

Reflexive CSCW and Managing Commitments

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1. Introduction

This paper notes the similarities between personal and group computer-based work, and argues that support for the single user provides an excellent platform for the development of many cooperative work systems. This approach particularly applies to the coordination and management of work items, and is demonstrated here by the successful shift from personal to group environments of a prototype system designed to support commitment reminders.

2. Personal Reminders become CSCW

With the proliferation of computers in the work place and the increasing size of the information space that they support, there is great potential for the user to become lost or lose track of the multiple activities to which he/she is committed. While many systems have attempted to deal with the problems of navigation, storage and retrieval, few attend to the more fundamental issue of "what do I have to do?"

In order to experiment with *personal* commitment reminders a purely text-based prototype system was developed under Unix. It supports a fundamental linkage between items of work and their associated commitments. Using these links, facilities such as navigational guidance to committed work items can be provided. Textual reminders are posted to oneself with an attached date and an optional link to a file or directory. The recorded commitments can be reviewed and notified using various techniques, such as browsing the items registered for a particular time period, and providing active guidance to any file by prefixing a flag onto its filename and all its parent directories.

This prototype could be classed under a "CSCW" (Computer Supported *Coordination* of Work) banner — it aids the individual's role as a responsible member of a group or organisation by increasing the likelihood of satisfying the personal responsibilities upon which others depend, however, a truly *collaborative* version would have to support the sending of reminders between members of a group. With the system already installed for individual users, this extension was unexpectedly simple to implement:

Where the reminders had previously been attached to *files* an extension was made allowing them to be also linked to *user names*. A command that registers the reminder in each receiver's environment is sent via e-mail with a special flag in the mail subject banner. At log on, or immediately before the Unix "you have mail" prompt, a program is run over the mail box to check for this flag. If it is found, then the reminder is automatically installed by running the message as a Unix command, the mail message is removed, and only if more mail remains is the "you have mail" prompt displayed. The user receiving the reminder is undisturbed by this process until notification of the message when its date becomes due.

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The group prototype, then, succeeds to support group communicated and personal reminders. It is potentially powerful, and easy to use for those already familiar with the Unix interface, and yet its integration into the wider collaborative environment happened more or less by accident. But is this so strange?

3. Similarities Between Individuals and Groups

Almost everyone works in a collaborative environment to some extent. Tasks that are considered to be personal work are often derived from external sources and have an associated deadline. Even when isolated from group activity, and working on purely self-motivated projects, the individual has two separate roles to fulfil:

- The “Personal Management role”: which involves coordinating the activity, deciding what to do next, assigning target completion dates, etc.
- The “Worker role”: which will carry out the actions required to complete the assignment.

When the worker has an assistant, whether human or computerised, another role is added:

- The “Meta-Management role”: this involves giving instructions to the assistant on what tasks are to be carried out. These instructions include:
 - what actions the assistant can carry out autonomously and whether the worker needs notification of the actions;
 - how and when to provide information on the current commitments and deadlines affecting the worker;
 - how and when to provide general reminders;
 - how to keep track of and notify the status of delegated work items.

So, the user acquires multiple roles in coordinating the progress of even a single personal task. The notion of the individual acting as a network of collaborating roles and personae is extended in the more natural collaborative work place environment where the worker has to cope with multiple tasks, some of which are delegated to him/her and may require delegation lower down the hierarchical structure of the organisation. Each task can be viewed as the responsibility of a separate persona, which can be further split into the roles described above.

So far we have assumed that the user is working on a single machine, resulting in separate activities that are dispersed solely over time. If an individual's work is spread over space as well as time by the use of multiple machines (perhaps a lap top, office and home machines), then the similarities with group work become even more pronounced. “Liveware”, a self-replicating distributed database system, has been proposed as a potential solution to the problems of maintaining concurrent copies of the same information store held on various machines [Thimbleby, 90a]. When personal work is distributed over time and space in this manner, almost all the requirements of a fully collaborative CSCW system are present in supporting the individual — synchronous communication links being virtually the only exception, since a person cannot be in more than one place at a time.

4. Reflexive CSCW¹

The single user, therefore, behaves very much like a group of one, working round several tasks, roles and possibly machines. From this blurred distinction between individual and group we can introduce the notion of Reflexive CSCW — collaborative

¹ The term Reflexive CSCW was first introduced by Thimbleby et al. [Thimbleby, 90b]

systems based on the requirements of the individual. Of course, in supporting the single user we are inherently supporting the group by aiding satisfaction of commitments upon which others depend, but further, there are advantages in using the same approach for personal and group work.

