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December 1999

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Recommended Citation

Warkentin, Merrill and Lee, Yang, "The Impact of Information Quality on Perceptions and Outcomes of Computer-Mediated Communication" (1999). *AMCIS 1999 Proceedings*. 128.
<http://aisel.aisnet.org/amcis1999/128>

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The Impact of Information Quality on Perceptions and Outcomes of Computer-Mediated Communication

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Abstract

Organizations are forming virtual teams of geographically distributed knowledge workers to complete workplace tasks. Various computer-mediated communications systems (CMCS) have been developed to facilitate effective collaboration between team members at remote sites. Factors such as "social presence," balanced composition, training, and trust have been shown to have a greater influence on outcome than technological factors. This research explores the role of *information quality* on the perceptions of the virtual collaborative process and on the outcomes of CMCS-based virtual teams. Specifically, we propose to empirically evaluate the impact of changes in *completeness, clarity, and credibility* of information on the collaboration process and outcome. A framework for exploring this important managerial issue is presented, and areas for future research are suggested.

Background

Many organizations are forming virtual teams of geographically-distributed knowledge workers to collaborate on a variety of workplace tasks. "A virtual team is an evolutionary form of a network organization enabled by advances in information and communication technology." (Jarvenpaa, 1998) But how effective are these virtual teams compared to traditional face-to-face groups? Do they create similar teamwork and is information exchanged as effectively? In our current research, it was found that teams using computer-mediated communication system (CMCS) could not outperform traditional (face-to-face) teams under otherwise comparable circumstances. Further, relational links among team members were found to be a significant contributor to the effectiveness of information exchange among them. Though virtual and face-to-face teams exhibit similar levels of communications effectiveness, face-to-face team members report higher levels of satisfaction. Therefore, steps must be taken to improve the interaction experience of virtual teams. Further, guidelines for creating and managing virtual teams are needed; and they must be based on the findings of well-designed research.

Conventionally, information quality has been described as how accurate the information is. Research

and practice over the last decade indicate otherwise. Both researchers and practitioners define IQ to be beyond accuracy (Huang et al., 1999). They identify IQ as encompassing multiple dimensions. Some of the dimensions are objective while others subjective; some are context independent and others context dependent. Furthermore, no standard information quality definition exists today. Three approaches have been used in the literature and in business practice to study IQ: intuitive, system, and empirical approach. An intuitive approach is taken when the selection of IQ attributes in a specific study is based on the individual's experience or intuitive understanding about what attributes are important. Many IQ studies fall into this category. The cumulative effect of these studies is a small set of IQ attributes that are commonly selected. For example, many IQ studies include accuracy as either the only one or one of several key dimensions (Laudon, 1986).

A system approach to IQ focuses on how information may become deficient during the information manufacturing process. Although system approaches are often recommended, there are few research examples. One such example uses an ontological approach in which attributes of IQ are derived based on data deficiencies. Data deficiencies are defined as the inconsistencies between the view of a real-world system that can be inferred from a representing information system and the view that can be obtained by directly observing the real-world system.

An empirical approach analyzes information collected from information consumers to determine the characteristics they use to assess whether information is fit for use in their tasks. The advantage of the empirical approach is that it captures the perceptions of information customers. Furthermore, it may reveal characteristics that researchers and practitioners have not considered as part of IQ. The disadvantage is that the correctness or completeness of the results cannot be proven based on fundamental principles (Huang et al., 1999; Strong et al., 1997; Wang et al., 1998; Lee, 1996).

Research Questions

Will virtual teams with higher information quality outperform virtual teams with lower information quality? Will teams given lower quality information (lower clarity,

for example) also perceive the team's internal communication and collaborative process to be of lower quality or less satisfying? We propose that teams which perceive the quality of the information they have as lower will also perceive the interaction process to be less satisfying and will perform more poorly than teams which are given higher quality information.

Research Methodology

The proposed study would explore the role of information quality on both the perceptions of the process and the performance outcomes of virtual team interaction. Teams will be formed from managers and working professionals who will collaborate using a web-based discussion forum. Twelve teams comprise the control group, and will receive information of high quality. Twelve other teams comprise the treatment group, which will be given lower quality information. Each team has three members. Higher information quality (IQ) will be based on higher levels of completeness, clarity, and credibility. For example, the control group will be given more complete information (more clues) about the murder, while the low IQ group may be given less complete information. The higher clarity of the control group's information will be based on greater specificity ("suspect A was 6 ft. 5 in." instead of "suspect A was tall") and more consistent (rather than contradictory) clues. Finally, higher IQ will also be based on perceived credibility of the source. For example, the control group will be told that "police investigators found ..." while the treatment group might be told "sources tell us ...".

These teams will collaborate on intellectual tasks validated by previous research. Intellectual tasks are those for which there is a known correct answer, as opposed to a consensus of group interaction. The specific task in this case is one previously used by Hightower et al. (1996, 1997) and Warkentin et al. (1997), in which the team members are given information related to a murder mystery. For each murder mystery, they are presented with three suspects and facts surrounding the murder, and are asked to collaborate with two other investigators to solve the murder. The teams will be studied over the course of three separate tasks (separate murder investigations) in order to identify any longitudinal changes in performance and perception of process.

We will also use previously validated pre-test and post-test research instruments. The post-test instrument measured Measures of Relational Links and Group Performance Measures. Three relational variables were measured: Group Cohesiveness, Perceptions of Group Interaction Process, and Satisfaction with Group Outcomes. This instrument is being further adapted for

the next phases of this research to include measures of perception of information quality.

Baseline data will be established in a pre-test survey in order to provide a basis for comparative analysis. Each team member will be asked to rate the quality of various information along three dimensions of information quality. This data will be compared with each member's responses to similar questions at the conclusion of the study.

Future Research

Much of current CMCS research involves research designs which compare the process and outcome of face-to-face teams with those of CMCS teams (virtual teams). There is a great need for exploration of the structural and temporal aspects of virtual team design. Additionally, there is a great need for practical research which seeks to develop empirically based normative theories for choosing appropriate electronic media and the structure, format, and rules for successful implementation of virtual teams with each media.

The findings of our research will suggest several avenues for future research. First, we must conduct a detailed analysis of group interactions to track what activities are performed by members of the groups and how well they are accomplished. Other dimensions of information quality must be evaluated in a similar manner. Another avenue for research is the role of time in building stronger relational linkages between team members, and the impact these linkages have on the perceptions of information quality. A comprehensive contingency framework might be developed to incorporate many of these relationships between and among system and environmental factors, which could serve as a guide to CMCS researchers and practitioners alike.

(References available upon request from Merrill Warkentin.)