Groupware: Interface Design for Meetings

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INTRODUCTION

A new research area is emerging in human-computer interaction, that of building and studying computer supported meeting environments. These environments contain one or more personal workstations, a large display screen at the front of the room, and a software system which integrates the input from each of the workstations. Beyond these similarities, the computer supported meeting environments differ dramatically, as do the meetings that take place using them.

In some of the meeting environments, a meeting facilitator is provided in the software; in others, the software supports a human facilitator. In one system, the shared information is organized by the computer. In another, the computer requires the users to build their own organization. Systems also vary in the amount of control users have over the large display screen and over how much of what a user types is displayed on the main screen.

These differences, and many others, are expected to have significant effects on the meeting that will take place among the participants. Each of the panelists is engaged in research aimed at measuring these effects and determining how to best design the group meeting interface to enhance computer supported meetings. The panelists hold a strong set of beliefs both on what issues are important to the design of computer supported meeting environments and on how such environments should be designed. In many cases the panelists disagree strongly on the resolution of these issues and on the best research approach to take for their resolution. Five major issues which they intend to debate and their respective positions are listed in the the paragraphs which follow.

Before beginning the debate of the issues, each of the panelists will show a five minute videotape of the system they are working on. The videotapes will demonstrate: (1) the physical meeting environment for the computer supported meeting, (2) individuals participating in an actual meeting in the computer environment and (3) a brief discussion of the main features of the user interface of the system being presented. The videotapes will be used to acquaint the audience with the types of systems we are debating. Audience participation is encouraged throughout the debate.

GROUP INTERFACE DESIGN ISSUES

1. **Meeting Facilitation:** Is a group facilitator an essential part of the computer supported meeting or can facilitation be a part of the computer software? If the latter is true, which group tasks and roles can be built into the software and which require facilitation?

2. **Meeting Environment:** Does the physical meeting environment play a significant role in the meeting behavior of the participants? Is it necessary to have an aesthetically pleasing environment which hides the electronics of the computer support or is a simple setup of tabletop computers acceptable? Does the placement of the personal workstations make a difference in meeting behavior and, if so, what is the best placement strategy?

3. **Meeting Types:** Can a general interface be built that will handle a variety of meeting types or will individul software packages be needed for each meeting type? If meeting support is to be individualized, what types of meetings exist and what types of software tools are necessary to support the meetings?

4. **Meeting Consensus:** Will the interface make it more difficult to reach consensus? Will participants behave asocially as they do in computer mail and teleconferencing systems or will they be more likely to behave according to the social norms set by the group? If asocial behavior occurs, what can be built into the interface to encourage consensus forming and still avoid the social controls that limit creativity?

5. **Research Methodologies:** Can design criteria be generated from studying non-computer supported meetings or will the computer support of the meetings dramatically

change their nature so that non-computerized meeting behavior is not applicable? What are the applicable research methodologies to use in studying these types of meetings? Will the computer input of the meeting participants be sufficient or do we need to collect additional data both during and after meetings?

PANELIST POSITIONS

Marilyn Mantei
Electronic Data Systems Corporation

The Capture Lab at Electronic Data System's Center for Machine Intelligence (CMI) has been designed to support a group of individuals meeting from different areas of a large manufacturing company. The purpose of the meetings is to foster communication among specialists working on a joint project. The computer environment can destroy this communication by being too hard to use without complete concentration, by being too obtrusive and by providing a representation that does not support the nuances of communication that the meeting participants need to exchange to foster the growth of group relationships.

Our studies of traditional meetings show verbally stated secondary agendas and consensus reaching on topics that do not appear in the meeting minutes or on future written agendas. These second tier issue discussions appear to be a part of the process of team formation and a motivating factor in the effort spent by the team on the primary agenda items.

I believe that the computer supported meeting environment, however good the idea sounds, has a strong potential for destroying the underlying purpose of a large number of meetings (to form consensus by exchanging and, primarily, understanding the roles and needs of the other meeting participants.) Often, it is not so much what is said, but what is implied in meetings that make them successful. Without heavy attention to continuing to support this aspect of meetings, the interface to the computer supported meeting system will be a failure.

In addition, from videotaped observations of meetings that have taken place in the Capture Lab, anecdotal evidence indicates that small changes in the interface design can change the behavior of a meeting participant from that of a group member to an individual actor. I believe that this change frees the participant from the group norms and social controls and is accompanied by the perceived lack of consensus and asocial behavior observed in electronic mail and teleconferencing systems. These interface design changes have been minor, e.g., an added keystroke and the blocked view of the lower jaw of the opposing group member. Because such small changes have a large impact, it is crucial to understand the effects of the interface design on group belonging if this environment is to be used for consensus forming and arbitration meetings

Lucy Suchman
Xerox Palo Alto Research Center

The point of bringing computer technologies to meetings is to provide new tools for a longstanding and highly developed human enterprise; viz. interaction in the interest of shared understanding and concerted action. Designing new tools for traditional practices involves a delicate balance between conservation and change. Most important to good design is an understanding of the use of current technologies, their utility and strengths as well as their weaknesses. Like many ordinary activities, however, meetings and their technologies have not yet been subject to extensive social theorizing or detailed analysis. As a consequence, a priority task is to assemble the body of observation and analysis necessary to adequate understanding and good design.

