PARTICIPATORY ANALYSIS OF MOBILE DIARIES TO INFORM THE DESIGN OF RIDESHARING SYSTEMS

SEYED HADI MIRISAEE

QUEENSLAND UNIVERSITY OF TECHNOLOGY

S.MIRISAEE@QUT.EDU.AU

JARED DONOVAN, MARGOT BRERETON, PAUL ROE

QUEENSLAND UNIVERSITY OF TECHNOLOGY

J.DONOVAN, M.BRERETON, P.ROE @QUT.EDU.AU

ABSTRACT

In many "user centred design" methods, participants are used as informants to provide data but they are not involved in further analysis of that data. This paper investigates a participatory analysis approach in order to identify the strengths and weaknesses of involving participants collaboratively in the requirements analysis process. Findings show that participants are able to use information that they themselves have provided to analyse requirements and to draw upon that analysis for design, coming up with insights and suggestions that might not have been available otherwise to the design team. The contribution of this paper is to demonstrate an example of a participatory analysis process.

INTRODUCTION

In many data gathering methods such as interview or questionnaire, designers use participants as informants to provide the information. In this approach participants are not involved in the data analysis(George Chin, Rosson et al. 1997). Participatory analysis aims to empower participants in the requirement analysis stage by asking them to involve collaboratively in the activity (George Chin, Rosson et al. 1997; Muller 2001). Participatory analysis is useful in order to get different perspectives on a specific practice. The objective is that participants from different backgrounds such as design and IT can see different aspects of a practice and disclose different understandings and requirements for supporting existing or new practices. The outcome of the analysis will give the researchers a better understanding for the design and development of a supportive system.

This paper considers the effectiveness of a participatory analysis workshop. The authors aim to understand how a participatory analysis of travel diaries can help them to develop a deeper appreciation and characterisation of the specific daily practices of travelling. Also, it considers the role of the facilitator in the activities.

This paper investigates the workshop activities in order to identify strengths and drawbacks of the participatory analysis workshop and to come up with some suggestion for future activities. The contribution for this paper is showing how to involve participants in the requirement analysis workshop in order to shift from a user-centred method to a participatory analysis method.

BACKGROUND

The use of collaborative workshops and participatory games as ways of organizing design activities is well established in the field of participatory design. Participatory design involves users being active in the design process (Brandt 2006). Common requirements analysis methods (Sanders, Brandt et al. 2010) in participatory design are interview, questionnaire, brainstorming and focus group. Currently, the game metaphor is used commonly in participatory design in order to understand and organize participation in the workshop (Brandt 2006). Using Mock-ups for hands-on experiments before designing the real prototypes in order to show future system started in the early nineties (Ehn and Kyng 1991). Owing to the expansion of technology intangible, digital, data collection is becoming more common in design. Buur and Seondergaard (2000) have started to investigate ways to make video available as a resource in design discussions. The video card game was designed in order to make the digital materials tangible (Buur and Soendergaard 2000). Integrating participatory design

approaches with the video card game and mock-ups formed the foundation of our workshop design.

METHOD

This research aimed to investigate users' behaviour and their requirements for their daily travel and it also analysed this in relation to the implications for the design of ridesharing systems. A particular emphasis was placed on the need to gather detailed qualitative data about participants' everyday travel activities and to complement researchers' interpretations of this data with the grounded understandings of the participants themselves. To achieve this, the study consisted of the following two parts:

- A mobile diary study was undertaken to gather information about people's everyday travel habits

- A collaborative workshop was then organized to collectively analyze the mobile diary study data along with the participants from the study

MOBILE DIARY

Diary studies are designed to capture participants' activities as they occur in the environment (Palen and Salzman 2002). The spread of smart phones has introduced the mobile diary as a new method of self reporting. The mobile diary method enables the reporting of details of activities, *in situ,* which are difficult to convey in words or remember in interviews (Hagen, Robertson et al. 2007).

