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Risks, strengths, and governance implications

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Designerly Living Labs: Design-driven experimentation

Martin Sjöman, Mia Hesselgren

Today, there is a broad understanding that new research methods are needed to achieve large-scale societal change. Across many sectors, there is a growing interest in experimentation and prototyping to handle the complexity of these challenges. In recent years, living labs, demonstrations and pilot projects have increasingly been used to develop, test, and implement new mobility solutions, often labelled ‘smart mobility’. During the last decade, a new wave of urban experimental spaces has evolved in connection to the concept of ‘Smart Cities’, often labelled Urban Living Labs, Future Labs, or Transition Labs, broadly aiming for more systemic change (Sengers et al., 2019). However, all these methodologies are open to many interpretations. They are implemented differently and resist clear definitions, and the concept of living labs has been likened to a “wet bar of soap” (Hakkarainen, 2017).

A central idea behind these new modes of experimentation is to actively involve citizens or users in developing the changes and the latest technologies that will affect them. Thus far, however, Chilvers et al. (2018) conclude that in technological research, the ‘dominant modes of participation’ are still limited to user consultation, participation as consumption, being subjected to behaviour change interventions, such as ‘nudging’ or being provided with information. On the other hand, design

has a long tradition of participatory approaches. The last decade has seen a further movement towards co-designing *with* participants rather than designing *for* the users. New methodologies have emerged highlighting *making* to engage non-designers in creating and exploring future visions (Sanders and Stappers, 2008, 2014).

This contribution draws on our own experiences as design researchers from explorative and open-ended design-driven research setups to define a typology of living lab research strategies. We classify alternative strategies for setting up and implementing design-led experimentation by separating different research purposes and various forms of user participation. We start by introducing three examples of design-driven research experimentation projects. We then present two strategic choices that need to be considered when planning design-driven experimentation and the key aspects that we have found to influence these choices. In the last section, we outline and discuss 'provoking' as a design-driven strategy for user participation. In this discussion, we bring out how more explorative and design-led experimentation projects can be carried out. We argue that this type of research calls for participatory user approaches, but these also come with new challenges.

THREE EXAMPLES OF DESIGN-DRIVEN EXPERIMENTATION

Below are three examples of design-driven experimentation set up by our research group at KTH Royal Institute of Technology in Sweden.

A CAR-FREE YEAR

In our designerly living lab, "A car-free year" (see Hesselgren

and Hasselqvist, 2016), three families with children in Stockholm, Sweden, were recruited through advertisements on Facebook and volunteered to live without their cars for an entire year. Instead, they leased light electric vehicles such as cargo bikes and electric scooters. Adapting to this new and very challenging situation, the families acted as co-researchers, documenting their travels and reflecting on the changes they made in their everyday life. The researchers made continuous efforts to maintain a close, transparent, and trustful relationship with the participants. During the year, the families developed new car-free practices while identifying both barriers and often unexpected new forms of value, such as family time on a train or increased independence for the kids, who learnt to travel by public transport.

FUTURE PLAYING RULES FOR MOBILITY

In the design intervention study “New playing rules for mobility” (see Sjöman et al., 2020), nine car-owners were randomly recruited outside supermarkets in three suburbs of Stockholm, Sweden. These participants volunteered to try out three future mobility policy changes for six months. The policy changes were economic incentives designed to promote more sustainable travel. These included the participants paying for trips made with their car using a fixed rate per kilometre of travel, paying only half-price when travelling on public transport off-peak, and getting paid for bicycling. The research project paid the fixed costs for the car, and the pricing scheme was individually set up so that when travelling precisely as before, the cost would be the same. In the case of any savings, the participants received a bank payment. In the end, some experimentation was made, but little real change took place. Still, the envisioned future poli-

cies and the highly visualised costs made all participants reflect deeply on their everyday travel practices. Two participants expressed intense unease with seeing the total costs of using their car but did not see any alternatives. A small number of long vacation trips accounted for a considerable part of their yearly driving for several participants. Still, these vacation trips were not considered when accounting for the cost of owning the car.

WORK CLOSER, TRAVEL SMARTER

In this partly design-driven living lab, a Neighbourhood Teleworking Centre (NTC) was set up in an outer suburb of Stockholm, Sweden, to reduce work-related travel. The aim was to explore and discover what social and environmental changes and concerns would emerge in people's everyday lives and at work. At this point, which was before the Covid-19 pandemic, the research programme's partner organisations from both the private and public sectors did not display much interest in the project. The NTC was set up as an open-ended experiment, not a pilot. The setting up of the NTC encountered many challenges that helped identify barriers to this type of service, including social norms, teamwork and management practices at work, WIFI-technology limitations, policies, regulations, and trade union agreements.

