

Making a home in Living Lab: the limitations and potentials associated with living in a research laboratory

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Making a home in Living Lab: the limitations and potentials associated with living in a research laboratory

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Introduction

Living Lab is a two bedroomed detached house on the edge of the university campus in Trondheim. It is also a research laboratory, which is testing state of the art technology committed to achieving Zero emissions within a 100m² building. The first qualitative experiment in Living Lab will take place from September 2015 to April 2016, when six different resident groups comprising of two to four people, will make Living Lab their home for a period twenty-five days each. The resident groups were chosen because they are associated with three basic demographic categories; students under 30 who are already cohabiting, families with small children and couples around the age of sixty. During the resident periods Living lab is expected to function as a home outside their actual homes for each of the six groups. The concept of home suggests both social and physical space; it is also often a major source of identity. At the same time, it is often an idealised model and not a true picture of how people actually live (Munro & Madigan 1999). The use and understanding of a home that is established is often a negotiation between what is suggested by the physical space (the house) and the needs of the social space imposed by family life or other relational activities. The insight gathered in Living Lab will provide understanding of how a concept of home is established within a highly technical setting and the implications this has for the use of the technology being tested in Living Lab.

The experiment in Living Lab has energy use and building performance as its central focus. However, the qualitative experiment in Living Lab will not be completed until the end of April 2016, the results and conclusions are at this stage still tentative. The paper will therefore focus on the methodological challenges met by an anthropologist, when faced with doing fieldwork in what is not a real-life context and sequentially getting to know and understand each residential group. These methodological challenges are closely associated with the challenges faced by residents when attempting to make a home in Living Lab.

What is Living Lab?

Living labs are commonly used as research tools for studying the development of new technology. An idea that was first established by William Mitchell at MIT during the 1980's as a user centred method for prototyping and validating complex solutions in what was intended to be as natural a user environment as possible, "*a real-life context*" (Cruz-Cunha, et al. 2009). In these terms, living labs are spaces for interaction between co-producers, where the process takes place before formal product development (Pierson & Lievens,

2005). Living labs are not necessarily bound by geographical location and may exist simultaneously in a wide number of interactive arenas. Living Labs may also represent a residential research facility, where in-house behaviour and usage patterns are observed and collected (Ibid).

Living Labs are often used as a method to achieve or understand innovation processes, and/or they may be understood as an environment where interaction between humans and technology may take place. The second understanding is closest to explaining what is taking place in Trondheim in association with an interdisciplinary research group including architects, engineers and social scientists. A central aim is to assess the building performance for a single-family house based on the zero emissions concept established by the ZEB Centre¹. Living Lab integrates state-of-the-art technologies for building envelopes, building equipment, solar energy exploitation, HVAC systems, and control interfaces. Its configuration allows the testing of, for example, building elements and technical control strategies. The house is therefore a highly technical space, and its performance is continually monitored by a quantitative experiment, which is taking place alongside the qualitative experiment presented in this paper.

Living Lab is a single-family house with a gross volume of approximately 500 m³, with a heated floor area of approximately 100 m². The ground plan of Living Lab has two main open-plan zones: a living area facing south and a working/sleeping area towards the north. The entrance is located in the south-west corner, and an open hallway allows direct access to the living room and kitchen. Most of the house's furniture was built on site². Two bedrooms (one facing east and one facing west) are located at either end of the studio/work space. The technical room (accessible from outside the building), bathroom and the kitchen are located along the central spine of the building in order to optimize the distribution of the technical equipment. The building construction has well insulated envelope. Walls, floors and roofs have a conventional wooden-frame structure with a double layer of rock wool insulation with a total of 40, 40 and 45 cm respectively³.

Home in a technical space

The residential experiment allows the study of the social, physical and technical aspects that shape energy demand. Research clarity requires a separation of the terms house and home, and in this case the house is the physical building, whilst home is connected to the social, emotions and relationships (Ellsworth-Krebs et al 2015). Living Lab is a house where material aspects such as energy supply, heating and cooling and life cycle analysis (LCA) may be measured. It is quite possible in Living Lab to measure performance independently of

¹ According to the ZEB centre, "Zero emission buildings require renewable onsite energy generation to compensate for emissions from different stages of the buildings' lifetime." (Risholt & Time, 2014).

² Architect Luca Finocchiaro designed the house and furniture.

³ For a more technical description of Living Lab see Goia et al. 2015.

occupant behaviour. However, the house was built to be lived in by people. The assessment of building performance takes place in a framework that includes real users playing active roles. Establishing a home within the framework provided by the experiment was a challenge for the groups living there, the house, the time scale of twenty-five days and the needs of running the technical systems all offered limitations⁴. How the residents dealt with the challenges provides insight into how homes are defined and used and supports the assessment of building performance by providing knowledge about the everyday practices and expectations that are affecting energy use.

