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Collaborative Systems for the Management of Resource Conflicts

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Abstract

As the economy and the business environment becomes more diverse and competitive, conflicts over scarce resources are sharpening. In addition, computer networks and advanced telecommunication allow individuals to connect with one another and work with social problems. In this paper we investigate whether collaborative technology facilitate effective management of resource conflicts? Our assumption is that attributions individuals make about others in their group will differ depending on the mode of communication. We therefore predict different outcomes related to the management of resource conflicts depending on motivational orientation and attributions that individuals draw as a result of the medium used for negotiation of resource conflicts. This project consists of 2 studies. Due to space limitations we present only the first study in this research-in-progress report.

Conflicts over scarce resources are sharpening, as the economy and the business environment becomes more diverse and competition increases both within the US and among international groups. Conflicts over scarce common pool resources such as water, fishing grounds, and shoreline are becoming more common and more difficult to resolve as the groups concerned organize and initiate complicated litigations. The Edwards Aquifer controversy and the tragic depletion of cod stock in the North Atlantic are only two well-known instances of the hundreds of resource conflicts that arise every year in the US and internationally. The cost of unmanaged resource conflicts can be immense, including depletion of irreplaceable resources, economic ruin for those who depend on them, and social displacement and unrest. As the rate of change and number of "players" in our economy increases, common pool resource conflicts are only likely to increase.

In addition, the increasing availability of computer networks and advanced telecommunications opens up new possibilities for connecting people and for working with social problems (Hightower & Sayeed, 1997). In this paper we pose the following question: Can collaborative technology be used to facilitate the effective management of resource conflicts? The focus of this project is (1) the use of a computer-mediated communication (CMC) system to promote communication among parties in a resource conflict and (2) the addition of a Group Support System (GSS) to the basic CMC system to help parties manage the conflict. Group Support Systems supplement simpler CMC technology by adding structured procedures and agendas to the basic communication tools. These higher order decision models help participants understand the conflict better, generate and evaluate a range of solutions, and explore integrative solutions.

CMC is becoming increasingly common in our society with the spread of the internet and discussion groups. It has been shown to promote communication and to open up organizations and social groups. Paradoxically this could have both positive and negative impacts on resource conflicts. CMC may promote conflict management by increasing understanding among parties. However, there is also evidence that CMC may make achieving consensus more difficult (Poole, Holmes, & DeSanctis, 1991). CMC may also worsen resource conflicts by facilitating the formation of opposing interest groups (Casey, 1996).

Some preliminary research on cognitive conflicts suggests that GSSs may promote more effective conflict management than either simple CMC or face-to-face interaction (Sambamurthy & Poole, 1992). A model similar to those built into GSSs was used during the complex negotiations that led to the Law and the Sea Treaty (Nyhart & Samarasan, 1989). Case studies indicate that this model promoted constructive negotiations much more effectively than face-to-face discussions. Our paper will shed light on the question of potential advantages and pitfalls in the use of collaborative technologies in the management of resource conflicts. Past research on behavior in resource dilemmas has demonstrated clearly that face-to-face communication among group members increases levels of cooperation to conserve a common resource pool (e.g., Dawes, McTavish, & Shaklee, 1977; Jorgenson & Papciak, 1981; Ostrom & Walker, 1991). It is less clear *why* and *how* discussion works to elicit higher levels of cooperation (see Messick & Brewer, 1983; Orbell et al., 1988; Kerr & Kaufman-Gilliland, 1994). The goals of this research are first, to determine whether common pool resources can be managed effectively using GSS, rather than FTF communication, and second, to determine what communication processes account for the effects of discussion through both media. If GSS is found to mediate conflicts productively, then this finding could have far reaching implications for the design of communication systems for larger-scale resource conflicts.

One important source of conflict among group members are the attributions that members make about each others' motivations and intentions (Thomas & Pondy, 1977; Rutte, Messick, & Wilke, 1987; Sillars & Weisberg, 1987). Motivational orientation (MO) refers to the preferences that a member has for allocation of resources to self and others. Two MOs are particularly important: (1) *individualistic*: the motivation to maximize one's own outcomes; and (2) *cooperative*: the motivation to maximize the sum of one's own and others' joint outcomes. If a group member concludes that others desire to cooperate and harvest the resource at reasonable levels, the member will reciprocate the cooperation (Thomas & Pondy, 1977). On the other hand, if a group member concludes that others have adopted an individualistic MO, then he or she is less likely to cooperate to conserve the resource.

Computer-mediated communication (CMC) differs from face-to-face (FTF) communication because it only permits communication through written modes (El-Shinnawy & Markus, 1997). Cues received through CMC are also more salient, since they are not competing with other cues available in FTF channels (Lea & Speers, 1991; Walther & Burgoon, 1992). Hence, the first few cues are likely to have a more significant impact on attributions in CMC than in FTF conditions. Two characteristics of cues will be explored in this study: cues that signal motivational orientation (individualistic versus cooperative) and cues that signal group identification (whether the communicator's MO is similar to or different from the receiver's). In the first case, the first few comments of a communicator may indicate either competitive or cooperative orientation. Hence, we would predict that:

H1: Attributions about other members' motivational orientations will be more definite and drawn with more confidence in CMC conditions than in FTF conditions.

