A Tool to Support Collaboration in Electronic Paper Prototyping

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ABSTRACT

This paper presents Gabbeh, a prototype that we have developed to integrate pen-based electronic prototyping media within a framework of participatory design practice. The main purpose of this tool is to discover to what extent an electronic paper prototyping tool could facilitate computer supported collaboration in the early stages of development process of interactive systems.

Recent years have seen the rapid development of new interaction devices in which a display screen is combined with pen-based input to allow users to create sketches or hand-written notes in an interaction that is similar to writing with a pen on paper. Research with such devices has shown how this capability can be used to rapidly create simple prototypes of interactive systems, such as websites. Such devices developed to date are designed in a way that facilitates only one of the stakeholder groups' work (e.g. designers) and they don't usually support equal opportunity in designing interactive systems for members of different stakeholder groups (i.e. users, analysts, designers, developers, project managers).

Keywords

Interactive system design, paper prototyping, collaborative design, Gabbeh, Denim and CSCW.

1. INTRODUCTION

It is generally accepted that user participation is central to the successful design of an interactive system. Enabling users to envisage or make sense of design proposals (whether those proposals originate with 'professional designers' or from the users themselves) is an essential element of all participatory approaches to design. Users can only make informed choices when the proposals being discussed are meaningful to them. Prototyping is one popular method of helping users (and designers) to understand possible alternatives.

To encourage user participation in the design process, the use of pencil and paper as an established participatory approach for designing interactive systems has been suggested [2], [7]. Whilst paper-prototyping has many advantages in promoting user participation, it also has some limitations. In particular:

- lack of an explicit representation of the navigational structure could make it difficult for users to understand and revise the dynamic behaviour of paper prototypes [8];

- it is difficult to review a paper-prototype when users and designers are not able to arrange a face-to-face meeting; and

- paper-prototypes may be difficult to relate to other representations being used within design, such as detailed specifications of behaviour and functionality.

As pen-based interaction devices have become more widely available, some software systems provide support for penbased interaction in interactive systems design. Examples include SILK and DENIM [4], [5] and Freeform [6]. These systems might be described as supporting a form of 'electronic-paper prototyping'. Such approaches overcome some of the limitations of paper-prototyping. In particular, these systems can make the dynamic behaviour of the proposed system easier for users to perceive and can permit the prototype to be distributed electronically.

2. DENIM

DENIM [5] is a sketching tool for designing web-sites. DENIM is usually run on a graphics tablet such as a TabletPC or a Wacom Cintiq. In DENIM users can sketch out the overall structure of a site (a collection of pages); sketch the contents of the pages as a set of 'scribbles'; define hyperlinks from scribbles in one page to another page; and then execute the resulting hypertext in a reduced functionality browser.

3. ENHANCING PARTICIPATION

To investigate the practice of using paper prototyping and DENIM a number of informal design sessions and a case-study were conducted. The case-study was conducted on designing a simple Student Marks program. The program was designed to allow users to assign students to a course module and allocate a mark to each student.

The results of our studies showed a major difference between DENIM and using a paper prototype is the limited support for communication of findings. In paper prototyping, post-it notes and hand written comments in form of scribbles can be used to indicate reasons for particular design choices, critiques of particular elements, or indications that further work is required or planned.

The lack of the ability to annotate the design may severely limit the ability of Denim to support communication between different stakeholders in the design process. Denim does not permit users or other stakeholders to give feedback directly through the medium of the prototype. Instead, any comment or feedback must be held separately (for example in an audio recording or minutes of the meeting), resulting in a difficulty in identifying the items to which any comments refers. This problem will be particularly acute if some stakeholders are not co-located with designers. By limiting the opportunity for users and other stakeholders to communicate with the designers by reference to the prototype, electronic prototyping systems such as Denim appear to have overlooked one of the primary benefits of paper-prototype.

4. GABBEH

Gabbeh is a prototype tool that extends the capabilities of existing tools by supporting dialogues between different designers, or between designers and other stakeholders. The core innovation in Gabbeh is in allowing users to add arbitrary comments either when the system is being designed, or when the prototype is been executed. Gabbeh is developed as an extension of Denim environment.

The current version of Gabbeh allows different stakeholder to add comments in the 'design view' from initial exploration phase of design. To promote user participation in using secondary notations, Gabbeh allows users to add arbitrary scribbles (free-hand notes) to a comment using a similar free-hand writing tool as is used to create elements in a web page.

A comment in Gabbeh can be associated with any arbitrary number of design components. It is important as it will allow different stakeholders in evaluation to give feedback at any component of a design.

Comments are given a background colour. This is intended to allow development teams to distinguish between different types of comments, or perhaps between comments from different speakers. The usage is left open deliberately to provide flexibility.

In the evaluation phase different stakeholders may execute Gabbeh using a limited functionality browser to review the design. Gabbeh allows users to view and add comments while they are reviewing the design in 'run mode'. This functionality is intended to allow stakeholders to give feedback through the prototyping media. Viewing and recording such dialogues among different stakeholders during the execution of the model promote user participation in evaluating the prototype. Also, it would support the communication when stakeholders are not located in the same site.

5. NEXT STEP

Gabbeh is at an early stage of prototyping. The design concepts have been developed from discussions with designers of websites, desktop applications and video games. Further enhancement will include being able to add comments in 'run mode' in more detailed level than a page level. This will expand the scope of user's feedback in design evaluation. Also being able to introduce comments on transitions, as well as being able to import images of existing applications so that the tool can be used to support design evolution and redesign.

At the time of writing, the basic functionality has been completed, and we are conducting an empirical study to evaluate Gabbeh. We are interested to discover to what extent Gabbeh facilitates the communication and collaboration among different stakeholders during the design process.

6. ACKNOWLEDGMENTS

7. REFERENCES

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