Redesign Workshop: Involving Software Developers Actively in Usability Engineering

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Abstract

In practical usability engineering feedback is only useful if it cost effectively leads to design changes. Several studies have looked into different feedback formats when passing on usability problems to software developers. Research has shown positive results both when providing developers with redesign proposals, and when actively involving software developers in the redesign process. Through facilitation and lecturing in interaction design provided by usability specialists, we wanted to further explorer potential advantages of actively involving developers in a collaborative redesign process. The leading question was: *"Can software developers contribute actively to alternative redesign suggestions?"* Under the guidance of usability specialists, we found that the developers were able to constructively reconsider the existing design based on a top down approach. In this paper we report a hands-on approach towards running such a redesign workshop.

Author Keywords

usability engineering, software developers, usability practitioners, redesign suggestions

ACM Classification Keywords

D.2.2 Design Tools and Techniques

Figure 1: Guitar pedal from TC Electronic.

Figure 2: GUI of the TonePrint Editor.

Introduction

Usability evaluations are used to gain feedback about how interactive systems are used and perceived with the goal of improving the quality of the interactive design. Such evaluations result in a set of usability problems. In the past Wixon has argued that the focus of research on usability evaluations abilities to identify usability problems overshadows *"…that problems should be fixed and not just found"* [9]. In practical usability engineering feedback is only useful if it cost effectively leads to design changes, also known as *downstream utility* [7].

Several studies have looked into feedback formats when passing on usability problems to developers [5,6,8]. Studies of industry practice yield that for usability evaluations to be useful they must provide feedback that easily can be acted upon [1,8]. Traditional usability reports have been found useful, but they are lacking information needed by developers [5]. Contextual information is valued by developers because it provides relevance, and a better understanding of the given problem [8]. In a study developers found redesign proposals as feedback to be of higher utility than problem lists because it's easier to understand the problem. They gained inspiration and new perspectives on how to solve problems, especially regarding non-trivial problems. Of disadvantages some redesign proposals were to complex to implement, and creating redesign proposals is more resource demanding than usability problem lists [6]. Høegh *et al.* found that developers request redesign proposals but argue that usability specialists not necessarily know enough about the systems and their limitations [5], especially in complex domains [4]. They propose collaboration between usability specialists and developers [5].

Bruun and colleagues explored collaboration and active involvement of developers in the redesign process. The developers gained deeper insight of the identified usability problems. Despite coming up with several redesign suggestions, no radical changes were proposed. It's concluded that even though not using the redesign suggestions, they were able to make informed decisions about which design to finally implement and how to complete it. The authors suggest that adding a usability specialist to facilitate developers can have several advantages. The developers have domain knowledge and as a group they can produce several alternative redesign suggestions while receiving guidance from a usability specialist [2].

In this paper we report experiences with conducting a redesign workshop with developers from a software development organization. In industry, usability problem solving is commonly done unsystematically through discussion with colleagues, and by looking at how others have solved similar problems [1]. With the approach presented here, we wanted to explorer one approach towards more systematic problem solving. The question leading this redesign workshop was: *"Can software developers contribute actively to alternative redesign suggestions?"* As training software developers in usability engineering has shown positive results [3], we included a lecture about interaction design to provide a basic theoretical foundation. The focus was to have the developers collaborate, and involved actively in the process of improving the usability of the released TonePrint Editor software[1]. In this paper we report a hands-on approach towards running such a redesign workshop.

Graphical User Interface Redesign Workshop

In the following we present the d*esign of the redesign workshop*, *the system*, *preparation*, *participants*, and *activities*.

Design of the redesign workshop
The redesign workshop was based on an earlier study in which the authors set three principles: *1) active involvement of the developers, 2) focus on the future system, and 3) support from usability specialists* [2]. These principles lead to the general structure and foundation of the workshop. The main focus was to have the participants engaging in an innovative redesign suggestion process through active involvement including exercises and group work. In the study by Bruun *et al.*, the developers used a bottom-up approach and focused only on the identified usability problems [2]. To provide the developers with basic principles of interaction design, a lecture was added to the workshop. The intention was to have the developers think about UI design in more broad terms. The focus of the lecture was on general principles and heuristics for designing UI's. The lecture focused on tangible content illustrated with examples of these principles and heuristics, and different UI's.

