

# User Segmentation & UI Optimization through Mobile Phone Log Analysis

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## ABSTRACT

To improve and optimize user interfaces of the system, the accurate understanding of users' behavior is an essential prerequisite. In this paper, we described the work which examines users' behavior through log analysis in their own environment. 50 users were recruited by consumer segmentation and logging-software was downloaded in their mobile phone. After two weeks, logged data were gathered and analyzed. The complementary methods such as a user diary and an interview were conducted. The result of the analysis showed the frequency of menu and key access, used time, data storage and several usage patterns. Also, we found the possibility that users could be segmented into new groups by their usage patterns. The improvement of the mobile phone user interface was proposed based on the result of this study.

## Categories and Subject Descriptors

H.5.2. [Information interfaces and presentation]: User Interfaces – Evaluation/methodology, theory and methods, user-centered design

## General Terms

Measurement, Design

## Keywords

User Behavior Analysis, User Segmentation, UI Optimization, Log Analysis

## 1. INTRODUCTION

In the field of interaction design, methods for understanding of users' behavior include face to face interviews and task-based usability tests. The former has a weakness that it is fully

dependent on user's memory while the latter has a weakness that it gives participants unnatural atmosphere of the given environment and tasks. This study adopts user log analysis to extract users' natural activities and improve the usability of the mobile phone user interface complementing those demerits.

The actively applied area of log analysis is web site. It covers wide range of domains such as digital library [4], internet shopping mall [5], and electronic news papers [6]. These studies report not only some implications for the development of several services [4, 5], but also present the findings can be used to improve effectiveness of electronic systems and identify areas for improvement [4, 6]. Recently, some studies on the electronic devices using log analysis have appeared. A prior work successfully demonstrated the effectiveness of log analysis on the improvement of the user interface of digital TV [3]. Moreover, a recent study introduced a tool gathering functionalities, durations and navigations of mobile phones based on log analysis [2].

Marketers generally have segmented consumers based on diverse standards such as their age, sex, location, occupation, life style, key buying factors, and objective of the product. For instance, to predict and model customer behavior, a study presented standards as follows: Geographic, Demographic, Psychographic, and Benefits & Behavioral [7]. However, for interaction designers, the segmentation based on user behavior would be more helpful [1]. User behavior includes frequency of use, importance of functions, data usage and usage flow, etc. From the user segmentation, personas which are hypothetical archetypes of actual users could be made up. The result of this study could be used to construct personas of mobile phone users.

## 2. METHOD & PROCESS

We used a specific model of LGE's mobile phone (KH-1300). The model was turned out in early 2007 and it was 3G phone. 50 users who bought and used the KH-1300 phones over two months participated in the study. They were selected by market segmentation and consisted of five groups (A~E). Participants were asked to visit our laboratory two times. In the first visit,

logging software was downloaded in their mobile phone and the setting values were checked by the coordinator. Meanwhile, a short interview was carried out. After two weeks, each participant visited our laboratory again. Stored log data were downloaded and logging software was removed from their phones. For two weeks, participants kept their diary by time and the diary data were used for contextual analysis of use. Logged data were extracted as text file format and analyzed by Microsoft office excel 2007 and Microsoft office access 2007.

### 3. RESULTS & DISCUSSION

As a result of the analysis of logged data, we gained frequency of menu access and key press, changed setting values, used time and storage, and usage context. Total frequency of menu access of 50 participants for 14 days was 109,747. Average frequency of a subject for a day was 156. Among them the most frequently accessed menu was multimedia menu (57.5%), and next was message (27%). The most rarely accessed menu is sound (0.29%). Menu structure is not merely decided by one element, but these frequencies can affect menu order. The most important fact of the setting values was that most of participants registered some items in 'my menu' (98%). My menu is a kind of short cut to favorite functions. Alarm/morning call (72.55%) was the most frequently registered items in my menu. It is followed by subway map (41.18%) and memo (33.33%). We could include these functions in 'my menu' as default values or put these functions into hotkeys. Specific scenarios such as calling pathways were also analyzed. The first way was from the call history (45.99%), the second was by auto completion (27.74%), and the phonebook search was next (17.47%).

We described used time and storage by segmentation. Segment A showed the highest calling and answering number (Average 318 Times per 2 Weeks) and just used a few functions. Segment B showed the highest rate in composing messages (9 Hours), sending and receiving messages (1160 Times). Segment C was very much interested in using media such as mobile viewer (42792 KB), mp3 storage (267 MB), playing mp3 (7 Hours), and playing games (4 Hours). Segment D held a dominant position in message box storage (68367 Byte). The highest tendency of voice memo storage (12846 KB) of segment E coincided with the lowest in use of text message.

Based on the above analyses of usage behavior, data storage and used time, the mobile phone users could be reorganized into three types; communicative-use type, entertainment-use type, and restricted-use type. Just segment A was regrouped as communicative-use type. They used the phone for business and they sent and received the call the most frequently as mentioned.

For communication-use type, calling-centered user interface design might be needed. We could improve the search type or raise the accessibility to frequent partners. Market segmentation B and C were categorized as Entertainment-use type. They showed the highest involvement in mobile phones. Above 50~60% of most of the items were occupied by this type. They especially loved to use messages and multimedia. For this new generation, unique user experience elements like new material and vibration patterns could be studied. Finally, restricted-use type including original D and E segmentation showed the lowest involvement in mobile phones. They frequently used 'my menu'. It meant that they used a few restricted functions. Therefore, the operation of 'my menu' could be improved for them.

We are planning to carry out similar researches in other countries, also. Differences by nationality and culture could affect users' behavior pattern and these factors might be analyzed together. In the future works, we could raise the reliability of log analysis conducting FGI and usability test integrately.

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