Most people still dream of having their own home, this is despite of their never being a period in western urban history when so little time has been spent at home (Cieraad 1994). Although less time is spent there, a house provides shelter from the outside world, and a home rather than being opposed to the outside world mediates between inside and out, is influenced and transformed (Briganti & Mezei 2012). A home is not static; it is able to incorporate new uses and ideas. Living Lab is part of the Norwegian housing context. Gullestad describes Norwegians as home-centred and tells us that "Most Norwegians want a nice home", but what this means varies according to equipment and use (Gullestad 1987). This niceness is also about a need that residents have (not just Norwegians this time) to express themselves symbolically through the spatial arrangements and decoration of their homes (Cieraad 1999). Another issue closely associated with understandings of home is privacy and creating the family's own space (Munro & Madigan 1999). Privacy, Garvey 2001 and Gullestad 1992 suggest, is central to the Norwegian understanding of a home. Within the privacy of home there take place negotiations and compromises between family members about establishing routines, use of space and the sharing of objects, both technical and non-technical. The negotiations are an on-going process that organise the home (Cieraad 1999), and can influence energy use (Ellsworth-Krebs et al 2015).

The aforementioned aspects influence how a sense of home is established in Living Lab. The resident groups wanted to have a "nice home" in the house but moving into Living Lab represented a clear break in their routines, a distancing from the decorative strategies they had in their own homes and a challenge to their sense of privacy. An initial interview in each of the residents own homes gave insight into what was the basis for these aspects. Most of this was left behind when they moved into Living Lab, but what they chose to bring with them indicates what was necessary to main a sense of being at home. During a study of working class women in Norway, Garvey (2001) observed that although major acts of refurbishment have acknowledged consequences for the presentation of home to others. It is the "small, easily taken forms of reordering which bear most on personal and intimate feelings."(Garvey 2001). This idea of small, easy reordering suggests a solution to

⁴ The financial framework for the project limits the amount of time available for the residential experiment. An aim is to include as many resident groups as possible for as long as possible. Twenty-five days was a result of a negotiation between these three factors.

understanding some of what will be presented here. Small and easy offers a manageable strategy for living for twenty-five days in Living Lab. Another aspect, which influences the resident's choices when they moved into the house, is making the most of what is available. A resident's understanding of a home rests on what it offers rather than what it lacks (Rørtveit & Setten 2015). Living Lab does not offer a bad house to make the most (see figure 1). Its birch wood walls, high ceilings, technical solutions and tailor-made furniture represent an attempt to create the best in contemporary architecture. It is however very different from the residents actual homes.



Figure 1: Exterior and interior images of Living Lab, photo SINTEF Building and Infrastructure, 2015

Participant observation in an experimental space

The following section describes the experimental context mentioned earlier, placing it within a methodological context and in relation to challenges experienced by residents living in Living Lab. The research team working on the qualitative experiment includes an anthropologist and a sociologist, and a range of qualitative methods are used to gather empirical information before; during and after the residence periods, such as structured and semi-structured interviews, photography, and participant observation. Residents keep a diary; make video recordings and are responsible for a guest book. A large number of in-house sensors record technical data about amongst other things temperature, CO₂, humidity, energy usage and production.

The methodological questions arising out of the anthropological part of the qualitative experiment in Living Lab started in June 2015, almost three months before the experiment started. During an anthropology conference in Trondheim, I was, asked what I was working on. The preparations for the Living Lab experiment had started, so I told my questioners about Living Lab. To which I received a follow-up question, "*how is that anthropology?*" The question was a result of the deep-rooted faith in participant observation as the foundation all methodological activity for an anthropologist and scepticism to using it as a method in the experimental context provided by Living lab, because despite the specifications implied by Mitchell, Living Labs only simulate real-life contexts. I answered the question by stating that my main method would be participant observation and that my theoretical and

methodological grounding would safeguard the anthropology in Living Lab, but the fact is that participant observation is difficult in Living Lab. This is in part due to Living Lab not being an actual home and in part due to the sequential nature of relationships with residents. In Living Lab, relationships develop over the space of twenty-five days, after which a new set of relationships is developed. A challenge has been establishing these relationships with each group on their own. It is useful for residents to know something about the social context that came before their period of residence, but not too much. The intention was to encourage residents to make their home in Living Lab independent of previous resident's actions.

