

Building Virtual Teams: Perspectives on Communication, Flexibility and Trust

Gloria Mark*
GMD- FIT
gloria.mark@gmd.de

Introduction

As organizations become more globally distributed, and as the fast growth of the Internet, multimedia, and collaborative software environments enable more opportunities for virtual groups to form and conduct business, it is important to understand how the technology affects group interaction. One such company interested in implementing virtual collocation technologies, The Boeing Company, has recently begun to seriously investigate the technology requirements for virtually collocated teams [4]. This paper reports on an empirical study of four virtual teams at The Boeing Company conducted over a three-month period in Spring of 1998. The goal of this research was to gain an understanding of the behavioral effects on work teams who are using such technologies.

Research Setting and Methodology

The primary means of communication for the four virtual teams was Microsoft Netmeeting² (NM). Although the groups used other technologies for communicating outside of the meeting context, most commonly email and telephone, the meetings all took place using NM; this technology usage became the focus of the study. NM enables application sharing from the desk-top. The teams used NM for synchronous data-sharing and additionally used teleconferencing for audio communication. Group members used NM from their own (or colleagues') offices using terminals, or from conference rooms using SMARTboards.

The investigation was ethnographic, a methodological approach where the behavior and attitudes of the team members can be observed in the context of their work. Such an approach enables an evaluation of systems in relation to the work practice and organizational setting, which is argued as necessary in influencing the re-design of both factors [5]. Using this approach, I sat in on the meetings as a "silent" observer³, and took notes. In order to supplement the observations, after each meeting an

electronic questionnaire was distributed to the participants, asking them various questions related to ease of using the technology, social aspects of participation, and satisfaction with the meeting. Supplementary materials were collected, such as meeting agendas, minutes, and chat windows used during the sessions. In-depth interviews were also conducted with selected members of the groups.

The groups were chosen because of a variety of factors: their availability was a prerequisite, but they were also chosen because they represented different disciplines, had different goals, and used different meeting configurations. Yet the groups also had common characteristics to enable comparisons, described in the next section. The groups were observed over a three-month period, where meetings took place generally once a week (for one group, bi-monthly). Two of the teams had main sites where members sat in a conference room; for these, the observer sat in the conference room. For the other teams, the observer sat at the desktop, connected to the group through the audio and NM channels.

The virtual groups: an overview

To begin with, a summary description of the groups will be presented. The groups were composed as:

Scientific problem-solving team: This team was voluntary, in existence for three years already, and recognized at the highest level of the organization--the CEO. The group was composed of members of different scientific disciplines, as well as machinists from the shop-floor. About 6-12 members met in a conference room in Seattle; up to 15 other members were spread out in locations in greater Seattle and around the U.S. The group met weekly, with the goal to apply science to solve real manufacturing problems in the company.

Technical working group: This group had an on-going mission to define Web architecture for the company, again a long-term prospect. This group was open to anyone in the company to participate in. Formed about eight months before the study began, it consisted of about six core members, about eight other regular members, often an expert who gave a presentation, and several others who joined in out of interest. The group met bi-monthly for two hours, and the goal was to gather

* This study was conducted while I was on leave at The Boeing Company, Collaborative Technologies group. It is part of a larger study conducted with Jonathan Grudin and Steve Poltrock

² NetMeeting™ 1998, The Microsoft Corporation

³ At the beginning of each meeting I always announced my presence to the group.

expertise to develop technical architectural standards for the company.

Staff: In this virtual staff, the manager was remotely located in St. Louis, one member in California, and about eight staff members were in Seattle. Also eight months old, the team used NM since their group formed. In their weekly meeting, their goal was information exchange and team-building.

Best-practice team: This was a division-wide team set up with a long-term mission to establish virtual collocation technologies in one of the company's divisions. There were about 15 members in this group, all managers, and they were spread out across the country. They met weekly for one hour with the goal of information gathering and long-term planning.

Common characteristics of the virtual groups

Although the groups had different goals, the four groups shared several commonalities:

- The groups were all designed to be together long-term, and were viewed by the members as such. Their long-term agendas were determined by different factors, e.g. by the nature of the funding, by their task, or by organizational restructuring.
- All groups used NM as the primary means for communication. Pre- and post-meeting communication was also virtual, but with other methods, usually email.
- With most of the members, their knowledge of a core group was initially through face-to-face meetings. It is only at later points that the whole group met face-to-face.
- All groups were geographically distributed around the United States. Two of the groups had a configuration of a main site located in a conference room connected to smaller satellite nodes. The configuration of the other two groups was such that all remote members participated from their offices.
- All groups were multi-disciplinary. All groups had some members who crossed organizational boundaries.
- All groups met on a regular basis with NM. Three of the groups met weekly, and one met bi-monthly.

