THE ADOPTION AND USE OF GSS IN PROJECT TEAMS: TOWARD MORE PARTICIPATIVE PROCESSES AND OUTCOMES

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Abstract

This paper reports the results of a field study of six medical project teams that worked together in meetings over a seven-week period to develop plans to improve customer service within a hospital. Half the teams used a group support system (GSS), while the other half used traditional processes that were the habitual norms for this organization. In the teams using traditional project team processes, the leaders defined the teams’ project goal, directed discussions, recorded and controlled the teams’ notes, assigned tasks to team members, and prepared and presented the teams’ report. In the GSS teams, the leaders faced leadership challenges or abdicated, regular members participated to a greater extent, the project goal emerged from team discussion, and the teams’ notes were open and widely distributed. In short, processes in the GSS teams were more participatory and democratic. At first, teams found the GSS-based meeting processes very uncomfortable and returned to traditional verbal discussion-based processes. Once they returned to these traditional processes, however, they found them uncomfortable and moved back to include more electronic communication-based processes. Participants’ attitudes (satisfaction, perceived effectiveness, and cohesiveness) were initially lower in GSS teams, but gradually increased, until they equaled those of the traditional teams. There were significant differences in overall project outcomes: traditional teams developed conservative projects that met the unstated project agenda perceived by the team leaders. In contrast, GSS teams developed projects more closely aligned to the interests of team members.

1Kwok-Kee Wei was the accepting senior editor for this paper.
Introduction

Group support systems (GSS) are being adopted by a small but growing number of organizations (Briggs et al. 1997). Most organizations have used GSS in day-long meetings with many participants (Grohowski et al. 1990; Van Genuchten et al. 1997). But, the pattern of GSS use is gradually changing as it is incorporated into the normal routines of project teams (e.g., Briggs et al. 1998; DeSanctis et al. 1991).

Initial research suggests modest success for appropriately used GSS in one-time meetings (Dennis et al. 2001). There is a paucity of evidence, however, on how project teams adopt GSS over time in field settings and if it is useful in ongoing projects (Christensen and Fjeremstad 1997; Fjeremstad and Hiltz 2000; Pervan 1998). As the use of GSS by project teams increases, it is important to understand how GSS use affects their processes and outcomes.

This paper reports on a field study of six project teams, of which three used a GSS and three used traditional meeting processes. We focus on the participativeness of work processes, and how that participativeness impacted work products. While there is evidence that GSS use can increase the equality of participation in quantitative terms (e.g., number of comments; Fjeremstad and Hiltz 1998), there is no indication that such increased participation results in more participative processes or products that more strongly incorporate the contributions of team members. Our primary analyses are qualitative (e.g., using observations, interviews, and transcripts), but following the advice of Mingers (2001), who advocates multiple methods, we also use quantitative and statistical analyses (e.g., questionnaires, project ratings).

Previous Theory and Research

This research focuses on how a GSS can impact project teams over time. Project teams are brought together for a limited time to address a specific task through a series of meetings. Work is frequently accomplished outside of meetings and when not all members are present (McGrath 1991). Project teams tend to be of moderate size (between 5 and 10 members) and comprised mostly of peers, some of whom work together on a daily basis (Kinney and Panko 1996; McGrath 1984). The task is often to develop plans to solve a problem (Kinney and Panko 1996).

GSS Effects on Work Processes and Project Outcomes

Much prior GSS research has been guided by the process gains and losses framework (Steiner 1972). Simply put, communication among team members introduces factors that act to improve performance (process gains) and factors that act to impair performance (process losses) relative to individuals working independently. GSS attempt to alter the way in which teams work (DeSanctis and Galleu 1987; Nunamaker et al. 1991) to change the balance of forces between process gains and losses (Connolly et al. 1990, Pinsonneau 1999), so that teams experience more gains than losses. GSS may also inadvertently introduce new process losses. There are many different types of GSS, but one common distinction is between single-user GSS, in which only the facilitator uses the GSS, and multiuser GSS, in which computers are provided to every participant so they can use electronic communication in addition to, or instead of, verbal communication (Ackerman and Eden 2001). A multiuser GSS can also be used in single user mode—termed chauffeured use—when one member (typically a facilitator) captures comments as the members discuss the issues verbally.

A GSS can affect the way in which teams work through both its structural features and its spirit.
Structural features are the specific components of the GSS, their capabilities, and the “specific types of rules and resources, or capabilities, offered by the system” (DeSanctis and Poole 1994, p. 126). For example, structural features such as anonymity can influence how information is discussed in a multiuser GSS, while a single-user GSS does not enable anonymity. The spirit of the technology is the general intent of its structural features, and is broadly defined to include the system design, its features, user interface, and training materials (DeSanctis and Poole 1994). This holistic view is more open to interpretation than are the structural features because both the designer’s intentions and the users’ perceptions influence the spirit.

The spirit of many multiuser GSS is to promote a meeting process that is fair and participative (Ackermann and Eden 1994; DeSanctis et al. 1991; de Vreede and de Bruijn 1999). Often, the spirit is to promote what Habermas terms ideal speech:

- to ensure that (a) all voices in any way relevant can get a hearing, and that (b) the best arguments we have in our present state of knowledge are brought to bear, and that (c) disagreement or agreement on the part of the participants follows only from the force of the better argument and no other force (Habermas and Nielsen 1990, p. 104).

The extent to which participants influence outcomes should be affected by the extent to which they are informed, correct, or have evidence, not their rank.

Multiuser GSS provide many tools that contain structural features to guide how the team interacts (DeSanctis and Poole 1994; Orlikowski 1992; Orlikowski and Robey 1991). Most multi-user GSS enable electronic communication, which can provide three structural features that may promote more participative interaction: parallelism, anonymity, and meeting memory (Nunamaker et al. 1991; Zigurs and Buckland 1998). We consider each feature separately, but in practice they blend together to affect how a team uses a GSS (DeSanctis et al. 1993).

The first, parallelism, is the ability for members to exchange information simultaneously. Everyone can type at the same time, so no one needs to wait for others before contributing as they would in a single-user GSS. This mitigates production blocking (Gallupe et al. 1994; Valacich et al. 1994) and more equal participation.

The second structure, anonymity, enables members to make contributions without attaching their names which is not possible when contributions are made verbally (i.e., using single-user GSS). Anonymity affects participation primarily through social influence (Jessup et al. 1990; Pinsonneault and Heppel 1997). If participants believe their comments are truly not identifiable (cf., Hayne and Rice 1997), evaluation apprehension, the fear of negative evaluation that can cause individuals to withhold opinions and information (Lamm and Trommsdorff 1973), may be reduced. Anonymity may reduce the reluctance to challenge the views of those in power, but may also increase free riding (Nunamaker et al. 1991; Tyran et al. 1992). Anonymity only has significant effects on participation when the importance of social evaluation is high (Pinsonneault and Heppel 1997); most laboratory studies with students have found few effects (Pinsonneault and Heppel 1997), but field studies suggest that anonymity can be important (e.g., Jones and de Vreede 2000; Tyran et al. 1992; van den Herik and de Vreede 2000).

The third structure, meeting memory, means that all typed comments are stored. Such a public memory can be used by all members to document decisions and remind themselves of what others have said (Nunamaker et al. 1991) so that they do not overlook information (Harari and Graham 1975; Maier 1970). The storage of comments is a physical feature that may impact participation, but is socially dependent on how a team utilizes it. Meeting memory may increase the equality of participation.
participation because every comment that is entered is saved unless explicitly deleted; the team as a whole owns its memory instead of having one person take notes and be in charge of the collection, documentation, and distribution of the meeting memory.

The spirit and structural features of a GSS cannot force ideal speech because their impact depends on their appropriation into the team’s social structures. The ways in which a GSS affects work are not always consistent across teams (e.g., Markus 1992; Zack and McKenney 1995). It is the interaction between the structures and spirit of the GSS, the habitual norms of the team, and the way in which the team uses the GSS that result in changed work processes (DeSanctis and Poole 1994). Teams may appropriate the GSS faithfully (in accordance with the “spirit and structural feature design” of the GSS [DeSanctis and Poole 1994, p. 130]), or unfaithfully. For example, one way to unfaithfully appropriate a multiuser GSS is to use it in single-user mode during idea generation, allowing only one person to type into the meeting memory at a time.

Significant prior research shows that when teams faithfully appropriate a multiuser GSS, there is an increase in overall participation and equality of participation in terms of the raw quantitative number of comments, both in ad hoc groups studied in laboratory experiments and in organizational groups in the field (e.g., Bikson 1996; Davison 2000; Fjermestad and Hiltz 1998; Kelsey 2000; Kremar et al. 1994; Majchrzak et al. 2000; Tan et al. 1999; Tyran et al. 1992; Williams and Wilson 1997).