The main challenge was that the recruited user-participants were often not allowed to work away from the main office. Rarely more than one day per week, except for a small number of participants whose working conditions permitted it, was allowed by the employers. However, access to the NTC led to several associated lifestyle changes and increased well-being for these users. For the partner organisations, engaging in resolving the practical issues around their employees using the NTC

led to learning experiences. After the two-year research project ended, three of them started developing similar concepts and solutions independently.

A TYPOLOGY OF STRATEGIES FOR DESIGN-LED EXPERIMENTATION

Depending on the research aims and the situation, different strategies are available when planning for design-led experimentation. Technology pilots and testbeds are often well-suited to answer specific questions, implying certain strategic choices for a pilot setup and implementation. In living labs, on the other hand, open-ended and explorative strategies may be required to answer more ambiguous questions. This requires other strategic choices to be made. In the following, we propose a typology of research strategies by identifying the *why* and *who* of experimentation spaces, explaining the dimensions of these choices and their implications for alternative research designs.

WHY: WHY THIS RESEARCH?

The first strategic choice to make regards the purpose of design-led experimentation: *why* the research is conducted and what kind of knowledge the research project aims to build. Different research purposes have implications for which research methods to use. Also, what kind of knowledge the project aims to produce depends on which stages in the research and development process (early or late) the project intends to cover.

Some projects aim to frame or understand a complex issue in an early research stage at one end of the spectrum. In the language of prototyping, a prototype can be used as a probe to support the analysis of complex contexts, and interventions can

be considered problem-making prototypes. In the case of the NTC example given above, we knew that we lacked the knowledge to design an optimal service or foresee its effects on people and travel, so we just opted to open the office space to see what would happen and start learning.

At the other end of the spectrum, in later development stages, prototypes are mainly used to validate a concept. In such cases, a proposed solution is already in place, and the project aims to test and evaluate it according to well-defined aims. Technology pilots and many living labs are closer to this end since their main concerns are user evaluations and adoption of technological artefacts; users are primarily engaged as consumers. Researchers are likely to take a more passive role in these experimentation setups, mainly evaluating the results. Weiland and others (2017) have argued that the technical aims are usually well-defined in technological pilots. Still, social aims or future visions are not, making it challenging to consider a broader or richer picture and pose more critical questions. In most traditional pilots, the focus is on testing, fine-tuning, and evaluating a new technology or service, and the pilot can be viewed as a first step in scaling up.

In the early research stages, the solutions envisioned may involve complex socio-technical entanglements where knowledge is still lacking for a complete design or large-scale institutional changes are required. In these cases, the aim of the experimentation may be to explore and understand a future scenario. Thus, the project's focus is on 'learning' (although there may be hopes of developing a full-fledged and viable service in subsequent projects). Action research has the dual aims of learning and making a change. Still, in our experience from the examples above, there is a difference between aiming to learn more openly

about an issue and aiming to define a solution that is functional and viable today. Taking the car away from the participants in A car-free year was certainly not a solution, but the challenges they met revealed what is required today to enable car-free living. These differences are summarised in Figure 1 below.

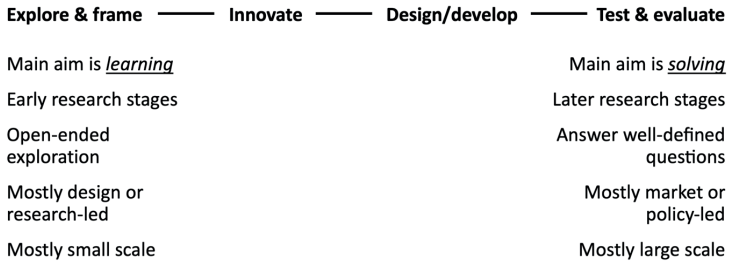


Figure 1: Five defining aspects of research in design-led experimentation spaces, at different stages of research and development from early (Explore and frame) to late (Test and evaluate).

In the more design-driven and open-ended experimental spaces that we have been part of setting up and outlined above, provisional concepts were used to learn about a possible future scenario rather than resolving it or answering well-defined research questions (see e.g. Sjöman and Hesselgren, 2020; Hesselgren and Hasselqvist, 2016).

In our experience, the balance between learning and resolving is a critical factor for the research design (See Figure 1). A commercial pilot aiming to evaluate and scale up a service generally requires many users and a quantitative focus. Conversely, staging future scenarios in the everyday lives of our participants requires close attention to their experiences and limits the number of participants.

WHO: WHO HAS AGENCY?