PARTICIPATORY ANALYSIS

By expanding user involvement in the design and analysis process and using participatory design, researchers aim to empower participants during requirements analysis. Techniques such as interviews or observations include participants in data gathering passively (George Chin, Rosson et al. 1997). Participatory analysis techniques aim at increasing user participation from the earliest stages of requirements analysis (George Chin, Rosson et al. 1997).

Our analysis approach is built on the philosophy of participatory design -- involving participants in the design process, co-design, and mutual learning of researchers and participants (Sanders 2002). We conducted a workshop order to test and evaluate our participatory analysis approach. The workshop's aim was to understand what people think about travel practices.

STUDY

PARTICIPANTS

A mobile diary trial, with five participants, was conducted for two weeks. Four participants who actively updated their diaries during these two weeks were selected to participate in our workshop. All participants knew each other and they had a background in design and IT.

DATA COLLECTION

Data from the four participants included photos and text messages which participants created using their handsets.

We analysed three different types of diary in this workshop:

- Daily travel diaries include the whole travel story in one message. These can be broken into chunks or analysed as a whole message.

- Partial travel diaries include a part of the participant's daily travel such as going to work. The partial travel log explains a series of activities from the origin to the destination (Figure 1).

- In situ travel diaries include an activity that takes place while travelling, for example, parking the car and the context of the specific parking activity.

Delayed for 10am meeting with Andy. Traffic at standstill on stone rd at I've. .Roadworks. Thought I'd avoid traffic by coming after 9am. Pls can you let Andy know?

Figure 1: A mobile diary entry- Partial travel diary sample

WORKSHOP DESIGN

Table 1 describes the workshop activities which were designed in order to achieve the objectives for participatory analysis. This program is inspired from Buur and Soendergaard (2000).

Table 1. Description of workshop activities

Activity	Description
Introduction	The facilitator explained the materials in the workshop.
Dealing with Cards	Participants read cards in a group of two and wrote notes about the cards. In this stage, there was no collaboration with the teammate. Each card represents a diary.
Grouping Cards in Themes	In this activity, teammates discussed each card with the other and tried to group their cards into themes. Finally, they finished the grouping activity by sticking photo-cards on

	an A3 poster for the theme.
Theme brainstorming	In this activity, participants could write their thoughts on a post-it note and stick it on the poster. Their thoughts could be about barriers to travel or suggestions about future mobile application.
Design Scenarios	Each group chose one theme and designed a mobile application prototype.
General discussion	We aimed to get feedback about the workshop activities.

ACTIVITY ANALYSIS

The workshop began with the facilitator's introduction and explanation about the first activity. Participants were familiar with the diary cards. Four participants were in the workshop. We called them P1, P2, P3 and P4. For the first three activities P1 and P2 were in team1. P3 and P4 were in team2.

DEALING WITH THE CARDS

In the first activity teams concentrated on writing notes on the cards. Team1 worked on the pile and sometimes, photos on the cards motivated them to pick the card. Different behaviours were observed for writing the notes on the cards. For example, P1 organized his cards to write notes and reviewed them while P2 just went through her pile. In Team2, participants started writing on the cards without any pre-ordering or specific selection.

Participants used their extra time to group their cards and prepare them for the next activity when they found about the next activity by reading the workshop program.

We achieved our main objectives in this activity, which was to summarize the diaries and to have different lenses on the diaries by distributing the diaries to different participants. Additionally, we found that drawing on the cards that happened to have comments but no photo was a very nice way to engage people in the activity and was a useful way to remember the cards' contents.

GROUPING CARDS

For the "Grouping Cards" activity, participants in the teams exhibited different styles of working with and talking about the cards when grouping them into themes.

Participants in team1 gradually grouped their cards by swapping stories and getting themselves familiar with the cards. Later, they stuck the cards on the poster and chose a title for the poster. Interestingly, team1 was concentrating on the main objective of the workshop during the activity which was designing a ridesharing system.