While more equal participation may be one goal (Habermas 1984; Habermas and Nielsen 1990), it is the improved performance from the more participative processes of ideal speech that is often the ultimate goal (Collins 1997; Magjuka 1989; Wagner 1994). Participative processes are those in which “influence is shared among individuals who are otherwise hierarchical unequals” (Wagner 1994, p. 312, emphasis added). In participative processes, lower ranking participants influence outcomes, not just have more opportunity to contribute. One might argue that more equal participation should lead to more participative processes and outcomes; after all, increased participation should bring more information, resulting in improved processes and outcomes that reflect that additional information (Ess 1996; Kelsey 2000). However, empirical evidence shows that the increased participation and equality of participation from GSS use does not always—or often—result in more equal influence or different outcomes, particularly in field settings where power is important (e.g., Dennis et al. 1997; Ess 1996; Hiltz and Turoff 1993; McLeod et al. 1997; Niederman and Bryson 1998; Parent and Gallupe 2001; Tan et al. 1999; Weisband et al. 1995; Zack and McKenney 1995).

We believe that inducing more equal participation is necessary but not sufficient to create more participative outcomes (Burdett 2000). Increased participation or equality of participation may have little real effect on project outcomes when those in power hold different opinions. While GSS processes may encourage more participation, those in power may choose to ignore it, so that the outcomes remain unchanged. Participativeness is reflected in the extent of influence exerted by leaders and team members in the leadership and decision-making processes enacted by the team (Collins 1997; Magjuka 1989; Wagner 1994). Teams are more participative only when those in power choose to listen to and act on the participation; leadership has a strong moderating impact on the link between more participative processes and more participative outcomes and can enhance or stifle participation (Lim et al. 1994; Parent and Gallupe 2001; Sosik 1997; Zack and McKenney 1995). As such, a true understanding of participativeness may only be reflected in what happens after the project is complete; that is, does participation have an impact or is it ignored?

Teams may have two sources of leadership: the leader and a facilitator. The leader focuses on the content of the discussions, while the facilitator focuses on work processes. There are many ways of examining leadership (e.g., participative, directive, transactional, transformational) (Bass 1999; Sosik 1997); our focus is on participative
and directive leadership. Directive leadership occurs when those in power closely control how a task is done (Muczyk and Reimann 1987; Sagie et al. 2002). When leadership is directive, team performance depends to a greater extent on the ability and knowledge of the team leader; when leadership is participative, performance depends more on team members’ ability and knowledge (Murphy and Fielder 1992; Sagie et al. 2002). While the leader’s individual characteristics will influence leadership style, organizational culture is also important (House and Aditya 1997).

In traditional non-GSS teams, leaders exercise dominance by controlling verbal queues, talking more often than others, preempting conversations, using nonverbal cues such as eye contact, and physically setting themselves apart from others (e.g., sitting at the head of the table) (Hiltz et al. 1991; Hovells and Becker 1962). In GSS’s electronic communication, many patterns of leadership—or the first advocacy often used to claim leadership—are weakened (Weisband et al. 1995) and thus leaders face greater challenges in exerting power (Eveland and Bikson 1988). When GSS are used in decision rooms, verbal discussion frequently augments electronic communication (Nunamaker et al. 1991; Tyran et al. 1992), so traditional leadership behaviors can still be used (de Vreede and de Bruijn 1999; Parent and Gallupe 2001). The leader shapes participants’ interaction (de Vreede and de Bruijn 1999; Parent and Gallupe 2001). Strong leadership can negate the participative structures and spirit of the GSS (DeSanctis et al. 1993; Lim et al. 1994; Parent and Gallupe 2001), so that GSS become “agents of phony democracies” (Parent and Gallupe 2001, p. 416).

Both single user and multiuser GSS often include a facilitator who can also provide leadership (Ackermann 1996; Bostrom et al. 1996; Niederman et al. 1996; Nunamaker et al. 1991). Whereas a team leader may set project goals and focus the content of discussions, a facilitator focuses on processes (Phillips and Phillips 1993). Facilitators play many roles: designing and maintaining agendas, matching GSS tools to the task and team, helping the team to adopt the GSS, clarifying and focusing on meeting objectives, and asking challenging questions (Ackermann 1996; Bostrom et al. 1996). As such, the facilitator helps the team to appropriate the GSS and create an environment for more equal participation (Ackermann 1996; Bostrom et al. 1996; Clawson et al. 1993; Niederman et al. 1996; Nunamaker et al. 1991). The facilitator is the living embodiment of the participative spirit and can significantly affect use (Batenburg and Bongers 2001; Schuman and Rohrbaugh 1991).

In summary, it is the structural features of the GSS (parallelism, anonymity, memory) that create the opportunity for and induce the team to more equal participation. It is the participative spirit of the GSS, often fostered by a facilitator, that can impel the team to the more participative processes and outcomes of ideal speech. While we can offer no study providing a clear link between the use of GSS with facilitators and more participative outcomes, one case study found that users of a facilitated GSS perceived that they had more impact on the outcomes than in non-GSS meetings (Bikson 1996), and a recent meta-analysis found that GSS teams with facilitators produced better decisions and were more satisfied with the processes than those without facilitators (Dennis et al 2001). Of course, no facilitator or GSS can cause more participative processes if the team or team leader does not wish to create them (cf., Parent and Gallupe 2001). We hypothesized

H1a: If teams faithfully appropriate a GSS, work processes will be more participative.

H1b: If teams faithfully appropriate a GSS, the products they produce will reflect the more participative nature of their work processes.

**GSS Appropriation**

We have qualified our arguments by assuming that teams successfully appropriate GSS. Most GSS research has examined special-event
meetings in which participants work on a task for one meeting, whether in the laboratory or field (Dennis and Gallupe 1993; Dennis et al. 2001; Fjermestad and Hiltz 1998, 2000). Far fewer studies have examined GSS use over time on the same project. Most studies over time have examined series of special-event meetings, with new tasks at each meeting (e.g., Chidambaram 1996; Hollingshead et al. 1993), or series of special-event meetings for large groups (e.g., Ackermann and Eden 2001; Batenburg and Bongers 2001; Gopal and Prasad 2000; Trauth and Jessup 2000).

Much previous research on GSS effects on members’ attitudes over time has examined ad hoc groups in laboratory settings (e.g., Chidambaram 1996; Chidambaram and Bostrom 1996; DeSanctis et al. 1991; Hollingshead et al. 1993; McGrath et al. 1993, Walther 1993; Zigurs et al. 1991). This research suggests that members of GSS teams express more negative attitudes toward team performance (e.g., perceived effectiveness, satisfaction) and toward each other (e.g., cohesiveness) than non-GSS teams during their initial meetings. Over time, these attitudes tend to increase to a level similar to that of non-GSS teams, but not always consistently.

One potentially important difference between project team use of GSS and prior studies lies in the effects of time on the teams’ work processes because these processes influence members’ perceptions and the quality of the products produced (Majchrzak et al. 2000). Over time, a culture or set of implicit social structures emerges to guide how teams interact. These structures evolve and may differ from one part of an organization to another (DeSanctis and Poole 1994; Giddens 1979, 1984; Orlikowski 1992; Orlikowski and Robey 1991), but nonetheless they form a powerful set of “habitual routines” (Gersick and Hackman 1990) that define how team members expect to work together (Majchrzak et al. 2000). For example, the leader may chair meetings, record the minutes, and make key decisions, while members work together on the same issues at the same time by taking turns speaking. Social structures evolve from interaction. As members work together, they establish structures that constrain how they act by defining normal and unacceptable behavior (Gersick and Hackman 1990). There is a duality of interaction; action creates structures and structures constrain action (Giddens 1979, 1984; Orlikowski 1992; Orlikowski and Robey 1991). This interplay of action and structure eventually settles into a somewhat stable set of habitual norms for most teams (DeSanctis and Poole 1994).

When a team first uses a GSS, members must learn the new GSS structures and decide which ones to appropriate and which ones to reject. The team’s habitual structures influence their understanding of the GSS structures (DeSanctis and Poole 1994; Orlikowski 1992; Orlikowski and Robey 1991). As a team begins to use a GSS, their understanding of its structures evolves with experience (DeSanctis and Poole 1994; Orlikowski 2000). Each time a team uses the GSS, new social structures and processes are possible as the team combines its traditional processes with GSS processes (DeSanctis and Poole 1994; Gersick and Hackman 1990; Majchrzak et al. 2000; Orlikowski 1992; Orlikowski and Robey 1991). Each time they use the GSS, members may reinvent their processes and structures (Orlikowski 2000). In time, new GSS-based structures may become the norm (DeSanctis and Poole 1994), but these too can change (Orlikowski 2000).

