

Practice-based Design of a Neighborhood Portal: Focusing on Elderly Tenants in a City Quarter Living Lab

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ABSTRACT

This paper contributes to the current discourse on practice-based research in HCI paying particular attention to the overall temporal and situational conditions which frame an R&D project. We present a Living Lab study situated in an arbitrary neighborhood of a German city which develops ICT support to foster informal help and social interaction with a special, but not exclusive, focus on elderly tenants. We demonstrate that practice-based, long-term research in a city quarter goes beyond those challenges already described in the current Living Lab and PD literature. The long-term study's positioning in a real-world context is contoured not only by a high diversity of stakeholders and their individual interests and motivation for participation but also by their individual skill sets and learning needs. These distinct and often contradictive perspectives have to be permanently counterbalanced. Thus attention has to be focused on how related strategies and decisions impact on the design of the project as well as on the final ICT product. To enable all tenants, irrespective of age and technical skill, to participate in a long-term ICT-based community development project, we applied the format of 'experience-based PD workshops' to foster confidence in ICT usage and encourage the competency of the elderly and non-tech-savvy tenants.

Author Keywords

Living Lab; city quarter; elderly people; participatory design; action research; practice; methodology

ACM Classification Keywords

H.5.2. Information interfaces and presentation: User Interfaces – Theory and methods

General Terms

Design, Human factors

INTRODUCTION

Practice-based design in HCI appears in methodological framings such as Participatory Design (PD) and Living Lab

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in real life contexts [7,14,31]. These approaches aim at a better understanding of the social fabrics in which future technologies are to be used. A further objective is to examine how current end-user practices and attitudes may influence the design and appropriation processes of the final product which is to be developed. In regard to PD with/for the elderly, research has demonstrated the importance of taking elderly persons' attitudes and (self-) images into account. These are often based on a low familiarity with new media. This results in anxieties and reluctance to accustom themselves to new media and hence affords certain measures for developing technology which is meaningful and useful to the elderly [4,22,40].

Thus Living Lab and PD research in non-work settings includes future end-user groups and their concerns and needs or social problems in their every-day lives. In addition, Living Lab research puts a focus on the construction of a design space for all parties involved in a cooperation project consisting of partners such as industrial firms, researchers and primary, secondary or tertiary end-users for co-exploration and co-design [7,18,31].

However, there is only very little research which then reports on the work done to integrate the various motivations and interests of the individual stakeholders as well as bringing their actual, specific efforts into the cooperative project from a bird's-eye perspective [6,10]. As these factors may have an important impact on decisions taken during a project life time and thus on the final design product, HCI researchers in the practice-based design field propose a 'practice turn' in HCI which takes these constraining and sometimes subtle factors more explicitly into account [21,41].

With our Living Lab-based research activities in the development of a neighborhood platform in a city quarter with a high diversity of stakeholder motivation, interest and capacity, we wish to point out some of these factors. In addition, with the format 'experience-based PD workshop' we put special focus on the integration of a group of elderly and/or non-tech-savvy tenants in the city quarter.

RELATED RESEARCH

Participatory Design (with older adults)

Participatory Design methods are being progressively integrated into human-centered technology design contexts. Especially when working with particular diverse target groups who exhibit a low level of familiarity with new

media, as is often the case with elderly persons, participatory design methods help to overcome the so-called 'symmetry of ignorance' [12]. It denotes the mutual lack of knowledge. Elderly or non-tech-savvy people lack insight of what is possible with modern technology and often cannot articulate their needs in respect to possible IT support. Researchers on the other hand, often lack understanding about the everyday life concerns of groups of future end-users [23,29]. Different approaches in HCI research attempt to overcome these problems by the generation of a common space of imagination between users and researchers, such as cultural probes [16], or the use of different forms of prototypes in participatory design workshops [22,24,36]. Another way to generate a common sphere of imagination about future possibilities is the usage of visualization methods like videos [5,33,39] and even theater performances [30] in order to provide examples for technology usage and hence stimulate participants' imagination.

Living Labs

Human-centered and participation-oriented technology research has been using living labs as an infrastructure for nearly 14 years now [14]. The first living labs were artificial laboratories, furnished like regular apartments [20, 32]. Subsequently, researchers and (mainly technology) companies then went on to establish living labs in real-life environments. This kind of living lab can be divided into two sub paradigms: test bed-like settings for primarily evaluation and innovation purposes, and more private, smaller-scaled household settings [1,14,18,37]. These settings seek to provide a frame for collaboration between researchers, companies, governance and future users in order to create holistic, sustainable and innovative products [14,37].

