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From Group Memory to Group Awareness Through Use of the Knowledge Depot

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Abstract

In the CSCW literature, systems labeled as group awareness tools are generally designed to provide relatively instantaneous awareness among a group of individuals. This paper describes a type of awareness tool that does not fit within this implicit classification of awareness. This tool instead focuses on providing individuals with awareness of multiple groups (rather than multiple individuals), over days or weeks (rather than fractions of seconds to minutes). We term this new type of awareness, organizational awareness. This paper discusses an enhancement of a previously developed system, the Knowledge Depot, that expands the system from a group memory tool to an organizational awareness tool. This change takes the tool's existing mechanisms for capturing and organizing knowledge and uses this organization to distribute relevant new information to users. The types of informational benefits derived from such a system vary greatly from the benefits of a typical group awareness tool.

Keywords: Group awareness, Organizational Awareness, Awareness Tools, Group Memory Tools

1.0 Introduction

In the CSCW literature, systems labeled as group awareness tools are generally designed to provide relatively instantaneous awareness of a group of individuals. This paper describes a type of awareness tool that does not fit within this implicit classification of awareness. This tool instead focuses on providing individuals with awareness of multiple groups (rather than multiple individuals), over days or weeks (rather than fractions of seconds to minutes). The types of informational benefits derived from such a system vary greatly from the benefits of a typical group awareness tool. The table below illustrates the types of questions answered by different classes of awareness systems. The two dimensions are the frequency with which users receive information and the unit of observation. A tool whose unit of observation is an individual, helps users maintain awareness of a set of individuals (Dourish & Bly, 1992; Mantei, Baecker & Sellen, 1991; Isaacs, Tang & Morris, 1996). A tool whose unit of observation is a group helps users maintain awareness of a set of groups (Abel, 1990; Bogia & Kaplan, 1995).

TABLE 1. Characterizing Individual, Group, Organizational Awareness

Frequency	Unit of Observation	
	Individual	Group
Minutes	What is a person's location and current activity? (e.g., Portholes, Piazza)	Is a group meeting? Where? What types of tasks is the group working on? Who is in the group? (e.g., Video Windows, wOrlds)
Days	What is a person trying to accomplish this week? What are a person's plans for this week? What problems is a person working on solving? (calendars, distribution lists)	What is a group working on this week? What kinds of problems are they encountering? What changes have they made in the task they are working on? When will the task be complete? (Knowledge Depot)

Information that users need to be aware of over days rather than over minutes tends to be much more conceptual and task oriented than physical. Instead of providing awareness of some physical fact through graphical or audio means (the user is in room X, sitting, talking on the phone and browsing the web), we instead have to provide information that is much more abstract (a person plans to work on the following tasks, and the tasks have this set of priorities, and the following problems are delaying them) which type of information is best represented textually, as is done in most calendars. Whereas the unit of information in a typical awareness system is an individual's current low level activity, the unit of awareness in a system aimed at groups over days is the task or set of tasks of the group. Awareness of the task then is what makes this type of awareness so important.

This paper is about an approach being developed to fill the Group/Days quadrant of the diagram. This paper will refer to tools that fit the Group/Days quadrant as Organizational Awareness tools.

Features that are needed by all awareness systems for them to function are

1. information capture

2. information distribution
3. information presentation

The effectiveness of an awareness tool will largely depend upon how well it provides these three features. It must capture useful information, distribute it quickly to the appropriate people, and display the information in a meaningful manner. From this, a bulletin board system could be argued to be an awareness system, as it captures information, distributes it by making it available to bulletin board readers, and presents it as a list of messages. However, the information capture requires users with information to deliberately start the news reader, navigate to a topic and submit the information, and distribution requires users to go to appropriate software and search for the information.

A distribution list can be considered an awareness tool over time where the unit of observation is an individual. Studies of distribution lists (Sproull & Kiesler, 1991) have shown that they make peripheral group members more aware of their group. Information capture takes place when a member writes a message. The message gets distributed to everyone on the list, and the recipients view the message with a mail reader. However, it is a weak awareness tool because it only captures information that people explicitly design to be distributed to the entire group.