Teams may appropriate the GSS faithfully or unfaithfully. The appropriation process is mediated by the degree to which the structures of the GSS, team, and environment are misaligned, the malleability of those structures, and the impact of disconfirming events (Majchrzak et al. 2000). Faithful appropriation is more likely when the team receives support for the appropriation (Dennis et al. 2001; Wheeler and Valacich 1996). One form of support is a facilitator or team leader who provides direct intervention into the meeting process to dissuade unfaithful appropriation and encourage faithful appropriation (called metastructuring by Orlikowski et al. 1995). For example, in a multiuser GSS environment the leader could encourage an open and anonymous debate of decision alternatives faithful to the GSS spirit.
When participative social structures inherent in the GSS’s spirit and structural features are closely aligned with the team’s preexisting social structures, the team should quickly understand them, because there should be fewer misalignments between the old and the new (Leonard-Barton 1988; Majchrzak et al. 2000); the team should find it simple to appropriate them in a faithful manner. In cases where the participative spirit and structures collide with well-established, less-participative structures, the team should experience problems in understanding and appropriating them because of the greater misalignment (Leonard-Barton 1988; Majchrzak et al. 2000). The greater the misalignment between old and new structures, the greater the turmoil and tension around adopting them (Conner 1993; Levinson 1978). Participants may perceive that they are less effective, less satisfied, or less cohesive when faced with misalignment (e.g., Chidambaram 1996; Chidambaram and Bostrom 1996).

In this study, we examine GSS use by nurses in a hospital, a setting well known for its non-participative culture (Adams and Bond 1997; Jones et al. 1997), in which nurses face significant power disadvantages from both the hierarchy and physicians (Makaram 1995; Sweet and Norman 1995). We would expect a high degree of misalignment between the participative GSS structures and the less participative existing structures. Teams should experience initial turmoil because members do not understand the GSS processes; initially members’ attitudes toward their performance (e.g., perceived effectiveness, satisfaction) and toward each other (e.g., team cohesiveness) should decline because members should be uncomfortable with the change (Conner 1993; Levinson 1978; Orlikowski 1993). After they accept and/or reject some or all of the new structures, the processes and attitudes should stabilize (Conner 1993; DeSanctis and Poole 1994; Levinson 1978). These cycles of change and adaptation of the GSS can lead to different results depending on the structures the teams bring to the processes and how each team adapts the GSS features (Zigurs et al. 1991).

If a team’s habitual norms are not malleable, then the team will be less inclined to faithfully appropriate the participative structures inherent in the GSS (Majchrzak et al. 2000). We do not know how malleable these teams’ social structures are, but given the general desire for participatory interactions in American culture (Collins 1997) and by the nursing discipline in particular (e.g., Mancuso and Toye 1994; Moss and Rowles 1997; Warner 1998) we believe that these structures are malleable (Aydin and Rice 1992). Thus, if the new work processes a team chooses to use are successfully appropriated and offer benefits, we would expect the initial decrease in the members’ attitudes and perceptions to be followed by increasingly more positive attitudes (cf., Chidambaram and Bostrom 1996). As members gain experience with the GSS and begin incorporating its structures into their processes, initial inexperience should give way to increased skill and better integration of the GSS structural features into the team’s processes, thus bonding the team together and moving them forward toward the completion of their task. Therefore

H2a: Project teams that use a GSS will experience an initial period of turmoil in which members’ attitudes toward team performance and other team members will drop.

H2b: Over time, GSS team members’ attitudes toward team performance and other team members will increase to a level at least similar to that of traditional teams.

Method

Participants

This study examines the efforts of six project teams from the Department of Nursing in American Medical Center (AMC)3 to improve customer satisfaction. This effort was undertaken jointly with American Physicians Corporation (APC), its sister organization of physicians affiliated with the

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3 All names are pseudonyms.
hospital. The Department of Nursing was divided into five principal directorates and three supporting directorates that reported to the Vice President of Nursing (VP). Six project teams were formed from the directors and managers in these directorates, plus their counterparts from APC. The six project teams were organized around the five principal directorates with the exception of the Critical Care/Trauma directorate, which, due to its size, was divided into two teams, one for Critical Care, one for Trauma. Due to capacity limitations, not all teams could use the GSS facility. Therefore, we randomly selected (via a coin toss) three teams to use the GSS facility and three teams to use their traditional meeting processes.

Teams ranged from six to eight members (mean 6.7) and were predominantly female, with an average of one male. Each team was comprised of one AMC director and members of the next management level below director and their counterparts from APC. Although similar in structure, teams were not similar in cohesiveness; all traditional teams were more cohesive than all GSS teams as the project began, as shown in the results section.

The GSS

The GSS meeting room was located in a building adjacent to AMC’s main building and provided 16 networked microcomputers with a large screen video projection system. The GSS software was GroupSystems (Nunamaker et al. 1991). The facilitator assisted in the technical operation of the GSS, acted as a scribe when asked, and advised in tool selection. The facilitator often plays an active process role in chairing verbal discussions (see Tyran et al. 1992), but the leaders immediately rejected this idea and chose to chair the meetings themselves. The same was true in the traditional teams: in each case the team leader chose to chair the discussions.

The Project

The project (and our involvement in it) was proposed by the VP. The VP had the authority to validate the use of the GSS and the need for the project. The teams’ objective as repeatedly defined by the VP was to write a proposal to improve the satisfaction of four customer groups: patients, families, physicians, and nurses. Interviews with AMC directors showed that they believed that the actual, unstated goal of the VP was to improve physician satisfaction.

The project began with a kickoff meeting in which the VP introduced the project and its goals, and explained the role of the researchers and the GSS. To help organize, analyze, and report the project plans, teams were given the 15-page Baxter Planning Worksheet used by AMC to develop organizational change proposals. This worksheet covered items such as project overview, project definition, key success factors, required investment, experience with similar projects, project competitors, other alternatives considered, and potential impacts. The teams were asked to draft a project plan using the worksheets and to give a short presentation seven weeks later at the final meeting. The teams were introduced to the concept of a GSS and told whether or not they had been randomly assigned to use the GSS. In the kick-off meeting, the teams were given 45 minutes to organize their plans; no GSS support was provided.

Data Sources and Analyses

At least two levels of analysis can be used to understand the appropriation and impact of GSS work processes in project teams. DeSanctis and Poole (1994) distinguish between micro-level analyses of speech acts, and higher level (global) analyses of overall processes. In this study, we focus on the global level.4

We collected both qualitative and quantitative data from multiple sources (observation, interview, ...

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4Micro-level analysis examines specific speech acts of participants and effectively requires a tape recorded transcript to ensure accurate analysis. We were not permitted to record meetings, precluding us from micro-level analysis.
transcripts, and questionnaires) (Strauss and Corbin 1990). By using a mixed method approach we were able to triangulate over methods. Our analyses are within-team over time and between-teams. Following Majchrzak et al. (2000) and Maznevski and Chudoba (2000), we used quantitative questionnaire data to enhance our understanding of the qualitative data, rather than as a primary focus of statistical hypothesis tests which are made problematic by the fact that we studied a small number of teams. This mixed method of utilizing quantitative survey data with a small N to complement qualitative data has become accepted in IS research and adds to the critical trail of evidence required to triangulate with the qualitative data (Mingers 2001; for examples, see Reich and Kaarst-Brown 1999; Zack and McKenney 1995). While we use statistical analysis to provide additional insight, it is the qualitative analyses within and across teams over time that provides depth and understanding rather than specific p-values on the statistical tests.

Qualitative Analyses

Qualitative observational data were collected to build a chain of evidence to describe the teams’ work processes. First, all meetings except one were observed by the first author with about one-third of meetings also being observed by a doctoral student (who observed the one meeting missed by the first author). Detailed notes were taken and case reports completed within 24 hours of each meeting; minor differences in notes were resolved between observers. We would have preferred to audiotape meetings, but this was not permitted. Second, transcripts of all electronic comments during GSS meetings were made. Third, each team leader was interviewed between each meeting. Finally, we returned two years later to examine the impact of the projects on AMC. During this visit we spent several hours interviewing the VP, the Director of Research, and two nurses, as well as observing the outcomes of the projects.

The qualitative data were analyzed in an iterative process of repeatedly identifying and refining the structures in the teams’ work processes (cf., Klein and Myers 1999), a process similar to that of Trauth and Jessup (2000). We began by using the structures proposed by DeSanctis and Poole (1994, p. 131) as seed categories (e.g., methods of idea generation, participation). We then added categories suggested by the data that gave insight into the participative constructs of leadership and influence. We reanalyzed the data using these new categories. These categories were refined, some were deleted, some more were added, and so on until we could identify no more changes (see Strauss and Corbin 1990). We conducted five separate iterations of data analyses. The final categories that emerged from the qualitative data were method of discussion, leadership emergence, participation, meeting continuity, assignment of work tasks, source of projects, and reaction to projects. Due to the volume of data collected, we looked for higher level themes running through our final categories in order to develop a clearer story of the data. These higher order themes were leadership processes and decision-making processes. It was the uncovering of these categories and themes rooted in the data that drove the analysis of this research.

