

How to Evaluate Prototypes Supporting Opportunistic Meetings

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ABSTRACT

For motorcyclists mobile opportunistic meetings are at the heart of their practice since they make biking more enjoyable. They use the meetings either to display their identity or to look at others. The bikers' opportunities to make such meetings possible and to make full use of them are constrained by high mobility. Therefore, we have invented the Hocman, which possesses the ability to supply appropriate identity during contingent meetings and increase awareness. It is a HTTP peer-to-peer application for handheld computers that enables sharing of HTML documents over ad-hoc networks. When evaluating our prototype we face a number of problems that has not been addressed when studying related concepts and practices. What is the appropriate fit between scope, setting and method, in order to get useful knowledge about support for mobile opportunistic meetings when people move through a vast area at very different occasions?

Keywords

Mobile computing, opportunistic meetings, unacquainted participants, ad hoc networking, evaluation methods

INTRODUCTION

Our research focuses on mobile opportunistic meetings between more or less acquainted people. Such meetings occur for many reasons and evolve in many different ways. Several projects in the mobility research group address this topic (www.interactiveinstitute.se/mobility). In this position paper we exemplify these issues with reference to the Biketalk project, which focus on developing support for motorcyclists' collaboration to increase their pleasure when riding their bikes [3]. We assume that handheld computers enabled with wireless communication will be widespread in the future. These technologies provide an excellent resource when addressing mobile opportunistic meetings.

We have chosen to study motorcyclists, since they are highly mobile with a strong social commitment. Despite the mobile and isolated situation they often engage in collaborative activities. They feel akin to other bikers they meet on the roads and take interest in what they do. Our fieldwork reveals problematic issues in coordinating their activity, such as the handling of contingent encounters; achieving awareness and making compelling information available to others. However, the bikers spend a considerable amount of

time on the message-board of a public web site in order to decrease the impact of these problems. But the communication tools supplied by Internet is only available when the users are distant in time and space from the situations discussed. This makes interaction impractical and fumbling. When they leave their desktops and find themselves in collaborative situations, they lack support. We believe that the motorcyclists would gain from a mobile application merging real life with the virtual. The Hocman prototype will provide a digital reference of the real world meetings, as well as providing rich information, which is abundant in the virtual. Our application will be of use in a wide area at varying times. The purpose of this paper is to discuss how such support for mobile opportunistic meetings should be evaluated.

Our research approach combines empirical fieldwork, design and evaluation. The ethnographic fieldwork was conducted by one of the researchers who owns a bike and use it every day during summer. Between July and September 2001, he has specifically attended to ten weekly biker meetings with approximately 200 to 400 participants. He has also participated during three organized one-day tours with at least 10 000 participants. During the same period, we also visited the message board practically on a daily basis. The findings from the fieldwork have later played a major role in the design process, where they have informed the development of a prototype. The analysis has been made as a collaborative achievement in our research group combining ethnographic competence with computer science. In the following sections we will present the ethnography as well as the prototype and discussion of how to evaluate the prototype.

MOTORCYCLING AS COLLABORATIVE ACHIEVEMENT

The motorcyclists studied are highly mobile and spends a considerable amount of time on the roads mostly to enjoy themselves. Here, they engage in interaction both with acquainted and unacquainted bikers. When meeting, a good portion of the activities concerns showing off. They impress with newly modified bikes, for instance equipping them with high performance exhaust pipes, modified breaks, seat cowls, etc. At other occasions they show off by performing stunt tricks, such as balancing on the front, or rear wheel. They organize trips to explore untried roads

with familiar bikers; they teach each other how to maneuver on familiar ones; or they simply go to enjoy the bends on a particular route.

A primary prerequisite when showing off is the need to be at least two persons, one performing the act and one observing it. However, coordinating motorcyclists is problematic due to the extreme mobility of each individual. In motorbike communities they try to solve this by agreeing on certain places to meet, requiring the biker to engage in tightly knit fraternity, or by using information technology. Irrespective of how they chose to handle the coordination some problematic issues remain to be dealt with:

- How to make motorcycling more pleasurable?
- How to sort out mobile contingent meetings? (Who did that, then and there?)
- How to locate someone in the vicinity? (How to find a friend without a scheduled appointment?)
- How to express social identity? (How to receive and distribute relevant information?)

Figure 1: Issues in coordination of motorcycling

The group we have studied uses a public website where they publish pictures, movie clips etc. It also includes a popular message board. It is used to handle contingent meetings, such as, following up their trips and discussing unrecognized bikers. Some members wear a sweater with an URL to the web site printed on the sleeve. This helps non-members to locate the message board and members to locate each other in a crowd. They express interest and personality, by adding a signature, containing a thumbnail picture and a nickname, to their message entries. However, they are cautious about revealing information, e.g. registration numbers and address, which would make them lose their anonymity.