Working with methods of interaction analysis from video data, we need to look at a range of naturally occurring meetings, with a variety of participants, using a variety of representational technologies. Our studies at PARC investigate non-computational tools like the whiteboard as well as experimental meeting environments like the Colab. Our analyses of both old and new technologies focus on the mutual structuring of interaction and representation over the meeting's course.

A central research objective is to develop an iterative relationship between meeting analysis and interface design. That objective can only be met by using observations of practice to raise questions about current design assumptions and to inform further design, and using the developing design as an environment for further use and analysis.

Gerardine DeSanctis
University of Minnesota

The Computer Aided Meeting (CAM) system has been designed to support the general meeting needs of work groups who come together on a regular basis to discuss issues and resolve problems. The purpose of the meetings may be to identify problems or issues, record comments or viewpoints relating to these problems, identify and evaluate criteria for resolving the problems, resolve competing viewpoints within the group, or select a course of action. Essentially, the system provides a rational problem-solving agenda from which the group can pick and choose from a menu of features.

The system is based on several assumptions about the nature of group support needs. First, it assumes that, while the purposes of meetings vary widely, many of the essential activities of meetings are the same. Computer-based features should support the general needs of meetings, then cater to specific needs of particular meeting types. Next, the interface design assumes that facilitation, or the presence of a support technician, should not be necessary for effective use of the technology. Third, it assumes that, while all group members should have equal

access to the system and its features, open access to all members' input is not allowed. The WYSIWIS (What You See Is What I See) principle is modified to protect private information, and each user is allowed to protect the privacy of his or her own work. Finally, the interface aims to be portable, comfortable, and convenient for the group in their usual meeting setting. Access to expensive hardware and elaborate surroundings should not be necessary for effective use of these systems.

Our experience at the University of Minnesota with computer supported meetings suggests that rational problem-solving features can be useful to groups and that too much attention on the part of the technology to the subtleties of group communication can be counter-productive. In short, if these systems were to support hidden agendas and the implied meaning of human communication, the potential for enhanced conflict in the group would escalate and the meeting environment would most likely become destructive.

Lynda M. Applegate
Harvard University

Group Decision Support Systems (GDSS) are integrated computer-based systems which facilitate group problem-solving. A facility and GDSS have been developed at the University of Arizona to provide a research environment for the study of the group decision process while top executives from a variety of organizations meet together to conduct corporate and business planning and group decision-making sessions. Over 200 decision-makers from a wide variety of public and private companies have used the University of Arizona GDSS facility since it opened in 1985. Our experience to date suggests that the technology significantly influences the decision-making process. In addition, high levels of satisfaction with the automated group decision-making process and the outcome of the decision-making sessions have been reported by the groups using the facility.

Many decision-making groups designate (formally or informally) a group leader to assist the group in achieving their objectives. I believe that technology influences group dynamics and, therefore, a group leader must understand how technology may facilitate or inhibit the dynamics of the group and how it may affect the group's progress toward reaching a decision or solving a problem. The design of a GDSS must consider the role of a group leader and the special support needed for this role. In some cases, a technical facilitator may be required to assist the formal group leader in understanding and utilizing the technology to achieve the group objectives. It may be possible, and is highly desirable, to imbed an increasing amount of the technical facilitation process into the GDSS interface.

In addition, I believe that it is crucial to consider the nature of the decision-making task in designing GDSS software. For example, the design of automated decision aids to support divergent thinking within a group will be very different than the design of automated decision aids to support convergent thinking. Some of the factors that should be considered in the design of GDSS include the shape of the table; the height of the computers; the decision to display work on a central large screen or the individual workstations (or both); and artificial group segmentations through network addressing and physical computer placement. These and other design factors can be manipulated to provide a sense of group cohesion or to stress group diversity.

Sirkka Jarvenpaa
University of Texas

NICK is a research project in MCC's Software Technology Program. The focus of NICK is on how group interfaces might improve or facilitate the processes in the early "upstream" phases of designing large, complex computer systems by a group of cooperating experts in face-to-face meetings. The problem of upstream design meetings is that they are normally adhoc, unorganized, and poorly documented for the issues raised and the decisions made.

I believe that group interfaces provide a great potential in aiding "upstream" design meetings. A medium-sized design group of six or more people may benefit from group interfaces if the technology allows the simultaneous use of multiple channels of communication, directs information only to those people who need it, and effectively structures any information presented. Additionally, the interface technology might have the potential to facilitate consensus forming if a means for voting and automatic tallying of votes is provided. Finally, if the technology adds additional nonobtrusive channels of communication (e.g. electronic mail), participants might be able to accomplish more than the specified agenda. Thus, group technology can be quite successful if specifically tailored to the problems of the meeting at hand.

Yet, my belief in the potential of group technology assumes significant advances to the current embryonic stage of the technology. The interface must be designed to be "invisible". Since the real action in a meeting is in people's listening, the technology should, at a minimum, not distract from listening, and, hopefully, directly augment the listening component of the group interaction. Also, the current group technology must not constrain the meeting space. An augmented meeting room that is difficult to access, has dimmed lighting, and includes an inflexible seating arrangement is certainly at a disadvantage to a normal meeting room.