From Workshops to Walkshops: Evaluating Mobile Location-based Applications in Realistic Settings

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ABSTRACT
Many open questions on how to best observe the mobile user experience remain – at the stage of design time as well as use time. In this paper, we are focusing on the stage of design time and describe our experiences from evaluating a mobile application for citizen involvement in municipal land use planning. Due to the problems and issues identified after conducting several user workshops in our exemplary case process, we propose "walkshops" as a complement to traditional workshops and prototype field studies specifically to evaluate mobile location-based applications (and similar context-aware systems). We report some problems with workshops and outline how a walkshop may be carried out. The first trials of the new method are promising and have generated valuable feedback, insights and discussions about using the mobile application within the intended contexts.

INTRODUCTION
How to evaluate the mobile user experience both at design time and use time poses many open questions. Specifically, conducting user evaluation with mobile location-based applications is difficult as most evaluation methods are not contextual and/or not suited for systems used in outdoor contexts. With this paper, we focus on a new technique for design-time evaluation of mobile location-based applications. Our purpose is twofold: 1) to illustrate situations where workshops, well suited for stationary computing, raise problems in a mobile context and 2) to show how this can be in part alleviated by, what we coined as "walkshops", given the right staging.

Methods for evaluating systems directly in the context of use exist. For example in prototype field studies the software is deployed and the use of the system over time somehow monitored or observed from a distance. They can be strong in their ecological validity, but in themselves they provide no access to how users think about the use.

Workshops address what field studies lack. The concept of 'workshop' as an evaluation activity has become an umbrella concept for a range of method prescriptions and activities involving groups of users who meet, where perhaps the participatory design workshop is the most well known type. Under the label of 'workshop' we find a number of evaluation activities that vary in how they are conducted, what they evaluate, and perhaps also their epistemological underpinnings. Workshops are, however, generally used in order to stimulate a discussion between users where the outcome is used in the next step of design. In the rest of the paper, we let the term refer to methods we have used throughout the project including future workshops, pluralistic walkthroughs and group discussions between users and designers facilitated by various design artifacts.

There may be differences between stationary use in a workshop and stationary use in practice in the field study. However, these differences are more severe in a mobile context, since mobile computing usually affords multi-tasking, and the physical conditions vary widely. Let us turn to walking as a methodological alternative that decreases these differences. Different walking approaches, where users would move about in the context of the application domain testing a system to be evaluated, have been used before, but a focus on walking as a stimulating activity has never been made explicit or analyzed systematically in any methodology to the best of our knowledge. For example, transect walks [4,5], a method from participatory rural appraisal (PAR), are used for understanding the local context (e.g. natural resources, landscape, land use etc.) by walking together with local informants through an area of interest (e.g. a rural village). In civil engineering and architecture, one researcher even spent an entire year walking the streets of Lisbon and Barcelona in order to understand the architecture of these places [8]. Ochoa highlights that "the physical walk allows the mental walk, stimulating the thought and making possible the contact of the body, as element of measure, with the space" [8]. Yet, both of these methods are aimed at understanding the environment and not the mediating technology.

Summing up, field studies do not provide the strength of workshops – to capture details in a user's sense-making and other cognitive processes. Workshops around a table do so, but sacrifice context. Walkshops enable the study of context paired with the micro-processes of sense-making. We apply walking (i.e. as in going for a walk) both as a tool for thinking and a tool for closer relation to the use context.

The forthcoming sections of the paper concretize this argument by examples from our research project. It describes how we developed that walking may stimulate reflection and that an increase of ecological validity can be gained by observing *sense*-making processes during walkshops. Finally it provides some lessons to be learnt.

RESEARCH CONTEXT
In this section, we describe the research setting where we employed our evaluations. This may give readers an idea of to what degree our findings generalize to their own evaluation tasks.

The evaluations have taken place within a project called "MobileDemocracy." This project has explored how citizens can participate in municipal planning in various ways. The approach is user-centered, and was conducted in participation with a municipality and some community-based organizations in western Denmark. A municipal plan is a document used in strategic planning that describes various visions and goals, but a key element is to relate the strategy spatially and to the existing physical infrastructure. The use of maps is frequent.