The Hocman Prototype

Hocman [3] is a HTTP peer-to-peer application for handheld computers that enables sharing of HTML documents, audio clips and images over ad-hoc networks. The application possesses the ability to supply appropriate identity during contingent meetings. In *cruise mode* upon discovering a new peer; Hocman will perform an automatic background download of a predefined index-page. This page could for example contain a thumbnail picture of the bike, nickname, phone number, or whatever information the biker will mediate. Cruise mode is helpful when handling contingent meetings in retrospect.

In *explore mode*, Hocman provides awareness. Whenever users are in the vicinity of each other, they will be appended in each other's list of accessible peers. This mode is useful when attending crowded bike meetings where hundreds of bikers are present. Apart from the awareness mechanism the user will also benefit from the browsing capabilities. It is possible to explore the HTML-pages in the vicinity. At gatherings this could be used to inspect pages describing the modifications of a certain bike.

RELATED CONCEPTS AND THEIR EVALUATIONS

There are several research projects that propose badges and devices to provide interpersonal awareness, in order to support collaborative activities. The principal ones are the Hummingbird device, GroupWear Tag, and the MemeTags System.

The Hummingbird [4] is a device used to monitor presence of other Hummingbirds in the close proximity. The carrier of a Hummingbird has no control in how the presence is displayed to the others. It is predefined to a "humming" sound and displaying a unique symbol denoting the detected device. The exchange of presence information provides no means of conveying an expression by the user. The Hummingbird device is studied through a set of usage experience cases [4, 10]. First, the researchers themselves tried their prototype at a their lab, a rock festival and at an academic conference. In order to evaluate the Hummingbird device in a more realistic setting, six devices were handed out to ski instructors, which used them during a five-day trip. The researcher performed a field experiment, by observing the instructors, using the devices during their daily activities. Two focus groups were arranged after the trip to complement the observational studies.

The GroupWear [2] is an active badge system that lets user share and compare their answers to a set of multiple-choice questions. In order for the users to have a meaningful exchange, the questions are pre-set and cannot be altered by the individual. The GroupWear badge was tested during an annual gathering of researchers, students and business people. A badge was given to all participants, and the usage of the tags was then observed.

The MemeTags System [1] provides mechanisms to monitor other user's presence, but at a shorter range than the Hummingbird device. In addition to the awareness mechanism, the Meme Tags System also offers a simple way for personal expression. It allows a user to enter and share "memes," a short sentence containing a poem, wisdom or any message the user finds appropriate. The MemeTags system was tested in a similar fashion, by distributing the tags at a conference consisting of approximately the same mix as in the GroupWear case. Besides observing usage, some data on usage, such as who met and which memes were exchanged, was automatically generated and collected in a database. The data was displayed on large screens, the purpose being giving feedback to the community, however no further analysis was made.

Summing up, the Hummingbird is designed for a limited scope and without having any particular setting in mind. As a consequence, the device is tested in several different environments, for example, the lab and the ski slopes, but the scope of the test is more or less the same. It is restricted to a limited number of users, staying within a well-defined area. The size of the area may vary however, from very limited as in the lab case, to quite large, as in the ski slope case. The GroupWear tags and the MemeTags system are both intended as co-operative tools to be used at confer-

ences. Consequently, they are both tested in such settings. The scope of both tests is characterized by a large implementation, with hundreds of simultaneous users and, since the tests are performed during a conference, a limit in time and area. These conditions are not applicable to the Hocman, which is designed for non-acquainted opportunistic meetings in large road networks. Thus the evaluation methods cannot directly be transferred to our case. We need a more analytical discussion on the pros and cons of available methods and also discuss possible scopes and settings for our evaluation.

AVAILABLE METHODS

When choosing from available methods, we have to consider the issues stated in Figure 1.

Fieldwork

Hughes et al [5] argue that ethnography is the proper method to study collaborative applications. By participating in the users everyday practice, the collected data gives a rich picture of individual activities. It provides means to perform a holistic evaluation of the application in its naturalistic setting, and is a proper tool to gather participant's viewpoints. However, ethnographic evaluations of applications generated by a design process, informed by initial fieldwork observations, seldom occur [9]. This is probably due to the practical problems involved in creating the intended setting. Instead it is often the case that researchers choose a similar one to evaluate their concepts. Juhlin and Weilenmann [7] is typical example of this conduct in the research on mobile opportunistic meetings. Fieldwork is not applicable when the evaluation of a prototype demands a large-scale implementation. In this case, a limited implementation is not enough, since the likelihood for contingent meetings to happen is low.

Field experiment

During a field experiment, the prototype is introduced in its intended setting, or a setting that resembles it to a high degree. A field experiment is similar to fieldwork in that it gives an opportunity to obtain holistic data on usage. The formal requirements of ethnographic fieldwork are not met since a number of restrictions are introduced and the usage of the applications is flawed by the instructions given by the researchers. There is also restrictions on the scope of the implementation e.g. the time of the prototype is available to users, or limitations on the area in which they can use it.

