

Patterns of Use Qualities for Mixed-focus Groupware

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Imagine how clerks at banks that have a need to explain something, swivel their screen towards their customers, or how designers turn to a colleague in order to coordinate. In these situations people mix collaborative work and individual work. A well-known gap that groupware (i.e. software used by groups to enable cooperative activity) need to bridge is the gap between individual and group work [e.g. Baecker, 1993]. Users need to be able to move fluently between individual and group activities. In these mixed-focus situations [Gutwin & Greenberg, 1998] people switch back and fourth between individual tasks and shared work undertaken with others. The thesis aims at characterizing objectives and solutions for interaction design of synchronous co-located groupware in mixed-focus situations. Such software is in my thesis denoted *mixed-focus groupware*.

Groupware in Co-located Mixed-focus Situations

In everyday activities people take advantage of the physical properties of artifacts in order to move between individual and group work. Physical objects can, for example, be tinted, moved, sorted, turned upside down, and handed over. Mobility is therefore an important awareness and coordination mechanism for physical representations [e.g. Luff & Heath, 1998]. The question is how to so similar things with computer-based representations. Previous research on design of applications for co-located mixed-focused collaboration can be structured according to the kind of groupware solutions that they employ: a single display [e.g. Stewart, Bederson & Druin, 1999]; multiple displays [e.g. Greenberg, Boyle & Laberge, 1999]; or computer-augmentation where the physical environment is amplified with computer power [e.g. Lai, et al., 2002].

Characterizing Objectives and Solutions in Interaction Design

Characterizing objectives and solutions for interaction design is not a straightforward issue. Four approaches are Design Patterns, Usability Goals, User Experience Goals, and Use Qualities.

During the 1970's Alexander [1977] developed the concept of *design patterns* within architectural design. Design patterns strive at resolving conflicting forces, wants, needs, and fears in the usage of a building. Every pattern describes a re-occurring problem, its context, the forces that are at play in the situation, and a generic solution to the problem. A pattern is a working hypothesis; each pattern represents the current understanding of what the best arrangement is for solving a particular problem. For this reason, it is important that the pattern is clear and debatable. Within

groupware design the use of patterns has just started [e.g. Martin et al. 2001].

Another approach to characterizing objectives for interaction design is by means of *usability goals*. Shackel [1986] proposed the LEAF definition of usability, which stands for Learnability, Effectiveness, Attitude and Flexibility. The main idea within this tradition of characterizing objectives for interaction design is that designers approach the situation of use trying to learn what the criteria, e.g. effectiveness, mean for that situation. Designers then create specific usability goals and objective measures that can be used to decide whether the goal is reached or not. The meaning of the term usability began to diversify in the 1990's and one should soon also design for criteria like co-operation, work practices, common ground, knowledge management, fun, accessibility, customization, localization et cetera. In order to handle that Preece, Rogers and Sharp [2002] suggest that one should write *user experience goals*. They add another ten criteria to an ever-growing list of things to consider. It is clear that the sheer number of criteria for assessing interaction design this leaves the designer with is quite difficult to manage.

A more recent approach to characterizing objectives for interaction design is *use qualities* (or qualities-in-use). The assumption behind this approach is that not all of the criteria are important design objectives for every system, and to meet them all in one design solution is quite unlikely. The basic idea is to take a step back and ask what make a certain artifact good to use from several different value perspectives, and stakeholders' points of view.

Thesis Question

Previous research on co-located mixed-focus collaboration has largely not addressed usage in situations where primarily private activities also take place (like homes and private workplaces). Instead it has, to a high degree, focused on primarily private group usage situations, like meeting rooms and classrooms. In addition, previous research has not characterized and categorized different kinds of mixed-focus situations of use. Furthermore, research has not shown if and how differences between situations of use call for various types of design solutions. Finally, research has not addressed the procedure of formulating use qualities, and how they can be used in the process of writing design patterns. The research question for this thesis can be found at the intersection these issues:

In terms of use qualities and design patterns, how should applications be designed for mixed-focus collaboration in primarily private settings?

Theoretical framework

The work presented in this thesis falls within a tradition of action-theoretic positions in human-computer interaction. It is closely related to activity theory [Leontiev 1978], and distributed cognition [Hutchins 1995]. An application, which mediates the users' actions in a cognitive system can be said to have many different qualities, or properties, in its usage (Elegance or Reliability for example). Every action or even the entire activity of using a system carries practical, social, and aesthetic aspects. Therefore when a user, designer, or other stakeholder of an application argues that it ought to be, for example 'reliable', its Reliability should be assessed from a practical, a social, and an aesthetic perspective. Other perspectives such as affection, construction or ethics may also be applied to the usage of any artifact [e.g. Ehn & Löwgren, 1997].