Quantitative Analyses

Four measures came from a questionnaire administered after each meeting. Perceived equality of participation was measured using one item with a 1 = unequal, 6 = very equal scale. The other attitude items were cohesiveness (three items from Price and Mueller [1986], Cronbach’s alpha = .68). Our goal was to have participants assess the number of people contributing to the discussion to triangulate with our assessments as recorded in our notes. The goal was not to assess one individual’s personal feelings, as we would when measuring satisfaction, for example. We used only a one item measure because we believed that anchoring the scale to specific behaviors (e.g., one person did almost all of the discussion) was more important than using the seven-point perceptual scales as used in the other questionnaire items. There is always a concern about reliability with one-item measures. Therefore, we treated each response to this question for each meeting as one rating from one judge and used Cronbach’s alpha to determine the inter-judge reliability. The results (alpha = .75) suggest that the responses were reliable.
.70), perceived meeting effectiveness (three items adapted from Dennis et al. [1997], alpha = .80), and satisfaction with the meeting (three items adapted from Dennis [1996], alpha = .82). Cohesiveness was also measured at the start of the project (at the kick-off meeting). We analyzed the data separately for the GSS and traditional teams using hierarchical ANOVAs with one quantitative factor for the week in which the meeting occurred and a second qualitative factor for the team, to account for possible correlation among responses from members of the same team6 (see Dennis 1996, pp. 444-445; Walther and Burgoon 1992, p. 67).

A fifth quantitative measure was on the post-study questionnaire (given in the final meeting during which the teams presented their projects), which asked the participants to rate all projects for impacts on the four customer groups (patients, families, nurses, and physicians).7 This measure was designed to assess the extent to which the projects focused on the different customer constituencies.

The final quantitative measure, also on the post-study questionnaire administered in the final meeting, asked members of the GSS teams to rate the importance of the four GSS structural features believed to increase participativeness (parallelism, anonymity, meeting memory, facilitator) and a fifth feature (meeting planning) on a seven-point (1 = not needed to 7 = very important) scale.

Analysis

Because this is a field-based case study, rather than a controlled experiment with scripted procedures, our primary focus is on qualitative analysis, not the quantitative analysis. We begin with analyses of the work processes used by the teams and then examine project outcomes. We conclude with a cross-team comparison that draws conclusions for our hypotheses.

Work Processes

In analyzing the work processes, we focus on two key participative dimensions proposed by DeSanctis and Poole (1994): leadership processes (how teamwork is focused and who does the work) and decision processes (how the team performs the work and makes key decisions). First, we examine the three teams that used traditional project team processes to identify patterns and common themes in their leadership and decision processes. Second, we examine the processes used by the GSS teams to identify patterns and common themes in their work processes. Third, we interpret the results and reflect upon the differences between the traditional and GSS teams.

Work Processes in Traditional Teams

In addition to the kick-off meeting in which the three traditional project teams began their discussions about the project, two traditional teams (which we call T1 and T2) held three meetings, while the third team (T3) held two meetings. Meetings ranged from 50 to 90 minutes in length (mean 68 minutes). Table 1 summarizes the leadership processes in the traditional teams. In all three teams, members assumed that the highest ranking person would become leader. In all cases, there were no challenges to this leadership and this person quickly emerged as the leader and began directing the team’s activities.

In teams T1 and T3, the leader proposed a project idea during the kick-off meeting which was quickly...
Table 1. Leadership Processes in Traditional Teams

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<th>Team</th>
<th>Leadership Emergence</th>
<th>Source of Project</th>
<th>Assignment of Work Tasks</th>
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<tbody>
<tr>
<td>T1</td>
<td>Highest ranking person (the director) was presumed to be the leader and naturally assumed the role.</td>
<td>Leader proposed an idea that had been identified by a prior task force (the problems faced by patients’ families caused by the lack of a waiting room and a consultation room in which to talk with the physicians) and possible solution proposed by the task force (construction of a consultation room, and the provision of old, unused pagers to families so that they could wait anywhere in the hospital and still be contacted immediately) for the project. The project idea and solution had been previously identified by an AMC task force.</td>
<td>No formal meeting agendas were developed or discussed. The leader assigned two members some between-meeting work (developing and administering a questionnaire to physicians and families to support the team’s claim that the lack of consultation and waiting rooms was hurting satisfaction). The leader developed presentation slides and had the team review them.</td>
</tr>
<tr>
<td>T2</td>
<td>Highest ranking person (the director) was presumed to be the leader and naturally assumed the role.</td>
<td>Guided by the leader, the discussion at the kick-off meeting quickly focused on how nurses did not always accord residents and private physicians the same respect they received at other hospitals. The team decided that their project would be to improve physician satisfaction. The leader unilaterally changed the focus of the project to T3’s questionnaire project in a later meeting.</td>
<td>No formal meeting agendas were developed or discussed. The leader assigned tasks for herself and two team members between meetings. The team decided to do a skit as the introduction to the presentation and planned it jointly with T3.</td>
</tr>
<tr>
<td>T3</td>
<td>Highest ranking person (the director) was presumed to be the leader and naturally assumed the role.</td>
<td>Several weeks prior to the kick-off meeting, the leader had proposed to AMC administration that she survey physicians to determine how her department could be improved. She was told to wait. When she suggested the idea at the kick-off meeting, “no one opposed it.” The idea was challenged in the second meeting, but the challenges were ignored.</td>
<td>No formal meeting agendas were developed or discussed. The leader assigned tasks for herself and one team member between meetings. The leader developed presentation slides without team input.</td>
</tr>
</tbody>
</table>

accepted by the team (see Table 1). Despite problems that emerged, the teams never deviated from the original idea. T3’s project idea was challenged by two APC members during the second meeting when the leader was absent, but they did not challenge the right of the leader or her deputy to lead. The AMC members ignored the challenge and pressed on. T2’s leader did not propose a project idea, but focused the team on one problem: lack of respect for the physicians. A project idea came from one member and the team pursued it during its first two meetings. However, T2’s leader began the team’s third meeting by stating “I’ve learned some things that
will make our job easier," and then unilaterally changed the focus of the project to be the same as that of team T3. While some members expressed concern about the change, none challenged the right of the leader to make the change. In all three cases, the final project idea existed prior to the team’s project.

None of the three teams developed formal agendas and the activities to be performed at each meeting were rarely discussed (see Table 1). The emergent agenda was established by the leader as he or she led the discussions. When between-meeting work was needed, the leader assigned tasks to members. In two teams (T1 and T3), the leader wrote and presented the team project. In T2, the entire team contributed to the presentation but the leader wrote the report by herself.

Table 2 summarizes the decision processes. Almost all members attended every meeting, but only half routinely participated. Most meetings were dominated by a few members. In all three teams, the leaders controlled the discussions. The leader posed questions or read items from the worksheet and members responded with comments which the leader recorded in his or her notes. The leader’s notes served as the meeting memory. In team T1, the leader lost the notes and the team had to reconstruct what happened in the previous meeting. All three leaders read the notes aloud when asked, but otherwise members did not have access to them; the leader did not circulate copies. All leaders used this control over the meeting memory to control the flow of the project. All three chose not to record members’ ideas on at least one occasion in all meetings (but typically more often). In the third (and last) meeting of T2, the leader eliminated all ideas that had been discussed in the prior meetings and replaced them with one phrase stating that “some physician recognition activities” would be undertaken. She then redirected the project to match the project undertaken by T3.

Figure 1 shows the attitudes and perceptions in the traditional teams and how those attitudes changed over time. ANOVA analyses found no significant differences in any of the four attitude and perception measures over time: perceived participation: (F(1,42) = 0.41, p = ns); cohesiveness: (F(1,62) = 0.94, p = ns); satisfaction: (F(1,45) = 0.29, p = ns); perceived effectiveness: (F(1,45) = 0.03, p = ns). The mean perception of
Table 2. Decision Processes in Traditional Teams

<table>
<thead>
<tr>
<th>Team</th>
<th>Method of Discussion</th>
<th>Participation</th>
<th>Meeting Continuity (Control of Meeting Memory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>The leader guided discussion by reading each item on the proposal worksheet to the team, and by writing down the responses. The leader also read notes from previous meetings and solicited improvements, recording them on the form.</td>
<td>Virtually all team members attended all meetings. In the first meeting, all members attempted to contribute ideas and the leader tried to record all responses (“You’re going too fast for the secretary; slow down”). By the middle of this meeting and in all subsequent meetings, participation changed. The leader and two members dominated and others contributed only slightly. In the last two meetings, members appeared bored, with much yawning and comments of “let’s finish this.”</td>
<td>Meeting notes were always taken by leader (although they were lost after first meeting and had to be re-created). In all meetings, members suggested other ideas about how to improve satisfaction that did not fit the current project plan (e.g., overnight accommodations for families, toys for children, computer support), but the leader did not record them in the notes.</td>
</tr>
<tr>
<td>T2</td>
<td>The leader guided discussion by reading each item on the proposal worksheet to the team, and by writing down the responses. The leader also read notes from previous meetings and solicited improvements, recording them on the form.</td>
<td>Virtually all team members attended all meetings. In the first meeting, three members regularly contributed to the discussion. In all subsequent meetings, all team members except one contributed, with the same three being the most active. The leader was clearly in charge, but the team was highly cohesive.</td>
<td>Meeting notes were always taken by the leader. In all meetings, members suggested other ideas that did not fit the current project plan (e.g., physician appreciation day), but the leader did not record them in the notes. In the third meeting, the leader edited the notes to reduce all of the team’s ideas prior to that meeting to one phrase.</td>
</tr>
<tr>
<td>T3</td>
<td>The leader guided discussion by reading each item on the proposal worksheet to the team, and by writing down the responses. The leader also read notes from previous meetings and solicited improvements, recording them on the form.</td>
<td>Virtually all team members attended all meetings. Three members regularly contributed to the discussion. The two APC members said nothing unless asked a direct question. Discussions were often tense (and argumentative at times). AMC members regularly joked, but APC members did not laugh or make jokes.</td>
<td>Meeting notes were always taken by the leader or the leader’s deputy. All meetings after the initial meeting began with confusion over what happened in last meeting. In all meetings, members raised other ideas that did not fit the current project plan, but the leader did not record them in the notes.</td>
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</table>
participation across all three teams fluctuated between 3.5 and 4.0 where a 3 indicated “Two or three people did almost all of the discussion” while a 4 indicated “Most people participated in the discussion, but some more than others.” Satisfaction and effectiveness fluctuated between 5.5 and 6.1 (where 1 was a low score and 7 a high score). Cohesiveness prior to the project was just under 6 and ended just over 6.