Contrary to what we might initially expect according to our observations of team1 activity, themes were not built up gradually for team2. They already had quite well developed names for the themes which helped them to do the activity more quickly. Pairs in Team2 gave a quick overview of all of their themes then started to merge or regroup the cards immediately following sticking on the posters.

Team2 collaborated in all tasks of the card grouping activity, even sticking the cards on the poster which somehow showed their joint work for the activity. Another interesting activity was adding a card to a previously finalized theme. This showed that using physical materials in the activity engaged participants in the activity. This engagement helped them to remember their themes and to consider the possibility of merging or adding cards to finalize themes and form bigger themes if desired, although no bigger themes were formed.

Study of the teams' behaviour in grouping activity showed two distinct styles. Team1 took a more expressive, storytelling approach for organizing their cards into the themes. The merging process took longer and happened by negotiation since they had to be sure that the card could fit into the group. However, Team2 took a more theme-based approach to grouping the cards. They had selected the themes beforehand for their own cards and tried to group or rearrange the cards according to their selected keywords or themes.

Figure 2. Participants made use of the physical affordances of the cards and table in order to group the cards

We achieved the objective of identifying different aspects of travelling from the participants' points of view since participants came up with various themes explaining different activities related to the daily travel. However, the number of themes was more than we expected and efforts to merge them to bigger themes were unsuccessful.

CARD TRADING ACTIVITY

This activity aimed to put cards in more appropriate themes and merging themes into some more general themes.

During the discussion, participants explained the themes to others by pointing to the cards one by one, rather than explaining the themes generally and then used the cards as a specific example. An interesting point during theme explanation was sometimes participants explained their own experiences in real life that were similar to the card activity. Also, some general discussion relating to the cards happened among the participants. Emerging experiences during discussion is one of the advantages of conducting a participatory analysis workshop. Since, those experiences can be used for requirement analysis as well.

By explaining each theme, the other team looked for similar themes or cards in their materials. We have heard sentences such as "*I've got one that slightly related…*" or "*similar to this card…*"

The outcome of this activity was not successful in terms of trading cards or merging themes into bigger themes. One assumption was that sticking cards on the poster hindered the exchanging of cards. We watched participants point to similar cards in other themes and discuss about it however, they didn't exchange cards. The other assumption was that participants already made their decision about grouping the cards and they were not willing to put them into other themes. However, this activity was very useful in terms of familiarizing participants with the cards and the themes for the brainstorming session.

BRAINSTORMING
Usually a conventional brainstorming session aims for "fast and furious" idea generation however, participants in this workshop brainstorming turned to a collaborative, sharing activity. Participants shared their ideas with each other and contributed to other's idea in a friendly environment with less disagreement and criticizing. We obtained fewer ideas rather than an ideal brainstorming but participants covered all the themes. They raised various issues in daily travel and came up with very interesting design ideas.

DESIGN ACTIVITY
Teams selected a theme to inspire a design. Watching videos of the workshop showed how participants analysed ideas attached to the poster in order to identify their required features and elements for their interface design. Additionally, videos showed how collaboration in previous activities helped participants to know each other better. For example P2 told that specific timing is interesting for P4 since he is the "on time guy". Different behaviours in the design activity such as how to use the interface cut-outs or previous materials showed that different characteristics of materials that people happened upon led them to create their design in different ways.

DISCUSSION
In this section we review our findings and participants comments on the activities in order to investigate the strengths and weaknesses of the participatory analysis workshop.

The main outcome of this workshop is obtaining more than one analysis for each card which reveals different aspects of travelling for the same situation. Writing notes on the cards was a popular activity among the participants. P1 was surprised by the amount of data and ideas extracted from the photo cards while he compared the initial data source with rich, detailed sources such as videos.