A group member's initial attributions should also influence his or her later behavior in the resource management task, in some cases fueling and in other cases dampening the conflict:

H2: Attributions about motivational orientation will have a direct effect on cooperation in the resource management task. Specifically, subjects who attribute individualistic MO to others will behave less cooperatively when compared to members who attribute cooperative MO to others.

H3: Individualistic behavior of group members will result in greater negative impacts on resource pool stock in CMC than in FTF conditions, due to stronger and more stable attributions drawn in CMC. Cooperative behavior will result in greater conservation of the resource pool stock in CMC than in FTF conditions.

Research Method

This study uses an experimental research method to contrast CMC groups with FTF groups. Groups of size 8 will be used because this number is sufficiently large to ensure a complex resource use situation. Communication in both FTF and CMC conditions will follow the same protocol to eliminate confounding discussion agenda with mode of communication effects. To test the hypotheses, the experimental groups must have variance in the degree of cooperativeness of their initial discussion. We will manipulate this through assignment of subjects to groups. Prior to the study we will give subjects a pretest to assess their motivational orientation and assign them to groups based on cooperative or individualistic orientation. Groups will be formed with the following motivational compositions: All 8 members cooperative; 6

cooperative, 2 individualistic; 4 cooperative, 4 individualistic; 2 cooperative, 6 individualistic; and all 8 individualistic. We use a 2 X 5 factorial design. The first variable will be communication mode [FTF, CMC] and the second will be motivational composition [(8,0), (6,2), (4,4), (2,6), (0,8)].

Experimental Task: A graphics-based simulation of a commons dilemma situation based on fisheries will be utilized as the experimental task. The program, FISH, simulates the process of harvesting of a fisheries stock by multiple fishers and renewal of the stock through natural reproduction (Gifford & Wells, 1991). FISH provides subjects with information on their own catch (harvest) rate, level of fish stock available, replenishment rate, profits, costs, and other relevant parameters. Subjects play the game simultaneously, interacting in real-time over a series of fishing seasons. Subjects may select different harvesting strategies and collective behavior is reflected in the level of fish stock available. FISH is a complex, realistic experimental stimulus that is well-suited for this study.

Experimental Setting: The CMC system provides computer conferencing over the internet. It enables participants to engage in a discussion electronically. It also provides an electronic "flip chart" to enable members to list ideas, and a rating tool to allow evaluation of ideas. No structure beyond this will be imposed. All members of the conference will meet in the same room, which is equipped with 20 workstations. They will work with the FISH game and interact through the computer conference. Face-to-face groups will also meet in the same room and work with the FISH game on the computers. However, during their discussion period, they will convene in a breakout room with a circle of chairs and a flipchart for recording ideas.

Procedure: Four weeks prior to the experiment, subjects will be given a pretest to assess their motivational orientation (Liebrand & McClintock, 1988). Based on the results of this pretest, they will be classified into sample subsets with cooperative and individualistic orientations. The experimental session will be divided into five periods: (1) Subjects meet for basic instruction in FISH and the computer network. Subjects fill out a pre-experimental questionnaire. (2) Subjects will play 10 rounds of FISH game. This is a sufficient number to enable them to learn how the fish resource depletes in the group setting and to help them set a basic strategy. (3) Subjects communicate with other group members. This session follows an agenda in which each member makes a statement of his/her position initially and then discussion is opened up about how to manage the resource. Free discussion via CMC or FTF mode continues for 15 minutes. Discussion in the FTF mode will be videotaped. (4) Subjects play 10 more rounds of FISH game. This is a sufficient number to determine individual strategies subsequent to discussion (and hence any communication effects) and group outcomes. (5) Subjects fill out post-experimental questionnaire (including manipulation checks) and are debriefed.

Measurement of Communication Behavior: Discussion is automatically captured by the CMC system. In the FTF condition, the videotaped discussion will be transcribed. The transcripts of the discussions will be coded for motivational orientation (cooperative or individualistic) of statements using a coding system to be developed by the investigators. Several variables will index resource management effectiveness, such as group harvest level, final pool size, number of fish replenished, mean individual profit, and mean group profit. This range of outcomes will enable us to evaluate effectiveness at both the individual and group levels. In addition, we can track individual game behavior before and after discussion to obtain a behavioral measure of cooperation and individualism. Post-experimental measures include: attributions about others' motivational orientation; own strategy; outcome satisfaction; perceptions of distributive justice.

Contributions

We expect our study to generate evidence on several points: (1) *The impact, positive or negative, of computer-mediated communication modes on management of common resource conflicts.* If we find no CMC impacts or if they are positive, then CMC might be used to get people talking about resource conflicts. If this study finds the predicted negative impacts, then this is a caution about the use of CMC without decision tools. (2) *Whether advanced information technology in the form of a GSS can promote better management of resource conflicts.* If we find expected effects from GSS, this is information that can be used to design CMC for discussion of resource dilemmas. If we do not, then it shows that more encompassing tools are needed. (3) *Preliminary guidelines for design of decision support systems for common resource pool conflicts*. The design and pilot testing stages of this project should provide advice on the design of computer systems for resource dilemmas.

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