The system
TC Electronic produces guitar and bass pedals, which are effects units used for altering audio source sounds for musical instruments. One product line is the TonePrint enabled guitar pedals (See Figure 1). TonePrints are presets consisting of two parts: A number of parameter values that describes the basic sound of the TonePrint, and a number of values describing the mapping of a small number of meta parameters. The meta parameters are called "modifiers", and enables the user to control up to three sound parameters with individual mapping functions directly from the physical knobs on the user interface (UI) of the guitar pedal (See Figure 1). Artist TonePrints made in collaboration with guitar and bass players from bands like Deep Purple and Guns N' Roses, can be transfered to the TonePrint guitar pedal. This is done through the smartphone app, TonePrint App, or through PC/Mac/iPad using the TonePrint Editor. In the TonePrint editor the user can: select an Artist TonePrint or create a customized TonePrint, and transfer it to the user's guitar pedal (See Figure 2).

Preparation
Participants from TC Electronic previously conducted think-aloud tests, and compiled a list of 19 usability problems. For each problem the following was given: a short description, a severity rating in the form: *minor*, *moderate* and *severe*, a list of all evaluators identifying the problem, a short redesign suggestion, a complexity rating (1-8), and a business value rating (1-8).

Participants
Six employees from TC Electronic participated in the workshop, two software developers, one hardware developer, two product managers, and one software quality assurance manager. In addition three usability specialists from Aalborg University participated, two as workshop facilitators, and one as workshop observer. In the remaining part of the paper we label all participants from TC Electronic as developers.

Activities
A one-day workshop was scheduled. (The program of the workshop is listed to the left: *Program of redesign workshop*). At the beginning and end the participants

were asked to individually list five strengths and weaknesses about the current GUI of the TonePrint Editor (exercise #1 and 3). This was done to measure the developers' attitudes to, or perceptions of the strengths and weaknesses of the current system, and to provide the developers an opportunity to actively think about, and consider the current GUI design.

The lecture in interaction design (activity #2) included:
1. *Identification and definition of interaction space:* object oriented analysis and design, such as use case scenarios.
2. *Detailed design of interaction space:* concepts on the organization of interaction space:
- Consistency: elements have the same representation and behavior throughout the interface.
- Screen Layout: structuring elements in the sense of their location on the surface or in space.
- Relationship: visual context or space between elements.
- Navigation: locally in the window, between the elements, sequence of elements.
- Gestalt Principles
3. Design patterns: example of wizards.

After the lecture the list of usability problems was presented, and the participants were asked to discuss the problems, and choose a few to focus on during a group work session (exercise #2). The participants then teamed up in two groups, three members in each, and were placed in separate rooms. A usability specialist facilitated each group. The groups were instructed to produce redesign suggestions and to prepare a short oral presentation for the plenum session. They were asked to both consider low and high level problems. The usability specialists facilitated the

process by providing design ideas based on principles from interaction design. In the plenary session each group presented the outcome accompanied with drawings, flip-overs etc. During the activities we observed the developers and recorded extensive notes. The final step was an evaluation of the workshop.

Findings
We here present the findings of the workshop.

Strategy for making redesign suggestions
The role of the usability problem list was limited as the groups did not explicit consider the identified usability problems. Instead they based their redesign suggestions on the principles learned during the lecture. They considered redesigning from a holistic point of view rather than focusing on minor issues. Both groups followed somewhat a top-down approach. The principles from the lecture were mentioned as a main driver towards this approach. For example, group 2 worked on getting the chronology of the interface in order (See quote 1). Group 1 started out by discussing the vision of the software. Part of this discussion was about writing a set of questions (See quote 2). The group would then discuss answers. This approach is in contrast to the findings of Bruun and colleagues. They found that their participants followed a bottom-up approach, and addressed the usability problems rather explicit [2]. We speculate that the interaction design lecture provided an alternative approach towards starting the redesign process, and the usability problem list no longer was the main point of focus.