Method

Three cases, consultation at the bank, interaction design studio work, and home entertainment and information, were chosen because they represent quite different situations of use with quite different computer systems. They are, however, all situations of mixed-focus collaboration. Due to their dissimilarity, common features are more likely to represent a more general condition. The overarching research method is a qualitative collective case study [Stake 1994] where three settings of mixed-focus collaboration are compared: consultation at the bank, an interaction design studio, and home entertainment and information. Within the cases, a collection of methods has been used. Workshops, observations, interviews, and questionnaires have been utilized. And in the case of home entertainment and information, prototype design and testing has also been carried out. The empirical work in these three settings includes, at time of writing, around 115 hours of interviews and observations, and about 35 hours of workshops, with 49 informants all in all. Furthermore an examination of the efficacy of a collection of patterns for mixed-focus groupware is underway.

Expected Contributions

The knowledge contributions of my thesis are directed both at practice and theory within interaction design of groupware. Firstly, it contributes with a typology of the product category *mixed-focus groupware* by characterizing typical use qualities for such applications in home information and entertainment, in professional consultation, in design studio learning, and relating that to previously designed and studied systems. It furthermore contributes to product knowledge by identifying re-usable design patterns that suggest features that can be used in design situation beyond the ones investigated here. Secondly, the thesis contributes to issues of *design methodology* by suggesting procedures for establishing use

qualities based on qualitative empirical material. It also contributes by exemplifying how to combine use quality analysis and design patterns.

References

- Alexander, C. [1977]. *A pattern language: towns, buildings, construction*. New York: Oxford University Press.
- Baecker, R.M. [1993]. The Future of Groupware for CSCW. In R. M. Baecker (Ed.), *Readings in Groupware and Computer-Supported Cooperative Work: Assisting Human-Human Collaboration*. San Mateo, CA: Morgan Kaufmann.
- Ehn, P., & Löwgren, J. [1997]. Design för quality-in-use: Human-computer interaction meets information systems development. In M. Helander, T. Landauer, and P. Prabhu (Eds.), *Handbook of human-computer interaction. Second, completely revised edition*. Amsterdam: Elsevier.
- Greenberg, S., Boyle, M., & LaBerge, J. [1999]. PDAs and shared public displays: Making personal information public, and public information personal. *Personal Technologies*, 3(1), 54–64.
- Gutwin, C., & Greenberg, S. [1998]. Design for Individuals, Design for Groups: Tradeoffs Between Power and Workspace Awareness. In *Proceedings of CSCW '98*.
- Hutchins, E. [1995]. *Cognition in the Wild*. Cambridge, MA: MIT Press.
- Lai, J., Levas, A., Chou, P., Pinhanez, C., & Viveros, M. [2002]. BlueSpace: personalizing workspace through awareness and adaptability. *Int. J. Human-Computer Studies*, 57, 415–428.
- Leontiev, A. N. [1978]. *Activity, Consciousness and Personality*. Englewood Cliffs, NJ: Prentice-Hall.
- Luff, P., & Heath, C. [1998]. Mobility in Collaboration, In *Proceedings of CSCW '98*.
- Martin, D. Rodden, T., Sommerville, I., Rouncefield M., Viller, S. [2001]. Finding Patterns in the Fieldwork. In *Proceedings of ECSCW 2001*, September 16–20, 2001, Bonn, Germany.
- Preece, J., Rogers, Y., & Sharp, H. [2002]. *Interaction Design: beyond human-computer interaction*. New York, NY: John Wiley & Sons.
- Shackel, B. [1986]. Ergonomics in design for usability. In M. D. Harrison and A. F. Monk (Eds.), *People and Computers: Designing for usability. Proceedings of HCI '86*. Cambridge: Cambridge University Press.
- Stake, R. E. [1994]. Case Studies. In N. Denzin and Y. Lincoln (Eds.), *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage.
- Stewart, J., Bederson, B. B., & Druin, A. [1999]. Single-display groupware: A model for co-present collaboration. In *Proceedings of the CHI '99 conference on Human factors in computing systems: the CHI is the limit*, 286–299, May 15–20, 1999, Pittsburgh PA, USA.