Contextual Inquiry: Quantification and Use in Videotaped Analysis

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ABSTRACT

Contextual Inquiry is a method developed by Beyer and Holtzblatt for grounding design in the context of the work being performed. In this paper, we describe our adaptation of the method to analyze videotaped presentations. Our goal was to find improvements for a slide presentation program currently in development, called 'SlideShow Commander.' Contextual Inquiry provided meaningful data on the structures and typical problems found in presentations, on which we based our design ideas. We then further analyzed and quantified the Contextual Inquiry data, beyond what Beyer and Holtzblatt suggest. This new step provided a means to prioritize the design suggestions, as well as a way to defend the potential commercial usefulness of the software. Deciding upon the value and direction of further effort is essential for software development; by using our adapted form of Contextual Inquiry, we were able to make and defend these decisions.

Keywords

Contextual Inquiry, Personal Digital Assistant, Palm Pilot, Usability Evaluation Methods.

INTRODUCTION

The Pebbles SlideShow Commander [3] uses personal digital assistants (PDAs), such as the 3Com Palm Pilot and Windows CE devices, to control a presentation in Microsoft PowerPoint running on a PC. It provides a handheld-means for a speaker to navigate through PowerPoint slides, view notes associated with the current slide, view the list of slide titles, and point or draw on the screen using the PDA. The current system uses either a serial cable or infrared (IR) to enable two-way communication between the hand-held device and the PC.

We were interested in finding ways to improve SlideShow Commander both in the short- and the long-term.

Initially, we had little idea of the common styles of presenters – such as the frequency and means by which they changed slides, or their use of the cursor to point or draw on the screen. Background literature searches revealed a large quantity of information about how one *should* give a presentation (e.g. [2]), but little on what people *actually* did. To obtain information on the latter, we decided to use the method of Contextual Inquiry (CI) [1].

The technique of CI recommends observing activities as they occur in their natural context, and using a graphical modeling language ('work models') to describe the work process and to discover places where technology could overcome an observed difficulty. We chose this method because it would provide data about the detailed structure of actual presentations and guidance on the design of the software.

METHODS

CI, as advocated by Beyer and Holtzblatt, centers upon live interviews with users at the workplace, based on previously determined foci. We learned the technique from graduate lectures in combination with a textbook [1], and had used the technique in several class projects exactly as described. However, for our study we had access to a large library of previously videotaped presentations. This enabled us to study presentations that varied in formality and style, and in whether the presentation was given to a local audience or simultaneously to both a remote and a local audience. Rather than discard this valuable resource, we decided to adapt the CI technique for videotapes.

The advantage of a live CI is that you can ask questions and prompt for explanations. However, this would not be appropriate for observing presentations, where uninterrupted observation is actually preferable. In such cases, the technique recommends taking notes and interviewing the participants immediately after the observation period. Unfortunately, we did not have access to the presenters of the taped talks, so we decided to piece together motivations and goals from the evidence of the videotapes themselves. To do this, we used the verbal comments and behaviors of the presenters when the problems occurred.

Using CI by videotape, we analyzed nine academic talks that were presented at Carnegie Mellon University between May 1998 and June 1999. All of the presentations covered various topics in computer science.

We found that CI using pre-existing videotapes produced an abundance of data for developing our design ideas. Because we had videotapes, we were able to return to earlier talks to concentrate on detecting subtle problems that were only revealed in later tapes. Videotapes also enabled us to perform further analyses on the severity and duration of the breakdowns. This gave us the evidence with which we could convince the software developers of the importance of our design suggestions.

RESULTS

Thirty-eight unique types of breakdowns were found in the presentations by using CI, with a total of 229 instances of breakdowns observed across the nine talks. Breakdowns were present during an average of 8.7 minutes of each approximately 60-minute talk. Each talk had an average of 34 instances of breakdowns, ranging from minor (Severity = 1) to moderately severe (Severity = 4, on a 5-point scale). The most surprising observation from the models was the frequency and total duration of minor interruptions in almost every talk. Instead of the presentation being a simple, smooth process, the presentations included significant periods of shuffling of papers or fiddling with cords as the audiences waited for the talk to resume.