When working with ethnographic methods such as participant observation the main aim is to study people's lives, by finding out how they view the situations they find themselves in, themselves as individuals and the people who are with them (Hammersley & Atkinson 2004). In Living Lab, how they view the house and the technology is also included. The main tools used apart from notebooks and a camera is the anthropologist's ability to observe social activity, and to engage the people encountered within the field in conversation. Conversations that preferably take place as far as possible on the terms of those talking to the anthropologist (Hylland Eriksen 2004). Importantly fieldwork can take as many forms as there are anthropologists (Carrithers 1998). My solution to the experimental context has been to establish relationships sequentially with the four groups that have so far lived in Living Lab. Human variability is a fundamental principle and by examining or comparing social orders (Boas 1955) or the routines of different groups it is possible to understand what causes the differences and similarities. Most relationships are sequential, conversations are not taking place with everyone that we know all of the time, but conversations may be viewed in context with other conversations that have taken place. The ethnographic method is about observing social activity, and engaging people encountered in conversation and is therefore similar to way most people make sense of the world and the people they meet. What makes it different is "a more deliberate and systematic approach" (Hammersley & Atkinson 2004) and it is therefore in some ways an "experiment in slowing down processes"⁵. In Living Lab new groups are kept separate from previous residents, but the research requires that the social context established by each resident group is compared and interpreted.

In addition, I became a drop-in anthropologist. The experimental context of Living Lab is located five minutes away from my own office. Conversations with residents are short and informal and the timing of the visits to Living Lab is established in dialogue with residents. However as mentioned earlier, Norwegians like their privacy, "Norwegians use home to create and express their specific ideas of identity and intimacy." (Gullestad 1992). The boundaries between public and private help to establish the home as a place for intimacy. The experimental context where the fieldwork in Living Lab takes place challenges resident's ability to establish the feeling of privacy necessary to their everyday routines. The house is

⁵ Varenne, H. <http://varenne.tc.columbia.edu/blgs/hhv/?p=692> (downloaded 04.03.2015)

part of the university campus, close to a busy road and intersection and residents often feel themselves to be under observation even when the research team is not visiting them. The windows in Living Lab are large and not all of them have blinds or curtains. The first couple to live in Living Lab went home on the second day to collect their dressing gowns after discovering that there was a strong chance of being observed if they walked naked between the main bedroom and the bathroom. The use of blinds in Living Lab signals how comfortable the residents are with their visibility. One resident group did not close the blinds at all, but instead used the solar shading system to allow more contact with the outside. Whilst another resident group started with open blinds and ended up with them closed during the last stage of their residency period. This is in contrast with the lack of closed curtains in most Norwegian living rooms and kitchens.

At home in Living Lab?

A home is a localisable idea one that represents an organisation of space over time. According to Douglas (1991) a home like a hotel offers differentiated and allocated spaces, but a home offers a much wider scope of intention, for example the space to raise children. Twenty-five days is longer than an average holiday, but a short period to establish a feeling of permanence. Living in Living Lab is not part of what the residents would call their normal activity. We encourage them to behave as if the house is their home, to continue as far as possible with their everyday routines, but the house as an experimental framework and the residential period of twenty-five days potentially limits the scope of intention. Three examples from the experiment in Living Lab presented below show that residents reacted in a variety of ways to the house and the time-frame.

Living Lab provides the same basic physical and technical context throughout the experiment. The residents provide the social context, and they can add to the physical context. It was suggested to all of the resident groups that they should make themselves at home in Living Lab. The house contains basic kitchen equipment (although no electrical goods other than a hob, oven, fridge, dishwasher and washing machine) and the house is furnished. Before each group moved in, what the house contains and what is sensible to bring with them was explained, for example bedding and a vacuum cleaner are not included. In addition, it was suggested that they could bring with them items that help to establish a feeling of home without specifying what these items might be. Each resident group has approached this differently.

The first resident group was a young student couple and they took the suggestion that they could bring into the house objects that provide a sense of home seriously, at the same time, it was the cause of debate. They agreed that plants were necessary, but the male resident was opposed to bringing too many objects from their own home into Living Lab. In the end, they chose together a limited number of objects that they felt defined their home, an orange teapot, a glass polar bear, a rocking chair and a poster of Hokusai's "The Wave". These objects were primarily decorative, the teapot and rocking chair were rarely used. As

students on limited budgets who were used to less comfortable living environments, they considered Living Lab a comfortable home. In Living Lab they had unlimited access to hot water and heat at a time of the year (October) when it was becoming colder and darker. Living Lab became a home not just because of the objects that they had chosen to take with them; natural light and location were factors that played central roles, but their decision to bring objects associated with home into Living Lab was I suggest a supporting factor. They said that they would be jealous of the new residents who had moved into "*our house*."

