
Experience Sampling as Personal Informatics Tools for Persuasion

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Abstract

In this position paper we propose the use of experience sampling and contextual diary tools as personal information applications to foster attitude and behavior change among individuals. Over the last years a diversity of these tools have been proposed in academics to research user behavior and user experience in-situ. We suggest utilizing these tools to help people collect personal information and trigger desired behavior changes. We present the Maestro approach, a concept to collect context data and study user behavior in realistic environments by using client-server architecture.

Keywords

Experience Sampling Method, ESM, Persuasion

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Within the last years the use of persuasive technologies (PT) have gained momentum in HCI research [4]. Different design strategies have been applied to change people's behavior in different contexts [3]. PTs have been used to promote healthier life styles [2], to

reduce energy consumption [8] or to reduce CO2 submission while driving a car [12]. Such technologies have aimed at changing peoples attitudes and behavior by logging user activities, sensing context parameters, and displaying this information to the user. Often strategies like illustrating behavior over certain periods of time, or comparing the own behavior with behavior patterns of others have been used to achieve the desired persuasive effect [15].

One big challenge in this realm is how to evaluate the long-term persuasive effect of such technologies. A prominent method to evaluate in-situ user experience in general over a certain period of time is the experience sampling method (ESM). ESM is a quasi-naturalistic method of data collection to capture participants' experiences in everyday life [11]. This is achieved by repeatedly triggering self-reports (e.g. diary entries, predefined questions) on the nature and quality of participants experience at various points in time. Lately a variety of different computerized ESM tools have been proposed to conduct ESM studies. Since most of these tools include the possibility to log certain user behaviors and context parameters we used ESM to evaluate the persuasive effect of PTs. In this paper we propose that ESM tools cannot only be used to evaluate PTs, but can be used as persuasive technologies *per se*. Additionally these tools can be utilized for personal informatics purposes.

Experience Sampling and Diary Tools

The possibility to use contextual information to trigger experience sampling questions has been firstly identified by Intille et al. [9] and demonstrated in the Context-Aware Experience Sampling toolkit (CAES). In the meanwhile different experience sampling tools have

been presented. For instance, MyExperience [5] and SocioXensor [16] are toolkits, which exploit hardware sensors and software capabilities located on the mobile device to enable context-contingent experience sampling. On both tools logging information and experience sampling data are deployed locally on the mobile device itself. Momento [1] is a tool based on client-server architecture to provide support for situated evaluation of ubiquitous computing applications by piggybacking on participants' existing mobile devices. Again context information like location, nearby people, and audio recordings can be logged. Pocket Bee [6] combines diary methods with ESM. It is a multi-modal diary tool based on the Android smart phone platform, which uses so-called "core questions" as cognitive triggers for pre-defined events in order to motivate participants to write diary entries according to these events. Reconexp [10] again combines aspects of the Day Reconstruction Method with ESM aiming to reduce data loss, improve data quality and reduce burden put upon participants by proposing a distributed application, which partly runs on a mobile device (ESM) and partly on a website (DRM). EDDY [7] again is framework for gathering various kinds of data on mobile devices consisting of a mobile phone connected with external sensors (e.g., heart rate, GPS) and a server with an online database. Thereby active data (e.g., text and audio input, pictures) and passive data (e.g., heart rate, 3D acceleration) are combined with diary entries.

Our Approach

All these tools have in common that they are not only capable of performing ESM studies but logging usage behavior as well as adapting context sensors (e.g., to get GPS data). Our approach is to use these tools for



Figure 1: Maestro structure

personal informatics purposes (i.e. to collect personal information about various aspects of life, behaviors, habits, and thoughts) as well as to utilize the experience sampling functionality of these devices as persuasion triggers. As personal informatics tools the above-mentioned approaches do not necessarily require active user participation in gathering information, but uses context sensors to log user activity. For persuasive purposes these tools can utilize the experience sampling functionality. ESM trigger cannot only be used as prompts for answering ESM questions, but also as cues to foster a certain behavior. By exploiting the strength of context aware ESM tools these cues can be timed precisely. The right time and the right place of intervention are considered as being crucial for the success of a persuasive strategy [14].

The Maestro Approach

“Maestro” is a concept to study behavior in realistic environments based on ESM following a client-server paradigm [13]. Contrary to many other ESM tools we propose a radical shift of system intelligence from the client (the mobile device) to the server. On a mobile device only lightweight client software has to be installed. Logged events (i.e. user behavior and context information) are not stored in a local database on the mobile device but are immediately sent to a web server and stored in a global database. Each of these events can serve as a trigger for user behavior driven and context triggered ESM. Figure 1 shows the Maestro structure we used for a study investigating people’s emotional relationship with their BlackBerry. The data collected through Maestro can be used for personal informatics purposes as well as to provide persuasion cues. Basically Maestro, like most other tools, serves two purposes. Firstly, Maestro is capable of recording

continuous objective context and usage information. This includes data from internal and external sensors (e.g., GPS data, light sensors, accelerators, signal strength), as well as user activities like for example the time and duration of outgoing and incoming phone calls including telephone numbers and information how the call was ended (e.g., participant or recipient has ended the call). Dependent on the operating system and the capabilities of the Maestro client virtually every status information of the mobile device can be logged. Secondly, Maestro provides researchers with the possibility to capture input from the users’ subjective experience by means of experience sampling.

So far we have deployed Maestro in a variety of long-term user studies. For example we have evaluated perceived work efficiency enhancement with the introduction of BlackBerry devices in large companies in a 9-week field study. Currently we assess the persuasive effect of traffic information systems for different user groups (e.g., commuters, leisure travelers) in a 6-week ESM study.

Application Contexts

Although the Maestro approach currently is focused on mobile phones the architecture is capable of integrating other forms of clients as well. So far clients for different platforms (e.g., BlackBerry OS, iPhone OS) have been developed. In the near future we will use the Maestro architecture not only in the mobile context but also in other environments. In the automotive context we will use Maestro to gather context and user experience factors especially while driving a car. These factors in return are planned to be used to persuade drivers to drive more safely and more eco-friendly. In the factory context we will deploy Maestro on different equipments

within a semi-conductor factory. Thereby we aim at persuading operators to improve compliancy and efficiency.

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