

# Evaluating Mobile User Experience In-The-Wild: Prototypes, Playgrounds and Contextual Experience Sampling

Karen Church and Mauro Cherubini  
Telefonica Research  
Barcelona, Spain  
{karen, mauro}@tid.es

## ABSTRACT

In this paper we describe some of the approaches we have worked with as well as some of the tools we have developed for carrying out mobile user experience research *in-the-wild*. We outline some of the challenges we faced and the lessons learned based on these experiences and highlight what we see as the key areas to focus on, in terms of carrying out mobile user experience research on a large-scale in the future.

## Author Keywords

Mobile HCI, mobile field studies, mobile user experience, contextual experience sampling, mobile playground, research methodology.

## INTRODUCTION

Carrying out mobile user experience research is a challenging task. Evolving mobile needs, dynamic mobile contexts and the inherent limitations of mobile handsets, all conspire to make the goal of observing naturalistic mobile behaviours very difficult. Much of the research we have been involved with involves exploratory mobile field studies or breaching experiments [4] where we develop mobile prototypes, deploy these applications on the personal handsets of real users and observe what happens. Sometimes we may have concrete research questions in mind, other times our goal is to see what new interactions emerge that can inform the design and development of future mobile applications.

In this paper we describe some of the approaches we have worked with to date, as well as some of the tools we have developed for carrying out mobile user experience research *in-the-wild*. In particular we discuss three different approaches. We begin by sharing our experiences of evaluating a social mobile search prototype called SocialSearchBrowser in a live field study. We continue by describing the concept of a *Mobile Playground* as a means of evaluating user reaction to future mobile services and finally we describe a context-

ual experience sampling framework we have developed that enables use to learn about mobile user information needs using one of the most trusted mobile communications tools, i.e. SMS. Each of these methodologies have advantages and disadvantages that we will discuss in the text.

Throughout our discussion, we outline some of the challenges we faced and the lessons we have learned based on these experiences and highlight what we see as the key areas to focus on in the future in terms of carrying out mobile user experience research on a large-scale.

## EVALUATING MOBILE PROTOTYPES IN-THE-WILD

SocialSearchBrowser (SSB in short) is a proof-of-concept mobile search prototype designed to enhance the search and information discovery experience of mobile users by proactively displaying what other users have been searching for in a particular location [3]. SSB presents the users with a view of evolving search activities (i.e the questions posted and answers submitted) that is sensitive to their mobile context (e.g. their location, time, etc). Prospective searchers can browse through these search experiences, learn from these searches, and initiate their own, in a way that takes full advantages of the strengths of their mobile handsets.

SSB was built as an iPhone optimized web application and was deployed in two separate live field studies. The first study involved 16 users over a 1-week period in April 2009 [3]. In this study we were interested in understanding whether people's information needs while on-the-go could be addressed by providing a readily available connection to a user's social network. In the second study we wanted to understand more about the impact that the type of user interface had on the search and information discovery experience of mobile users [2]. This second study involved 34 participants testing 2 applications (one map-based, the other text-based) for a period of 1 month during September 2009.

Both field studies involve the installation of one or more mobile applications on the end-users personal iPhone devices. Due to restrictions with the Apple App Store at the time of the user studies we had to use an ad-hoc installation approach which involved sending participants the iPhone installation file and a link to a website with full instructions on how to install the applications. Although this approach is perhaps not as flexible as using a Mobile App store, the

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ad-hoc installation still enabled us to involve more participants and to include users from remote locations because as researchers we didn't need to carry out/observe the installations in person. As a matter of fact, while the recruited participants of the studies referenced above were living in Dublin, Ireland, the research team was located in Barcelona, Spain and could monitor and analyze the logs remotely.

