A Comparison of Groupware Evaluation Methodologies

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Abstract. Single user system evaluation techniques are less than ideal to evaluate groupware, for they don't take into account important aspects, such as user and work contexts or communicability between users. Evaluation methodologies have been developed that attempt to handle specific issues related to group work besides usability problems. The objective of this paper is to explore the peculiarities and characteristics of two groupware evaluation methodologies through a comparison between them, using them to analyze a cooperative work tool, Groove. The chosen methodologies were CUA and OFC.

1 Introduction

With recent economic changes and the increase in work teams throughout the world, companies have started to adopt groupware tools. Enterprises need to facilitate group work, keep track of projects and of knowledge generated by the teams. This, they attempt to do through the usage of cooperative work tools.

In this type of application, users not only interact with the software, but with each other through the system. Due to this and to the social factors involved, evaluating groupware efficiency is a serious challenge [6]. Existing single-user software evaluation methodologies are, to an extent, relevant to groupware evaluation, however, they are insufficient in that they don't address the social interactions inherent to these applications [6,1].

Different evaluation methodologies have been proposed, with different focus: some evaluate the ease with which users and work groups perform their tasks and others evaluate the ease of communication between users through the system. Criteria used in groupware evaluation are: interaction between users, interaction between users and the system; human factors [2] and social factors [3]; and general usability criteria.

Groupware evaluation is important to assess how well the software supports cooperative work and verify if it achieves its users' objectives. When dealing with groupware, it is hard to address all the social, organizational and political factors when designing a groupware interface.

The objective of this paper is to compare and contrast two groupware evaluation methodologies, pinpointing their differences, similarities and particularities. In order to compare and assess how the evaluations are conducted, we performed evaluations of Groove (www.groove.net), a reasonably complex mainstream groupware package, with resources for file sharing, messaging and shared spaces.

The two methodologies we used were CUA (Collaboration Usability Analysis) [5], which focuses on an analysis of the group's task to identify possible usability problems; and OCF (Online Community Framework) [7], a framework that identifies usability problems that have an impact on the communicability in social communities. These two were chosen because they have different approaches to evaluation.

This paper is organized as follows: in section 2 we present a brief overview of the two methodologies employed, followed by a brief presentation of Groove and its evaluation scenario in section 3. We finish in section 4 with a discussion and comparison of results produced by the different methodologies.

2 Background

For the evaluation, two recent methodologies were used: CUA (Collaboration Usability Analysis) [5], evaluates groupware through an analysis of the tasks performed by a group, to identify usability problems. OFC (Online Community Framework) [7] attempts to identify and analyze the levels of communicability and social interaction that a groupware system provides to its users.

2.1 Collaboration Usability Analysis (CUA)

The CUA methodology [5] mixes task analysis and Groupware Walkthroughs [4]. This involves a step-by-step analysis of real tasks to verify usability problems, in order to evaluate software.

CUA's focus is on teamwork, more specifically grouptasks. CUA presupposes that each collaborative action can be mapped to a set of *collaboration mechanisms*, through which, it is possible to relate a software interface element to with a cooperative task. In CUA, a scenario is described hierarchically: it is composed of tasks, which may be individual (Individual Task Instantiations - ITI) or collaborative (Collaborative Task Instantiations - CTI). These tasks are executed through actions.

Collaboration mechanisms are fine grain representations of the basic collaborative actions occurring in teamwork. For instance: for the Spoken Message mechanism, typical actions may be Conversational or Verbal Shadowing; for Gestural Message mechanisms, possible actions are Indicating, Drawing or Demonstrating. For an extensive description, see [5].

Analysis results are represented as diagrams that can easily be interpreted by those involved with the project and with the evaluation. The diagrams display three types of information: task component details, task component flow and task distribution between group members. When groups are small and tasks are simple, the represen-

tation is a simple sequence of arrows, in more complex cases it may use preconditions and branching to represent task hierarchy.

This methodology presents a framework within which simulations of real-use situations can be run in a controlled manner and usability problems (caused by the user interface) more easily identified.