While in the CSCW field workplace studies and similar methods for observing people in their working environment have been applied for some time [19,38], the penetration of private households for technology research purposes emerged only recently when the trends in ubiquitous computing, home automation and smart homes were demanding a deeper understanding of human practices in their personal environments. This form of living lab supported by ethnographic methods such as diary studies, participant observation or cultural probes [8,31] can provide a huge variety of qualitative data that can support the researchers in understanding certain practices on a very detailed, personal level as well as in identifying general attitudes, problems and needs [9].

Preceding research on ICT design and implementation in neighborhood settings draws on the concepts of PD [7,15,35] but only partially in terms of living labs [7] and largely neglects the specific involvement of elderly people in the processes and problems of counterbalancing diverse stakeholders' interests and motivations. In addition, to our knowledge there is no work which affords empirical

insights on related negotiation and decision processes in such broader real-life research settings. Besides reporting on challenges and obstacles linked to the need to permanently balance all stakeholders' visions, the paper deals with another aspect which is novel in Living Lab research: some researchers reported problems and strategies in the recruitment of suitable participants and on the impacts of their choice in the course of the project [4, 31]. A design project located in a city quarter neighborhood is confronted with the situation to tackle a high diversity of possible future end-users, but will not be able to integrate every person in that shared living environment.

Bird's eye perspective on stakeholder interactions

In the meantime, there is a great stock of methods in HCI regarding how better to involve future users (and especially particular user groups), such as PD methods. A perspective on reconciling a larger amount of stakeholders in a cooperative project has, however, not been worked out very intensively. For instance, the emergence of dissonances between diverse stakeholders is more or less foreseeable throughout the course of a project. This is due to the diverse backgrounds, attitudes and goals linked to each and every project partner [10]. They usually have to rely on uncertain outcomes [10] and need to incessantly negotiate the further progress of the project in order to meet all the different expectations [3,6,25]. While there does exist the notion of differences between stakeholders in literature, not many insights have been given in concrete decision and negotiation processes during the life time of the project. Stakeholder management literature either provides solutions from a top-down managerial view [11,27], in a more process- and tool-oriented stance [42] or non-participatory approaches [34]. For HCI design research however, these approaches are less suitable. In the stance of practice-oriented HCI research [21,41] only few papers provide more explicit insights in stakeholder interests, performances and how related decisions impact on the final design product [6,10].

THE CITY QUARTER LIVING LAB

Project aims and setting

The city quarter living lab encompasses a cooperation project aiming at research and development of ICT-based measures to support elderly tenants in maintaining an autonomous life in their habituated city quarter. The project partners are a local housing company and several interested tenants, a counseling agency which is an expert in participatory change management in the housing domain (in such as, e.g., tenant participation), as well as HCI university researchers. A software development company is subcontracted to the university.

The housing complex utilized in the project is located in a middle-sized German city and consists of ten three-story tenements with 144 predominantly small 1-3-bedroom apartments. The largest proportion of the inhabitants consists of elderly tenants over the age of 60, both couples as well as many people who live alone. There are also some

students of the nearby university and a few families with young children. The living quarter is situated in one of the rather ill-reputed areas of the town, where the socio-economic structure is predominantly low.

The aim of the three-year-project lies in the development of a socio-technical infrastructure for the neighborhood, which contributes to supporting and maintaining information & communication, social interaction, and both formal and informal support. The project is specially targeted at the elderly; besides that they are the largest group in the quarter, the special focus is set due to funding requirements by the ministry of family affairs. Objectives encompass the following aspects:

- Providing support for the maintenance of existing informal support networks in the city quarter as well as enabling new channels for communication and interaction.
- Providing an interface between the housing company and the tenants in order to examine ICT-based possibilities for the company to improve their mutual communication and interaction sphere.
- Ensuring that all tenants are capable of using the future socio-technical infrastructure.

The initial ideas in regard to the technical infrastructure encompassed two main components: An internet portal which may be accessed by both the tenants' individual devices, such as PCs or mobile devices, as well as via displays openly located in the neighborhood. The the city quarter living lab process involved a multitude of research and design activities:

- Deploying the participatory design process of the neighborhood portal, aligning the interests of both end-user groups: the local tenants and the housing company
- Organizing the selection and decision-making process regarding the hardware and software to be purchased and installed
- Setting up a sustainable learning environment for elderly, non-tech-savvy, project participants.