In summary, the work processes in the traditional teams were stable and very similar. Interviews with team members indicated that these patterns were the habitual routines used by teams at both AMC and APC. Likewise, members’ attitudes remained relatively stable over the life of the project. The traditional teams adopted their habitual, leader-centered work process, with the most senior team member directing the project activities and controlling team discussions.

**Work Processes in GSS Teams**

Following the kick-off meeting, one GSS team (G1) held five meetings, one (G2) held four meetings, and one (G3) held two meetings. Meetings ranged from 45 to 120 minutes (mean 95 minutes). Table 3 summarizes the leadership processes in the GSS teams. As with the traditional teams, GSS teams began discussing the project at the kick-off. In team G3, the highest ranking person assumed the leadership role as in the traditional teams. However, instead of proposing a project idea, she actively participated in and shaped the discussion of the project. The initial idea was abandoned in the second and last meeting, replaced by an idea proposed by a regular team member.

There was no uniform acceptance of the leader or the project idea in the two other GSS teams. In G1, the team looked to the highest ranking person for leadership, but she was reluctant. Instead, a coordinator was appointed for the next meeting during which the coordinator played only a limited role in guiding the meeting, and the team again turned to the highest ranking person for leadership. In the subsequent meeting, a different member emerged as the leader and played that role throughout the remainder of the project. The project idea did not originate with the senior person, the coordinator, or the emergent leader. Instead, the team initially identified two distinct projects, discussed and analyzed them using the GSS, and finally integrated them into one project during the second GSS-based meeting of the team.

The leader of team G2 faced several open leadership challenges during the kick-off meeting and the first GSS meeting. The most senior person attempted to assume the leadership role and proposed a pet project that had been rejected by the VP several weeks earlier. Many different views were expressed at the kick-off meeting, and it was not uncommon for two (or even three) members to talk at once—even over the top of the leader—although two APC members made few comments. At the end of the meeting, the leader stated that everyone had agreed to pursue her idea, although this was not clear to the researchers. The leader was openly hostile to the GSS, claiming that everyone had “the same ideas,” that no discussion was needed, and that computers couldn’t help them. Nonetheless, she agreed to try the GSS for one meeting.

In the first GSS meeting, three APC managers sat on one side of the room and three AMC managers sat on the other. During the initial verbal discussion about what to do, only the AMC managers and one APC manager spoke; the other two APC managers were silent. The situation was reversed when the team used the GSS. All APC managers and one AMC manager actively typed ideas and challenged those of others, using the multiuser GSS as a multiuser GSS. The most senior person—and putative leader—was flippant about using the GSS and tried to distract the team, making sarcastic remarks, complaining that the GSS could not automatically link related ideas, and engaging in side conversations. Four members ignored the leader and worked on the GSS. After 40 minutes, the four stopped and the team reviewed the electronic comments verbally, with the facilitator recording additional remarks as directed by the team, thus switching to using the GSS in single-user mode, where one person con-
<table>
<thead>
<tr>
<th>Team</th>
<th>Leadership Emergence</th>
<th>Source of Project</th>
<th>Assignment of Work Tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>The team looked to the highest ranking person (the director) for leadership, but she</td>
<td>In the kick-off meeting (without GSS), the team discussed a wide range of project</td>
<td>No formal meeting agendas were developed but each meeting started with a review of prior</td>
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<td>was reluctant. A coordinator was appointed instead. During the second meeting, a</td>
<td>ideas and narrowed it down to two (the lack of support for the family and the flow</td>
<td>work and a discussion of that meeting’s objectives. When the team decided it was necessary</td>
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<td>different member emerged as the leader. Occasionally, the emergent leader and director</td>
<td>of patients through the ICU). These alternatives were refined in subsequent meetings,</td>
<td>to do between-meeting work (e.g., a literature search), members volunteered to do it. The</td>
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<td></td>
<td>proposed ideas that helped steer the team to a solution, but the team always</td>
<td>until the team settled on one at the end of the second meeting. All team members</td>
<td>leader gave a presentation that closely followed the team’s report.</td>
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<td>discussed the ideas and came to consensus before agreeing (e.g., the emergent leader</td>
<td>contributed ideas and opinions to the goal.</td>
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<td>observed that the two alternatives were the same; after discussion the others agreed).</td>
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<tr>
<td>G2</td>
<td>The highest ranking person (the director) became the leader after a series of</td>
<td>Several months earlier, the leader had proposed that AMC establish a nurse-run clinic</td>
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<td>challenges in the kick-off meeting and the first GSS meeting when the team initially</td>
<td>for outpatient procedures (e.g., IVs). The project was turned down. The leader</td>
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<td>did not follow her leadership. Only after the team accepted her idea did they accept</td>
<td>proposed the same idea in the kick-off meeting, but it was not clear that the team</td>
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<td>as the leader.</td>
<td>accepted it. Only after team members discussed the ideas in the first GSS meeting</td>
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<td></td>
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<td>was it clear that team members accepted the idea.</td>
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<tr>
<td>G3</td>
<td>The highest ranking person (the director) was presumed to</td>
<td>The initial ideas for the project came from a verbal discussion (dominated by the</td>
<td>No formal meeting agendas were developed. There were no between-meeting assignments. The</td>
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<td>be the leader and naturally assumed the role.</td>
<td>director and two others). The final idea of a computer bulletin board was proposed by</td>
<td>leader declined to give the presentation. The team argued until one member was selected.</td>
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<td></td>
<td></td>
<td>a team member at the last meeting.</td>
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</table>
trolled the meeting memory and anonymity was not possible. By actively discussing the comments that members had contributed, they came to the realization that the original idea proposed by the leader was one that they wished to pursue. By the end of this discussion, the team had accepted the leader and her idea. Prior to the next meeting, one researcher met with the leader to see if the team would use the GSS again. She stated that the previous meeting “was very successful” and agreed to continue its use.

Although meeting planning has been cited as an important contributor to the successful use of GSS (Nunamaker et al. 1991) and the participants were encouraged to plan their meetings, participants chose to do no formal planning prior to their meetings. However, two teams (G1 and G2) began each meeting with a review of prior work and a discussion of that meeting’s objectives. When between-meeting work was required, the leaders did not assign work to team members; instead, members volunteered for various assignments (see Table 3).

Table 4 describes the decision processes. All three GSS teams experimented with a variety of discussion methods as they tried to adopt the GSS structures into their habitual work processes. In the first meeting, all three teams began with a phase of purely electronic communication (a multiuser GSS environment) followed by a combination of electronic and verbal discussion (which resembles a single-user GSS). The decision to use this set of processes was made by the leader, based on the advice of the facilitator. However, at the end of the first meeting, several members of each team and all three leaders expressed dissatisfaction with the GSS process.

In their second meeting, all teams abandoned electronic communication in favor of verbal discussion with the facilitator taking notes in the GSS (a single-user GSS), but in different ways. During the second meeting of G1, a member voiced opposition to electronic communication, but only after the emergent leader expressed concern did the team move to a single-user approach in which the leader led the discussion and the facilitator typed. After the first meeting of G2, the leader expressed concern with electronic communication, and chose to begin the second meeting with the facilitator typing into the GSS. During the second meeting of G3, the leader led the abandonment of electronic communication in favor of a single-user approach with the facilitator taking notes. Thus, by the end of the second meeting, all three teams had returned to more comfortable verbal processes.