It was noted [Winograd, 87] that an advantage of his Coordinator system for collaborative work was that it made involvement in a web of dependencies explicit. The individual became more aware that what was considered to be "personal" work was actually part of a team's efforts. In true communicative CSCW systems, the reflexive techniques for supporting the single user can be used for the entire group, and there are advantages in doing so — by using the same methods for personal and group work, the user feels more at home in the collaborative environment. The importance of enhancing the willingness to collaborate through these strategies has been noted by previous CSCW system developers including the hypermedia system KMS [Yoder, 89]. Another advantage of the reflexive approach is that it avoids the necessity of learning and remembering a separate interface for collaboration, which may be used infrequently.

5. Consequences of the Reflexive Approach

What type of support will systems developed from a Reflexive CSCW perspective offer? Obviously, in managing personal work the individual has little need for the high bandwidth audio/visual communication services which are the focus of many CSCW research projects. Away from computing environments, personal reminders are most frequently and effectively supported by textual means such as Post-It™ sticky-notes to oneself², or a diary/calendar, other techniques such as tying knots in hankies can cause problems of a "now what was that to remind me of" nature. Graphical reminders are also commonly used to represent concepts and ideas in the making.

If, when coordinating *personal* work individuals use textual (or graphical) notes with little need for audio/visual techniques, then a collaborative CSCW system that strictly adheres to a reflexive approach will also abandon the high-bandwidth communication channels. Video systems, however, can offer additional clarity and completeness in the information that they transfer, this is often achieved through subtle gestures that textual means could not encapsulate. Text based communication has been criticised for its inability to thoroughly and accurately convey social and emotional influences [Kiesler, 85 & 86; Tang, 88, 89; Greenberg 89]. When such limitations of text are viewed against the potential benefits of rich communication available through multimedia, it becomes obvious that excluding high-bandwidth schemes simply to satisfy an implementation ideal would be extremely inadvisable.

In some situations the use of audio/visual support facilities may not be appropriate or necessary, while elsewhere, a combination of textual utilities with the high-bandwidth channels may enhance the effectiveness of real-time conferencing systems. However, text-based systems can offer several useful features which are as yet unavailable or impractical in audio/visual systems, two of these are:

- Text is a readily transportable medium, either in hard copy, in a lap-top computer, or along e-mail channels — the statement "Office automation simply does not reach people who are away from their offices" [Stefik, 88], need not be true with the advent of lap-top computers supporting textual CSCW systems.

² Post-It™ sticky-notes provide an interesting example of a real-world tool for collaboration also being used in a reflexive context.

- Text based systems can offer additional functionality — filtering schemes can allow actions to be automatically carried out on the arrival of specific messages dependant on their content, and time or source of origin. Several systems (Information/Object Lens [Malone, 88a, 88b]; ISCREEN [Pollock, 88]; Andrew Message System [Borenstein, 88]; The Coordinator [Flores, 88]) have already been developed which support message filtering for various purposes. These include easing the receiver's plight in information overload, aiding the coordination and organisation of work, and utilising intelligent active agents to carry out minor tasks on the users behalf. Such filtering mechanisms could allow a major enhancement of the secretarial roles of computers.

7. Conclusions: Did it Fall or Was it Pushed?

Many systems appear to have fallen onto the CSCW bandwagon in the same way that the prototype described at the start of this paper suddenly developed into support for fully *collaborative* coordination. This accidental development may result in systems supporting the coordination of collaborative work that are more acceptable to the individual end users because the facilities are focused upon their needs.

Until we have a much greater understanding of the way that people work together, and are able to reflect this knowledge in our support systems, the reflexive approach offers an attractive design method. Learning a separate system for use solely when collaborating is an unwanted and unnecessary burden. The methods and techniques used in personal work should be as closely related to those of collaboration as possible.

In conclusion, future generations of "accidental" CSCW systems that are grown out of personal support promise the wisest approach, offering rich audio/visual communication as well as the functionality available from textual means. No longer is there a pre-conceived notion of the individual or the group, instead the focus is on developing an *integrated work environment* which eases and encourages the inclusion of personal work, and enhances awareness of group involvement.

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