1.1 Benefits of Organizational Awareness

One reason awareness of groups is important is that it allows people to keep track of the status of the tasks being worked on by other groups. When people join together into a project group to engage in a complex task, (build a software system, organize an event, write a report, etc.) it is common for the project group to divide into a number of smaller groups, each working on a different aspect of the task (construct a software component, obtain equipment for the event, research and write a section of a report). The types of information that group members want to know about another group concerns the status of the other group's task. If the work is behind schedule, the groups whose work depends upon the delayed task need to be aware of that. If a group changes their design in a way that might affect the work of other groups, other groups may need to adjust their own designs to compensate.

The two standard strategies for distributing this information are:

1. Send mail to everyone you can think of who might be affected, and trust that they will forward it to anyone you missed
2. Send mail to everyone, and assume that the right people pay attention, rather than treat it as junk mail.

These mechanisms fail as an effective distribution mechanism, because if either method is used frequently, either someone will fail to receive needed information, or someone will ignore important information hidden within too much irrelevant mail.

A system that better matches the definition presented above for an organizational awareness tool is the Information Lens (Malone, Grant, Lai, Rao & Rosenblitt, 1989). The Information Lens has a mechanism for capturing information (people send email to a user account "Anyone"), a means

of distribution (users specify rules that the system uses to determine which messages will be of interest to them), and a means of presentation (a person's electronic mail box).

While the creators of the Information Lens did not describe it as an awareness tool, they described many of the same benefits from their system as are defined above for an organizational awareness system. One example they use is distributing engineering change notices. If a plan or design changes, someone on the group making the change will send mail to "Anyone" describing the change. All people whose work will be affected by changes to this aspect of the project will have set preferences to insure that they will receive information about such changes.

This still leaves users with a limited view of the change. They know that the change was made, but will have no idea why and receive no warning that it might happen. If they set their rules to capture all of the information leading up to the change, they will end up with too much information in their mailbox.

An ideal presentation method then would be a method that presents a fish-eye view of the project (Furnas, 1986). At the focus of the eye is the mail sent within a subgroup directly to the subgroup's members. These people receive the entire message and are assumed to have read most of the message. Near the focus of the eye are other groups whose work is related. People on the project who are interested will receive summaries of these related group's email. This will allow them to stay aware of changes being discussed and decided upon, and of problems delaying the task. The summaries would include a link allowing them to access the entire message if they need more than an overview. The proximity to the focus of a person's work determines how frequently these summaries are received. Farthest from the focus are groups working on unrelated tasks. From them a user will only receive an occasional message that is broadcast to the entire project. Generally, little awareness is maintained of these unrelated groups.

The rest of this paper describes a system that meets the desired traits of an organizational awareness tool: information is captured about many groups over time, it is distributed daily and weekly to those who specify that the information is relevant to them, and the information presentation attempts to approximate a fish-eye view of the organization.

2.0 Knowledge Depot

Groups that use email to announce decisions, discuss problems and their solutions, and to carry on other work related discussions produce a rich pool of information as a side effect of these conversations. The Knowledge Depot, an enhanced version of GIMMe (Zimmermann, Lindstaedt & Girgensohn, 1997), captures and organizes this information, allowing users to browse through the information to rediscover (or learn for the first time) why different decisions were made, what problems were encountered as a result of those decisions, and allowing the user to regain some of the context in which those decisions were made.

The system organizes its knowledge around a set of topics defined over time by all users of the system. The topics frame is shown in figure 1 as a hierarchical list of discussion items. A topic is four things

