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Living labs to develop reuse and repair workshops in territories

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Abstract: Current industrial practices, supported by an unsustainable economic growth and technological innovations, are leading to a "throwaway" era leading to inefficient use of natural resources and social inequity. The reuse and repair of products are priority strategies for a radical reduction of the environmental and social impact of our production and consumption. It consequently questions the paradigm of traditional economic growth. The transition to repair and re-use activities requires going beyond the technical aspect of waste management to embrace a citizen and territorial logic. In this paper, we submit the hypothesis that through "living labs", that is to say, citizen, collaborative and experimental workshops, it is possible to structure communities of practice and to improve the recognition of repair and reuse activities both for citizens, political and economic actors. On the one hand, the aim is to understand how to stimulate the collaboration of heterogeneous actors through experiments in the context of reuse / repair and upcycling oriented living labs. On the other hand, the objective is to collectively participate in the emergence of territorial repair networks, with the objectives of reducing environmental impacts while creating social links and questioning development models. For that, we expose the protocol developed to structure the living labs as well as the some qualitative results.

Introduction

Current industrial practices, supported by an unsustainable economic growth and technological innovation, are leading to a "throwaway" era leading to inefficient use of natural resources and social inequity. Even if European directive promotes a waste reduction approach, recycling is still the most developed solution. Such short-term and technical solution are counterproductive and create path dependencies, closing opportunities for real sustainable alternatives waste management and participating in a constant growth of waste production.

More particularly, current design approaches in terms of eco-design or circular economy are based on disassembly, upgradability, modularity, and are largely focused on large-scale business models, and on the search for technical solutions (Bridgens et al., 2018). Therefore, these alternative development models, supposedly less unsustainable, target the same objective of an economic "green" growth.

In parallel, new organizations from civil society have emerged in territories. These grassroots and social initiatives propose real alternatives both in social and environmental issues. Nevertheless, public actors and traditional business stakeholders still poorly consider them. Called, often indifferently, repair workshop, "ressourcerie", "repair café", they are generally the result of collective movements, often very locally situated, with a social or environmental objective, and offer to develop second-life markets with reused, repaired or upcycled products. Therefore, these activities challenge our patterns of consumption and production, and consequently the current regime¹. They are seen as a transitional stage towards a truly circular economy (Terzioglu, 2017). However, these niches are struggling to overcome an embryonic and economic unsustainable state.

This research is part of the RECYLUSE project in which a multidisciplinary team analyzes the technical, political, cultural, and societal barriers from the regime to the emergence,

¹ (DeHaan, 2010) "If the regime embodies the powerful, yet conservative mainstream, then a

niche is its innovative, avant-garde but not so powerful counterpart."

diffusion and viability of repair niches. The research presented in this communication aims at removing some of these barriers observed on the ground and literature.

In this paper, we submit the hypothesis that through "living labs", that is to say, citizen, collaborative and experimental workshops, it is possible to structure communities of practice and to improve the recognition of repair and reuse activities both for citizens, political and economic actors. This paper will expose how such living labs can help to structure a repair and reuse culture.

State of the art

The scientific literature largely mentions techniques to favor disassembly, upgradability, modularity (Pialot et al, 2012, Cooper, 2013). Repair is often mentioned as a strategy of the circular economy as a means of prolonging the life of products and of working in a closed loop (Terzioglu, 2017). These expert approaches integrate constraints from other stakeholders (for example the development of dismantling technics for recycling operators) and are focused in a closed design process, as they generally do not involve other relevant stakeholders (users, citizens and communities). In contrast, a phenomenon emerging in recent years, the living labs, allows the exchange of know-how between stakeholders and seem to be a modality to change representations and unlock some resistance and create space for discussion. Living labs are experimental environments in which end users are considered as co-designers (Ballon, 2005). They benefit from a European network (the ENOLL network), and are a user-centered research methodology for detecting, prototyping, validating and perfecting complex solutions in multiple and changing contexts of life real. A living lab is a process of thinking centered on uses, with a strong iterative design process. This type of approach encourages a more global reflection, extracting from the purely technological framework of product design, to a system level. It is a collaborative design space that allows prototyping new systems where all actors are considered experts. They allow the co-construction of innovative and local specific solutions and must encourage a better social acceptability (Gobert and Brulot, 2016) and economic territorial integration.

However, the cases of applications are rare on the theme of end-of-life products. We can note

the works of Bridgens et al. (2018) but who are more interested in exploring the establishment of repair and upcycling space than in the co-construction of solutions. A second research, by Terzioglu (2017), focuses on developing and observing repair workshops, without being qualified by the author as living labs.