2.2 Online Community Framework (OCF)

OCF's main purpose is to help designers and evaluators understand online communities that form through groupware use [6]. The framework uses entities and relationships to represent communicative aspects of computer mediated human interaction that affects communities. The framework's main element is an online community, an abstraction of a community structure in terms of people, goals and plans, which, in turn, are divided in other elements, relations between them and functions. People, individuals and actions are OCF's main entities. The main relations between them are *share*, *constitute* and *influence* and the attributes of the elements and relationships are *name*, *rule* and *objective*. The full ontology in explained in [7].

A designer or analyst can verify which statements (such as <actions follow norms, rules> or <individuals perform actions>) can be instantiated when evaluating a groupware. These statements can be extracted from the rules the entities, relationships and attributes are subject to. Rules are structures in an if-then format. This methodology's main contribution lies in the identification of the dependencies between communication, usability and sociability. The full description can be found in [7].

3 Case Study: Groove

In this section we present Groove and its evaluation using the two aforementioned methodologies.

3.1 Groove Software

Groove is a peer-to-peer groupware system that provides a shared virtual space for real time interactions between people. Participant create shared spaces to communicate and collaborate with each other. Changes to a space are propagated to other group members automatically, so that all members remain synchronized. It has a set of tools that can be used by group members to work and exchange information.

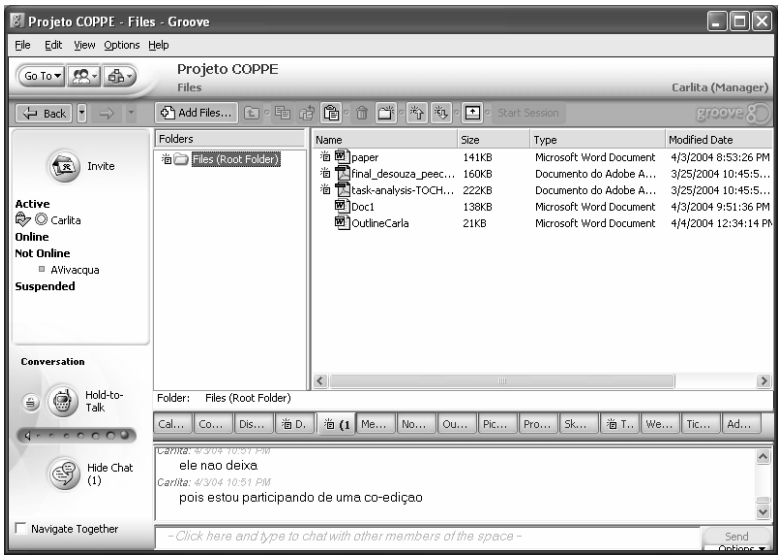

Fig 1. Groove's file tool

Figure 1 is a snapshot of the "Projeto COPPE" shared space, created by one of the participants. The left side lists the members and their status (whether they are logged or not). The tool displayed is the file sharing tool. Users can alternate between tools using the tool palette, choosing to navigate together or individually between tools. Real time communication is accomplished via Groove's text or voice chat, shown in the lower left hand side. Groove allows groups to add or remove tools from a space, tailoring it according to their needs.

3.2 Groove Evaluation

In our evaluation scenario, two participants were using the environment, to discuss and collaboratively work on a thesis outline. After a preparatory face-to-face conversation about what would be done, the two participants entered the environment to work on the document. We picked a few situations to illustrate the evaluation.

In our first situation, Participant 1 and 2 were already in a shared space, and Participant 1 had created another space specifically to hold this discussion, to which both participants would have to move. A contextualization of this use-case scenario reads:

Scenario: Brainstorm to elaborate a thesis outline.

Activity Description: Participant 1 elaborates an outline draft and sends it via email to Participant 2, so he could read and criticize it. Participant 2 suggested a virtual meeting, the two logged in, discussed and edited the outline together.

Roles: Participant 1: Manager, Participant 2: Manager.

User Specification: Both users have extensive computing knowledge and Participant 2 has some experience on the subject under discussion.

Intended outcome: an outline for a Participant 1's master's thesis.

