Supporting Group Awareness in Alliance
(Extended Abstract)

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ABSTRACT
An important problem in several scientific and technical fields, and in general in the whole human knowledge, is the development and maintenance of common documents. Alliance is a collaborative writing system which allow co-authors, spread out across different locations, to work together sharing common documents. In order for collaboration to succeed and to be efficient, co-authors need to be aware of each other’s activities (actions, intentions, presence, etc.). This position paper focus on describing the protocol developed for supporting group awareness in Alliance. A discussion of how well this protocol works in a real operational context is included.

Keywords
Group awareness, collaborative writing system, groupware system, CSCW.

INTRODUCTION
Several research studies have been demonstrated that most of written works are produced collaboratively [2]. Significant efforts have gone into studying the way in which co-authors collaborate in order to produce shared documents [4]. All these works have been carried out taking into account studies of cases, interviews and observations of real situations in collaborative writing.

The aims of developing Alliance [5] were to study and better understand the specific requirements from the author’s point of view and to develop techniques allowing complex documents to be handled more efficiently in a collaborative distributed environment. One of the main aspects we were interested on was how to make one author’s activities visible to their colleagues. During the collaborative writing task, co-authors are faced with the problem of keeping each other aware of their current activity. Therefore, one key element in collaborative writing systems and, in general, in any groupware systems, is group awareness.

In [1], Dourish and Belloti define group awareness as “an understanding of the activities of others which provides a context for your own activity”. Group awareness in a collaborative writing system allows co-authors to coordinate their work taking into account the understanding of what they did, do or will do. It also allows co-authors to decide how and when their own contributions should be shared with other colleagues. In Alliance, the group awareness protocol was developed on the basis of the Alliance’s document sharing layer.

DOCUMENT SHARING
In the development of complex documents, the way co-authors interact with each other is well defined: the work is organized and each member of the team has a different role to play on the project. Therefore, a notion of role has been introduced in Alliance. According to the role, documents can be automatically and dynamically divided into variable-sized sharing units (called fragments). For each fragment, any author may play one of the four available roles (symbolized by special icons at the user interface level):

- **Writer** (pencil): the author playing this role is allowed to modify the fragment content.
- **Reader** (eye): the author playing this role is allowed only to see the fragment.
- **Null** (forbidden): the author playing this role is not allowed to see the fragment (considered confidential).
- **Manager** (crown): the author playing this role is allowed to assign or change the previous roles, to modify fragment size and to modify the fragment content. The creator of the document plays the manager role on the whole document. Any author playing the manager role is also allowed to assign his/her role (the manager) to his/her colleagues.

The same author may play different roles on different fragments. He/she can then be allowed to modify some fragments, read only some others, and even not to see the rest. It is also possible that two or more authors play the writer or manager role on the same fragment at the same time. However, at any moment, one fragment can only be written by at most one author.

In a fragmented document, the icons (pencil, eye, crown, forbidden), symbolizing current roles, are attached to each fragment limit (one icon by fragment). Not only these icons help to know the current role played by an author on a fragment, but also they work as active buttons that allow co-authors to perform collaborative writing actions and to be aware of the evolution of the different fragments. These icons, the four roles and document fragmentation constitute the bases of the group awareness protocol.
GROUP AWARENESS PROTOCOL

Alliance is based on asynchronous group awareness. When exactly a member of the team sees the contributions of other co-authors depends on decisions of this member and his/her colleagues. Changes made by an author are not shown to the others until he/she explicitly validates his/her contribution. At any time, each author may decide whether or not to have the latest version of fragments written by others to be displayed on his/her screen. As different authors can play different roles, they can see different icons at the same time. The four role icons have different variants (transition states), showing the status of the fragment that follows. These icons are active: by clicking on them, the author can change the status of the associated fragment.

When an icon has the attentive reader state (green opened eye icon), each time a new version of the associated fragment is made available by its current author, the icon changes to the modified fragment state (red opened eye icon). Then, the author may decide to get a new version of that fragment by clicking on the icon, which returns to the attentive reader state.