The municipality we interacted with has had problems in mobilizing its citizens and cooperated with us in order to better understand citizen involvement. The community-based organizations cooperated with us in order to make their voices heard to the municipality.

Our initial design idea was to create a mobile application that allowed citizens to suggest changes or to react to proposed changes, where these contributions could again be utilized in the planning process. The application was envisioned to be location-aware, and provides notifications when a user passed by a site of discussion. The municipality in our case is sparsely populated, so the number of discussions was estimated not to be occurring often enough to make most users turn off the notification. This mobile app was to be paired with a desktop interface, where people could engage more deeply in discussion. In sum, get people motivated (be it curiosity or indignation) through a mobile application, and provide room for deeper reflection at the desktop. The rest of this paper concerns the evaluations of the mobile prototype.

THE DESIGN PROCESS AND ITS EVALUATIONS
In this section, we highlight how we continuously evaluated our ideas in the design process, in order to arrive at an identification of some problems in the following section.

We explored these ideas in a user-centered system prototyping. The process was iterative, and we created a number of scenarios, storyboards, paper prototypes and refined a mobile prototype in a number of versions. The initial functions proposed in early versions of these design artifacts were based on a mix of our own ideas and empirical data from interviews and cultural probing not further described in this paper.

All of our design artifacts were put in contact with citizens and planners in workshops. Typically, we presented a scenario or storyboard, and discussed it with the participants. We moderated the discussions in order to get more concrete details or examples of actually ongoing planning situations, for the variety, and for barriers to appropriation of such systems. In one occasion, we assigned different roles to citizens, and asked them to discuss a fictive dilemma, and how dilemmas like this could be facilitated by IT. We did not show interaction on keystroke (or "tap stroke") level in these workshops.

We also conducted two pluralistic walkthroughs each with one user and one or two researchers in the panel [3]. The first was conducted on paper, where interactivity was emulated through Wizard of Oz [7]. The second walkthrough used an early version of the high-fi prototype on a mobile phone. The participants were given some tasks, where a problem a user could possibly relate to was introduced. They were then asked to solve or react on it through the prototypes. Following the steps proposed by Bias [3], each set of screens (on paper or the mobile phone) was looked at and notes written down individually. Afterwards they were discussed within the panel with the user going first. Some tasks given were aimed for use of potentially all functions of the prototype, and others were for a specific control inside the application.

Participants
There are two user groups in this project: citizens and planners from the municipality. The citizens were selected through "organizational belonging", and were therefore to some degree convenience sampling. However, we established contact with several organizations independently from each other, in order to avoid e.g. that the municipality chose citizens that would have opinions that fitted to their focus. The users from the municipality were chosen because they worked with municipal planning as key persons at various levels.

The citizens participating in our experience workshops were spread along common demographical spectra (age, gender, education, profession, computer literacy). The users in the most recent workshop to evaluate our latest high-fi prototype were chosen so that they fitted our final choice of a target user group – i.e. citizens from the more rural areas of western Denmark with medium computer, or rather mobile phone literacy.

METHODOLOGICAL ISSUES IDENTIFIED
On a general level, results from the workshops strengthened our design concept in making us sure about the motives in the activities users engaged in and in particularly interesting ideas for scenarios. Thanks to the Wizard of Oz nature of the first pluralistic walkthroughs, we got feedback of the interface at a stage, where we did not have to engage in time-consuming programming in order to implement it.

When we planned and later interpreted the results from the workshops, we experienced a number of problems with our method:

- We experienced a relatively formal workshop or meeting room atmosphere. No matter how we structured them it was mostly a bi-polar exchange between researchers and users.

- We could not utilize exploration by foot or vehicle in a natural manner, due to the physical scale of a meeting situation being too small. A user who was prompted by a position-dependent function had to be told "now you walked through the parking lot of your workplace" and then we made the mobile phone beep.

- Time constraints and stress on the user (e.g. for input with the onscreen keyboard) was observed to be totally different when sitting at a table (e.g. in a workshop where they posed no problems) or standing outside or even walking.

- We observed that in practice, typical workshop situations often proceed in a rather fixed setting, where one or two users continue to work on one phone. Although hypothetically possible, people do just not switch places that often.