CUA Analysis. In the CUA methodology, scenarios and tasks are represented as diagrams and, through a walkthrough, usability and teamwork problems are identified.

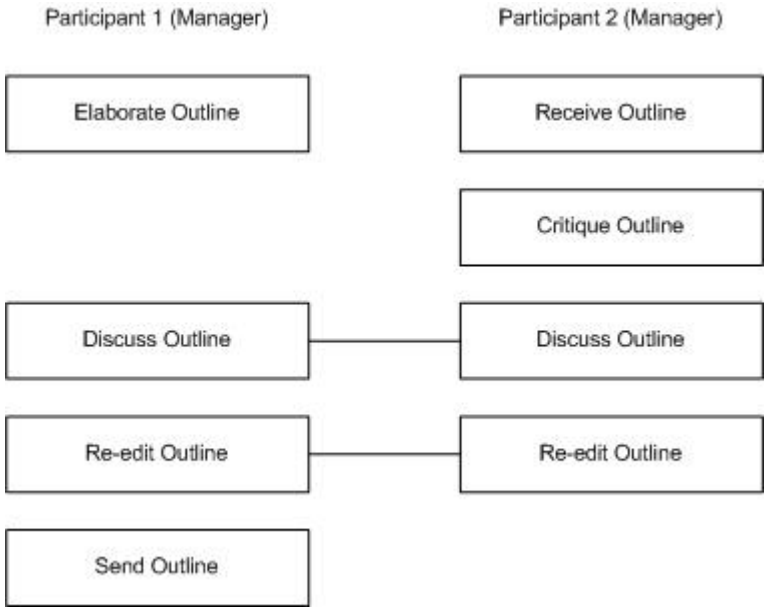

Fig 2. Activity flow between two participants. Cells represent scenarios and horizontal lines indicate relationships in collaborative scenarios that involve both participants. "Discuss" and "Re-edit" are scenarios that involve collaborative actions.

The "Re-edit Outline" scenario is further specified as a task diagram (only a partial diagram is shown here). This scenario was divided in two main steps and has two columns to represent each participant, as shown in Figure 3.

Through a Groupware Walkthrough, a few problems were found:

- Even if both individuals are logged on and participating in a shared space, the invitation to join in another space comes through email, which the software doesn't handle. This leads to a necessity to change context and leave the shared space to retrieve the email and be able to join another space. This invitation is necessary to join a space, and could conceivably be received through the environment itself when the user is logged on.
- Synchronism didn't function very well and generated a series of errors and misunderstandings during edition.
- When minimized, the chat tool doesn't signal new messages. There are, in fact, too many parallel ways of exchanging messages. In some situations, a chat would start in one window and continue in another, breaking conversation flow and making it hard to determine whether or not messages had been answered.

- In the co-edit tool, if two participants are collaboratively editing a document and one of them closes the document, the other isn't informed, causing a loss of the sense of co-authorship.

