which data would you like to integrate?

SUMMARY

- ✓ It was proposed to focus on one representative building of the site called Building 101 where an energy monitoring system would be developed. A specific building was identified because it is considered relatively new, hosts approximately 200 people, has a big recently renovated atrium with a social area and has screens installed that can be used for data visualisation.
- ✓ The proposal is to implement a system to monitor energy consumption (heating, cooling and electricity) and production from the PVs installed on the roof. At the initial stage, data could be collected only at building level since the available infrastructure does not allow collection of all data at office level.
- ✓ A collaborative challenge was be proposed so that all the staff working in the selected building could work together to reduce the building's energy consumption. *"We can foresee a long time window where we start collecting data and then launch a campaign that lasts a few weeks where everybody is committed to save as much energy as possible"*[1]. The staff will be personally engaged in finding ways to reduce the energy bill for their building.
- ✓ It was proposed to organise a dedicated event to explain the project to the staff working at the selected building. The data will be visualised on the screens before, during and after the campaign. After the campaign, the staff will be invited to a co-evaluation meeting where the collected data will be made available, and the analysis and results will be presented. Feedback will be collected from the event.

[1] Quote from participant to the workshop.

The results obtained in the second part of session III, **Evaluate the proposed solution and modify it**, are summarised here below:

1. **Practical usefulness**: reducing energy consumption of the buildings will save costs and raise awareness of the staff working in building 101. This could be re-invested in energy efficiency actions.

2. **Financial benefits**: the solution could decrease the energy bills and create a domino effect: "*what we learn at work, we can use it when we are back home*". Also for a future emission trading scheme, the institution will have to pay for the CO_2 emissions it will produce. If energy consumption is reduced, there will be fewer costs for the site management.

3. **Ease of use**: the infrastructure such as the metering devices for the Building Energy Monitoring System is, in part, already there; the co-designed solution should be as easy to use as possible. The System should be user-friendly for the staff.

4. **Impact on habits**: games and challenges could be developed to change the habits of the target group (staff). A long-term goal is important, such as targeting a zero-energy building, that the organisation is committed to achieving in its premises by 2030.

5. **Emotional relationship**: feeling part of the community, influencing together the energy consumption of the working space could be rewarding. At the end of the activity, the staff would feel proud, engaged and empowered.

6. **Social influence**: communication is essential in order to implement the plan. Specialists in this field could be involved to engage the staff.

7. **Physical space**: The infrastructure (metering devices and screens) are already there. There is no need to adapt the physical space. In order to change consumption on the long run, changing the default settings and the context of use is extremely important (Sunstein, 2017).

Conclusions

The ideas discussed at the workshop and the solutions which emerged therein have been reviewed by the Living Lab team. An action plan is being proposed, detailing the main steps to be followed for the successful implementation of the proposed energy monitoring solution, as well as the phases for the development of the other two use cases discussed at the event.

The identified actions – ranked in terms of priority and feasibility – will be brought to the attention of senior management, the site management, and all potentially interested contributors. In order to implement the proposed solutions, and to deliver on time, management buy-in and support from senior management is essential to ensure the allocation of adequate financial, human and technical resources.

To this aim, we would like to receive feedback on the following questions to help inform the action plan: what are the challenges ahead with the project? How can we motivate management to give the appropriate resources to implement the actions? How can we keep the staff engaged in the project?

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