What Do Users Really Do?
Experience Sampling in the 21st Century

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Abstract. As practitioners we spend a great deal of effort designing and testing products within the confines of usability testing labs when we know that a rich user experience lies outside. What is needed is more research in "the wild" where people use the very interfaces we take so much time to design, test, iterate, and develop. Through innovative advancements in mobile technology, we can expand upon the tried and true "experience sampling" research techniques, such as diary or pager studies, to effectively solicit, monitor and receive data on users' interactions at given points in time. This paper describes various research methodologies and recent advancements in mobile technology that can provide practitioners with improved research techniques to better assess the user experience of a product. The conference presentation will also include results from a pilot experience sampling method study focused on collecting data on usage and satisfaction of a product.

Keywords: Experience sampling, in-situ research, mobile device research, pager study, diary study, mobile research, SMS studies.

1 Introduction

All too often, as designers and researchers, we spend a great deal of effort creating and testing products within the confines of our corporate offices or labs. Yet, we know that there is a rich user experience that lies outside—where people use the very interfaces we take so much time to design, test, iterate, and develop. In order to create better user experiences, we need to better understand how users actually use the products we build.

There are research techniques that can capture experiences that occur "in the wild". The user experience field needs to incorporate more of these techniques into the research and discovery phases to produce more insights that can foster more thought and design discussions. This paper addresses some of the reasons why traditional research techniques fall short and describes how experience sampling methods (ESMs) can be applied using recent advances in mobile technologies to capture how users actually use products. The conference presentation will also include results from a pilot ESM study focused on collecting data on usage and satisfaction of a product.

2   Common Research Techniques

There is a number of common research techniques employed to understand the user experience of a product. These methods range in difficulty from easy to challenging, but each provides insight into different aspects of the user experience.

2.1   Usability Testing

Usability testing with users is a critical component of any user-centered design process. Traditional usability testing involves task-based research in the lab where designs can be tested, iterated and validated. Within the confines of this controlled environment, this methodology is ideally suited to assess usability in a highly tactical and specific manner. Outcomes include answers to specific design questions. Usability testing is critical to product success because we must ensure that the core features are usable.

However, the focus of usability testing on tasks is also a limitation because the lens tends to target the "walk-up-and-use" user experience of the product. Session time is often limited and the user experience typically does not involve a user who interacts with a device that he/she actually owns.

As practitioners and designers, we accept the lack of external validity because of the benefits of usability testing to formative and iterative design. We apply the insights uncovered in the lab into the design and hope that they generalize to how the product is actually used in the real world. However, we understand that the usability, usage, and usefulness of a product are determined over time and not necessarily in the first hour of use in the lab setting.

2.2   Surveys and Focus Groups

Often the data provided to describe the "real world" user experience is obtained through survey or focus group methodologies. While these research methods are quite useful in the early-stage development of feature importance, pricing, or intent to purchase, using this information for design is challenging. Results tend to be at a high-level and we often need more tactical direction to meaningfully influence some of our design decisions.

Even when these methods are directed toward answering design questions, the obtained data is largely retrospective in nature. We know that asking users to reflect on tasks done in the past is not as robust or credible as when the same question is asked during or immediately following the completion of the task.

Satisfaction metrics can be obtained in surveys, but they would be much more useful when captured as close to the actual usage instance as possible (e.g., gathering satisfaction data after completing a task rather than asking in a focus group or survey months after the experience occurred). The benefit of a short latency between the action and the satisfaction request is more than simply measurement integrity. Specific feature and functionality questions can be asked immediately after use to acquire more insightful and relevant feedback with direct impact on design.

2.3   Ethnographic Research

One method that avoids retrospection and any associated confabulation due to the long latency between action and question is ethnography. It involves observing user behaviors in a natural environment. However, there are obvious challenges that prevent its widespread use as a research technique. Setup and logistics necessary to observe natural behaviors are difficult (e.g., consider the case of trying to observe mobile devices where screens are small and interactions are very rapid). Fieldwork and analysis can be time-consuming. Sample sizes are often small. And most importantly, the likelihood that the output of the study will be actionable is low relative to more direct and tactical techniques such as usability testing. Because ethnography is best suited to uncovering insight that drives ideation rather than answering direct design questions, securing authorization and budget to conduct ethnographic research can be difficult. However, what cannot be refuted is that ethnographic research collects data in the environment where interactions occur and with products used by the users.