In terms of carry out exploratory mobile field studies, mobile applications stores present a huge opportunity for researchers. They allow us to deploy our mobile prototypes on a much larger scale, to gather early feedback and to observe naturalistic usage behaviour in dynamic mobile contexts. In the case of SSB, the participants could use the application(s) in their private context and in real usage situations at any time of day/night. Despite having to go the ad-hoc route, this allowed us to understand more about how mobile service like SSB could fit into the day-to-day lives of our participants and revealed very interesting behaviours and implications for the design of future social mobile services, which would have been impossible to measure under more controlled/static settings.

One of key issues in using mobile application stores for deploying/testing research prototypes in this manner relates to the users and to the validity of the results. We need to be aware that today, the *typical user* of a mobile application store is the traditional early adopter segment (i.e. young males) who use high end mobile handsets (typically smartphones)<sup>1</sup>. If the goal is to understand future usage behaviour and future mobile services, then deploying a research prototype in these settings appears reasonable. However, if the goal is to understand usage beyond high-end smart phones and beyond the traditional early adopter segment of young males, then we need to look towards approaches that will allow us gain more control even within open mobile application stores. At Telefonica Research we are working with a concept called the *Mobile Playground* which we believe holds great potential for carrying out mobile user experience research on a large scale.

### TOWARDS A 'MOBILE PLAYGROUND'

One of the biggest challenges of testing a new application in-the-wild is finding a consistent amount of people that are willing to cope with the roughness of a prototype application and with the uncertainty and glitches of an experimental setup, during the specific time period of the research. For mobile field studies, the critical part is recruitment. Researchers should be able to find subjects that own a certain type of phone because it would be costly or impossible to deploy a prototype for a multi-platform architecture.

Recruiting subjects that have the same kind of phone (i.e., most of the time smartphones such as iPhones, Androids, Windows mobiles, or Symbian) often makes it difficult to preserve the representativeness of the sample used in the user studies. In fact, often the market is segmented in such way that the higher-end phones such as those mentioned attract

<sup>1</sup>Where are all the Android girls? Android users are mostly male, young. See <http://bit.ly/aIzsF9>, last retrieved July 2010.

only a certain part of the population.

The other option that researchers have to circumvent complex recruitment is that of offering a certain kind of mobile device to each test participant. This approach has the advantage that the researchers have full control of the device and any configuration issues can be detected and solved before deployment. However, this method also has many disadvantages such as the fact that the participant is asked to either: a) use two phones during the study, or b) use a new device during the study. Both approaches impose an overhead on the participant that often infringes on the validity of the collected results.

Our solution involves recruiting subjects for a longitudinal period of time that exceeds that of a standard field study. We basically engage with volunteers who have a positive relationship with our company and that are willing to become permanent beta-testers of our new products. Once a subject joins the beta program, which we have given a friendly name; the 'Mobile Playground', he/she is assigned a mobile device that becomes his/her own. By doing so we make sure that after a certain amount of time, the user is both familiar and comfortable with the device on which we will be deploying new prototypes. The other advantage of this solution is that we have more control of ensuring the representativeness of our sample, by not being limited to youngsters or richer participants.

Panel research is a technique that has been successfully used in the past, albeit mainly in market research. While panelists are usually recruited for a specific study and often based on hardware or preferences they already possess, our approach consist in creating a group of testers who are longitudinally engaged with several studies. They are given the time to appropriate a mobile phone that is instrumented to receive *over-the-air updates* of the software, and specifically of the set of available mobile apps. This creates the unique opportunity for researchers to easily deploy new applications to the group of participants without disrupting their daily routines. Participants are given the choice to start using the new application(s) or simply ignore them.

The other great advantage of the playground is that of building a trusted relationship with the participants that exceeds the timeframe of a single user study. While participants recognize that their input is greatly appreciated and required by research labs, they also give us access to a wealth of contextual data that can corroborate user studies, such as call logs, location traces, etc. We are fully aware of the sensitive nature of this information and therefore our motto is always to keep up with the highest standards of data protection of the collected information.

As the reader can imagine, though, running a mobile playground might be extremely costly, even for a large corporation. Also, while the playground supports the *depth* of the investigation, sometimes researchers strive for the *breath* of inquiry. For these reasons, more recently, we started perfecting a data collection method that could account for larger

samples while supporting all sorts of phones. See the following section for more details.