The main similar work comes from the recent research of Hirscher and Mazé (2018). They proposed to develop a framework to analyse the results from a 'co-sewing café'. They adapted an analytic framework based on three main component: the stuff (i.e. the material used during the process), the skills used and developed and the images (i.e. the meaning of the workshop). They specifically underlined that participatory design process, such as living labs, questions the role of designer and users, as users are directly involved in the design process. Moreover, they underlined that workshops (as co-sewing workshops) allows participants (including professional designers or dressmakers) to share clothes-making techniques, to teach and learn these techniques. Participants can both use classical everyday tools (as a textile chisel) and more specific ones (such as a sewing machine).

Development of a repair-oriented living lab protocol

This paper aims to develop new understanding on how to implement a living lab focused on repair and reuse activities, towards both citizens, public actors and companies. As previously said, developing reuse and repair activities in territories requires a systemic thinking, covering not only product and process innovations but also dealing with user practices, markets, policies, regulations, cultures, or infrastructures (Gaziulusoy and Brezet, 2015). Thus, this protocol has a threefold objective:

- (1) To understand how the methodology of living labs promotes the culture of repair and reuse among the participants,
- (2) To understand how the living lab fosters communication between the various actors involved in reuse and repair (designers, citizens, companies, public authorities, recyclerie user and employees),
- (3) To analyse the relevance of this methodology to question the different systemic levels: product/workshop/territory.

This section exposes the multi-level perspective of the protocol developed for the reuse and repair oriented living lab and then focuses on the product level approach.

The multi-level approach for reuse and repair living lab design.

The protocol is based on a systemic approach to develop a reflection on the three levels of a territorial reuse and repair network.

- (1) At the 'practical / product' level, the objective is both to support participants on learning on reuse/repair (i.e. basic knowledge on reuse and repair) and on practically experimenting how to implement reuse and repair everyday products;
- (2) At the repair workshop level, the objective of this protocol is to collectively design a repair workshop regarding its missions and objectives, organisation (internal and external logistic, skills and knowledge acquisition and transmission), business models;
- (3) At the 'territorial' level, the aim is to model and discuss the tangible and intangible metabolism of territorial repair networks, to identify new synergies and to strengthen or diversify collaborations.

At this state of the research, the protocol to support the territorial level is under construction and only one living lab at workshop level was tested. This communication focuses on the product level living labs protocol and the observation of four workshops.

Product-level living lab

The different steps of the living labs, the different objectives as well as the deliverables are described in table 1. The protocol draws two main parts: the individual diagnostic of discarded/failed products and secondly, the designing and prototyping of solutions to extend these discarded products' lifetime. Two templates to support the participant's work were designed but are not detailed here. Between these two parts, facilitators present the stakes of the sector and some examples of existing initiatives to counter negative effects of these activities.

First part : Individual diagnostic of the products
Objectives
<ul style="list-style-type: none"> - Identification of the product and of its characteristic (nature, perceived quality, risks, current state of the product) - Description of the problem: broken, damaged or failed part of the product - Description of the domestic practice of the participants facing this problem.
Deliverable : Discovery template
<ul style="list-style-type: none"> - Description of the product - Description of the failed part of the product - Description of first solution ideas
Break : information – inspiration
<ul style="list-style-type: none"> - Social, environmental and economic challenges in the sector - Presentation of inspiring solutions from invited professionals
Second part : Design and prototype
Objectives
<ul style="list-style-type: none"> - Group must collectively find solutions: - Describe the problems identified during the product analysis step - Describe / Draw the different solutions - Realize a prototype
Deliverable : Concept template
<ul style="list-style-type: none"> - Description of the concept (words and schemas) - Description of the process (steps, tools, material) - Listing of difficulties and constraints (skills, tools, ...)
Collective restitution and discussions

Table 1. Protocol for product level living labs

In addition to the deliverables completed by the participants, facilitators captured specific events (ideas generation, prototype development, presentation of results, etc.) on video and researchers in design and social sciences made direct observations. Few days after the living labs, participants received an online survey to have feedbacks on the workshop.

Implementation of product-level living labs

To remain accessible, living labs have been adapted to all kind of participants (industrial, repair and public actors, and citizens), whether they are experts or not of the sector, sensitized or not. Three 'co-sewing café' were organized with the support of two members of a sewer collective (Orratzetik Hari), in three cities of the

Agglomeration Pays Basque (Southwest of France) and gathered 46 participants. A living lab on furniture was realized with the designer and carpenter of Api'R bois, a furniture upcycling workshop. Table 2 summarizes some characteristics of these living labs.