This return to traditional processes also proved uncomfortable. In both teams that continued past this stage (G1 and G2), one of the regular team members led the team away from the traditional, leader-centric single-user approach back to the original two-phase pattern of pure electronic communication followed by a combination of electronic and verbal discussion. Thus a series of misalignments and disconfirming events triggered new adaptations of the GSS structures (cf., Majchrzak et al. 2000). Perhaps most interesting was the recognition that the traditional structures were no longer adequate once the new GSS structures available in multiuser GSS had been experienced, and this disconfirming event led the team away from the traditional structures.

While most participants in G2 attended most meetings (averaging one team member absent per meeting), this was not the case with G1 and G3. Of the six G1 members, all but one attended the first two meetings, but the remaining three meetings were attended by only four members, two members, and four members, respectively; the absent members were on previously scheduled vacations. When members attended, they were all actively engaged in the project. The GSS teams adopted participative work processes, although the mode of participation was different for various members (some were more active in the electronic discussions, some more active in the verbal discussions) (see Table 4). The GSS meeting memory provided continuity between meetings. The electronic meeting notes were “written” by all members or by the facilitator and were not altered between meetings. Copies of all notes were circulated among all team members of G1 and G2 (see Table 3). A member of G3, how-
Table 4. Decision Processes in GSS Teams

<table>
<thead>
<tr>
<th>Team</th>
<th>Method of Discussion</th>
<th>Participation</th>
<th>Meeting Continuity (Control of Meeting Memory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td><strong>Meeting 1.</strong> The team used electronic communication to brainstorm a solution to solve two key problems. Then, the team used electronic and verbal communication to organize their ideas into a set of two alternatives. <strong>Meeting 2.</strong> The team began by using electronic communication to elaborate on the two alternatives. One member opposed typing, but the others convinced him to use it. After 35 minutes, the emergent leader said &quot;We're spinning our wheels&quot; and the team switched to verbal communication while the facilitator typed notes. <strong>Meeting 3.</strong> The team began by discussing the issues verbally with one team member typing notes. The team found this too slow. One by one, the team members disengaged from the team and began typing on a different part of the proposal until everyone was working separately. For the rest of the meeting, there was only occasional verbal conversation used to coordinate activities (e.g., &quot;I'll do Case Manager under 'Other Approaches Considered.' You do Clinical Nurse.&quot;) or for clarification (e.g., &quot;What does 'patient volume' mean?&quot;). <strong>Meetings 4 and 5.</strong> For the final two meetings, electronic communication dominated, with verbal communication used solely for coordination and clarification.</td>
<td>All but one team member attended meeting 1. Only about half of the team attended each subsequent meeting (no clear pattern to the absences, most explained (e.g., vacation, illness)). In the kick-off meeting (without GSS support), all but one member contributed to the discussion. In subsequent meetings (with the GSS), all members actively participated electronically by typing their ideas and challenging those of others (e.g., &quot;[Unit] 6E needs more beds.&quot; followed by &quot;Would more beds really slow transit time through the unit?&quot;). One team member actively typed but did not make any verbal comments to the team during the entire project; instead, she whispered comments to a friend who stated several of them to the team.</td>
<td>The meeting notes were kept solely in the GSS. The notes were printed after each meeting and carried back to the hospital by one team member who made copies for all members (both those who attended and those who did not). At the beginning of the meetings the team members would review what was done previously by reading the GSS meeting memory. During verbal discussions, the team often referred to specific comments entered in the GSS.</td>
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</table>
Table 4. Decision Processes in GSS Teams (Continued)

<table>
<thead>
<tr>
<th>Team</th>
<th>Method of Discussion</th>
<th>Participation</th>
<th>Meeting Continuity (Control of Meeting Memory)</th>
</tr>
</thead>
<tbody>
<tr>
<td>G2</td>
<td><strong>Meeting 1.</strong> The team began with a verbal discussion of the project, and then moved to electronic communication. After 40 minutes, the team stopped and used verbal communication to review the results with the facilitator typing notes.</td>
<td>Virtually all team members attended all meetings. During the kick-off meeting, it was not uncommon for two (or even three) members to talk at once, although two members made very few comments. In meeting 1, the leader was openly disdainful of the GSS and tried to distract the team while they were using it, making sarcastic remarks, and engaging in loud side conversations with two other members. In the following meetings some members only participated verbally, while others only participated electronically, and still others participated both electronically and verbally. During the last meeting, every member actively participated in the verbal discussion.</td>
<td>The meeting notes were kept solely in the GSS. The notes were printed after each meeting and carried back to the hospital by one team member who made copies for all members (both those who attended and those who did not). At the beginning of each meeting the team members would review what was done previously by reading the GSS meeting memory. The team often referred to specific comments entered in the GSS during verbal discussions.</td>
</tr>
<tr>
<td>G3</td>
<td><strong>Meeting 1.</strong> The team used electronic communication then verbal communication to discuss the issues, but all felt frustrated by the absence of the leader.</td>
<td>The kick-off meeting was dominated by the leader and two other team members. Meeting 1 was attended by only three members; the leader did not attend. All three team members participated equally in meeting 1, but the leader and the same two other members dominated meeting 2.</td>
<td>After meeting 1, one team member was vehemently opposed to letting the non-attending members see the output as she felt that her boss would think it was a waste of time; the printout was not circulated. As meeting 2 ended, the team took printouts and a disk and went out to dinner together to finalize the remaining issues.</td>
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</table>
ever, was concerned that the meeting notes would reveal that the team did not utilize its time effectively during the first meeting and objected to providing the notes to non-attending members. After much discussion, the notes were not circulated to other members and, as a result, the team had no shared notes with which to begin its next meeting.

During meetings, all members of the GSS teams had direct access to the meeting memory and equal opportunity to add to or edit its contents. The meeting memory was “owned” by the team, not just the leader. The leader could (and did) control the meeting memory, but had to do so overtly and publicly by directing the facilitator to make changes, rather than covertly by not recording points or by later editing the notes.

Meeting memory was critical in enabling G1 to work when few members attended meetings. Without it there would have been little continuity between meetings. None of those attending the fourth meeting had attended the third meeting; they relied on the meeting memory to review what had occurred and to continue working where the others had left off.

Figure 2 shows team members’ attitudes and perceptions over the life of the project. Perceptions of participation remained stable over time (F(1,44) = 0.02, p = ns) with all three teams’ values fluctuating around a 5, indicating that “Most people participated about the same amount, but one or two people were less involved.” In contrast, the other three attitude items show a steady and statistically significant increase over time: cohesiveness (F(1,60) = 16.02, p = .001), satisfaction (F(1,45) = 7.16, p = .010), and effectiveness (F(1,45) = 26.88, p = .001).

In summary, the leadership and work processes in the GSS teams were not consistent across teams and changed over the life of the project. The most senior person of one team was automatically accepted as the leader. For a second team, the senior person was accepted as leader after a series of challenges and only after her project idea was accepted. The third team’s emergent leader was not the most senior person. In one team, the leader provided the project idea, while the project idea emerged from team discussion in the other two. Interaction patterns changed over time as the teams experimented with different GSS struc-
tures and methods of using the GSS (single-user and multiuser modes). All teams at first experienced discomfort with the GSS structures and attempted to return to their habitual norms. They discovered these norms were equally uncomfortable after experiencing the more participative GSS structures of multiuser GSS, prompting a return to more participative GSS structures.

Project Outcomes

While the work processes employed by the GSS and traditional teams were a major focus of this research, we were also interested in the projects produced by the teams. Once again, we first examine the project outcomes for the traditional teams and then turn to those of the GSS teams.

Project Outcomes for Traditional Teams

Table 5 presents the final projects from the traditional teams and our analyses of them. The three projects were: T1 proposed the construction of a consultation room for the physicians to meet with patients’ families as well as the use of pagers so patients’ families could wait anywhere in the hospital; T2 and T3 both proposed a questionnaire of the physicians. Participants rated the projects proposed by the traditional teams as having a significantly greater impact on physicians (mean = 86) than on patients (66), families (69), or nurses (68), but there were no differences among the impact ratings on patients, families, or nurses (F(3, 368) = 11.07, p = .001, post hoc Tukey tests at α = .05). Recall that the team leaders perceived that the VP’s goal was to improve physician satisfaction, and notice that for all three projects, the impact on physicians was rated higher than the impact on nurses, the participants in the teams.

The second analysis in Table 5 examines the response to each project at the final meeting given by the project participants, who were predominantly nurse managers. The project by T1 was favorably received, the projects of T2 and T3 were relatively poorly received. The final item in Table 5 lists which projects were actually implemented after two years. The project of T1 was partially implemented, but the projects of T2 and T3 were discarded.

In summary, the traditional teams produced projects that focused on improving physician satisfaction, the team leaders’ perception of the VP’s unstated goal. Only one project received a good reception and was actually partially implemented. The other two projects were discarded.

Project Outcomes for GSS Teams

Table 6 presents the projects from the GSS teams and our analyses of them. The three projects were: G1 proposed the use of a specially trained nurse to act as a family liaison with patient families; G2 proposed the construction and operation of an outpatient clinic; and G3 proposed that the hospital improve the communication among nurses via an e-mail or computer conferencing system. These projects were significantly different for impacts on nurses (82) and on physicians (70), but there were no other significant differences in impacts on physicians, nurses, patients (76), or families (76) (F(3, 367) = 4.81, p = .003, post hoc Tukey tests at α = .05). For all projects, the impact on nurses was rated higher than the impact on physicians.