Method & Procedures

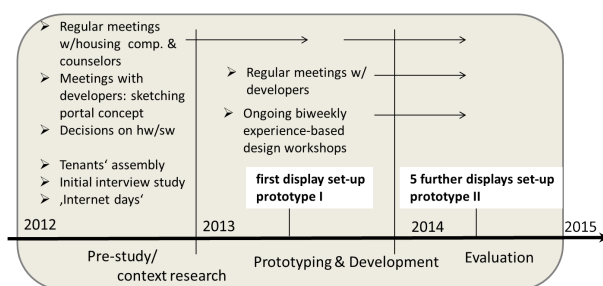


Figure 1: Overview over the project activities

Pre-study/context research

The analysis of the city quarter living lab process is based on different sets of data and procedures (see figure 1). The

first phase of the project started in spring 2012. It consisted of several meetings and workshops between the housing company and the counselors to gain an understanding of their interests in the technology design and future usage visions. Each meeting was documented in the form of common action plans and supplemented by field notes. During this phase, the researchers undertook research on technological components and provided them for discussion with the organizations.

The housing company invited the tenants to an assembly where the researchers introduced the project ideas. During the assembly, researchers could chat with the tenants and results were kept in the form of field notes. Contact was made to eight tenants of varying ages and these tenants were subsequently contacted for interviews. These pre-study interviews focused on the interviewees' every-day lives in the city quarter, their social networks and interactions with neighbors as well as their attitudes towards and actual usage of new media. The interviews revealed that only a small number of the tenants aged 60+ were familiar with new media. In order to inform about possibilities of internet usage and to provide a space for them to reflect individual usage options in their individual and collective every-day lives, we started by organizing two 'internet days'. This is a 3-4 hour workshop format we have described elsewhere [28]. The activities and chats with some 20 tenants, who accepted the invitation were documented in field notes and photographs.

Prototyping & development phase

During the second project phase the regular meetings with the organizational partners took place on a regular 3-6 weekly basis, either personally or by telephone conferences subsequently complemented by field notes.

The interaction with the tenants was intensified when they were offered a mobile device and corresponding introductory sessions from the researchers. We then distributed 15 tablet PCs and 5 smart phones to interested tenants of which 15 were in the 60-86 age bracket and the rest were younger tenants aged between 30 and 55. Linked to receiving a device was the invitation to join regular workshops with the researchers in order to co-create the structure and contents of the neighborhood portal. The workshops were held bi-weekly and were documented by field notes and photographs. In mid 2013 a first portal prototype was launched and one public display was set up for test purposes. We will elaborate further on this in the section on design decisions and implementation steps.

Evaluation phase

The evaluation of the first portal prototype and the public display happened simultaneously with the ongoing context research and requirements elicitation for prototype II. Five additional public displays were set up in front of further tenements and a first version of prototype II was launched recently. The division into the three phases is not as strict as depicted in the figure as all phases overlapped to a certain

degree. The evaluation phase of prototype II and referring refinements are actually still an ongoing process. However, we expect only minor refinements to be needed as the development was formed on a dense data basis in an ongoing process. For the final months of the project, until spring 2015, a concept development for a sustainable structure after the end of the project is to be worked on in cooperation with the housing company.

The data analysis of interview transcripts and field notes was coupled with the iterative research and design process. The overall methodology combined elements from qualitative data analysis [13] and action research [17]. From the beginning, project reflection, activities with stakeholders and idea generation was framed by means of theoretical sampling regarding data collection, documentation, analysis, reflection and further planning. The documentation mainly consisted of interview transcripts, field notes and photos.

DESIGNING THE CITY QUARTER LIVING LAB PROJECT

In the following, we report on our research activities to understand and bring together the different stakeholders' interests and motivations for their engagement with the design and implementation process of the neighborhood portal. We also report on preconditions we found that impacted on the set-up and further execution of the cooperative project in regard to integrating the stakeholders' interests, which were highly diverse in parts. We also indicate related decisions and measures taken under the given project focus directed on the elderly tenants.