- A meeting space is limited in the number of objects to interact with in ways that may be problematic. For instance, parts of tasks in our workshop included taking a picture. This resulted in arbitrary shots of e.g. the table instead of a suitable real-world photo. This includes e.g. problems of where to stand when taking the picture, or how the user would reason when the quality of the picture was poor. Similar issues arose when entering other types of content.

Our conclusion was that we wanted more realistic user conditions. At the same time, we wanted to keep the possibility to gain insights on the user's sense-making processes, which ruled out field studies with remote monitoring.

WALKSHOPS: EVALUATING MOBILE LOCATION-BASED APPLICATIONS IN REALISTIC SETTINGS

In this section, we further motivate and outline our proposed walkshop method, which we think alleviates some of the problems identified above. We also present experiences and results gathered from three walkshops we conducted with different user groups within the MobileDemocracy project.

The term "walkshop" itself has been used before – mainly by activist groups and in academia on topics like walkable cities as well as architecture and urbanism [10,9,6]. We adopt this term as it highlights the need to move part of the traditional workshops out of the meeting rooms and into the actual context of use. We stress both the in situ aspect and the aspect of walking as a thinking tool. The aim of this method is to evaluate prototypes in a more realistic or natural setting (i.e. within the context of use). Thus, the focus is on understanding the mediating technology, rather than the environment or context it is used in. With this, we strive to bring the evaluation into the context, rather than bringing the user's context into the evaluation situation.

Walking as a Thinking Tool

Neurologists have recently shown that walking as a rhythmic activity may possibly have a positive effect on our thought processes [2]. Similarly from the field of regional planning, Anderson proposes a method called "talking whilst walking", which suggests "that conversations held whilst walking through a place have the potential to generate a collage of collaborative knowledge" [1, p. 254]. While focusing on how an understanding of the knowledge and lives of individuals can be gained by wandering around aimlessly through place, he also again acknowledges that "the bodily movement of walking invokes a 'rhythmic relaxation' of both body and mind that 'frees the imagination'" [1, p. 258] as well as that "the rhythm of walking generates a rhythm of thinking" [Solnit in 1, p. 258].

We can thus argue that walking goes well together with talking and discussing the issues that surround us, and those we may be occupied with at that moment. We are aware of casual walks in the park with colleagues, friends or family, which occasionally lead to interesting and profound conversations. Back to our context, the activity of walking or wandering frees workshop participants from the fixed confines of the meeting room, table, and chairs making the atmosphere much more informal by allowing participants to move about freely and flexible.

Conducting Walkshops and Results

Our focus for the proposed method is on evaluating mobile location-based systems as their use cases are based on acquiring one or more spatial positions. Bringing these systems into the context allows for the creation of more realistic evaluation settings closer to the actual application domain (in terms of body movement, light conditions, distortion, etc.). Location and other environment variables can be incorporated more easily than in a spatially fixed setting.

Throughout the course of the MobileDemocracy project, we conducted three walkshops at different stages of the prototype and with different user groups. All walkshops took place outdoors. The first two walkshops were an integral part of workshops. One walkshop was conducted with planners from the municipality (three users), where the prototype only notified the user of topics at the locations he or she was currently walking and allowed him or her to retrieve details of these topics and see them placed on a map. The second walkshop was conducted with citizen users (four users), where we, in addition to the functionality above, allowed and asked participants to also create new topics with details, take photos related to these topics as well as view an augmented reality visualization of the future plan. The third walkshop was part of a preliminary project presentation again with planners and other interested parties from the municipality (six users). Here, we showcased in a hands-on (and foots-on) session the main functionalities and look-and-feel of our prototype implementation via scenarios and let the users react through the prototypes.

While one could imagine conducting walkshops as stand-alone, we deliberately chose to do them in conjunction with

user workshops in order to be able to work on different aspects of the project. In a three-hour session we reserved a timeslot of 45 minutes for a walk of approximately one kilometer. Before going out, the walkshop was introduced with a very short briefing of the prototype and followed up afterwards with a discussion. Here, created content (in our case topics and photos) could serve as a starting point and framing of the discussion. For the walk itself, we prepared real world points-of-interest along the route, of which our prototype would notify users and would allow them to view details and write comments. Users were also provided with more concrete problem-centered tasks and asked to respond to or rather interact in response to them. As it was our desire to understand the sense-making with such technology when used in context, we, as researchers, came along the walk. Our roles were, similar to those in workshop settings, those of facilitators (in terms of setting up the infrastructure and helping with usability issues), of observers (in terms of action research), and those of partners for informal conversations (in terms of soliciting, probing and discussing feedback and insights).

