Are Mobile Spreadsheet Applications Usable?

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ABSTRACT

Many businesses are heavily reliant on data and many people working in business like to have almost constant access to this data. Mobile phones provide users with access to a wide range of office applications, including word processors, email applications, and spreadsheet applications. However, the limitations of the mobile devices can cause a number of usability issues which may limit the productivity of users of these devices. This paper presents the authors' investigation of the usability of mobile spreadsheet applications. Through a controlled study they examined the performance of users using a mobile spreadsheet application to perform a series of simple tasks, such as finding data and altering values in the spreadsheet. The authors found that although mobile spreadsheet applications can be effective, they are highly inefficient due to a large number of usability issues.

Keywords: Applications, Mobile Application Usability, Mobile Phones, Mobile Spreadsheets, Office Applications

1. INTRODUCTION

The spreadsheet application has become an integral part of the financial sector (Croll, 2005). The nature of this environment means that those working in this sector desire almost constant access to data contained within spreadsheets. This need cannot always be met with desktop or laptop applications because these devices are too large and cumbersome to be used in some environments. Advances in mobile phone technology mean that spreadsheet applications can be run on a mobile phone and this allows users to access spreadsheets virtually anywhere and at any time.

There are a number of known limitations to mobile devices in terms of screen size, process-
ing power and connectivity and these limitations impact the way in which spreadsheets are used on these devices. These limitations have also introduced a number of usability issues which can affect the effectiveness and efficiency with which users can complete their work. The efficiency of mobile spreadsheet applications can vary by as much as 90% (Flood, 2011a).

This paper presents a pilot study on the use of spreadsheets on a mobile device and is structured as follows: Section 2 outlines some of the usability issues associated with mobile devices and describes how these issues can impact the spreadsheet application; Section 3 outlines the objectives of the study and the research questions it addresses. Section 4 of the paper describes the design of our study which compares using spreadsheets on a mobile device with using them on a desktop computer. Section 5 presents the results that were obtained. A number of limitations to this study are presented in Section 6. The study identified a number of issues that could be addressed through alterations to the mobile spreadsheet application. Section 7 of this paper outlines these changes and how they can address the issues identified by the study. The paper is then concluded in Section 8.

2. BACKGROUND AND RELATED WORK

2.1. Usability in the Mobile World

2.1.1. Research Methodologies

The rapid progression of technology has led to an increase in the number of mobile applications available. Although these applications offer a number of advantages in terms of portability and convenience they do so at the cost of usability. Usability evaluations can be performed in the lab or in the field to find the problems users face when interacting with a specific system. These problems have various levels of severity, ranging from critical problems (which prevent the users from completing a task and recur over all test users) to serious problems (which increase the time to complete a task drastically) and cosmetic problems (which increase the time to complete a task slightly) (Duh, Tan, & Chen, 2006). There are many methods for assessing usability, including heuristic evaluation, cognitive walkthrough, usability testing, and comparison against existing guidelines. Deciding which method to use is difficult and depends on the objectives of the overall evaluation process.

Support in making such a decision has been proposed (Duh, Tan, & Chen, 2006; Kjeldskov, Graham, Pedell, Vetere, Howard, Balbo, & Davies, 2005). In Kjeldskov et al. (2005), four different approaches for evaluating the usability of mobile guides are used, namely: field evaluation, lab evaluation, heuristic walkthrough, and rapid reflection. The results show that none of the techniques managed to identify all the critical problems, although field evaluation did identify more than a half of all the serious problems. In addition to this, the type of problems identified by each technique differed. While field evaluation identified issues of validity and precision of the data presented on the device, the heuristic walkthrough pointed to problems related to the overall use, flexibility and usefulness of the mobile guide. Rapid reflection brought to light issues related to the perceived relevance of the available information linking it to the users’ emotional responses to the overall design of the mobile guide.

A slightly different approach is used in Duh, Tan, and Chen (2006) for identifying the differences between usability tests conducted in lab and in field environments in terms of: (i) the quality and quantity of the usability problems revealed, (ii) the usability performance measure of each task, (iii) the users’ satisfaction, and (iv) the users’ behavioral patterns. The results showed that the number of usability problems identified in the field environment was twice the number of problems revealed by the lab environment. Moreover, the time needed to perform the task was much longer in the field environment. However, the behavior of the participants was more positive in the lab environment which led the authors to conclude that this would affect the overall results of the usability tests, making the
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