

# A Multimethod Approach for Measuring Mobile UX

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## ABSTRACT

A multimethod approach for capturing a broad perspective of user experience (UX) of mobile media content and technology is presented in the current paper. In this research design, a variety of standardized research instruments are implemented and complemented by structured instant recall (SIR) interviews and/or unstructured interviews for targeting in-depth qualities of users' subjective mobile media experiences as well as usability issues. Methods selected and explored for measuring emotional experiences are described in further detail. The ambition is to create a toolkit of pragmatic evaluation methods, simultaneously targeting both usability and users' actions, reactions, attitudes and affect of different mobile media content and technology.

## Categories and Subject Descriptors

H.5.2 [User interfaces] Evaluation / methodology

H.1.2 [User/Machine Systems]: Software psychology

## General Terms

Human Factors, Measurement

## Keywords

User experience, usability, evaluation methods

## 1. INTRODUCTION

The joy-factor is a key to success for almost any media solution today. Not to say that usability is not important. However, it is merely not enough. Media users of the 21<sup>st</sup> century are critical in their judgments of systems and services they choose to use. They take functionality for granted, but also entertainment; if something does not entertain them, they simply go somewhere else. Hence, a media encounter needs to give rise to a good user experience (UX). However, there is still no official definition of UX [10]. In fact, there are several theories and models describing and defining the concept of UX. Battarbee [1] divides these into person-centered frameworks that focus on human needs and/or the relationship people have with products, product-centered frameworks that focus on qualities of the design, i.e. product attributes, and interaction-centered frameworks that focus on the actions of the user. Despite the lack of a unified model or definition of the concept, there seems to be a general agreement that UX is something more than mere usability [12]. It extends beyond technical and usability-oriented aspects (i.e. product-centered), into human emotions and needs (i.e. person-centered). The concept of UX emphasizes the totality of emotion, motivation, and action in a given physical and social context [14].

Users' experiences of media products and media content are affected by both product-centered aspects, such as functionality and aesthetics, as well as person-centered aspects, such as personal motivation and expectations [11].

Hence, learning about users' media experiences is a powerful tool, and an essential determinant for improving product design [4], including products designed for mobile use. We have recently witnessed an increase in the demand from the industry for testing the UX and usability of mobile media products (i.e. mobile media content and technology) and we are currently involved in a development project where usability and UX of a mobile application for personal health care is tested. Accordingly, our current commercial and scientific ambition is to see how different research methods and instruments can be synchronized and fine-tuned for measuring users' attitudes, affect, actions, and reactions from mobile media encounters. Our approach is to both illuminate different aspects of UX in mobile media related contexts, but also to see how different methods and research instruments can be utilized and triangulated. We want to know what lies behind our choices of using or not using mobile media products, to gain a broader and deeper understanding of the essence of UX of mobile media interaction, and also which is the best way of measuring mobile UX. The development work includes exploring and developing valid methods for conducting commercial and scientific research of UX of mobile media in laboratory studies as well as in-situ.

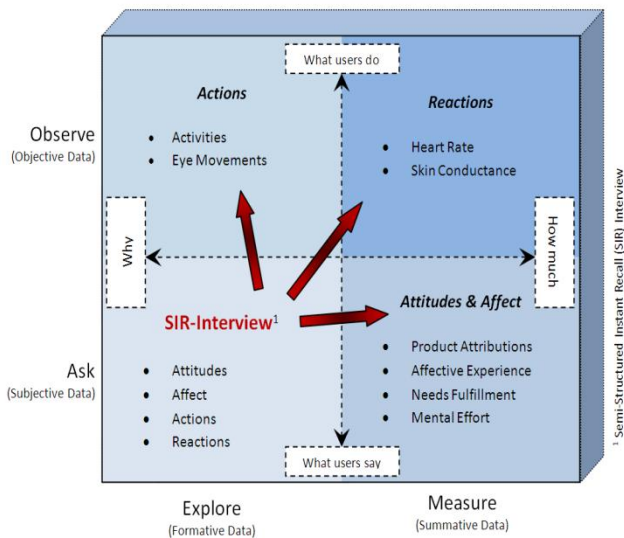
The current paper presents a multimethod approach, which is explored in our attempt to develop standardized research procedures and methods for testing both product experiences and emotional experiences of mobile media content and technology. This approach has successfully been utilized in several commercial studies investigating the usability and/or UX of both print and web based media content (unpublished). Selected research methods targeting emotional experiences are also described in further detail.

## 2. A MULTIMETHOD RESEARCH DESIGN

As our perspective of UX is holistic, we have developed a standardized procedure for investigating both usability and user experience with a wide range of validated methods and instruments. Earlier studies conducted at our audience research lab (iDTV Lab) have confirmed that a combination of methods guarantees a broad and deep understanding of how humans experience media interactions [9]. By combining different methods, it is possible to study a broader range of research

questions and to produce a more complete picture of UX. It is also possible to provide stronger evidence for a conclusion through convergence and corroboration of findings, to increase the generalizability of the findings, and to complement any weaknesses of a single method [2, 5].

Our UX research design includes methods targeting both quantitative and qualitative data about attitudes, affect, actions, and reactions of media users. The selected methods can further be categorized into subjective and objective measurement techniques. The subjective measures include standardized questionnaires based on Likert-scales, questionnaires with open-ended questions, unstructured interviews, and various forms of structured and semi-structured interviews that are based on instant recall techniques. The objective measures include psychophysiological data collection such as monitoring heart rate, and skin conductance. Objective measures also include behavioral data recordings (e.g., eye movements, screen recordings, and recording the person within the physical environment while interacting with a product/media solution). Figure one presents an outline of chosen methods and how these are distinguished regarding what they measure and what kinds of data they generate. The three arrows in the figure point to the targets of SIR (Semi-structured Instant Recall) interviews: attitudes and affect (mostly questionnaire items), reactions (psychophysiological measuring), and actions (behavioral observations). We emphasize the development and fine-tuning of selected research methods, especially the triangulation of methods for answering specific research questions in accordance with demands.



