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Data Collection in the Palm of your Hand: A Case Study

By Kelly Spain & Chad Phipps

Mobile computing devices, which are commonly known as either personal digital assistants (PDA) or personal information managers (PIM), are an emerging technology that has the potential to be very useful in specific areas of computing. One area in which mobile computing devices are gaining favor is in ***data collection***, especially in places where larger computers are impractical. While the use of these devices as a data collection tool is not a new idea (see Drury, 1987), it has been a bit slow to take off. However, recent advances in this area of technology have allowed the gap in functionality between mobile computing devices and personal computers to be closed to such an extent that these devices may be considered to be as functional in many ways as a laptop or palmtop computer for collecting data. In fact, the conversion of paper and pencil forms such as surveys, questionnaires, and assessments to these devices may be considered a next logical step in the use of mobile computing devices.

In order to expand the functionality of mobile computing devices, SURL, along with the Kinesiology and Sport Sciences (KSS) department at Wichita State University has been involved in the process of modifying their current paper and pencil fitness assessment forms to work with the confines of 3Com Palm Pilot™ (Palm). The KSS department, which is interested in the physical health of the elderly, sought to find a way to eliminate the need for manual data entry into a database and to make the data entry as efficient as possible. In an attempt to understand the physical capabilities of the aged, the department collects performance data on different physical activities of older (age 60 or older) participants.

Examples of the data collection include performance on balance, timed walking, grip strength, and flexibility activities. These data are collected in a variety of settings, therefore providing an opportunity to use a mobile computing device in lieu of a notebook computer or paper and pencil forms. The use of a Palm allows for faster and more accurate transfer of data from the assessments to the database in which they are stored (see Figure 1 for sample screen). From this database, these data can be easily manipulated for final analysis. It is in this phase that the real benefit of the mobile computing device is seen. Our project sought to decrease transfer time and improve the overall accuracy, while not increasing the time to complete the assessments. In order to transfer the data collection process to the Palm, the following points were considered:

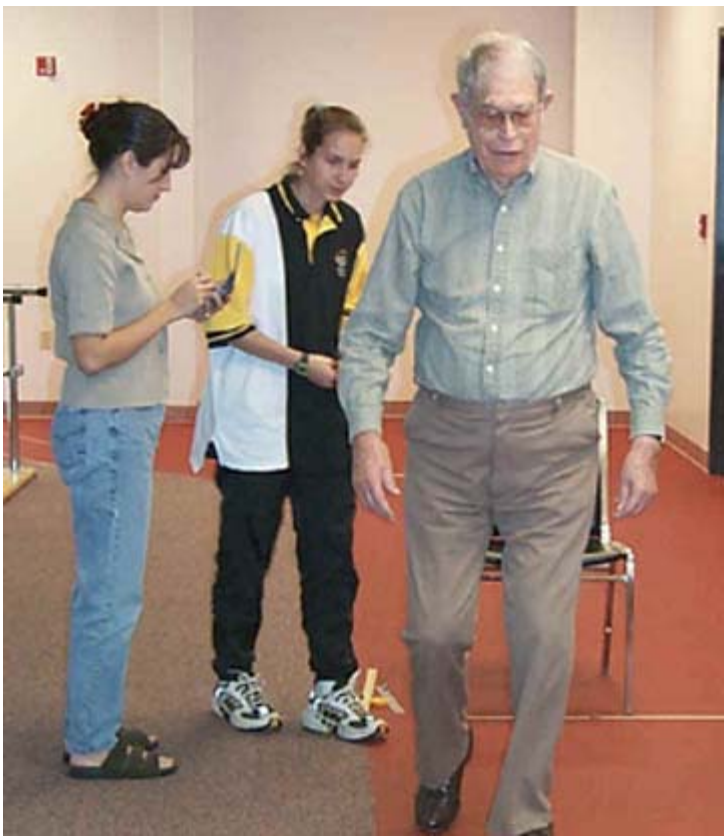
- The use of the Palm should not interfere with data collection. The participants and assessments are the focus.
- The use of the Palm should not add any time to the assessment session.
- The Palm forms should be capable of recording data for multiple participants. Participants are often tested in pairs. This is simple to do on paper, but with one Palm, this could be more difficult.
- Anything that the Palm could do for the data entry user was considered an improvement.
- The size of the screen (160 x 160 pixels) and the low resolution were a concern since minimal portions of the assessment could be visible at once.

A typical assessment takes approximately 30 to 40 minutes with paper-and-pencil forms. The Palm method took about the same length of time. This was not surprising since the length of the assessment process often depends upon the participant's physical health: the types of measures taken rely on the speed at which the participant chooses to move. We expected to see the greatest time savings during data transfer. The previous method called for manual data entry, a process that took 5 minutes per participant, but was prone to input errors. With the Palm, the data for all participants are transferred to the database in a matter of seconds.

Figure 1. Sample Palm data entry screen

Usability tests of the Palm application were conducted throughout the design process. During these tests, the users were generally unfamiliar with the device but were familiar with the fitness assessment process. The unfamiliarity of the device did not seem to cause a problem with the users. The usability test results showed that the Palm is an effective method of data collection. This program is now being implemented to the KSS assessment process and will replace the paper and pencil forms. A major benefit of the use of this program is the portability of the device. Because the test population is older, some individuals may be in adult living facilities and unable to travel to the university. The portability of the device allows the assessments to be completed anywhere.

This project provided a number of challenges. These included the small screen size and lack of user interface design guidelines for these devices. The development environment (Satellite Forms) also provided somewhat of a challenge, as it was different from other platforms that are available for programming. Overall though, the benefits of the finished application far outweighed any challenges the process provided along the way. We found the Palm to provide an excellent platform for field data collection by providing a mobile and relatively cheap data collection tool.



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