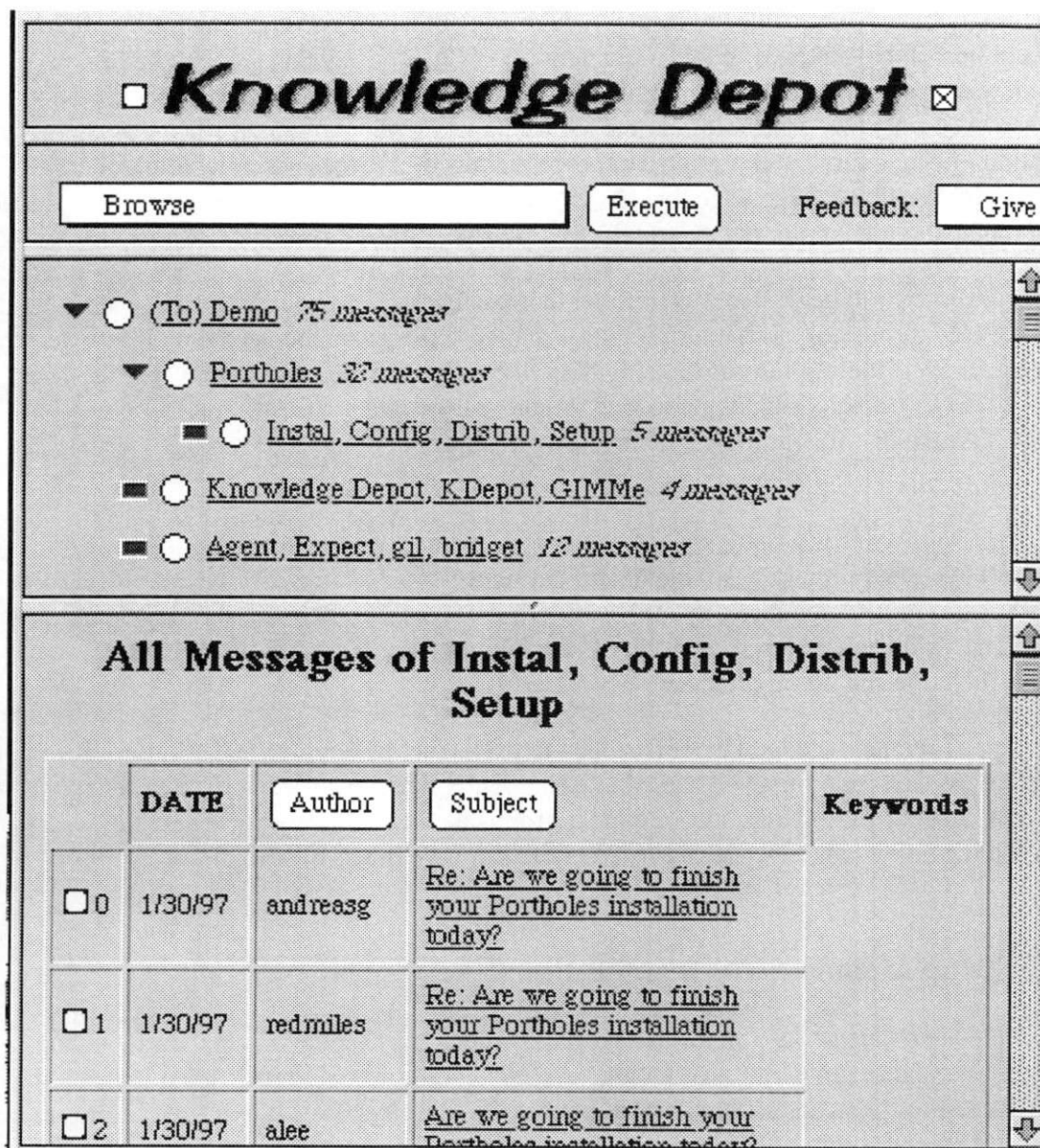


Figure 1: Knowledge Depot displaying a title frame, a controls frame, a hierarchical topic browser frame and a message list frame.

1. A *phrase* describing a concept, task or activity representing aspects of the group's work
2. A *place* where people go to find information
3. A *definition* of the type of information the system looks for to determine whether something belongs in the topic
4. A *destination* that people will aim their messages at in order to have the message stored correctly for later retrieval

A topic then might have a name like "Portholes". This says that any message that has "Portholes" in the subject line will be captured in this topic, and people browsing for messages will know to look for email discussing Portholes within this topic. People having an email conversation about Portholes then need only put "Portholes" in the subject, and CC the Knowledge Depot system for the information to be captured and put in an appropriate place. Furthermore, the hierarchical organization of topics allows a message that has "Portholes Installation" in the subject to enter the "Portholes" topic, and then enter the "Instal, Config, Distrib, Setup" subtopic.