2.4   Longitudinal Research

Longitudinal research captures data from users over time. With its foundations from developmental psychology, this methodology has been largely observational in nature, using correlational analysis to assess phenomena. However, the longitudinal approach has applicability to user experience research. While usability testing can be seen as tapping the user experience just once, the study could be extended over time to make multiple, repeated assessments on the same set of users over time. The study could have users perform tasks and provide feedback. Thus, learning can be an area of interest. Moreover, the methodology could assess how the user adapts and uses the product during critical periods of its lifecycle.

Longitudinal research is compelling as it often involves fieldwork in a naturalistic environment with the benefit of having a more structured data collection technique. Questions, tasks, and observations can also be very design-focused and tactical. Moreover, it fills in the post-walk-up-and-use gap left open with a usability testing methodology. In short, longitudinal research offers access to the daily user experience of a product.

Consider a mobile phone. Usability testing can assess the usability of core functions such as the ability to add a contact or determine whether or not there is sufficient affordance to use a specific keypad button to complete tasks. The problem is that when usability issues are uncovered, it is impossible to know if the feature that was difficult in usability testing can be learned and become second nature over time or will be left unused because users could not learn it.

Information about how users interact with products over time is thus extremely valuable. Longitudinal methods could provide information about a product in the hands of users. Because assessments can be made over time, the technique can capture how the user learns to use the product.

Given the possible potential of longitudinal research, why is it NOT widely used? At the 2007 CHI (ACM-SIGCHI) conference in San Jose, a new special interest group (SIG) on longitudinal research was formed. What was most interesting is that only 25% of the attendees of this SIG had actually conducted a longitudinal research study in the last couple of years. Possible reasons for why longitudinal research is rare include:

A. **Long timelines:** The business challenge of a research project where data collection is stretched over time makes longitudinal research compete with "just in time" or "we need the data last week" research alternatives.
B. **Cost:** Building a user panel where users are tapped for an extended period has a high cost and high panel attrition. Since timelines can extend across multiple product releases with benefits to different business groups, it is unclear which group should be charged for the study. Securing funding is inherently more difficult.
C. **Complex logistics:** Study design and execution have a high initial setup cost because every aspect of the study must be coordinated. Any repeated measures technique will require allocation of resources to manage the study activities for an extended period of time.
D. **High effort:** Data collection requires high effort from both researchers and users who must participate across multiple data sessions. Alternatively, data come in the form of written diaries where the coding process is non-trivial.
E. **Difficult analysis:** Analyzing the large amount of data collected can be time consuming as data are essentially multiplied by the number of repeated measures.

2.5 Need for an Alternative Method

If usability testing captures walk-up-and-use usability, ethnographic research gets us in the field and longitudinal research can reveal how users learn, what still seems to be lacking is usage and motivation. Consider the mobile phone example again. Manufacturers and mobile service providers know that a call was made and how long it lasted. What is unknown, however, is whether the user called "John" from their contacts or dialed the number directly. In terms of designing features, researchers and designers are blind as to whether the user ever entered John into their contact list or what motivates the user to even use the feature. All too often, when launched, the product becomes a mysterious "black box" and we do not know how users use the product or feature that took so much effort to design.

3 Experience Sampling Method

Experience sampling method (ESM) refers to in-situ (Latin for "in place") research where the phenomenon is examined in the place where it occurs. The methodology was developed in 1977 at the University of Chicago by Csikszentmihalyi, Larson and Prescott [1] to understand the experience of adolescent activities, but its applicability to other areas of user experience is clear. ESM is more commonly referred to as a "pager study" where users are asked to provide information via a diary. Users are prompted to enter information by a "page" sent to a device (e.g., "What are you doing now?"). Participants enter data into a paper diary. Prompting could be either controlled by a researcher or set to prompt at specific intervals. The data can be analyzed to understand user activity, motivation, and other cognitive and social dimensions. This methodology can be used to assess how users use products.