The housing company

The participation of a housing company in such socio-technical design and real-life R&D contexts is rare in Germany to date, and demonstrates that a high risk was taken as there is no immediate perspective on economic outcomes. This being so, the CEO has to justify his participation in the project to his colleagues in the board of directors of a bigger housing association of which he is a member. The CEO is interested in gaining information about possible future developments on the basis of socio-technical infrastructure in the living quarters, and their synthesis in short-term real-life implementations in the actual quarter. Besides the CEO, we have several other contact persons in different organizational roles: a construction manager, who is responsible for the organization of the set-up of the public displays; an IT officer; a customer consultant serving as an administrative contact person for the tenants; and a caretaker, who is frequently present on site and represents a direct contact person for the tenants.

A core interest of the housing company is to retain the elderly tenants as long as possible. The tenants are not being regarded as only an "economic factor" by the housing company who is bound by its own policies to foster the welfare, especially of its older tenants. Hence the company

has an interest in keeping older tenants in their own apartments as autonomous individuals. Additionally, this policy coincides with a sound financial management as they avoid undue refurbishment costs by having long-term tenants.

The counseling agency

The counseling agency representative herself attended about one third of our workshops. Prior to our admission to the project, she had already conducted a minor project with the aim of fostering informal help and social interaction among the neighbors by means of social interventions. Her work resulted in the construction of two communal facilities in the quarter in the form of a square for the game of boules and a community room. The representative, together with some committed tenants, had renovated, decorated and furnished the community room, which was subsidized by the housing company with the assistance of state funding.

The researchers

Our scientific aim was to contribute to the existing knowledge and experience of ICT research and co-design with elderly persons. Incorporating the Living Lab perspective into a city quarter with diverse stakeholders and constantly experiencing this real-life environment on-site in a long-term quarter management context (beyond our funding period) was a new challenge for us. The funding structure made provision for ample technical equipment but only for limited staff. Having to run the project on a 50% position proved a hard constraint, with a little additional monetary support to fund student assistants. One of the strategies to cope with the participatory and action-research-based workload was to acquire BA and MA students in HCI and media/social sciences, alongside the researchers. These students utilized sub-tasks in the project for their final thesis work.

The tenants

The initial interview study showed that all interviewees in general perceived their neighborhood to be positive, but also revealed that they often thought of it as being relatively anonymous beyond their own tenement building. A high proportion of tenants valued the initial social interventions. In regard to attitudes towards new media usage, the study disclosed a high reluctance, often expressed as precaution, anxiety or simply disinterest among the elderly persons we interviewed.

Regarding the younger tenants, the option of acquiring a test device motivated some of them to join our assemblies and workshops at the beginning. Altruistic motives, such as doing something good for the community, as well as delight that the housing company was dealing with innovative ICT ideas in the city quarter also contributed to the younger tenants' motivation and interest to get in touch with us.

In general, we found a high dominance of limited experiences with ICT in the elderly. This non-tech-

savviness in many of the elderly people is – in different extents – based on their living circumstances, such as certain levels of education and rather low economic resources. Many of the mainly elderly ladies who we finally could get interested in working with us had been housewives and mothers with only low qualified jobs, if at all. This means that they did not have contact with ICT related themes in their working life. This is also true for the male elderly tenants in terms of opportunities to get in contact to ICT during their working phase. Hence, in most of the elderly tenants, there were no ICT usage patterns at hand which we would have been able to make use of.

All in all, we faced severe problems in integrating the young and the elderly in a long-term common participatory design process. In the first assemblies, we had acquired some interested elderly persons who were willing to join workshops with us in order to reflect on their living circumstances, wishes, needs and problems. However, in the initial stage we had hardly been able to install a common thinking space for reflections on the technology and thus to generate implications for design. In contrast, the younger people who joined the first assemblies showed deep interest in discussing technological options with us. They were expecting only a short development phase and a quick roll-out of the portal. However, as the project focus was on elderly tenants, our priority was to find ways to arouse their interest, too, and to prepare them both to engage in the design and – what was equally important – to actually use the platform at a later date.

Measures to acquire access to the elderly people and their willingness to engage in technology reflections

After the first tenant assemblies, the researchers joined an ongoing activity already being offered by the caretaker to the tenants during the pre-project. Called “coffee klatsch and cake with the caretaker”, it takes place in the community room every 2-3 weeks. He, as a passionate baker, offers home-made cake and invites all tenants to join in and keep in touch with each other. Most of the (up to 15) participants are elderly, occasionally accompanied by younger people. We were invited to join this event in order to get to know the elderly people better. Since our initial experiences had revealed a high level of skepticism and reluctance towards the technology issues, we were more than happy to make use of this chance. The caretaker, who enjoys a reputation amongst the tenants of being highly trustworthy, thus acted for us as a door-opener to the tenants. We took mobile devices with us to these sessions for demonstration purposes and to discuss various usage options based on an ongoing discourse on facets of their every-day lives.