Diary

Letting the users record voice diaries, e.g. by the use of mobile phones, is another method to gather data from a mobile setting [8]. Here they have the possibility to tell about usage and express their opinions. This method provides a good overview, since data from several concurrent activities and users easily can be gathered. On the other hand, the empirical findings will lack in details since the users probably will not specify all elements of their activities. Accordingly it will be problematic to piece together the participants' different versions of meetings that oc-

curred. Even if the participants have the possibility to record voice messages by mobile phones, the recording of data will be separated in time and space from the actual situation making it difficult to account for relevant details.

Log

By logging the activities performed within the application, one more perspective of usage is given. The data provides a picture restricted to quantitative aspects of usage, such as verifying that contingent meetings occur and to what extent. User opinions, and many relevant activities, will be disregarded.

Focus group

The focus group will provide a medium where the actors of a contingent meeting discuss the activity in retrospect. This method is preferable done in order to receive additional information regarding the user experience, which could not be done only by observations. Similar to diaries the weakness with this method is the separation of the relevant situation and the recording.

Interview

Finally, the interview, structured or unstructured is a traditional method to gather data [6]. The researcher can explicitly ask questions concerning the participants' opinions regarding pleasurability, handling of contingent meetings and collaborative activities. It is preferable if the interview is performed in connection to the activity, but still the answers may lack in relevant details.

HOW TO EVALUATE HOCMAN

When evaluating the Hocman prototype we must take into account the scope of implementation and the setting. The first factor considers the scope, i.e. the amount of resources we are able to put into the evaluation regarding the implementation of Hocman. This could range from presenting the concept in a video to a field experiment. The fact that we have limited resources, also conflicts with the evaluation of the conceptual idea. We are only able to hand out a restricted number of prototypes. However the hypothesis is that it is a valuable tool when a large number of people use them. Furthermore, due to this limitation we have to bound the time the Hocmans are available. This interferes with the aim of users themselves being responsible for creating and maintaining relevant content.

The second factor concerns the choice of setting. The Hocman prototype is designed for a large community of motorcyclist to be used on the road. Therefore we have to be careful when we select our test subjects and where we set up our test cases. Furthermore, using the roads creates a very large area in which users roam. This is problematic, since it is hard to guarantee the occurrence of a sufficient number of opportunistic meetings. Also, the vast area in combination with the relative low number of devices will make them even less likely.

In order to obtain useful knowledge we must find an appropriate fit between scope, setting and method. Taking the

limiting factors into account we propose three complementary approaches:

- Web demo with questionnaire
- Demo in naturalistic setting and focus groups
- Field experiments and diaries

The first approach aims at extracting feedback from a large number of potential users. We will construct a web site, with a demo of the prototype and a questionnaire. The demo will consist of a movie clip showing the functionality of the application. By linking it to the site we monitored in the field study and having it available throughout the season, we hope that a large number of motorcyclists will provide feedback. The downside of this approach is that we cannot guarantee the validity of the result, that is, there is no way of knowing if there really is a motorcyclist posting the answers? Furthermore, we would spend a lot of extra work on developing a demo of a working prototype that we could evaluate in other ways.

In the second approach, the aim is partly to prove that the Hocman application works technically, and to obtain some response on usage. We summon two groups consisting of eight to ten motorcyclists at two separate occasions. Then we introduce the Hocman prototype and request each test subject to complete a sequence of task that that we believe would represent typical usage in a full implementation. The tasks are a mix of handling a motorcycle, such as driving a predefined tour, and using the Hocman application. We finish off by collecting their responses in a focus group, in close connection to what they have experienced. This approach allows the users to get a much better feel for the concepts in a realistic setting. We believe that it will make it easier to comment on issues related to contingent and opportunistic meetings. The weakness of this approach is that it is quite far from the intended setting and scope. Since we control the place and timing of opportunistic meetings to a high degree, will we get relevant feedback on these issues?

In the third approach, the aim is to collect data on usage in a realistic setting. We hand out a set of ten to fifteen Hocman enabled devices to the same number of motorcyclists. The motorcyclists will be picked among people that usually attend similar places and thus are likely to meet even though they are unacquainted. We provide them with the possibility to use their mobile phone to record a voice diary to collect their thoughts on usage. Beside the diary we gather data by being present and performing fieldwork at the regular meetings. In this approach, problems of a technical nature that the user cannot handle may arise. The problems may prevent the users to take active part in the evaluation

CONCLUSION

Handheld computers and wireless networks provide an interesting resource for applications supporting mobile

contingent meetings. But it is difficult to evaluate the workability of Hocman and its effect on motorcyclists practice. We suggest a stepwise use of evaluation methods starting with demonstrations on the web and in a naturalistic setting in combination with questionnaires and focus groups. Field experiments and diaries should then follow these initial evaluations.

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