### CONTEXTUAL EXPERIENCE SAMPLING VIA SMS

Our recent research in the mobile space has shown that many mobile information needs cannot be answered by existing mobile search engines or other mobile services and in such cases our friends and family are in a better position to help us. As such we decided to carry out a large-scale field study in an attempt to understand more about mobile users and their needs, in particular, what proportion of information needs can be answered by traditional search engines and other mobile services, compared to what proportion of information needs can only be answered by other people (*i.e.*, friends, family, etc.). The study involves participants informing us about their information needs using a contextual experience sampling approach via SMS (Short Message Service).

Experience Sampling (more formally known as the Experience Sampling Method, or ESM) is a research method that involves asking participants to report on their experiences with an application, service or something similar at specific points throughout the day. Often subjects are sampled at random points and over a longer period like a week or a month. Contextual experience sampling methods attempt to go one step further by only signaling users at appropriate times or in the right context.

As Cherubini and Oliver highlighted in a previous paper [1], the main advantage of ESM is its ability to preserve the ecological validity of the measurements, defined by Hormuth [6] as: “the occurrence and distribution of stimulus variables in the natural or customary habitat of an individual”. This method compares with recall-based self-reporting techniques –although recall delay is kept minimal– by “beeping” the subject in close temporal proximity to when a relevant event was produced. However and due to the level of involvement of each participant in the collection process, the method produces self-reported data. See Intille et al. [7] and Fisher [5] for some recent approaches to contextual experience sampling.

Additionally, the biggest advantage of using the ESM in research involving ubiquitous devices or applications consists in the ability to deploy user studies to large samples without the usual restriction or the device fragmentation. However, large samples imply a computational infrastructure to support the research team in deploying the stimuli and collecting the responses from the participants.

To facilitate this study we are developing a contextual experience sampling framework that utilizes two-way SMS technology to learn more about mobile information needs. Users send details about their information needs via SMS, while users are periodically probed about their information needs, also via SMS. The framework is built around the concept of an *intelligent experience sampling algorithm* that relies on the profile and schedule of the end-user to ensure that participants are only asked about their information needs

at the most appropriate times and in a non-intrusive manner. We combine the contextual experience sample with an online web diary tool in which users can provide more details/context about the information needs they expressed earlier in the day. In this way the SMS messages sent by the end-users act like a type of trigger, reminding users where they were at the time of the need, who there were with, etc.

SMS is not a new technology, however, in terms of facilitating mobile user experience research, SMS offers a number of advantages. Firstly SMS is very popular<sup>2</sup>, trusted communication technology for mobile phones used by billions of users to communicate with friends and family. Furthermore, given that the vast majority of mobile phones, even very old feature handsets, support SMS this means we are not restricting ourselves to one particular OS, one particular mobile platform/device or one particular subset of users. As such, the set of users we can involve increases immediately and so too does the diversity of those users, given that we not simply focusing on smart-phones and early adopters.

Although mobile application stores hold great potential for carrying out mobile user experience research, trusted technologies like SMS should not be forgotten as one potential approach to gathering valid mobile experience information in-situ from a diverse set of users.

### CONCLUSION

Mobility poses a complete new set of challenges to practitioners, and methodologies that were developed in the past and in different disciplines need to be carefully adapted to this new research field. At the same time, researchers nowadays have access to a wealth of technological solutions that was impossible to foresee only few years ago. For example a range of mobile application development tools and libraries for a range of mobile handsets as well as open mobile application stores for distributing our research prototypes.

The objective of this paper was to discuss three success cases that we developed in our corporation for carrying out mobile user experience research on a large-scale and illustrate pros and cons of each of these methodologies. We look forward to the workshop and to the discussion of integrating our solutions with other approaches presented at the workshop with the objective of developing new research methods for mobile technology that could lead to more valid and representative results.

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