

User Perceptions and Groupware Use

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INTRODUCTION

The increasingly complex, global nature of work tasks has led to increased interest in virtual teams that interact across space, time, and organizational boundaries to achieve organizational objectives (Bell & Kozlowski, 2002; Roebuck & Britt, 2002). One of the factors thought to contribute to the popularity of virtual teams is the availability of groupware systems (Townsend, DeMarie & Hendrickson, 1998). While some groupware systems, such as electronic mail, have become almost ubiquitous in many organizations, other groupware applications have not enjoyed similar acceptance (Briggs, Adkins, Mittleman, Kruse, Miller & Nunamaker, 1999; Orlikowski, 1993). Because of the importance of groupware to the success of virtual teams, it is important to understand *why* this innovation has not successfully diffused.

This article uses a diffusion of innovation (DOI) perspective (Rogers, 1995) to understand factors that impact intentions to use groupware technology. The Rogers' DOI perspective gives us a much richer set of factors than other technology adoption models, and should therefore better aid in understanding groupware adoption (Plouffe, Hulland & Vendenbosch, 2001). We surveyed 186 college students and found that intentions to use groupware technology are impacted by perceptions of: relative advantage gained from use of the groupware, amount of complexity in groupware use, compatibility with work practices, and demonstrable results. Suggestions for positively influencing these factors are offered in order to ensure more successful groupware implementations.

BACKGROUND

Group Support Systems

Groupware technology facilitates the work of groups by providing electronic means to communicate, cooperate, coordinate, solve problems, compete, or negotiate. While traditional technologies such as the telephone qualify as groupware, the term is ordinarily used to refer to a specific class of technologies relying on modern computer networks.

The origins of groupware technology are often traced back to the early 1980s, when academic researchers at the University of Arizona, University of Minnesota, and Southern Methodist University developed group "decision rooms" supported by group decision-making software (Power, 2003). With advances in telecommunications over the last two decades, groupware applications have expanded to include e-mail, audio/video/data conferencing, instant messaging, electronic meeting systems, and a host of Web-based collaboration tools. With approximately 130 million workers worldwide expected to telework in 2003, the integration of groupware into organizations is expected to grow rapidly (Roebuck & Britt, 2002).

The growth in virtual teams also reflects this change in work habits, as employees may be located anywhere around the world at any point in time (Townsend et al., 1998). Virtual teams use groupware to span geographic, temporal, and organizational boundaries. The sophisticated communication facilities of groupware facilitate

Figure 1. Groupware classification (source: Johansen, 1988)

	Same time “synchronous”	Different time “asynchronous”
Same place “co-located”	Group decision support systems, Voting, presentation support	Shared computers
Different place “distance”	Videophones, chat, instant messaging	Discussions, e-mail, workflow

frequent communication among team members, which is an important factor in creating a sense of identity in virtual teams (Kezsbom, 2000). In particular, asynchronous groupware helps overcome time-related barriers to distributed work (Kelly & Jones, 2001).

Groupware technologies are typically categorized along two dimensions, time and place (Johansen, 1988), as shown in Figure 1. Based on the time dimension, users of the groupware can work together at the same time or different times. On the other hand, the place dimension indicates that groupware users can work together in the same place or in different places.

Diffusion of Innovations

Diffusion of innovation (DOI) research is concerned with how use of an innovation spreads throughout a social system (Mahajan, Mueller & Bass, 1990). Diffusion theory has been applied to a wide range of technologies, including information and communication technologies such as groupware. Diffusion theory states that potential adopters' *perceptions* of an innovation's characteristics, rather than an objective assessment of how an innovation rates on these characteristics, impact the diffusion rate (Rogers, 1995). Rogers (1995) identifies five perceived characteristics of an innovation that influence its adoption: relative advantage, compatibility, complexity, trialability, and observability. Moore and Benbasat (1991) provide empirical support for breaking observability into two constructs: result demonstrability and visibility. Additionally, because use of innovations may be optional in some settings, the degree to which potential users feel that innovation use is voluntary has been found to be important in understanding innovation use (Agarwal & Prasad, 1997).

Other models such as the technology acceptance model, or TAM (Davis, 1989), have proposed characteristics that may influence adoption, including perceived usefulness and perceived ease of use, which are conceptually similar to relative advantage and complexity (Moore & Benbasat, 1991). However, this research uses Rogers' diffusion theory with the additional constructs noted previously. Reasons for this are two-fold: first, we seek a

better understanding of the groupware technology diffusion process. As such, Rogers' model offers a richer set of potential factors than does the more parsimonious TAM model (Plouffe et al., 2001); second, we hope to provide guidance to managers to ensure successful groupware implementations. Again, Rogers' model provides us with more areas that can be influenced by management to create environments conducive to groupware adoption.

MODEL OF GROUPWARE TECHNOLOGY DIFFUSION

Based on the previous research, we propose the model in Figure 2 for understanding factors important to groupware technology diffusion. In general, the model suggests that users' perceptions of a groupware system influence their subsequent intentions to use the groupware system. Research indicates that these intentions are highly correlated with actual future use (Davis, 1989).

Validating the Model Using Domino

As a test of our model, we surveyed students at a major midwestern university. The students, primarily college seniors, were enrolled in courses where a groupware system, Lotus Domino, was made available to them for optional use in the course. The Lotus Domino Discussion database is an asynchronous groupware product designed to be used “any time and any place,” placing it into the lower right-hand portion of the grid in Figure 1. The Domino groupware system was chosen because it supports student-centered, project-based courses, with faculty as facilitators of student learning, as opposed to providers of information. In our experience, Domino does help in achieving learning goals in such courses (Day, Lou & Van Slyke, 2004).

Users access Domino discussion databases and participate in group discussions over the Internet using a Web browser. Users have the ability to browse through or participate in discussion topics and responses contributed by others. The history of any discussion is pre-

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