The second strategic choice is *who* should have agency in a design-led experimentation project. In our experience from the examples above, this critical aspect is notoriously challenging to handle in collaborations with a range of public, private, and academic stakeholders since there are ethical issues that need to be dealt with around the agency of users. Differences in views and understandings may be hard to bring out to allow discussions. When prototypes are tested and evaluated in technological pilots, the participants are mainly engaged as consumers providing usage data. When prototypes are designed and tested in relative isolation during development, users are often viewed as informants giving input upon request. However, users may be engaged as active co-creators or even co-researchers in more participatory approaches.

Engaging participants in open-ended design-led experimentation requires a close, open, and trustful relationship between the user-participants and the researchers and a keen focus on the links between the experiment and broader social and experiential aspects. In these research designs, the participants will be strongly affected by being involved in the experimentation, and there can be no claims to objectivity.

Figure 2 below illustrates this width of research approaches and roles by adding the *insider-led* mode to the right of Sanders and Stappers' (2008) notion of *for* and *with* users. Sanders and Stappers (ibid.) argue that research approaches designing *for* users involve a less active partnership *with* the user. Hence, we categorise the two other notions (*with* user and *insider-led*) as participatory approaches.

	"Participatory"		
	For user	With user	Insider-led
Solving focus	User/consumer	Co-designer	Community/movement
Learning focus	Informant	Co-researcher	Citizen

Figure 2: A matrix including six different modes of user participation

In practice, however, distinctions and terms are unclear, and the user is referred to various terms in different research contexts. In design contexts, the co-researcher role often implies acknowledging users as experts in their own lived experiences, and citizenship means taking an active role in a democratic society.

The differences between aiming to learn or solve have ethical implications for participation. When aiming to ‘resolve’ a situation in the here-and-now, a project may produce lasting changes that affect the lives of the users involved. In our view, this is where democratic values must come to the fore. When aiming to change a real-world situation, it is ethically and practically advisable to involve the people affected by the envisioned change, favouring more participatory approaches and a more equitable partnership between researchers and participants.

However, in our more learning-oriented living labs, the provisional concepts are not designed to resolve a situation in the here-and-now. Still, they are foremost meant as interventions to *provoke or enable* the user-participants to experiment. This means that we, as design researchers make the strategic choice of not asking the participants about which solutions they need. A car-free year produced rich learning experiences, but taking the car away is not a ‘solution’ that car-owners would suggest. Instead, in our living labs, our research approach has been to design and stay in control of the parameters of the interventions. Ethically, our stance is that we may ask people to participate in our ex-

periments, given that we inform them to the best of our knowledge about what they will experience and why the experiment is carried out. However, these methodological choices are often loaded with strong views on what constitutes participation, ownership, or agency.

Finally, different research strategies also imply different levels of agency for the researchers. As described above, in technology pilots and more traditional market- or policy-driven living labs, the researchers may take a more passive role, collecting user data and performing interviews. In some cases, they can take a more active role as an intermediary or by leading co-design sessions. However, they may have limited influence over the project's overall scope and aim. In insider-led research, as described above, a project's research questions and aims should be set by the affected user groups or communities.

Design-driven and exploratory research setups require a close relationship with user-participants, and setting up real-life interventions come with many practical challenges. For these reasons, they are costly to stage at a large scale, limiting our experiments' size. Also, when a working solution is not yet in sight in the early stages, it is harder to secure funding from policy or market actors. Therefore, our design-led experimentation projects have been research-led, meaning that the researcher's role has included scoping and framing the projects. Furthermore, in design-led research, like the director of a theatre play, a designer-practitioner researcher may envision future scenarios or concepts and practically orchestrate how this future is prototyped or staged in real-life. Moreover, we have used participatory approaches for engaging the user-participants.

PROVOKING STRATEGIES FOR USER PARTICIPATION

Our design-driven approaches to living labs have been set in early research stages, with an explorative learning focus and a participatory strategy of engaging the users as co-researchers. This section expands upon the design-driven methodology of staging ‘provoking’ or ‘disturbing’ interventions in real life and some connected challenges and considerations.

As outlined above, we argue that our design interventions are participatory as the participants take on roles as active co-researchers. Still, these and similar design-driven experiments have received criticism from proponents of other participatory approaches. The research agenda and the interventions should have been developed collaboratively with or by the participants. However, we believe the sustainable futures that we aim to explore and demonstrate from a design perspective would probably not be ideated or requested by user communities. These futures are mostly perceived as less convenient or in conflict with current norms. This also means that user communities are not easy to engage. In discussions with researchers from several Swedish smart mobility pilots, it has been clear that citizens’ engagement in sharing schemes has not been easy to produce, even in small and closely knit rural areas.