3.1 ESM Coupled with Advanced Mobile Technologies

It would be great if the product could tell us how it is being used, but that is not necessarily practical, nor does it provide the rich user experience as interpreted and

provided by users. Imagine if a technology could retain the tactical and rigorous elements of "in-lab" research while capturing the richness and environmental cues associated with more natural settings. What if the satisfaction data are not retrospective, but closely tied to user behavior and actions?

Through innovative advancements in mobile technology, researchers can now expand upon longitudinal and experience sampling research techniques to effectively solicit, monitor and receive data on users' interactions at given points in time. These advancement tap directly into both application and operating system to provide the building blocks to take user experience research to new levels.

3.2   Using Mobile Technology to Capture Data

Mobile device technology has advanced to a level where research can be more complex than simply paging users to ask them to write passages in a diary. The mobile device itself can be the conduit between the user and researcher. Imagine what research areas would be open if practitioners could conduct studies on a robust platform that prompts the user, collects data both from the user and from the device itself and handles logistics (e.g., compensation). Moreover, what if the device is the participant's own personal mobile device?

With full QWERTY keyboards on mobile phones, one can readily imagine feedback in the form of free-form text responses. Considering the abilities of the youth of today who can type 40 words per minute using a 12-key numeric keypad, the tremendous data collection benefit of a phone over diary input is easy to envision.

In addition, the device can be leveraged as a powerful remote data collection tool where areas under investigation could be anywhere a user could go with their mobile device at their side. This opens up novel forms of research never before possible without specialized equipment specifically designed for the study.

Using mobile devices, user input and feedback extends beyond making a simple selection or answering a series of questions. Users could speak their response and have it recorded. They could also respond by taking a picture or recording a video of their experience. The remote capabilities of a mobile device as a research tool create a wealth of research opportunities.

LEOtrace Mobile^{TM} is a mobile technology that uses ESM to obtain data [2]. It runs on Windows Mobile 6, Symbian Series 60, and RIM Blackberry devices. User input and device information that can be collected is shown in Table 1.

Table 1. Types of data that can be collected from ESM using LEOtrace Mobile^{TM}

User-provided data	Device-provided data
A. Open-ended feedback	A. Task completion (success/fail)
B. Scaled feedback (binary, Likert-scale, slider ratings)	B. Event (app start/end, SMS sent, picture taken, etc.)
C. Image selection	
D. Voice recording	
E. Camera image	
F. Video clip	

3.3 Event or Behavior Triggers

Research using new mobile technologies could be further enhanced by analyzing user behaviors and feature usage to trigger prompts for user feedback. In this case, the user's own actions are of interest and the behavior itself prompts the device to ask specific questions around the behavior captured. This differs from contrived tasks set up by a researcher for the user to complete. Algorithms can be designed to watch for specific situations to occur that would trigger research questions so feedback can be obtained very close to when the behavior happened.

3.4 Other Mobile Technologies

This paper describes various research methodologies and recent advancements in mobile technology that can provide practitioners with improved research techniques to better assess the user experience of a product. Besides LEOtrace Mobile™ there are several other technologies available – from those that sit on old Palm Pilots to those that run on the latest mobile devices; from techniques involving simple SMS text messages to ask for feedback to web surveys solicited via phone-based email or messaging, there are many mobile technologies that can be used to solicit data from users.

As practitioners, the potential of remotely capturing user interactions in an ecologically valid manner while extending beyond walk-up-and-use usability is compelling. Experience sampling techniques can further our design practice by yielding more insight into user motivation, usage, and learning. Implications for future research are vast given the capability to more efficiently and remotely monitor user behavior and perception "as it happens."

4   ESM Study Findings

The conference presentation will include findings from an ESM study. Device usage and satisfaction data will be presented from a four-week study with a participant sample size of 100. Participants will use mobile devices they presently own. Software will be loaded on the devices to passively monitor usage. Users will also be asked to perform specific tasks. Success and failure will be reported with user feedback on their experience and satisfaction using device features.

References

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