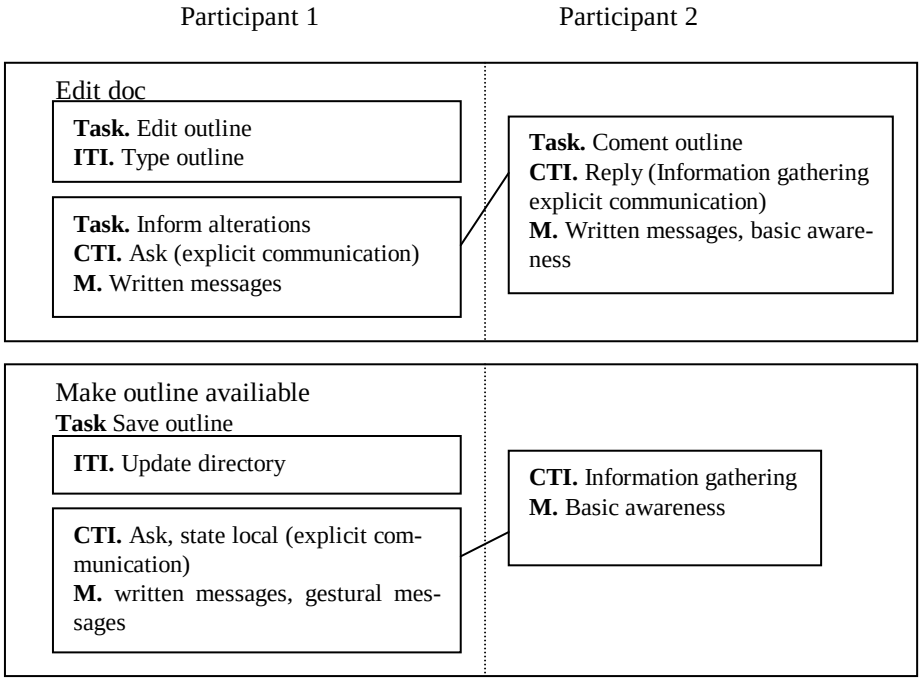

Fig 3. Analysis of the scenario breakdown for "Re-edit Outline" scenario. CTI: collaborative task instantion and ITI: individual task instation.

OCF Analysis. The analysis begins with a brief description of the community. The next step is instantiating framework elements in a communication model to represent messages sent by the community. Then, one verifies if the assertions elicited through the framework are present in the environment or not. If not, there may be a usability problem with the environment that causes communicability and sociability problems.

The following message was extracted from Groove's chat.

AVivacqua: 4/3/04 8:47 PM

Nao recebi o convite.. vem por email?

Instantiating the framework model:

This is an entity of the type communication with attributes:

Identifier = Message

Speaker = Participant 2 (Computer Scientist)

Listener = Participant 1 (Computer Scientist)

Topic = Receiving an invitation to join a shared space.

Content = Clarification of invitation receipt.

Form = Portuguese sentence. “Nao recebi o convite….vem por email?” (meaning: I didn’t get the invitation, does it come in email?)

Speaker_intent = Find out whether the invitation was sent and why he hasn’t seen it. Find the invitation

Appropriateness = appropriate

Listener_understanding = <understanding of portuguese and of invitation mechanisms is expected.>

Listener_response = <a change in how the system works is expected>

Pre-conditions = user has listeners; user and listener are part of the same context; user and listeners share the same language (or code of communication)

Post-conditions = <user’s intention fulfilled>

The system should perceive that the user receiving the invitation is already logged in and in a space and send the invitation directly instead of forcing him or her to retrieve it from another program. This functionality should have been allowed by the system. Therefore, <actions follow norms, rules> and <individuals adopt norms, rules> has an impact on <individuals perform actions>.

4 Discussion

The experiments with Groove were useful to verify how two different methodologies approach groupware evaluation and at what level of granularity they work. Both present fine granularity when representing actions and scenarios for evaluation, and neither needs an expert to apply. CUA performs a task-based analysis through a Groupware Walkthrough [4] while OCF is based on semiotic engineering [6], which maps the communicative intent of the designer towards the user through the interface. It stresses the community and communication aspects of the interactions, not necessarily tied to a specific task.

CUA identifies usability problems through a low level analysis of collaborative and individual tasks, verifying which collaboration mechanisms can be utilized during the task. OCF identifies and analyses usability problems that make user-system and user-user communication difficult through the application of semiotic engineering principles.

CUA’s strong suit is in the decomposition of teamwork into elements that can be extracted through observation of collaboration in real-world situations and mapped to components and interface structures. OFC’ strength lies in not only in the identification of usability problems but also on the online community dynamics and sociability between individuals through the system.

These methodologies are fundamentally different from single user evaluation methodologies. They offer means to evaluate interaction characteristics (verbal, written and gestural communication) between members of a group, as that is an important aspect of cooperative work. Furthermore, the emphasis of these two approaches reminds us of two different aspects of CSCW research: group work and communities.

While group work is more focused and task based, communities don't necessarily have tasks or projects, they are collections of individuals with similar interests. The purpose of being a member of a community is different than that of being in a work team, and these aspects are appropriately emphasized when we look at these two methodologies.

Acknowledgements

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