The most frequent breakdown we observed was the physical awkwardness of changing slides. Six presenters walked to one spot to talk, then turned and walked to their laptops, re-positioned themselves, advanced slides using their PC, and then returned to the original spot. Often, the PC was poorly placed, compounding the problem. This procedure wasted an average of 48 seconds in each talk in which it occurred. One other presenter found a less time-wasting solution: staying next to the slide control on the podium throughout the lecture part of her presentation, and then moving to a spot away from the podium and closer to the audience for the discussion period. Navigation was also error-prone. Every time that users tried to go backwards in their slides using Power Point, they failed on their first try (by pressing the wrong key, or not knowing what to do).

Another frequent breakdown was the inability of presenters to keep track of time. Six presenters asked audience members for the time at some point during their lectures.

Videotapes allowed us to find and observe the frequency of breakdowns that were overlooked in earlier presentations we studied. For example, it was not until an audience member specifically asked for a reference to be written on the board (in the fifth talk we examined) that we realized the difficulty most audience members must have when references are given only verbally, or skimmed over in slides. None of the talks we studied used handouts, so audience members had no way to find the references after the talk. Once we noticed this breakdown, having videotapes allowed us to return and look at the other tapes where we found other places where this problem had been overlooked.

Design

After we analyzed the talks, we took the completed master list of breakdowns and determined which could have been eliminated using the existing version 2.3 of SlideShow Commander; and which could potentially be solved with either short-term (version 3.0) or long-term improvements to the software (Table 1). We measured the duration and ranked the severity of breakdowns to argue for the benefit of these improvements (Table 2). The developers took our advice for the short-term improvements, and incorporated them into version 3.0 of the software. We have initially tested version 3.0 using volunteers in practice talks. These talks showed an absence of the breakdowns we had predicted would be eliminated by version 3.0.

Version	Description
2.3	Initial version of SlideShow Commander. Partially solves slide navigation problems.
3.0	Relatively easy changes, including the addition of a timer and enabling user-assigned hard buttons for slide navigation keys.
long-term	Future long-term developments, such as providing a way to control other devices such as VCRs and Projectors in conjunction with the PC; and including a 'task switcher' to enable fluid transfer between one running application and another, and launching of additional applications.

Table 1. Versions of SlideShow Commander.

Version	Instances of Breakdowns Prevented	Average Severity	Total Time Saved Per Talk
2.3	178	1.5	54.7 sec
3.0	19	1.25	13.5 sec
Long-term	15	1.7	4 min, 48 sec
None	17	2.1	2 min, 43 sec

Table 2. Improvement from SlideShow Commander. 'None' refers to breakdowns that occurred in the presentations but were outside the bounds of current or future versions of the software.

CONCLUSIONS

Using CI on videotaped presentations helped us to form our design ideas for the software. By capitalizing on the use of video to measure the frequency and duration of breakdowns, we produced numerical data to support the importance of our designs. Most programmers we have met prefer hard numbers to anecdotes or pictures. By quantifying our CI analysis, we have bolstered our arguments as to the impact of our design ideas. From our prior experience, CI is a useful technique for acquiring an accurate picture of the user. From our adaptation of the technique to use on videotapes, it is evident that even this alteration proves beneficial to usability studies.

ACKNOWLEDGMENTS

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REFERENCES

1. Beyer, H. and Holtzblatt, K. *Contextual Design: Defining Customer-Centered Systems.* Morgan Kaufmann Publishers, Inc., San Francisco CA , 1998.
2. Mablekos, C. *Presentations that Work.* Institute of Electrical and Electronics Engineers, NY, NY, 1991.
3. Pebbles SlideShow Commander. Available at http://www.cs.cmu.edu/~pebbles