The next column in Table 6 shows the participants’ response to the projects. The project of G1 was favorably received. G2’s project received an overwhelmingly positive response. G3’s project was received unfavorably. G1’s project was partially implemented. G2’s project was fully implemented: a new clinic was built and brought into operation. A project similar to that of G3 was implemented; the VP stated that G3’s proposal was an important step in the decision to implement a hospital-wide e-mail system, but we can find no corroborating evidence.

In summary, the projects developed by the GSS teams focused on the participants themselves—the nurses—rather than on the physicians. With the possible exception of G3’s project, the GSS
### Table 5. Project Outcomes for Traditional Teams

<table>
<thead>
<tr>
<th>Team</th>
<th>Final Project Idea</th>
<th>Rated Impact (1 = low, 100 = high)</th>
<th>Reception in Final Meeting</th>
<th>Status Two Years Later</th>
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<tbody>
<tr>
<td>T1</td>
<td>Construction of a consultation room for the physicians to meet with patients’ families and the use of pagers so that patients’ families could wait anywhere in the hospital</td>
<td>Impact on Physicians: 88 Nurses: 65 Patients: 78 Families: 93</td>
<td>The project was received favorably. Prior to their presentation, members of two other project teams asked the researchers if team T1 was going to propose the construction of a consultation room.</td>
<td>Project was partially implemented: the consultation room was discarded, but the pager idea was implemented as recommended by the original task force that proposed it before T1 considered it.</td>
</tr>
<tr>
<td>T2</td>
<td>Questionnaire of physicians</td>
<td>Impact on Physicians: 84 Nurses: 68 Patients: 58 Families: 56</td>
<td>The presentation started with a five minute skit by all six team members that generated much laughter, followed by a two-minute presentation by the leader that stated the team's intention to conduct a survey of the physicians. The room was taken aback by the shortness of the presentation and the lack of detail. The next presenter, the T3 leader, started with “[T2's leader] gave you the fun stuff. We'll give you the meat.”</td>
<td>A questionnaire was implemented by the Director of Planning who was already conducting the same project independently of the project teams and was not affected by the team’s plans.</td>
</tr>
<tr>
<td>T3</td>
<td>Questionnaire of physicians</td>
<td>Impact on Physicians: 87 Nurses: 71 Patients: 61 Families: 59</td>
<td>During her presentation, the team's leader noted that “I’m not sure we’re going to learn anything... but it will create awareness and package information.” The Director of Planning commented quietly to the VP “That wasn’t a project. We’re already doing it.” This comment was made with a tone of disgust and appeared to indicate that the Director of Planning felt that this group was taking credit for her earlier efforts.</td>
<td>A questionnaire was implemented by the Director of Planning who was already conducting the same project independently of the project teams and was not affected by the team’s plans.</td>
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</tbody>
</table>
Table 6. Project Outcomes for GSS Teams

<table>
<thead>
<tr>
<th>Team</th>
<th>Final Project Idea</th>
<th>Rated Impact (1 = low, 100 = high)</th>
<th>Reception in Final Meeting</th>
<th>Status Two Years Later</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Use of a specially trained nurse to act as family liaison to provide information to patients' families and answer any questions.</td>
<td>Impact on Physicians: 69&lt;br&gt;Nurses: 81&lt;br&gt;Patients: 78&lt;br&gt;Families: 90</td>
<td>The emergent leader presented the plan in detail (e.g., background required for the position, responsibilities, and salary range). The proposal was favorably received, but there was concern about the need to hire additional staff.</td>
<td>The project was partially implemented: a reduced form of the family liaison idea was implemented by increasing the roles and responsibilities of existing staff to include the family liaison function.</td>
</tr>
<tr>
<td>G2</td>
<td>Construction and operation of an outpatient procedure clinic (similar to an x-ray clinic) in which patients could receive IV’s and similar procedures.</td>
<td>Impact on Physicians: 87&lt;br&gt;Nurses: 91&lt;br&gt;Patients: 92&lt;br&gt;Families: 86</td>
<td>The presentation began with some jokes about the team’s experiences with the GSS, and then the leader carefully described the outpatient procedure clinic in great detail. When the presentation was finished, the room erupted in discussion. All five directors present immediately spoke in favor of the proposal, as did the VP. Many detailed questions were asked and answered.</td>
<td>The project was implemented. The clinic was established in a new wing built by AMC.</td>
</tr>
<tr>
<td>G3</td>
<td>Improvement of communication among nurses through the use of e-mail and computer conferencing. The team did not complete the project worksheet.</td>
<td>Impact on Physicians: 54&lt;br&gt;Nurses: 76&lt;br&gt;Patients: 58&lt;br&gt;Families: 53</td>
<td>The presentation was not well organized and presented only theoretical arguments of what should happen with increased communication rather than a detailed proposal.</td>
<td>AMC management claimed that the project was implemented but the evidence is unclear. An electronic mail package (similar to the proposed bulletin board) was installed on the existing computer system, but it was not available in the department that proposed it until one year after the initial installation.</td>
</tr>
</tbody>
</table>
projects were well received and implemented within two years. G2’s project is the strongest indicator of success because it required substantial capital and operating budget. It changed AMC.

Cross-Team Analysis and Hypothesis Testing

Our first hypothesis (H1a) argued that GSS teams would enact more participative processes. The traditional teams adopted leader-centric processes in which the highest ranking member became leader, determined the project objective, guided discussion, assigned tasks, took notes, and prepared the report (see Table 7). The GSS teams adopted processes in which the leaders and project ideas emerged from the discussions, the team set project agendas, and members volunteered to perform tasks. Analysis of the post-session questionnaires on participation shows that GSS teams rated perceived participation higher than traditional teams (F(1,86) = 23.77, p = .001). We conclude that the GSS teams used more participative processes; H1a is supported.

H1b argued that if teams faithfully appropriated the GSS, more participative project outcomes would occur. All projects from the traditional teams met the leaders’ perceptions of the unstated agenda of the VP (see Table 7). The traditional teams’ projects focused on physicians more than the other customer groups and only one of the three projects was partially implemented by the hospital. By contrast, the projects proposed by the GSS teams focused on the nurses more than the physicians, and all three projects were implemented to some extent. We conclude that the projects from the GSS teams more closely reflected the goals and ideas of the participants themselves, not the team leaders, and as such demonstrate more participative outcomes; H1b is supported.

H2a and H2b argued that GSS teams would experience turmoil as their habitual routines clashed with the participative GSS structures; their initial attitudes would drop, but over time this turmoil would subside and attitudes return to normal. The traditional teams experienced a stable set of processes and stable attitudes (see Figure 1). In contrast, the GSS teams exhibited significant turmoil (e.g., switching between single-user and multiuser mode). All GSS teams experienced turmoil in the first meeting and altered their process to more closely match their traditional meeting structures during the second meeting (i.e., single-user GSS). The two teams that continued beyond the second meeting (G1 and G2) returned to using the GSS in a more participative fashion as a multiuser GSS. Initial satisfaction and effectiveness were below those of the traditional teams but by project’s end, they were indistinguishable (see Figure 2). We conclude that H2a and H2b were supported.

Discussion

Participativeness of Processes and Outcomes

We conclude that the introduction of GSS had a significant impact on the participativeness of the teams’ work processes and the project deliverables. All three traditional teams enacted similar leader-centric leadership and decision process structures—structures that participants reported were their habitual norms. The most senior person became the leader without challenge and proceeded to propose the project, assign tasks, lead meeting discussions, record the team’s notes, and prepare the team’s report. Only half the team members participated in a meaningful way. In short, the leaders of the traditional teams dominated their team activities and actively shaped the project.

