

A Trouble Shared is a Troubled Halved: Disruptive and Self-Help Patterns of Usage for Co-Located Interfaces

Massimo Zancanaro, Chiara Leonardi

ITC-irst
I-38050 Povo (TN) Italy
{zancana, cleonardi}@itc.it

Abstract. The use of co-located interfaces can be more problematic than working on standard single-user software because people have to deal simultaneously with the dynamics of group behaviour and with the hassles of the (wrong) design. In this position paper, we report the some preliminary result of a qualitative study conducted on 10 small groups using a tabletop device in a natural setting. We discuss the several patterns of disruptive behaviour induced by the interface as well as the some patterns of collaborative appropriation of the system's functionalities.

1 Introduction

In this paper we present a preliminary qualitative study conducted on face-to-face meetings in which a co-located interface was used to support group activities. This device is conceived as a first step toward a larger integrated environment in the context of the European project CHIL - Computer in the Human Interaction Loop - which aims to create ubiquitous computing environments in which multimodal technologies are exploited to support human-human interaction and synchronous cooperation in an unobtrusive way.

We focus here on the first outcomes of a larger ethnographic investigation aimed at understanding not only the usability of the system but in particular how the people “appropriate” the technology (Dourish, 2003) and integrating it in their working practises.

The System

The CHIL tabletop device is a top-projected interface that turns a standard wooden table into an active surface. The user interface was designed around the concept of virtual sheets of paper that can be opened and used by the participants (the process of User-Centred Design of this system is explained in Falcon et al. 2005).

Each virtual sheet can be shrunk or moved to save space and can be rotated to be made accessible to all participants. Participants can use a pen to draw or write (the pen position is tracked with a commercial tool based on infrared and ultrasound, due to hardware limitation only one pen is available for the group which therefore has to share it). A keyboard is also provided to write longer texts. Import and export functionalities are offered in order to allow the participants working on already prepared sketches as well as starting from white sheets.

Since one of the main goals was to support the group organization, two sheets of papers with special functions are also provided: the agenda and the “to do” list. The former contains the issue to be discussed. Issues can be added, removed or sorted. Each issue can be active or inactive. The system displays a time counter on the active issue; the counter is paused when the issue is made inactive.



The “Outcome note” list allows keeping track of the decisions taken during the meeting. Each entry is automatically associated with the agenda issue currently active (if any) and, through drag-n-drop, to one or more documents.

3 The Qualitative Study

Ten small groups composed of three up to six participants were invited to hold their meetings with the tabletop device. Before the start of the meetings, participants received instructions about the device. All the groups consisted of ITC researchers, none of whom involved with the CHIL project. Twenty people in total were involved and two participated in more than one group. All the interactions were videorecorded with two cameras and tabletop microphones; the video analyzed using MultiVideoNote¹. Several semi-structured interview were also performed with members of the groups.

¹ MultiVideoNote is an open source project for qualitative analysis on multiple video streams (<http://tcc.itc.it/research/i3p/mvn>)

3.1 Disruptive Patterns of Usage

A disruptive pattern of usage occurs when the interface hinders the flow of the interaction and comprises (or risks to compromise) the efficacy of the meeting.

One typical pattern is observed when the entire group is dragged out of the discussion to focus on the interface. Usually this happens when the group faces an unexpected behavior of the interface or when one participant tries to use a functionality of the table attracting the attention of the others. For example in one of the observed meetings, P. is trying to move a window while Z. is talking; after some failed attempts by P., the rest of the group is involved in helping P. while Z. gave clearly annoyed.

(ex. M. and N. try to use the interface simultaneously; P. tries to move a window when Z. is talking).

A second pattern of disruption happens when two or more persons negotiate the use of the system (the tabletop device at present does not allow multi-user interaction). In a meeting, N. wants to update the meeting while M. is working on drawing a workplan on a document. N. asks the pen in order to update the agenda item and the group starts discussing the item forgetting the finish the workplan.

Another pattern that can be recognized is when one single person is pulled out of the discussion because s/he trying to understand some functionality of the system. In most of groups, one person plays the role of the expert in using the technology. Although, the expert is usually the one who leads the group in adopting the technology, sometimes s/he isolate from the discussion. For example, N. plays with the agenda tool for more than 2 minutes in trying to understand how it works, leading M., the group leader, to repeatedly call him at order.

3.3 Self-Help Patterns of Usage

A Self-Help pattern of usage occurs when the group collectively learns to use the system either to solve a problem on the interface, to learn how to use functionality or to invent a new use.

The most apparent pattern can be called the “jigsaw” pattern. It consists of many different participants that contribute to the learning process. That is, nobody in the group possesses the knowledge but each single contribution increases the group awareness and stimulates others’ contributions. In a meeting, the leader tries to define the agenda items. The leader did not remember the how to manage the agenda and the entire group was progressively involved in solving the issue. Eventually, they manage to have a list of items done.

Another pattern is when the interface task cannot be accomplished by one person alone either because of cognitive overload or because of system’s limitations. For example, using the Agenda requires a continuous switch between activities - start an item using the pen, to write the item using the keyboard, to use again the pen in order to change the item, and so on. In several cases, this limitation leads the participants to toward an explicit division of labor where one person used the pen and a different one the keyboard thus playing the Orienteer and Group-Observer roles described in (Bales, 1970).

The third pattern is the “specialization of functions”: when one participant succeeds in doing a task (esp. after repeating attempts), s/he will be required (or volunteer) to perform it again the task in the future. For example, in a meeting M. does not participate too much in the interaction with the system but he succeeded at the very beginning in dragging a document in the notes (a very difficult task indeed). When later on the group needed to perform this task again, he volunteered. In the same meeting, the leader after being involved in dragging several documents in the trash bin, he nicknamed himself the “trashman”.

4 Discussion

This qualitative study shows initial insights on how groups can reduce the cognitive effort of using a co-located interface, and sometimes overcome bugs and design limitation, by a process of cooperative discover. It shows also that a co-located interface can systematically hinder the flow of interaction in a group interaction but acting as a disruptive tool (not necessarily because of bad design but also, like in the second disruptive pattern, because too rich in functionalities).

Although the work is still preliminary, we think that the collection of a number of such patterns may help in designing co-located interfaces that best suit the group needs of support and in providing guidelines for heuristic evaluation of such systems.

Acknowledgements

This work was conducted in the context of the European funded CHIL project. We would like to thank Daniel Tomasini, Vera Falcon and Fabio Pianesi for the discussions on the design of the use of the tabletop device and Valentina Proietti for her help in the ethnographic work.

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