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Challenges in Virtual Collaboration

Videoconferencing, Audioconferencing, and Computer-Mediated Communications

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Summary

Purpose

Virtual collaborations are collaborations in which the people working together are interdependent in their tasks, share responsibility for outcomes, are geographically dispersed, and rely on mediated, rather than face-to-face, communication to produce an outcome, such as a shared understanding, evaluation, strategy, recommendation, decision, action plan, or other product. This report summarizes the research literature on how the processes and outcomes of virtual collaborations are affected by the communication medium, discusses how problems in such collaboration can be mitigated, and suggests a strategy for choosing the most effective medium as a function of task and context. The focus is on interactive collaborations in real or near-real time.

Background

Virtual collaboration uses "mediated-communication" rather than face-to-face (FTF) encounters. The principal modes are audioconference (AC), videoconference (VC), and computer-mediated communication (CMC). These are increasingly being used for "reach-out" (e.g., contacting experts not readily available for FTF meetings), to improve response time, and to save money. Such forms of collabora-

tion occur in many walks of life and at many different levels of organization. President Bush has critical meetings with cabinet members in which some participants attend by videoconference. Business-world chief executives do the same. During military conflicts and civil crises, staffs are commonly involved in virtual collaborations using, e.g., e-mail, Web-based chat rooms, other forms of CMC, AC, and sometimes VC. These may be deliberate (as, for example, in discussions a few days prior to a decision to go to war or in meetings held by a NASA mission director before launching or deorbiting spacecraft) or time-critical (as, for example, in war when new and fleeting targets arise and aircraft may be diverted from other tasks to strike them *if* prompt assessments indicate that doing so will be effective and will not result in unacceptable collateral damage; or when decisions must be made about where to send emergency response teams in a civil crisis with many simultaneous reports and a great deal of confusion). Clearly, it is important to understand how the form of virtual collaboration (i.e., the communication medium) influences group processes and outcomes—not only in obvious ways, such as timeliness, but with respect to issues such as the quality of outcomes.

Most research in mediated communication focuses on comparing a given medium with FTF communication or compares different media for specific tasks, such as negotiations. In this report, we step back and evaluate virtual collaboration for a broad range of task types and across VC, AC, and CMC. To our knowledge, it has been more than 25 years since the last paper (Williams, 1977) provided a comparably broad view.

This is an opportune time for such a review because of the proliferation of virtual collaboration and the related use of mediated communication. It is known that the various communication media can have significantly adverse effects, which are often not evident to participants. Can these adverse effects be avoided or mitigated by the appropriate choice of communication medium for the tasks at hand and by adopting good practices and aids? The media options here are improving because of advances in technology, including the ongoing convergence of VC, AC, and CMC in affordable systems. As a result, virtual collaborators can more often choose how to "meet," and—if

they think to do so—how to "tune" effectiveness by astute relative emphasis on video, audio, and computer-mediated media in a hybrid session. We hope that this report will assist those who use virtual collaboration in choosing and tuning wisely.

Lessons on the Effects of Communication Media

How do the various communication media affect group processes and outcomes? More than 40 years of research have produced thousands of papers, books, and dissertations, but inferring an answer from that research is not straightforward, for many reasons. First, technology has advanced markedly, and older research results must therefore be evaluated critically for today's contexts. Second, there exists no agreed-upon model of virtual collaboration and mediated communication to help organize research findings. Third, outcomes depend on many factors: communication medium (or media), task type, context, group characteristics, and individual characteristics. Moreover, these factors interact, complicating interpretations of research. Finally, it is important to note that the baseline for comparison—FTF communications—also has many problems that have been studied in depth in recent decades. The resulting insights must be considered when organizing assessments of the mediated communications. For example, it is necessary to distinguish among meetings (whether FTF or virtual) that are relatively more focused on fact-finding, negotiations, socialization, or "people problems."

Despite these complications, a number of conclusions emerge from the empirical literature. The following have arisen consistently across different experimental conditions, and we see them as largely valid:

- All media change the context of the communication somewhat, generally reducing cues used to (1) regulate and understand conversation, (2) indicate participants' perspective, power, and status, and (3) move the group toward agreement.

In VC, AC, and CMC, participants tend to cooperate less with those at other "nodes" and more often shift their opinions toward extreme or risky options than they do in FTF collaboration:

- In VC and AC collaboration, local coalitions can form in which participants tend to agree more with those in the same room than with those on the other end of the line. There is also a tendency in AC to disagree with those on the other end of the communication link.
- CMC can reduce efficiency (as measured in time to solution), status effects, domination, participation, and consensus. It has been shown useful in broadening the range of inputs and ideas. However, CMC has also been shown to increase polarization, deindividuation, and disinhibition. That is, individuals may become more extreme in their thinking, less sensitive to interpersonal aspects of their messages, and more honest and candid.