It is worth pointing out that many studies of groups using CSCW technologies have looked at groups of a much shorter-term nature: e.g. ad-hoc groups, project groups, and collaborative writing groups (e.g. see [2], [3] for

reviews). For this reason, the observation of groups with a long-term agenda provide the opportunity to focus on aspects of virtual group behavior that concern development in different phases of the group life-cycle.

Some preliminary findings

A large amount of data was collected, and in this overview, I would like simply to mention the range of results. Content analysis was used for the interviews, and from this, common themes emerged. These themes were used to substantiate the observations, and covered a number of interesting issues concerning virtual teams. In the next section, I will simply highlight a few of the results.

New facilitation roles: social and technical support

The Scientific problem-solving team employed two new roles to help coordinate their virtual meetings: a person who was responsible for operating the technology, and another who was responsible for running the meeting.

The technical facilitator was extremely valuable in ensuring the smooth operation of the meeting. He established the connection, made sure remote members were connected, did trouble-shooting, and controlled the presentation. In addition, he monitored the sound quality to make sure that remote members were being heard, and always checked that members at the main site were speaking loud enough into the microphones. In short, in his words, his goal was that "The medium must be as transparent as possible". In contrast, many struggles to use the technology were observed in the other teams, sometimes taking even up to 15 minutes at the beginning of the meeting to establish a connection among all participants.

The meeting facilitator performed many functions during the meeting, some of which emerge as a result of using virtual collocation technologies. For example, checking attendance is extremely important for the group. He would periodically check to make sure others were still connected and present, and would keep all members up-to-date on attendance. In contrast, in the other groups, it was sometimes observed that a member would be called on who was no longer there (or who had the mute button on). This facilitator also identified speakers, especially at remote sites, which was valuable especially when members had never met face-to-face. He also aided in coordinating speaking turns, by managing interruptions, calling on remote members to speak (or to wait), or recognizing hands raised in the main site.

The value of chat for informal communication

The technical working group was the only group to use the chat window during the NM meetings. An examination of the chat window showed that it was used

to communicate a range of information, from informal chatting, e.g. private jokes or comments on the meeting, to elaborating the meeting content. Some of the most useful functions for the group appeared to be attendance tracking, checking if people needed help getting connected, helping solve problems with the technology during the meeting, and seeking information in parallel to the meeting that is discussed during the meeting. To the minute-taker, the chat window served to complete the record of the meeting.

The value of face-to-face contact

One of the themes that emerged was the value that meeting face-to-face at different points had for the group, and the corresponding difficulty that teams had with speaking protocols when meeting virtually. All of the virtual teams have met face-to-face at different intervals.

Whereas all the Greater Seattle and Wichita members of the Scientific team were familiar to one another from a workshop, at the time that NM began to be used, people in the other sites were not known. The whole group has since met face-to-face in a workshop.

Although the team leader of the Technical working group claims that he receives requests frequently to meet face-to-face, the group has only met twice so far in person, about every six months. In these meetings, it was only the core members who met. In the first meeting, upper management came to inform the group on what it wanted. In the second meeting, they reviewed deliverables, and planned for the next year. However, due to the openness of the group (anyone in the company can attend), many new people participate in the virtual meetings that are unknown to the core members (and vice versa).

The Virtual staff, meets face-to-face every 1 1/2 months. Of course the majority of the staff at the main site interact daily; their offices are all in the same corridor. The leader and the California member are the ones who travel to Bellevue, and the remaining staff in St. Louis (e.g. administrative assistant) travel rarely. As part of the virtual team agreement, the leader offered to pay the travel of anyone on the staff if they wanted to travel to meet him.

The Best-practice team met face-to-face about six times since the group began eight months ago, at various locations in the U.S. At one of these, the author was able to observe the meeting and noted the stark contrast between the high participation level in the face-to-face meeting compared to the NM meetings.

Many members report the value of the face-to-face information as providing information that helps the teams coordinate themselves during their virtual meetings. Many members reported that having met a person previously in

a face-to-face meeting helps them manage speaking turns with that person, interpret silences (is someone reflective?), and gives them a better understanding of questions. Face-to-face meetings also helped the facilitator in the Scientific problem-solving team, since he learned more about the backgrounds of the members, and was better able to direct questions to them. Nearly all the members reported a benefit from having met their team members face-to-face.