A family with two small children responded differently to the framework provided. The announced early on that they were "*not decorators*". They brought with them objects that were primarily functional and only a limited amount of these. Enough toys to keep their two children happy (they took "home" toys that the children became bored with and collected replacements during the 25 days) and enough clothes, but a limited amount so that they used the washing machine more often than they would have done in their own home. The physical and technical space provided by Living Lab offered opposition during their residency period. They moved in during early January, the coldest part of the year (minus 14-15 degrees during the first week). Early in the residency period, because of the outdoor temperature and some technical problems, Living Lab never seemed to them to be warm enough. This improved but it affected their relationship with the house. They went home and collected an oil heater to add extra warmth to the house. All the groups at some point during the residency period are asked if they consider Living Lab to be their home and this resident group said no. It seemed that they never really left their actual home. Returning regularly for different reasons during the 25 days and they expressed a clear preference for their own house during the whole residency period. It was not just technical problems that caused them to be critical; they found the design of the tailor-made furniture and kitchen to be less than functional. Their own home they said was more functional, it allowed them to be more sociable together and they could organise their children's use of the space more effectively. They were not afraid of disturbing the children and they could even avoid them if they wanted to.

A pensioner couple established Living Lab as their home almost immediately. During the first week of residence, because of technical problems the largest windows in the house were removed and then reinstalled. The female resident welcomed all eight different technicians, window specialists and other professionals into Living Lab, stating that she felt protective because "*this is my house now*". Flowers, plants, blankets and candlesticks were moved from the window and seating area and the resident herself was forced out of the main living area into the studio space to read and watch the progress of the repair in cold and uncomfortable conditions. The window repair was a much bigger process than both the resident and anthropologist expected, but when later asked if it was ok that a technician visited the house and adjusted some of the sensors, the residents replied that it was fine and that they were used to receiving repairmen. Living Lab is a complex technical system and adjustments are regularly required, but this group's sense of being a home in Living Lab did not disappear,

despite the male resident being convinced that his wife had caught a cold whilst the windows were being reinstalled (it was 1-2 minus degrees on that day). Living Lab was an experimental space for this couple. They stated that they were there to learn, and when I suggested that they did not have to feel that they had to learn the female resident said, "*Learning is what we do.*" Learning was a philosophy for living for this couple, despite them being 68 and 81 years old. At the same time, as they were conscious of being part of an experiment they felt that they had to bring enough objects into Living Lab to make it into a home for the 25 days. Candles, flowers and drawings made by their grandchildren helped them to establish a home in Living Lab.

Tentative preliminary conclusions: making a home in Living Lab

The insight gathered in Living Lab is intended to provide understanding of how a concept of home becomes established within a highly technical setting and the implications this has for the use of the technology being tested in Living Lab. The examples presented here do not go into detail about energy issues in Living Lab because of the tentative nature of the results, but they do indicate energy and technical issues arising from resident behaviour. For example, the first student group was much more relaxed about energy use in Living Lab, than in their own home. Conversations with the couple established that this was in part due to access to free energy due to the experimental nature of Living Lab, and in part due to a belief that activity in the house would use less energy because it is a Zero emission house.

The examples presented primarily focus on the experimental context provided by Living Lab, and the challenges this caused both methodologically and to the feeling of being at home. Sequentially it possible to act, as any anthropologist would even in Living Lab. Sequential relationships make it possible to compare the routines of different groups and allow an understanding of what causes the differences and similarities. Ethnographic conversation is more deliberate and systematic than everyday social interaction and in many ways functions as an experiment, slowing social processes down so that they may be observed. Living lab provides a space for a slow ethnographic process to take place.

Each of the residents groups were asked to act as they would in their own homes, to take with them routines and objects, and to make Living Lab into a home, but although Living Lab is a nice house, it is different from their own homes. A home provides us with identity, one that is often idealised. The use and understanding of a home that is established is often a negotiation between the physical space and the needs of family life or other relational activities. Most of this was left behind when they moved into Living Lab, but what they chose to bring with them indicates what was necessary to maintain a sense of home. Some of the residents achieved a sense of home and some did not.

Living Lab provides insight in the idea of a good home, not just a home that is lived in, and it challenges the idealised version of what a home should be. The experimental setting, where the residents are constantly observed or monitored in some way, one where they are aware

of being part of an experiment, one that deals with domesticity and home-making, produces findings on how the subjects relate their identity (we are learning, we are not decorators) to the physical space of Living Lab. In this sense, they all enact domesticity and identity (rather self-consciously) and that is what which is observed. Living Lab resembles an ideal, more or less empty canvas to produce and observe these enactments. What remains is to complete the experiment and place the observations within a technical and energy use context.

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