Evaluating Mobile Applications: A Spreadsheet Case Study

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ABSTRACT

The power of mobile devices has increased dramatically in the last few years. These devices are becoming more sophisticated and allow users to accomplish a wide variety of tasks while on the move. The ease with which mobile apps can be created and distributed has resulted in a number of usability issues becoming more prevalent. This paper describes the range of usability issues encountered at all stages of the mobile app life cycle, from when users begin to search for an app to when they finally remove the app from their device. Using these results the authors developed a number of guidelines for both app developers and app platform developers that will improve the overall usability of mobile apps.

Keywords: Application Process Model, Mobile Applications, Mobile Technology, Mobile Usability, Portable Computing

1. INTRODUCTION

Advances in technology have allowed a range of sophisticated devices to emerge which enable users to perform a variety of tasks in a mobile context. These tasks include both tasks which were previously only available on traditional desktop applications and tasks that are only enabled by the use of mobile devices. To facilitate these tasks a wide range of mobile applications, referred to here as apps, are available from easy to install locations, such as the App store provided by Apple or the Android Marketplace provided by Google. In order to improve the portability of both of these types of apps, a number of compromises are necessary. These compromises, such as smaller screen size, more limited processing power and the mobile context in which the device is used, have frequently had a negative effect on the usability of these apps. The compromises can most readily be seen during the use of mobile apps. There has been a large amount of research into the usability of specific mobile apps (Ahmadi, 2008; Geven, 2006; Schmied, 2009; Shrestha, 2007). However, little research has been conducted on the selection, installation and removal of mobile apps, all of which can be problematic. This paper presents a study in which we examined

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aspects of user interaction with mobile apps during various steps in the usage lifecycle of mobile applications: application identification, installation, usage, and removal. To illustrate the range of interactions that a user may have with a mobile app we also present a mobile app process model which shows the typical lifecycle of a mobile app.

This paper is structured as follows. Section 2 describes related work. Section 3 addresses user interaction with mobile devices. Section 4 of the paper outlines the case study conducted to investigate the usability of mobile applications at various steps in their lifecycle. Based on this investigation, a set of guidelines for improving usability is provided in Section 5. The paper is then concluded in Section 6.

2. BACKGROUND AND RELATED WORK

2.1. Usability Models and Standards

There are three major ISO usability standards, each one identifying different attributes for measuring usability. ISO/IEC 9241-11 (ISO/IEC, 1998) defines efficiency, effectiveness, and satisfaction as the main attributes of usability, while ISO/IEC 9126-1 (ISO/IEC, 2001) proposes understandability, learnability, operability, attractiveness, and compliance with published style guides. ISO/IEC 9126-4 defines the concept of quality in use as the composition of three factors: effectiveness, productivity, and safety. The general limitation of these standards is that they are too abstract and give very little advice about how to interpret scores of specific usability metrics.

To address these limitations, the Metrics for Usability Standards in Computing (MUSiC) model was developed to “provide valid and reliable means of specifying and measuring usability, while also giving diagnostic feedback which enables the design to be modified to improve usability” (Bevan, 94). In measuring usability, the MUSiC model assesses the user performance in terms of the context used for the evaluation, effectiveness, efficiency, productivity, learning, satisfaction, and cognitive workload. Performance-based assessments of usability, however, lack aspects such as user satisfaction.

Seffah and Donyaee propose QUIM (Quality in Use Integrated Measurement), a hierarchical usability evaluation model which decomposes usability into factors, then into criteria, and finally into specific metrics (Seffah, 2006). There are 10 factors considered by the model: efficiency, effectiveness, productivity, satisfaction, learnability, safety, trustfulness, accessibility, universality, and usefulness. As criteria, the model includes time behaviour, resource utilization, attractiveness, likeability, flexibility, minimal action, minimal memory load, operability, user guidance, consistency, self-descriptiveness, feedback, accuracy, completeness, fault tolerance, resource safety, readability, controllability, navigability, simplicity, privacy, security, insurance, familiarity, load time, and appropriateness. To define the usability metrics associated to the model the authors identify a set of relationships between the factors and the criteria. For example, the efficiency factor is directly related to criteria such as resource utilization, operability, and feedback.

In Hussain (2008), the authors propose a method for developing usability metrics using the Goal Question Metrics (GQM) approach (Solingen, 1999). The GQM model is a hierarchical structure which starts with a goal which is further refined into questions. Metrics are then created for each question. For example, using this approach, Hussain et al. consider one goal to be “Efficiency” and derive a set of questions for it, such as “Once users have learned the design, how quickly can they perform tasks?” Corresponding to this example question, the authors consider the following metrics: task completion time, duration used to finish given exercises, duration spent on each screen.
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