Handling expectations of people with different ICT skills

As mentioned above, various aspects initially motivated the younger and more tech-savvy participants to join the workshops. However, as we were obliged to intensify support for the elderly in the appropriation processes of the devices, the workshop topics mainly shifted towards the

elderly peoples’ needs and interests regarding their technology appropriation. Thus the younger participants became progressively bored by repeating very basic topics. Eventually, none of them attended the workshops anymore. In this project phase, we decided to focus on the interested and committed elderly attendees in terms of shaping our activities according to their wishes and demands. This is because their input was needed in order to adapt the design to their specific requirements and their dedication in order to subsequently gain more elderly participants. However, we let the younger people keep the devices, hoping to retain them as a basis for the intergenerational interactions on the portal at a later phase, when the elderly would be better equipped to participate in the concrete design discussions.

EXPERIENCE-BASED PD WORKSHOPS

In this chapter, we present our approach of *experience-based participatory design workshops* and further means of engaging the elderly and non tech-savvy persons in order to reach our above-mentioned goals.

Preparing the elderly to become co-designers

The experience-based participatory design workshops are essentially aimed at spanning a bridge between actual practices of peoples’ conduct of their every-day lives and the ability to imagine possible applications for meaningful ICT support, i.e. to establish a shared thinking space of future possibilities (in a similar vein as e.g. described in [4]). Two essential features are the basis of the workshops: First, the delivery of off-the-shelf technology and support in individual and group-based appropriation, which is strongly linked to the individual’s every-day life issues. Second, based on subsequent diffusion of technology usage meaningful to the individuals, an engagement in concrete participatory design sessions can be started. The final goal is then to provide the former unexperienced participants with a certain level of skills that enables them to operate the technology in - for them - meaningful ways and perhaps more importantly, to get over their skepticism, anxieties and negative self-images in respect to new media and instead foster their pleasure to see themselves as capable and important contributors to the design project.

The workshops provide low-threshold activities in order to offer an open, welcoming space where anyone has the chance to form an opinion – on the basis of presentation of and interaction with off-the-shelf-technology. In this we see a pre-requisite for individual sense-making processes towards reflections of possible ICT usages in their every-day lives. The first steps within the project were to kindle a first interest and only then further steps could be taken. For the younger and tech-savvy group we presupposed and experienced sufficient knowledge of ICT in order to make an informed decision on their participation.

Anchor points and social learning

These are some examples of issues we identified as anchor points in order to bridge the current practices of the elderly participants with new media applications: in the beginning,

we started with a demonstration of photo and video features on the tablets because some of the attendees had brought pictures with them to show to us their family or places they liked, such as their favorite (former) holiday destinations or their former hometowns. We seized this notion and started the presentation of the tablets by introducing the photo and video features, i.e. how to take pictures and videos, how to save and find them on the device. As this practice was being perceived as being both very easy and a lot of fun, taking pictures and making videos became a major topic for the next couple of weeks. Next, some attendees asked how to exchange pictures because, as one said: *“It is a pity. I am never in the pictures I take myself. And Hilde has all the nice pictures of me.”*

This was the trigger for us to introduce email to those who expressed the wish to be able to exchange pictures. Several months later, when every participant had joined and been supplied with an email account, we even established a mailing list in order to stay connected in between workshops. We additionally introduced an instant messaging tool that was used intensively to stay in touch between the workshops.

Gradual increase in participation

With the elderly’s growing familiarity with the devices and applications, we were able to start co-design sessions with them. The current workshops are based on the following structure: we begin with coffee and cake and small talk on what has happened in the last two weeks and how everyone is doing. This is followed by one hour of “troubleshooting”, as incidents often occur on the tablets that the people do not understand, such as update alerts, problems with sending emails or the internet connection. After having addressed all problems and questions, we conduct a 1.5-hour co-design session in different forms. The degrees of participation in co-construction and ideation of the platform have become more and more intense.