Through these walkshops we found several usability problems we hadn't identified before. These related especially to data input under stress (e.g. when standing or walking rather than sitting at a table), but also to ways of how and to what extent our system will and can actually be used in these (more realistic) settings (including what kind of content was created). Similarly, we experienced elaborate discussions and reflections of the users on how the system works, how it might be used, and which other opportunities it opens for the future. This may be in part due to the users interacting with the real environment rather than a staged one only provided through scenarios or similar. We believe that the real environment provided more graspable stimuli, which helped to fuel the users' imagination and thoughts leading to interesting discussions.

On a practical level, the walkshops allowed interacting with real-world objects and issues to create content from or take photos of. Furthermore, the walkshops afforded a flexible reconfiguration of usage situations between users. While also possible in workshop settings, with users already being on their feet and mobile, they simply moved around more and were free to engage with different other users, with the researchers or just explore the prototype on their own.

Apart from these findings, we are also of the opinion that going out into the context rather than bringing the context in is often the only meaningful way to evaluate a location-based mobile system with users. As our aim was to get an understanding of the sense-making process of users using the system, we decided not to put the system out into a field study and monitor it from a distance at this stage.

CONCLUSION

Based on our experiences with the workshops it seems that some things are problematic: Formality, stress constraints, exploration, and shortage of objects to interact with. It suggests that if such issues may be important for a user's experience, it is inadequate to rely too much on workshops for evaluation. Walkshops seem to mitigate some of these problems by intertwining the evaluation with the actual context of use. In conclusion, we observed users being more engaged with the software and the evaluation situation as a whole, but limitations e.g. on the use of paper prototypes persist. Therefore, walkshops are no silver bullet and we propose to integrate them into traditional workshops and complement them with other methods such as prototype field studies in later stages of a project.

REFERENCES

1. Anderson, J. Talking whilst walking: a geographical archaeology of knowledge. *Area 36*, 3 (2004), 254–261.

2. Babu, H., Ramirez-Rodriguez, G., Fabel, K., Bischofberger, J. and Kempermann, G. Synaptic network activity induces neuronal differentiation of adult hippocampal precursor cells through BDNF signaling. *Frontiers in Neurogenesis 3*, 49 (2009), 1-11.

3. Bias, R.G. The pluralistic usability walkthrough: coordinated empathies. In *Usability Inspection Methods*, J. Nielsen and R.L. Mack, Eds., John Wiley & Sons, New York, NY (1994), 63-76.

4. Chambers, R. The Origins and Practice of Participatory Rural Appraisal. *World Development 22*, 7 (1994), 953-969.

5. Dearden, A. and Rizvi, H. Participatory IT Design and Participatory Development: A Comparative Review. In *Proc. PDC 2008*, ACM Press (2008), 81-91.

6. Do Projects. *How to bring a Systems/Layers walkshop to your town*. (2010) http://doprojects.org/news/how-to-bring-a-systemslayers-walkshop-to-your-town (accessed August 25, 2010).

7. Kelley, J.F. An empirical methodology for writing user-friendly natural language computer applications. In *Proc. CHI 1983*, ACM Press (1983), 193-196.

8. Ochoa, R. The Importance of the Walk in the Analysis of Public Space. In *Understanding the Post-Industrial City: Metropolis, Urban Renewal, Public Space*, Joint PhD Seminar, Lisbon, Portugal (2009).

9. Osservatorio Nomade. *Walkshop: Aqueduto das Águas Livres*. (2009) http://www.osservatorionomade.net/lisboa/ (accessed August 25, 2010).

10. Walk21. *Walkshops at the Walk 21-VI 'Everyday Walking Culture' International Conference, Zurich, Summer 2005*. (2005) http://web.archive.org/web/20051223130401/http://www.walk21.ch/deutsch/programme/walkshops.htm (accessed August 25, 2010).