Instead, our research group has developed a methodology built on a practice-oriented design inspired by researchers such as Scott and others (2011) and Kuijer (2014). Inspired by social practice theory, our design interventions have aimed to cause a ‘crisis of routines’ (Reckwitz, 2002) to reconfigure existing practices through design-led interventions. We have aimed to disturb or disrupt energy-intensive travel practices and create opportunities for our participants to experiment with new ones. Building on Sanders and Stappers’ (2014) typology of co-de-

sign methodologies, we have thus used design to *provoke* rather than *serve* a community or a user. In this way, we have shifted emphasis from the innovation of future mobility concepts to user-innovation and to exploration of new practices that such concepts may be forcing or enabling. In a complex situation, we start by *making* something provisional and provoking with the primary purpose of creating learning. In this way, our research builds on a vision of future transformative change, but this change has yet to be realised within the frame of the current project (see Figure 3).

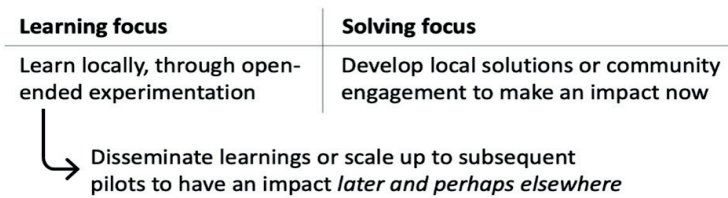


Figure 3: The temporal aspect of learning and solving focus in design-led experimentation

This design-driven research poses new challenges for user participation. As we have seen, the future concepts we wish to learn about are mostly not requested by users and may conflict with today's practices and norms. In an earlier paper (Hessलगren et al., 2017), it is discussed how this requires a balance of soft and strict strategies, meaning that the futures we envision and stage may either remove elements (like in 'A car-free year') or add new ones (like offering access to the NTC in 'Work closer'). Removing elements that constitute parts of the user-participants' everyday practices is a strict strategy as it forces the participants to experiment with creating new practices. 'Future playing rules' were soft as the interventions mainly offered in-

formation and opportunities to save money but still represented provoking rather than serving.

In her thesis, Hesselgren (2019) discusses how provoking, especially using strict strategies, may require recruiting curious and engaged early adopters or forerunners. In 'A car-free year', advertising in sustainability-oriented Facebook groups led to 74 families applying, out of which three highly motivated families were selected. Conversely, in 'Future playing rules', we found that when we prioritised recruiting a more random mix of citizens with different lifestyles, experiences and attitudes, the lack of intrinsic motivation led to little experimentation, even though monetary incentives were offered. The close researcher-participant relationship evoked a sense of responsibility that motivated the participants to put effort into providing input. Still, this did not extend to perseverance in experimenting with changing their everyday practices, with a few exceptions.

Building on these two experiences, we experimented with a format called 'Challenges' in 'Work closer'. In this three-year project, many participants found it difficult or were not allowed by their managers to work from the NTC for more than two or three days per month. In this situation, we successfully 'challenged' a mixed group of ten participants to try and use the NTC more for a limited time. We asked them to use it for a minimum of three days per week for three weeks while keeping a log of when and why this proved difficult. In 'Work closer', we also learned a lot from a small group of users whose specific working conditions allowed them to use the NTC more than others. Out of the 64 participants initially recruited, around 25 came to use the NTC regularly, at least for a shorter period. Around eight of them kept using it regularly, at least three or four times per month for the project's duration (with some

exceptions during the Covid-19 pandemic). For two of those participants, the new practice of using the NTC several days per week led to other related lifestyle changes and increased well-being.

These more active user-participants that may be called ‘fore-runners’ have played a significant role in all our projects. In ‘A car-free year’, the recruited families were motivated by their high engagement in sustainability issues. This did lead to bias, but at the same time, it can be seen as part of envisioning a future where norms and attitudes have shifted in this direction. In ‘Work closer’, some user-participants had conditions that allowed them to make a change, and the researchers asked some to experiment. In all cases, the design intervention provoked or enabled change, and when experimenting with creating new everyday practices, the participants were not just co-researchers but also innovators.

A CONCLUDING REMARK

To carry out design-driven experimentation is challenging, and staging and managing a designerly living lab in real-life is time-consuming and demanding. Still, we argue that these research approaches are needed to break with taken for granted structures, norms, and practices. Design-driven research strategies provide possibilities for rich and shared learning experiences and enable identifying barriers and pathways to sustainable futures already in the early research stages.

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