DESIGN DECISIONS AND IMPLEMENTATION STEPS

At an earlier project stage, reflections on the actual platform design were merely based on interactions with the housing company and the younger tenants, as the elderly were not yet prepared to reflect design details. Later on, the workshop discussions on their accomplishments in everyday life, their reflections on social interactions, and their wishes and needs were used by the designers to formulate design implications.

Dividing the prototype in two parts

One of the most important decisions based on the project dynamics caused by the divergent interests of the individual stakeholders was to divide the prototype implementation into a two-step procedure and split the portal into a simple and an advanced part. It was the impatience of the younger tenants and the housing company and also their incomprehension of the necessity of intensive preparatory work with the elderly which gave rise to this decision.

Furthermore, the set-up of the first outdoor monitor was influenced by seasonal preconditions, such as ground frost.

Thus the simple Prototype I consisted of a static TYPO3-based website with dedicated subpages for the bulletin board of the housing company, information about the community room and the provision of information about the whole project. With this simple content, Prototype I was finalized when the first monitor was set-up. For the company employees to be able to generate and upload content, we organized a training session provided by the development firm. Although the employees estimated that it would be rather easy for them to use the TYPO3 back-end and enjoyed the training, not much content was being generated by them due to time constraints.

The evaluation of Prototype I was conducted in sessions with the tenants in front of the display and discussions on several iteration cycles.



Figure 2: Outdoor Display. On the right: actual positioning. On the left: demonstration of the starting page of the neighborhood portal (Prototype II).

Generation of design implications for prototype II

The generation of design implications for prototype II could perhaps be more deeply founded in the elderly people’s reflections, as by then they had achieved a sense of the extent to which a neighborhood portal could be meaningful to them on the basis of their own practices in using the tablets. Prototype II provides an extension with community features and individual log-ins for the tenants. In the participatory design sessions we co-developed the following categories: (a) “the neighborhood portal” with three sub categories: 1. search for and offer help; 2. flea market and 3. organizing common activities. The second category (b) provides information on professional service providers in the quarter, and the third, (c) represents the user profile.

It took several weeks to define the final set of categories in the second prototype. Discussions and negotiations around the first category (a) “the neighborhood portal” centered around the following aspects: Our findings are confirmed by other publications, which describe barriers the elderly have to overcome when asking for help due to aspects of (self-) stigmatization [26]. However, they basically liked the idea of having the options of asking for and offering help and saw a possible benefit in it. What finally lessened their concerns was especially that the system not only

enabled them to ask for help, but also provided a balance between offering and asking for help, thus affording them the opportunity for reciprocal activities. Further, in the workshops, this topic was linked to reflections that demonstrated a strong trade-off between the wish to be connected and to participate in local community building on the one hand and the desire to preserve privacy on the other hand. In talking about this tension, the participants described subtle categories regarding the question of trust in another person from whom they would accept help or to whom they would offer help themselves. For example, they could imagine having a person from the quarter watering their flowers in case of absence, but only someone they already know and trust, in most cases living in the same building. On the other hand, they would not feel comfortable with making their request for someone to water their flowers visible to the whole neighborhood network. They would be afraid that an unknown person responding to this request would snoop around or maybe even steal things.

When we discussed this, regarding using the system to foster community building and to support mutual awareness in the city quarter, the result of that scenario, i.e. that the tenants would only send requests to the people they already know, would only have a minor impact. When we explained this trade-off to them, they started reflecting on other possible requests and offers, which they could imagine being made visible to other buildings as well, and thus to tenants they actually do not know. For example, one lady likes to sew and could imagine offering a sewing service. All in all, the tenants' categories centred around "circles of trust", starting with well-known neighbors in their own buildings and gradually widening to encompass the neighboring buildings in which some people are known, some only from sight, and so forth.

The individual's visibility in the system was another topic intensely discussed in the workshops. Some younger participants, who were committed to developing an atmosphere of mutual help in the neighborhood (e.g. they had set-up an emergency telephone number for the neighbors that they operated autonomously), asked for a feature to rate the helper after the activity. The elderly tenants, however, strictly rejected this feature. They essentially had two reasons. Firstly, they feared that they could be rated negatively if the recipient of an activity wasn't satisfied ("What if someone doesn't like my sewing? I'm not a professional, and some people might complain"). Thus this feature would have the potential to damage one's reputation and this corresponded to other scenarios developed by other participants. Secondly, there was a general feeling of unease about being put into spotlight, even with positive evaluations. Although they basically desired more contact to other tenants, they would feel embarrassed about being at the disposal of all the other neighbors in the portal in this way.