Flexibility

In addition to the expected benefits of saving time and money in travel, the idea of gaining flexibility in work life became apparent with the use of the technology. Some unique ways in which flexibility was expressed were:

- The flexibility for the Technical work group to draw in expertise for a presentation, independent of place. Formerly, for this team's meetings, one of the group's members would spend a great deal of time gaining the expertise that was needed to discuss a particular topic, and then would present it to the group. Now, the group simply finds the expert in the company, irregardless of where they are located, and this person connects to the meeting and provides the expertise.
- The flexibility for one team leader to actually relocate to another city, and still remain leader of the group.
- For the leader of the virtual staff who travels frequently, NM enables him to meet with "anyone, anywhere". It is also a way for him to expand his meeting circle by including others in the electronic environment.
- The flexibility to show any data during a meeting that is stored in any team members' computer. One member described his model of NM as containing all data "in one [electronic] place".
- The flexibility for employees all over the company to join and sit in on the Technical working group's meetings, since they are open to the public. This results in more information being shared.

Final comments

What is reported here are only selected aspects of the observations made during the virtual team meetings, leaving out, due to lack of space, other important aspects such as organizational influence, meeting involvement, the effects of NM on travel, and benefits other than flexibility. The choice was motivated by what I believed would be interesting to discuss during the workshop.

One of the most important considerations involved in building virtual teams is the notion of trust. As mentioned

earlier, many studies dealing with virtual communication have investigated its effects on ad-hoc groups. Yet for groups who have long-term agendas, building trust is an important component of the team-building process. In general, trust and relationship building was very crucial to all of the teams observed. For this reason, members cited the importance of meeting face-to-face to build trust, in fact at considerable expense to the company. In a study targeting trust in virtual teams, Jarvenpaa and Leidner [1] found that trust in virtual teams may form fast, but may not be substantial. What warrants further study is understanding how face-to-face meeting can work in combination with virtual meetings so that the members can establish and maintain trust. This is especially true in a large organization where the virtual technologies are crossing over organizational barriers.

To some extent, the results show that a high quality facilitator may be able to ease much of the coordination difficulties that occur when remote partners are not visible. The value of informal communication and side conversations for the groups although only briefly mentioned here, was quite evident. And what turned out to be quite unexpected was the different ways that flexibility proved to be a benefit. The model of all data "in one place" and accessible independent of location is emerging as a good description of what virtual collocation technologies can provide.

References

- [1] Jarvenpaa, S. L. and Leidner, D. E. (1998): Communication and trust in global virtual teams. *JCMC* 3(4) June 1998, 1-38.
- [2] Mark, G., Haake, J. M., and Streitz, N. A. (1997): Hypermedia use in group work: changing the product, process, and strategy. *Computer Supported Cooperative Work: The Journal of Collaborative Computing* 6: 327-368.
- [3] McLeod, P. (1992). An assessment of the experimental literature on electronic support of group work. *Human Computer Interaction*, vol. 7, 257-280.
- [4] Poltrock, Steven E. and Engelbeck, G. (1997). Requirements for a virtual collocation environment. In (S. Hayne and W. Prinz, eds.) *Proceedings of the International ACM SIGGROUP Conference on Supporting Group Work, Group 97*, Phoenix, AZ, Nov. 16-19, pp. 61-70.
- [5] Twidale, M., Randall, D., and Bentley, R. (1994). Situated evaluation for cooperative systems. In *Proceedings of the ACM 1994 Conference on CSCW*, Oct. 22-26, Chapel Hill, N.C., pp. 441-452.

A Computer Network is a Social Network

Barry Wellman
University of Toronto
wellman@chass.utoronto.ca

Can people find community on-line in the Internet? Can relationships between people who never see, smell or hear each other be supportive and intimate? The debate about "CSC" (computer supported community) fills the Internet, the airwaves, and especially the print media. Enthusiasts outnumber critics, for as the prophet Jeremiah discovered millennia ago, there is more immediate reward in praising the future than in denouncing it. Unfortunately, both sides of the current debate are often Manichean, presentist, unscholarly and parochial.

The Manicheans on either side of this debate assert that the Internet either will create wonderful new forms of community or will destroy community altogether. These dueling dualists feed off each other, using the unequivocal assertions of the other side as foils for their own

arguments. Their statements of enthusiasm or criticism leave little room for the moderate, mixed situations that may be the reality. The up-to-the-minute participants in this breathless debate appear to be unaware that they are continuing a century-old controversy about the nature of community, although with new debating partners. There is little sense of history.

Although broad references to Gutenberg and McLuhan are often made, both sides of the debate are presentist and unscholarly. Consistent with the present-oriented ethos of computer users, pundits write as if people had never worried about community before the Internet arose. Yet sociologists have been wondering for over a century about how technological changes (along with bureaucratization, industrialization, urbanization and capitalism) have