Active involvement
Through collaborative group work the developers were actively involved in the entire process of generating
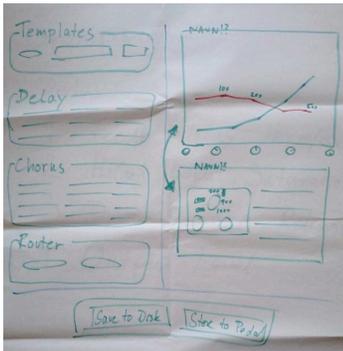
Figure 3: Redesign suggestion about how to reorganize the main window of the TonePrint Editor.
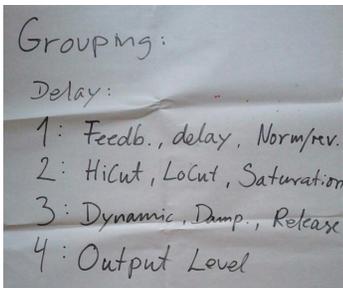

Figure 4: Redesign auggestion about how to group the '*delay*' parameters in the TonePrint Editor.

alternative designs. The hands-on approach and the small sized groups forced active involvement. By providing a set of instruments in the form of the list of usability problems and lecture, they had a starting point. The usability specialists took on a passive role during the group work. Instead the participants were free to discuss and conduct the activities they wanted to. In the beginning they were brainstorming and asking questions (see Quote 2). This would lead to different answers for the questions that finally lead to redesign suggestions. As the software in question requires domain knowledge, it was difficult for the usability specialists to provide specific advice about the specific functionalities. Instead they provided knowledge about interaction design that was utilized by the developers. The developers would then apply these concepts to the actual design of functionalities.

Focus on the future system
The redesign workshop did not lead to puzzle solving, but rather lead to a more "open mind" about redesigning the interface and understanding the usability problems. They could relate the concrete design principles from the lecture to their day-to-day work tasks. One example is that the participants were presented to examples of UI's not related to the TonePrint Editor. This provided the participants a chance to relate to other types of designs. This served as a foundation to imagine completely different design types. The participants pointed out that it's easy to get "tunnel vision" when working on a specific development project. Through the workshop the developers had a chance to be exposed to other design considerations and ways to do things, but also simply to work with different reorganizations of the current design (See Figure 3 and 4) based on established design theories.

As feedback the participants mentioned that group discussions would have been very helpful during the development phase of the TonePrint Editor, as getting ongoing feedback could have been helpful. A need also reported by other software development organizations [1]. The participants pointed out that the approach of the workshop potentially could lead to more internal discussion in the development team, as the workshop provided some concrete tools. They further got a better idea about when it's meaningful to get feedback. As is, feedback is often introduced in a too late stage.

Support from usability specialists
We find that the facilitators mainly served two passive purposes: *discussion manager* and *input provider*. Facilitation of the workshop and discussions was essential, as the discussions otherwise easily could get off track. Here the facilitator added breaks to, and summaries of the discussions. For example, by pausing the discussion and writing down a set of essential keywords based on the discussion. They as well provided different kinds of input. For example, one facilitator tried to support the ongoing discussion by visualizing central components of the application and the link between the parts. We find that this prevented the process from going into circles, as the participants had a tendency to get into details.

Conclusion
As workshop facilitation by usability specialists has been suggested by several studies [1,2,5] and active involvement of developers in the redesign process has shown positive results [2] we conducted a redesign workshop about redesigning software that requires domain expertise. In essence the goal was to provide the developers with tools and an environment that

would allow the developers to experiment with design ideas without focusing solely on specific usability problems. In summery we received positive feedback from the developers as they gained new insights, and were able to use established design principles. As a result the developers followed a top-down approach. We found that workshop facilitation was essential to keep the discussion on track, as discussions quickly could end up circling around the same topic or minor detail. By having the facilitator summarizing discussions, adding breaks and asking questions, it was possible to keep a fruitful discussion. The workshop did not result in actual fixes or a finished design, but provided the developers with new visions and ideas that can be further refined into fixes of identified usability problems, and finished designs. From an academic point of view, the purpose with this workshop was to explorer active involvement of developers in the redesign process of complex domain software. From a practical point of view, the purpose was to evaluate this approach as part of the ongoing (re)design cycles of software. We hope this approach can support the development process in the organization and can be implemented into fast paced development environments. Especially we see this as an approach making is easier to conduct redesign workshops as needed during the software development process. We have here presented a step towards further refinement, development, and exploration of redesign workshops uniting different skills and expertise.

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