The development of the other two subcategories "flea market" and "organizing common activities" based on the wishes of the elderly, and in the case of the flea market, on an existent practice. In one of the buildings, some of the tenants had already organized a flea market. They all found this an interesting category as it would serve to strengthen their position in giving something instead of only being a recipient of help. They strongly wished for the category "organizing common activities" and suggested a number of activities that could be more fun to do in company (e.g. a theater visit, but also a shopping trip). The privacy and trust concerns mainly corresponded to the first category. They could, however, imagine posting requests in the other category too in the future, when more social interaction could be expected thanks to all the measures currently being deployed. A design decision which tries to counterbalance the trade-off of the desire to build community with trust and privacy concerns, is the following (figure 3):

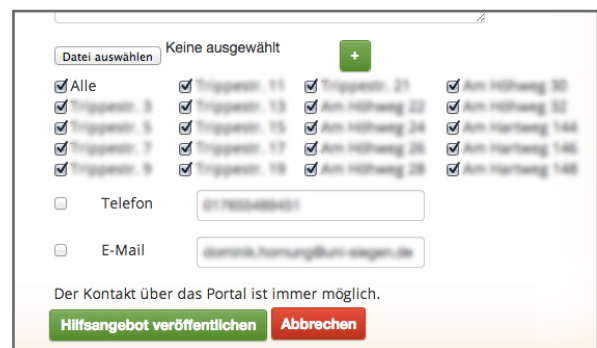


Figure 3: selection of houses for which the request will be visible (blocks in the center: houses with street name and number (anonymized))

The elderly tenants' categories of trust and privacy rely on the different houses of the quarter. All had stated that they would be fine with showing every request to the neighbors in their own house. Some requests would only be shown to neighbors in houses where they know at least one person. Accordingly, while creating a request, tenants can choose for which houses (checkboxes in figure 3) the request will be visible. This is at least a level of awareness slightly above 1:1 interaction. We dismissed the younger people's idea who had opted for a rating system for the help provided in the quarter, although people are free to thank the helper in the remainder of the thread. This, however, is again only visible to the initially selected set of people and cannot be found in the foreground as it would be with a dedicated rating system. In addition, in order to place the degree of their visibility into the hands of the tenants, the completed requests are being listed in a separate category where the originator may leave it, visible to others, or delete it. So far, the portal is only being used for evaluation purposes with the elderly who have personal log-in credentials. The elderly had fun contributing first offers among themselves for test purposes. They are also proud

and happy to see that the software corresponds to the discussions on their concerns and fears.

Five further outdoor displays had recently been set-up, displaying prototype I because the final Prototype II is still in evaluation. It would undoubtedly have been useful to have had these monitors set-up with the final prototype; but here again, the housing company had to follow their construction plans and was not able to wait. This timing, as well as some technical problems in setting up the computers running the outdoor displays, caused a lot of disturbance in the quarter. The housing company received negative feedback from some tenants who did not attend our workshops. The housing company was displeased and forwarded the complaints to the researchers with the request that the displays be turned off until the hardware and software run stably. Here again, the perceived image of the company and their construction is based solely on the performance of the displays and not on the amount of work we spent in the participatory development.

The evaluation of the two-step prototype development shows a divergent picture. On the one hand, the early set-up of one outdoor monitor with basic portal features showed a positive outcome insofar as the company could demonstrate the first result of the common project and the younger tenants saw some of their comments being integrated. It also provided the housing company with another tool for participation after being trained to insert content. In addition, the hardware and software could be used to help the elderly in imagining the full technology to be developed. On the other hand, due to paucity of resources the housing company employees did not contribute any content above some introductory threads created at the beginning. More interest could have been generated in younger tenants had the housing company provided news that was often updated. The first prototype with limited interaction options did not seem an innovative gain for the younger tenants. However, the predominant need for visibility of project outcomes on behalf of the company could be satisfied, at least for a couple of project months.

DISCUSSION & CONCLUSION

Challenges for the city-quarter-based Living Lab study Negotiations of stakeholders' interests and pace needs

In the eyes of the housing company, our engagement in the experience-based PD workshops did not seem to push the dedicated project result at first sight. However, we decided to follow this format to ensure that the portal will be usable by all tenants of different levels of tech-savviness.