Place	Characteristics	Nb.
Bayonne	Main city of the Pays Basque conurbation	14
Cambo	Peripheral city of Bayonne	19
Mauléon	City located in the interior of the Pays Basque conurbation	13
Saint-Pierre-d'Albigny	Rural city in the Coeur de Savoie conurbation	15

Table 2. Participants in the living lab

The analysis of the deliverables is not yet performed but some results of the surveys are presented below.

Analysis of the post workshop surveys

Twenty-three persons (over forty-six) respond for the textile living labs and five (over fifteen) for the furniture.

First questions are a qualitative self-evaluation of the participants' level regarding sewing or carpentering, product design and their general knowledge about repair workshops. A Lickert scale enables the self-evaluation: null, fair, average, good, excellent. Only one participant considers himself as a true beginner in sewing or carpentering. Their knowledge on repair workshops is disparate but there is not 'expert' level participants. An outstanding result is that participant evaluates their selves with a fair or null level in product design (56-60%). 60% have never been in a repair workshop, 28% have already experienced self-repair or repair in a repair workshop for the sewing living labs, no one for the furniture. Workshop participants have basic or advanced knowledge or practical skills on the topic of the workshop.

The first phase of the living lab is considered quite useful (textile: 88%; furniture: 75%). The objectives, instructions and the 'discovery sheet' were clear and the products presented were similar to what participants have at home.

During the second phase, and even if their initial design level was quite poor, participants did not face strong issues to design their solutions. Regarding the prototyping of textile solutions, participants consider that they did not have

great difficulties (82%). The initial sewing level has an impact on the ease of designing and prototyping products (same repartition in self-evaluation of sewing level and impact of this on the design/prototyping).

Advices and supports from facilitators and inspiration boards were considered useful and sufficient by the participants. However, we observed that co-learning within teams during the living labs and teamwork appears as a strong strength for the success of these living labs.

82% of the participants for the textile living lab and 40% for the furniture living lab consider that living labs provides new knowledge on environmental and social issues in the sector considered. 70% (textile) and 100% (furniture) consider that they do not acquire new knowledge on sewing or woodworking. Textile living labs had positive influence on the perception of repair workshops (77%), repair and reuse activity (82%). The workshops also encouraged participants to be engaged in repair and reuse activities (88%). Furniture living lab had mitigated impacts on the perception of repair, reuse activities or in the perception of repair workshops. Nevertheless, it encourages participants engaging in these activities (80%).

Every participant to the textile living labs consider that they respond to their expectations but this is equally distributed for the furniture living lab. Twenty over twenty-one respondents have a fun and good time and would recommend these living labs.

Discussion and conclusion

In this paper, we have presented a multilevel protocol for living labs with the objective to promote repair and reuse culture and to foster the communication between stakeholders of the reuse and repair activities. First, participants acquired new knowledge on the sector and they highlighted importance of group work and peer-to-peer knowledge transmission from group members or facilitators. They also largely want to be engaged in repair-reuse community of practice. However, we have also to consider the lack of representativeness of the "concerned" actors within the participants. For the industrial sector, even if some professional actors (e.g. textile designers, wood sellers) shows some interests about the topic, no one participate to the living labs. Public actors participate in Coeur de Savoie as they are part

of a repair workshop project, but there was no representative of the public actors in the Pays Basque. Participants were mainly non-professional practitioners or students in textile for the textile living labs. It questions the representation of these actors embedded in the regime and it was an interesting illustration of the gap between stakeholder of the mainstream economy and social economy.

A strong result of the living labs was that there was only little technical learning. Indeed, even if everyone participate to the design of the solution, participants who do not have an expertise only learnt a little from their peers and expert facilitators. Moreover, we saw than some of them missed the basic vocabulary to describe physical or conceptual notions. Moreover, even if there is a demand for physical supports or models instead of pictures (it was the case for the first part of the furniture living lab), no one use model material during the furniture living lab (cardboard, glue, painting etc.).

Another objective was to analyse the relevance of this methodology to question the different systemic levels: product / workshop / territory. It appears difficult for the participants to project on other system levels and to imagine the consequences of their current decisions on another system. Consequently, there is a need to stimulate the consideration of the interfaces between levels to integrate external disturbances to the system under consideration.

One next step of this research will consist on analyzing the different prototypes developed by the groups with professional sewers to understand the feasibility to develop these concepts. Moreover, another step will be to analyze the living labs develop for other levels (repair workshop and territory levels) in order to better understand how each level (product, repair workshop, territory) can promote the culture of repair and reuse among the participants.

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