Suggestions for Improving the Effectiveness of Virtual Collaboration

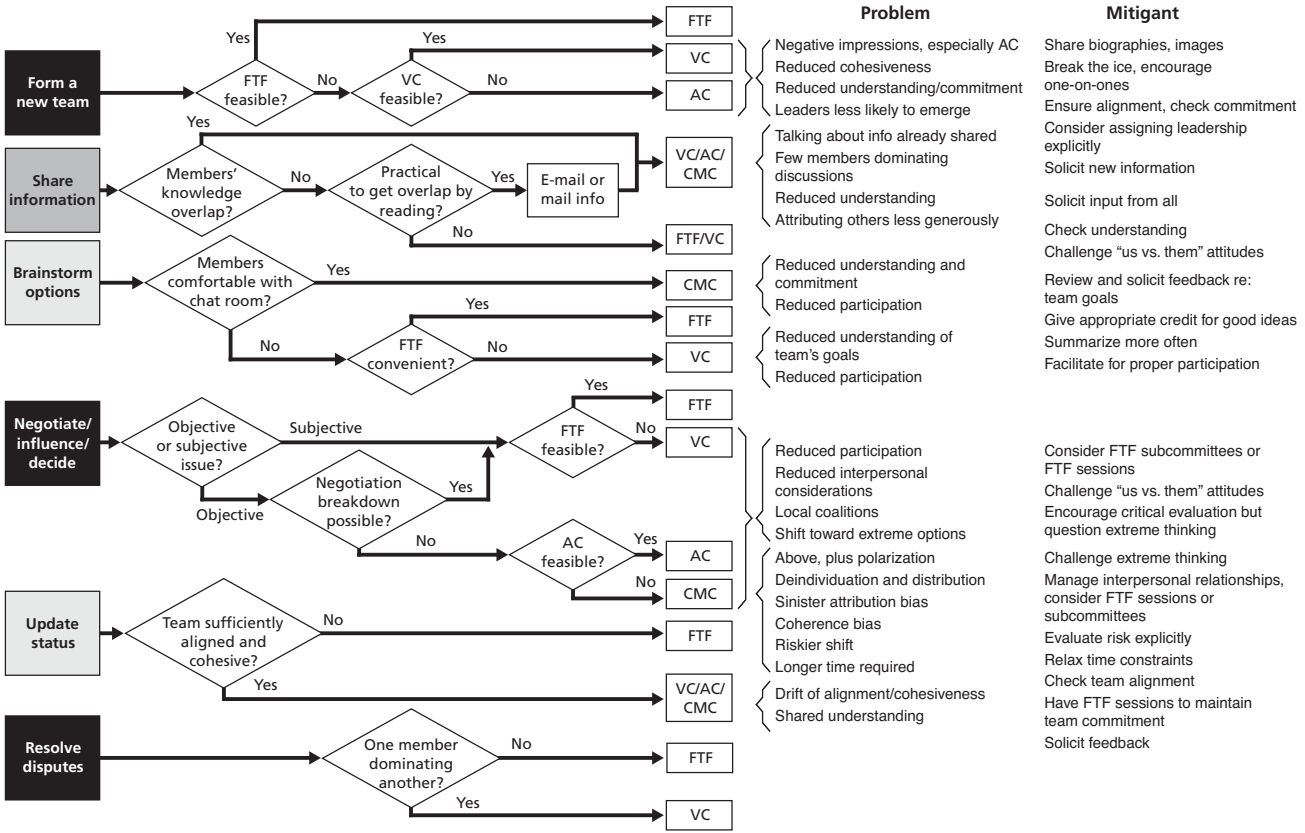
The empirical findings discussed above have some direct practical significance. Simple awareness of the tendency to form local coalitions, for example, might help prevent them. However, many of the effects discussed are not obvious to the participants, and explicit mitigation strategies are therefore called for. Drawing upon the literature and our own experience and reasoning, we summarize in Chapter Four a number of measures to mitigate problems. They include, for example, assuring that people know each other personally before relying upon virtual collaboration or, next best, building in time for "ice-breaking," socialization, and development of common understanding of purpose. Group leaders can be educated about how to prepare for, lead, or moderate virtual collaboration and about the problems to watch for and deal with. This typically requires conscious effort and experience, as does learning to be a good chairperson of a live meeting. Simply "doing it" and relying upon intuition is unwise.

Professional facilitators can be useful, although in our experience, they must have some subject-matter knowledge to have credibility with the team. In some cases, it is better to have a knowledgeable, respected, and "open" leader, trained in facilitation techniques appropriate to the communication medium. Using up-to-date technology (e.g., good sound, good video, and sharing of documents and graphics) is important. Moreover, specialized group software (e.g., group decision support software, GDSS) can be very helpful when used well—a function of education and experience. Individuals can be given guidelines and cautionaries to minimize flaming, reduce tendencies to think poorly of people at other nodes, and encourage awareness of unintended risky shifts and the like.

In addition to suggesting these discrete measures, the empirical record clearly suggests that a given type of mediated communication helps in some situations and hinders in others. We therefore suggest a strategy, summarized in Figure S.1, for choosing the collaboration medium (or tuning the different aspects of a hybrid system with a mix, e.g., of video, audio, and text). The left column distinguishes among different objectives for a given collaborative session; the logic tree in the middle suggests the preference order in which one might choose, for a given objective, the different types of medium. The right column summarizes important challenges associated with each. Interestingly, FTF sessions are not always the best, and relatively "low-tech" CMC characterized, e.g., by e-mail or chat rooms may be especially valuable in some cases. We believe that the strategy represented by Figure S.1 makes intuitive sense and accords with empirical work. However, the most important suggestion may simply be for virtual collaborators to consciously think about the kind of setup that would be most effective for their particular context, rather than simply following the path of least resistance or the path of usual procedure.

We end by again noting that concern about the matters we discuss in the report is clearly appropriate. Sometimes-subtle effects of the media used can indeed adversely affect high-consequence decisions made by virtual collaborators. These adverse effects include biases of judgment, the shifting of team choices toward risky or

Figure S.1
Strategy for Selecting the Best Medium for Virtual Collaboration



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extreme options without adequate evaluation of risks, and the formation of negative attitudes about outside groups and participants who are more "distant" in the virtual collaboration.