In terms of methodological challenges for a long-term and large-scale PD project, we experienced the need to handle different *requirements of pace* in the different stakeholder groups. Regarding the tenants with their different levels of tech-savviness we learned to better structure the long-term project along their different paces needed for learning and getting familiar with the project goals on behalf of the

elderly and non tech-savvy persons. On the other hand we had to postpone activities with the tech-savvy (and mainly younger) tenants when project phases were more interesting to them and better met their cooperation expectations.

Design decisions to keep the consortium stable

Some authors [21,41] hint at problems practice-based research may involve, such as having to make additional efforts although the outcome of the final design product is uncertain (in our case the large amount of work invested in the workshops). Another aspect is the effort expended on the permanent negotiation and balancing of the project atmosphere. We took some decisions with impact on design results to keep the project alive when we decided on the two-step rollout. This was due to the housing company needing this step for their public relation purposes. In doing so, we were able to satisfy the company's needs at least for a couple of project months which in turn helped keep spirits in the consortium.

Bridging the gap between the present and the future in a real-world environment – and beyond the funding phase

Some of the platform features (e.g. 'offer and request help') addressed the actual needs of the elderly and their willingness to use the software. Other categories, such as 'organizing common activities', provide a path to future practices which the elderly can now envisage, but evaluation shows that these paths will probably not be used immediately. However, in light of the expected outcomes of the overall community-building measures that are currently in deployment, we see that it may well become a successful category in the future. It was necessary to build bridges between current practices and future opportunities which might be adopted to support neighborhood activities at a later date. A practice-based project situated in real-life circumstances must build a bridge to activities beyond the dedicated project end. With additional social measures to be set-up in the future, some of the categories can be considered as such a bridge. The ability to embed these design challenges in the vibrant life of a city quarter using stable technology to be set-up at the end of the project brings a novel angle to the stock of solutions developed to enable co-design, such as cultural probes or visualization technologies [e.g. 4,16]. In the study at hand, co-design also had to include a perspective on future practices after the end of the project which in turn will influence the tenants' confidence and skills when using the platform in the future.

Proximity and distance in a large-scale PD project

The problem of 'unknown' and not interested end-users

Real-context Living Lab research points out difficulties in long-term projects with end-user motivation, invisibility of research results and instable prototypes [14,31]. As demonstrated, these difficulties are multiplied in a city quarter living lab context: we have already elaborated on the problem of bringing together tech-savvy and non-savvy end-users, and the strategies we followed. A new challenge to Living Lab-based design is the question of how to deal

with people who are unknown to us and with whom we do not have the chance to develop a relationship (these are described as important factors in Living Lab research [14, 31]). Many of the housing company's tenants did not accept any invitations to join the project but yet became somehow involved with the set-up of the outdoor displays erected in front of their tenements. Due to initial hardware and software problems, they complained to the company.

Research in the field of urban informatics [15] discusses this problem in the context of guiding people's attention to public displays and the technology's affordance as a motivational factor to public usage. As a research setting positioned between public citizen participation and a small-scale household-based Living Lab, the city quarter Living Lab project presents the challenge of integrating motivational measures which apply to both densely built-up user-designer relationships but also to unknown tenants in the quarter. However, within a large scale PD project we have to accept the fact that not all tenants have a desire to participate in activities. Nevertheless, we see the need to provide low-threshold activities in order to offer an open, welcoming space where anyone has the chance to form an opinion, as we provided with the workshop format.

Subtle issues in privacy-community trade-offs

The diversity of the tenants' relationships among each other and the subtle feelings they utter when reflecting the representation of such relationships in the portal is another challenge which multiplies compared to small-scale Living Labs aiming at fostering community building. We see some densely knit face-to-face relationships, some loose neighbor networks but also no contacts between neighbors at all. Possible ways of information sharing with these different classes of acquaintance are linked to very subtle and personal categorizations. The option to choose visibility related to *individual trust circles* is one such idea to address this inclusion vs. privacy trade-off.

Future work

In order to let the tenants and other stakeholders be able to use the developed infrastructure after project end, a perspective on sustainability of both the current technology appropriation process and the maintenance of the technology as well as the development of further service design has to be taken. We will follow this task in the future and have already made contact to other actors in the quarter, such as associations for senior citizens. However, due to space limits, this could not be included in the scope of this paper.

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