**Figure 1. Instant recall techniques based on research targets presented in relation to levels of data, investigating usability and user experience of media solutions.**

Methods employed for targeting emotional aspects of UX are behavioral observations (actions), psychophysiological measurement (reactions), standardized questionnaires, and semi-structured instant recall interviews and unstructured interviews.

The selected questionnaires targeting emotional experiences include, the *Self-Assessment Manikin* (SAM) [6], the *PANAS-X* [13], and the *Needs Schedule*, [10]. The *SAM* (Self-Assessment Manikin) is a non-verbal, pictorial questionnaire measuring general emotional states, including *valence*, *arousal*, and

*dominance*. The *PANAS-X* (*The Positive and Negative Affect Schedule – Expanded Form*) is a self-report questionnaire measuring general dimensions of affect, i.e. *Positive affect* (including interested, excited, strong, enthusiastic, proud, alert, inspired, determined, attentive, and active) and *Negative affect* (including distressed, upset, guilty, scared, hostile, irritable, ashamed, nervous, jittery and afraid). The questionnaire further contains the following subscales: *Fear*, *Hostility*, *Guilt* and *Sadness* (representing basic negative emotions), *Joviality*, *Self-assurance* and *Attentiveness* (representing basic positive emotions), and *Shyness*, *Fatigue*, *Serenity* and *Surprise* (representing other affective states). As needs and emotions are tightly coupled [10], a third questionnaire measuring ten fundamental psychological needs and the extent to which these needs are fulfilled during a satisfying event was selected. The questionnaire measures the following needs: *Self-Esteem*, *Autonomy*, *Competence*, *Relatedness*, *Pleasure-Stimulation*, *Physical Thriving*, *Self-actualization-Meaning*, *Security*, *Popularity-Influence*, and *Money-Luxury*. The construct is employed in order to measure the extent to which the fundamental needs are experienced and met during a mobile media encounter.

The chosen methods for measuring emotional experience are employed and combined according to the following procedure: Participants' behaviors and psychophysiological reactions are first monitored during task performance after which the questionnaires are filled in. The interviews are then carried out. Here, the SIR (Semi-structured Instant Recall) interviews, in which each participant is subjected to instant recall stimulated by their own replies regarding their emotions as well as their bodily reactions and behavioral actions, complement the standardized research instruments by targeting more in-depth qualities of users' emotional experiences. In an *Attitude & Affect-Targeted Interview*, for instance, an in-house developed computer-based research tool, IRIS (Instant Reduction of Items into Scales), sums up the scaled items of the selected questionnaires, and calculates the means of scales. These means signal the direction of the areas that need to be improved in a product. It further provides us with a useful instrument to structure interviews by, in which a large number of questionnaire variables are down-sized into an easily manageable number. By using the data gathered with the questionnaires, we can target interviews in order to gain a deeper understanding of users' experiences. An *Action & Reaction-Targeted Interview*, on the other hand, is based on psychophysiological data (heart rate and skin conductance) and behavioral data (activities). Hence, the targets are actions, as well as reactions. Video-recordings of the user's actions and reactions during the test situation are used as a stimulus for this part of the SIR interview. Here the in-house developed research tool eValu8 is used, which allows a simultaneous interpretation of video-recordings/screen recordings and psychophysiological reactions. These interviews are again video-recorded in order to get as much information as possible for the analyses of stimuli of reactions and actions. The instant recall interviews and triangulation of data are ways of validating findings from a wide selection of objective and subjective measurements.

The technical research equipment (including psychophysiological measurement device, eye-tracking camera and other) and the methods selected for studying usability and UX at our audience

research lab are portable and can be employed in field settings. However, the mobility of mobile media poses new challenges regarding methods and procedures for collecting data on user experience and usability. Consequently, one of the ambitions of our research and method development is to investigate the applicability of the subjective methods described in this paper in natural mobile user contexts.

### 3. CONCLUSION

In the present paper, we described a combination of objective and subjective instruments for measuring the emotional experience of mobile media interaction, along with a standardized research procedure. However, as we see emotional experience as one of several aspects of UX, a multimethod approach for investigating both usability and UX of mobile media by employing a wide battery of research instruments that cover attitudes, affect/emotions, psychophysiological reactions, and users' actions/behaviors was also presented. The main goal of our method development is to guide product development, so that the end-product answers to the needs and demands of targeted users, as in the development project of a mobile application for personal health care mentioned above. By exploring the implementation of the variety methods described earlier in a mobile media context (both in experimental and natural settings), we expect to gain a broader and deeper understanding of the users' experiences and usage of mobile media content and technology. The multimethod approach enables validation, triangulation and refinement of selected methods, which might result in a new methodology for measuring mobile media experiences. The employment of multiple methods is further a way of verifying research results, which is essential in the collaboration with development projects of mobile applications where audience testing is carried out at several phases of the design process. However, the applicability of existing UX methods needs to be carefully explored in the field of mobile media interaction [3], as the existence of different frameworks of UX and the complexity of the concept along with the diverse and dynamic nature of mobile media consequently have an impact on how different aspects of UX of mobile media can be measured.

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