If a new type of discussion begins, any group member can create a new topic or subtopic to capture the new type of discussion. If the terminology changes, users can change the definition of the topics. For example, if there is a topic "NYNEX, collaboration" for discussing work done with NYNEX, and NYNEX changes its name to Bell Atlantic, the topic would simply be updated to "NYNEX, Bell Atlantic, collaboration". This allows the organization of knowledge to evolve over time as the group itself evolves.

The Knowledge Depot uses the same type of privacy mechanism as the Information Lens: information does not become publicly available unless explicitly emailed to a special user name. The Information Lens used the account "Anyone" to determine which knowledge should be publicly distributed, while Knowledge Depot uses a mail account named after the group to capture mail that is to be archived in the group memory.

The predecessor of the Knowledge Depot has been in use at NYNEX Science & Technology and at the University of Colorado for two years, and has recently been installed at the University of California, Irvine. Several Software Development groups at NYNEX have modified their work practices to use the Knowledge Depot as a tool to help improve their software development process.

2.1 From Group Memories to Organizational Awareness

Turning the Knowledge Depot into an awareness tool is made easy by the fact that it already has a means of capturing and organizing information. All that is required is for people to indicate that a topic is of interest to them, and of how much interest. The greater their interest, the more frequently they will receive summaries on new information that arrives in that topic. Direct email is still used to discuss a topic with group members, arriving immediately in full detail in the mailboxes of the person's group members, but summaries of information generated by other groups can now arrive in users mailboxes at an interval reflecting the level of their interest.

Figure 2 shows the current subscription method. Users select a topic or subtopic in the topic browser, and select "Add Subscriber" from the operations pull-down menu. This presents them with a form for describing the subscription. People choose between receiving header information (author, date and subject), summary information (header information plus some additional information from the contents of the message), or the entire message. They also choose who the updates will be sent to (usually themselves, unless they are subscribing someone who does not have access to the system).

Send to every days

Feedback:

- ▼ (To) Demo 15 messages
- ▼ Portholes 32 messages
 - Instal, Config, Distrib, Setup 5 messages
 - Knowledge Depot, KDepot, GIMMe 4 messages
 - Agent, Expect, gil, bridget 12 messages

Figure 2: Subscribing mkantor to receive weekly updates of the “*Instal, Config, Distrib, Setup*” topic

All updates of new information received will be accompanied by URLs to the full body of the message. The key advantage that a system like this has over any Information Lens type of mail distribution system is that it is built upon a group memory. As a group memory, this system gains two advantages in awareness:

1. Users can get a better approximation of a fish-eye view of what is going on, but can still get the full information on items of interest (by following a hyperlink into the group memory).
2. Users can note things that might be relevant later, and when it becomes relevant, they can browse through the group memory to find the item and all related information and context.

The updates keep people aware of issues, and of the knowledge stored in the Knowledge Depot itself. A clear side-effect of this is that if a user is subscribed to a topic, the user will be constantly reminded of the existence of the tool that stores their messages, potentially increasing their usage of the tool (in the experience of this author, many tools get little use simply because people are not sufficiently aware of their existence).

3.0 Research Directions

This research looks at a number of issues. One of the issues is to determine if the concept that is the basis for this paper is valid; is organizational awareness a meaningful and useful classification for awareness tools, and are the believed benefits presented above actually derived from such a tool? The other main issue is to see how closely Knowledge Depot approximates the main concepts of an organizational awareness system. An aspect of that question is to determine if one can generalize the changes made to the Knowledge Depot group memory to group memories in gen-

eral. One last matter of interest is the effect that a tool has on usage when it constantly makes the user aware of its existence by sending them mail (summaries of new information rather than junk mail) on a regular basis. It is our hope that this will increase awareness of the tool itself, increasing the frequency that it occurs to people to both look for knowledge and to send more knowledge to our tool.

We are currently testing this system on two groups of event organizers, each of whom works year around to prepare for their events. One group consists of 6 organizers, and many people who need to remain aware of the decisions of the 6 organizers. The group members are distributed across the state of California. The second group is also of 6 people, but all located in the same part of a campus. We are also planning a study involving two groups each working on different software systems where the software systems themselves must interact with one another and remain compatible regardless of changes made to them.

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