This workshop aimed to involve participant collaboratively in the requirement analysis activities in order to understand the barriers of daily travel and obtain user-centred ideas for resolving the issues. However, some activities such as sticking the cards on the posters or sticking posters on the wall hindered the collaboration. In the closing discussion with participants, two participants mentioned sticking posters on the wall was a hindrance for collaborating in brainstorming. They recognized if we made the posters more tangible by putting them on the table it might lead to a better result.

The brainstorming activity in participatory analysis workshop was less quick and spontaneous due to the collaborative behavior of participants to explain situations, sharing the idea and then writing the idea. However, this brainstorming approach led to ideas being elaborated and required less effort to analyse and refine.

Finally, P3 mentioned that participants might think about the workshop afterwards, so it could be good to send them a summary of the workshop to obtain further feedback and comments about the activities.

FINDINGS FROM THE TRAVEL DIAIRIES
This workshop also aimed to get a different perspective of designing ridesharing applications by involving participants collaboratively in the requirements analysis stage.

From the participants' point of view, travel activities are a part of their life which is started before the travel by planning and can be changed in different situations. From their perspective, situation and context can change the aim of the activity. For example sharing a place can be a fun thing or an activity for safety. Family activities and events form a large part of these participants' travel practice. It is essential to consider family activities in the design of new system. Findings show that participants look at travel activity as a part of their life and have a broader view of the activity in comparison with system researchers. The experience of involving participants in the requirements analysis demonstrated how new features and practices are disclosed from the same data. Therefore, participatory analysis can help us to rethink ridesharing systems design

CONCLUSION

In this paper we explicated how the activities helped to empower participants for the participatory analysis of daily travel. Revealing different perspectives for similar situations in the daily travel demonstrated the strength of participatory analysis rather than individual interviewing. Design activities showed how participants analysed the provided information such as barriers and suggestions in order to design the prototype. However, a few drawbacks were recognized during the reviewing of workshop's video. For example, sticking the posters on the wall reduced collaboration in brainstorming. The contribution of this paper is to reveal details about how to involve participants in a requirements analysis workshop in order to change their roles from an informant to an analyzer.

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REFERENCES

Brandt, E. (2006). Designing exploratory design games: a framework for participation in Participatory Design? Proceedings of the ninth conference on Participatory design: Expanding boundaries in design - Volume 1. Trento, Italy, ACM**:** 57-66.

Buur, J. and A. Soendergaard (2000). Video card game: an augmented environment for user centred design discussions. Proceedings of DARE 2000 on Designing augmented reality environments. Elsinore, Denmark, ACM**:** 63-69.

Ehn, P. and M. Kyng (1991). Mocking-it-up or hand-on the future Design at work : cooperative design of computer systems. M. K. Joan Greenbaum. hillsdale, L. Erlbaum Associates**:** 169-195.

George Chin, J., M. B. Rosson, et al. (1997). Participatory analysis: Shared development of requirements from scenarios. Proceedings of the SIGCHI conference on Human factors in computing systems, Atlanta, Georgia, United States, ACM.

Hagen, P., T. Robertson, et al. (2007). Engaging stakeholders: mobile diaries for social design. Proceedings of the 2007 conference on Designing for User eXperiences. Chicago, Illinois, ACM**:** 2-14.

Muller, M. J. (2001). Layered participatory analysis: new developments in the CARD technique. Proceedings of the SIGCHI conference on Human factors in computing systems. Seattle, Washington, United States, ACM**:** 90-97.

Palen, L. and M. Salzman (2002). Voice-mail diary studies for naturalistic data capture under mobile conditions. Proceedings of the 2002 ACM conference on Computer supported cooperative work. New Orleans, Louisiana, USA, ACM**:** 87-95.

Sanders, E. B.-N. (2002). From user-centered to participatory design approaches. Design and the social sciences: making connections. J. Frascara. New York, CRC**:** 1-8.

Sanders, E. B.-N., E. Brandt, et al. (2010). A framework for organizing the tools and techniques of participatory design. Proceedings of the 11th Biennial Participatory Design Conference. Sydney, Australia, ACM**:** 195-198.