The locked reading state (closed eye icon) indicates that the author does not want to be aware of new versions of the associated fragment. The automatic update state (opened eye icon labeled “auto”) means that he/she wants the fragment to be automatically updated as soon as a new version is validated by the current author. Transitions between the three states locked reading, attentive reading and automatic update are made by clicking on the icon.

When an author plays the null role (masked state – forbidden icon) on a fragment, that fragment is hidden. This fact not only may be a consequence of the role that has been assigned to him by an author playing the manager role, but it may also be the result of his/her own decision. Then, the author may temporarily lower his/her role for a given fragment to focus on other fragments. In the latter case, if the author is playing the writer or manager role on that fragment, he/she gives also the opportunity to his/her colleagues, for those who are able to play the same role, of taking his/her role for the associated fragment. The author is able to recover his/her original role once again according to the current writing activities of his/her colleagues.

When an author decides to lower his/her role on a fragment, the corresponding role icon is annotated with an up arrow, indicating that he/she can raise his/her role for the given fragment. If he/she is playing the writer or manager role, his/her colleagues are notified with the up arrow too. Then, they are also allowed to raise their role. Obviously, the principle of a unique author playing the writer or manager role at a time for each fragment is guaranteed by the Alliance’s document sharing layer. The up arrow appears not only when an author has decided to lower his/her role, but also when a author playing the manager role has assigned a higher role to the fragment or when the author quit his/her writing session.

An author playing the null role must be aware as soon as the fragment can be accessed for reading. The icon of the associated fragment changes to the modified masked state (not forbidden icon) when this change takes place. Changes in the content of a masked fragment are never shown.

Finally, the locked masked state (crossed forbidden icon) indicates that the author does not want to be aware of new writing possibilities on the associated fragment, such as modification of the fragment size and changes of roles.

DISCUSSION

The protocol developed for supporting asynchronous group awareness in Alliance was described. Until now, Alliance has been used in a real operational context inside our research Institute and other research centers for writing research and technical reports. Informal tests revealed that people found the protocol very useful and well adapted to most of the real scenarios of collaborative writing. However, they also found interesting of having more than one author at a time on the same fragment.

As a formal study, we have recently made a comparative analysis of group awareness support in several collaborative writing systems, including Alliance. For this purpose, we adapted Vertegaal's framework [6], which considers the workspace and conversational awareness elements. We found that Alliance is strength in workspace awareness and weak in conversational awareness. Complete results from this study are reported in [3]. We plan to improve conversational awareness in Alliance.

REFERENCES

I received my PhD from the National Polytechnic Institute of Grenoble, Grenoble, France in April 1998. My dissertation research on a system support for collaborative writing on Internet included a study of social and human factors (cognitive models, coordination strategies, interaction modes) involved in the process of collaborative writing.

Since October 1998, I have been working as a full-time researcher at the Department of Computer Science at IIMAS, UNAM in Mexico City. I am involved in research and teaching of CSCW, HCI, Distributed Systems and Computer Networks. Other interest include: GDSS, CSCL, Web technology for collaborative work and coordination theory.

Recently, we have been investigating on how group awareness protocols can improve co-authors writing work. Nowadays, we can see that group awareness and collaborative writing constitute very active research domains (see for example the ACM CSCW’2000 Workshops on these domains).

We are convinced that designing collaborative writing systems not only involves many technical challenges (document consistency, machine failure, network partitions), but also human factors (social interaction, author’s actions, intentions and presence). We believe that our experience designing and implementing Alliance could be useful for other people developing any other kind of collaborative environment.

In order to foster communication and collaboration among researchers in Latin America, I think that we can try to create a virtual forum (for example, we can start with a Web site) where researchers could let everybody know their research works on HCI. This virtual forum could also be used as a communication medium and as a shared workspace to keep in touch efficiently.

My future directions for HCI research will focus on usability engineering for groupware systems in general and collaborative writing systems in particular.