By contrast, the GSS teams enacted more participative processes. Participants reported more equal participation in post-meeting questionnaires similar to other GSS studies (Fjermestad and Hiltz 1998, 2000), but we were more interested in parti-
## Table 7. Summary of Findings for Participateness

<table>
<thead>
<tr>
<th>Research Dimension</th>
<th>Traditional Teams</th>
<th>GSS Teams</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H1a: Work Processes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leadership Processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leadership</td>
<td>Highest ranking member</td>
<td>Leaders emerged from team</td>
</tr>
<tr>
<td>Source of Project</td>
<td>Leader</td>
<td>Highest ranking member of 1 team; regular team member of 2 teams</td>
</tr>
<tr>
<td>Assignment of Tasks</td>
<td>No formal agenda, leader guided all meetings and assigned work</td>
<td>No formal agenda, but one developed by the team at start of meetings; members volunteered to do work</td>
</tr>
<tr>
<td><strong>Decision Processes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Method of Discussion</td>
<td>Leader-guided discussion</td>
<td>Fluctuated between electronic and verbal discussions. Sometimes leader-guided discussions.</td>
</tr>
<tr>
<td>Meeting Continuity</td>
<td>All notes taken by leader. They did not always include all team members’ ideas</td>
<td>Notes captured in GSS, equal access to notes and all members could directly review notes.</td>
</tr>
<tr>
<td>Participation</td>
<td>All members attended meetings, but not all contributed ideas.</td>
<td>Not all members attended all meetings, but those who did participated.</td>
</tr>
<tr>
<td><strong>Participation Ratings</strong></td>
<td>Ranged from 3.5 to 4.0</td>
<td>Ranged from 4.5 to 5.0</td>
</tr>
<tr>
<td><strong>H1b: Project Outcomes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impact ratings</td>
<td>Projects met the perceived unstated agenda of the VP favoring physicians over nurses</td>
<td>Projects favored participants (nurses) over physicians</td>
</tr>
<tr>
<td>Reception</td>
<td>One modest; two poor</td>
<td>One outstanding; one modest; one poor</td>
</tr>
<tr>
<td>Implementation</td>
<td>One partial; two ignored</td>
<td>One fully implemented; one partial; one possible</td>
</tr>
</tbody>
</table>
GSS teams—both leaders and members—discussed meeting agendas, and regular members successfully proposed significant changes. Leaders did not assign work to members; members volunteered. The leader was replaced or challenged in two teams; it is unclear why the person who would normally have become leader in G1 declined, and why the leader of G2 faced strong leadership challenges, both in the kick-off meeting and in the first GSS meeting. Would the leader of G1 have stepped down or the leader of G2 have been challenged if the teams had used their traditional processes? There is no definitive answer to this. We speculate (but cannot prove) that the challenge to G2’s leader would have occurred because the project she proposed had been previously rejected by the VP; whether the challenge would have been as strong without the GSS presentation that highlighted its participative spirit is unknown. Perhaps more importantly, would the team have been successful in rallying behind the leader’s idea without the ability of members to discuss the project among themselves anonymously using the GSS in multiuser mode? We speculate that without the GSS and the frank discussion it enabled, the team would not have so quickly accepted the leader’s idea.

The more participative processes adopted by GSS teams were also reflected in their project deliverables. All traditional teams’ projects met the leaders’ perception of the VP’s goals, whereas those of the GSS teams did not. We believe that the more directive traditional leaders used their position to steer their team to meet what they believed to be the VP’s goals. In sharp contrast, the GSS teams’ projects focused on the nurses, not the physicians; team members used the more participative process structures in the GSS to directly influence outcomes so that the projects focused more on their own interests and goals rather than the perceived agenda of the VP.

All traditional teams adopted a preexisting idea as the basis of their project for reasons that are unclear. Perhaps the leaders simply adopted the first major issue that came to mind, and since the habitual norms were to not challenge the leader, team members followed their leader’s direction. Alternatively, the leaders may have picked up on existing political undercurrents (e.g., the hidden agenda) and decided to follow them (e.g., T2’s change of project in midstream).

In the GSS teams, the project idea was a new idea that emerged from team interaction, not from the leader (G1 and G3), or was a significant revision of a previously rejected idea (G2). This may have been due to the members having greater direct access to the meeting memory. They were able to add to and edit it, and they regularly received printed versions. The leader no longer had personal control over the meeting memory and, perhaps as a consequence, had less control over the direction of the team. GSS team members were more likely to actively participate in and influence the discussions, whether in multiuser mode or single user mode, than members of traditional teams.

Participative decision making has long been argued to improve organizational decision making (Magjuka 1989), yet organizations have been slow to adopt it (McCaffrey et al. 1995). Barriers to participative systems are frequently embedded in habitual norms used by organizations that embrace centralized control, such as hospitals (McCaffrey et al. 1995). The GSS enabled team members to challenge these norms. If the goal is to enable broad participation in decision processes, we believe GSS can be a helpful tool. Even in the face of a critical response by the leader (e.g., G2), GSS can induce more participative projects. However, this also suggest that leaders need to understand the potential genie that GSS can unleash. Leaders have fewer opportunities to subtly shape their team’s direction; successfully meeting hidden agendas becomes more difficult. For participative structures to be effective, it is important that participants understand the true goals.

One intriguing question is why the GSS teams’ projects were better received by the AMC than those from the traditional teams. From a rational perspective, it could be that the GSS projects had better, well-reasoned plans. From a political perspective, it could be that once the VP was faced
with strong public support for two GSS projects, she could not ignore them.

**Appropriation of Structures**

The traditional teams had stable work processes throughout the project, whereas the GSS teams altered their processes over time. The GSS processes evolved significantly from single-user mode to multiuser mode, with electronic communication playing a key role (owing to its parallelism, anonymity, and direct access to the meeting memory). At first, the new structures disrupted the traditional processes as the teams tried to decide which features should be adopted. As their normal routines were challenged, members felt uneasy about the misalignment between the new and old structures. They attempted to return to the old structures (i.e., single-user GSS), but after experiencing the participative processes offered by the multiuser GSS, they recognized the problems inherent in the traditional processes (e.g., taking turns speaking, one person taking notes).

Exposure to GSS structures enabled teams to recognize misalignments (cf., Majchrzak et al. 2000) between traditional structures and their desired structures; that is, the participants realized they wanted more participative processes than existed in their traditional structures, and the multiuser GSS was a vehicle to enable this change. They, therefore, revised their processes to include more participative GSS features.

The appropriation process was experimental, driven by misalignments, discrepant events, and unanticipated events. Despite the best intentions of the participants and facilitator, it felt more like "ongoing improvisation enacted by organizational actors trying to make sense of and act coherently in the world" (Orlikowski 1996, p. 65), rather than the seemingly rational process suggested by our reading of DeSanctis and Poole (1994). The past experiences of the facilitator (the first author) in facilitating hundreds of hours of large, special-event GSS meetings, provided little forewarning of the often chaotic trial and error appropriation processes of the teams in this study.

**Effects of GSS Structures**

By the end of seven weeks, the teams had formed opinions of the usefulness of the features offered by the GSS. Three features were seen as important (meeting memory: 6.38; the facilitator: 6.00; parallelism: 5.31), while two were significantly less important (meeting planning: 3.45; anonymity: 2.08) (Ryan-Einot-Gabriel-Welsch multiple range test at $\alpha = .05$). These perceptions triangulate well with our observations in most cases. Electronic communication provided meeting memory and the parallelism that helped increase participation and enabled participants to more directly influence outcomes, as in previous research (Dennis and Valacich 1994; Gallupe et al. 1994; Valacich et al. 1994). These factors enabled regular team members to directly write parts of the reports, provided continuity between meetings, and made it difficult for the leader to make unilateral changes. This removed the need for the leader to play the centralizing role of bringing the work products together into one document (Majchrzak et al. 2000).

Electronic communication also provided anonymity, which was seen as unimportant, in sharp contrast to previous field studies (e.g., Jones and de Vreede 2000; Tyran et al. 1992; van den Herik and de Vreede 2000). Perhaps anonymity is harder to maintain in the small teams in our study compared to the larger teams in other studies (cf., Hayne and Rice 1997) and thus, while anonymity may have been physically present, the GSS may not have been perceived as providing true anonymity (cf., Valacich et al. 1994). We used anonymity more for practical reasons than theoretical ones. The teams used a writing tool; if it had attached authors’ names to the text, the team would have had to remove them in the final draft.

Another significant difference between the GSS teams in this study and those in previous field studies was their view of the importance of
meeting planning. Prior field studies have reported extensive meeting planning (e.g., Tyran et al. 1992), but the team leaders in this study did not conduct extensive planning about what tools and processes to use. They did not believe that spending 30 minutes to plan a 90-minute meeting was an effective use of their time.

Interpreting the high ratings for the facilitator is more difficult. Prior research suggests that the facilitator plays a crucial role (Bostrom et al. 1996; Clawson et al. 1993; Phillips and Phillips 1993). Yet each leader chose not to have the facilitator “facilitate”—each leader did that him- or herself. We believe this may have been due to the leaders’ desire to control the meetings and not share the power with the facilitator. Aside from an initial GSS tutorial, some initial advice on which tools to use, and answering occasional technical questions, the facilitator’s role was essentially clerical and passive (starting and stopping tools, typing, and answering questions as directed by the leader). The facilitator performed none of the “important” behaviors (Bostrom et al. 1996; Clawson et al. 1993). When not employed as a typist, the facilitator sat in a corner observing.

So why did participants rank the facilitator as an important component, when he/she did so little? One possibility may be that the facilitator’s knowledge was essential in starting the GSS; without the facilitator, the team could not have used the GSS. Another possibility is that the teams felt the facilitator should be given some credit for attending the meetings. It may also be that the facilitator played a key role in introducing the GSS’s participative spirit and that this participative conception of the GSS was sufficient to shape the appropriation. The initial understanding of a technology plays a key role in how it is appropriated (Johnson and Rice 1987; Orlikowski 2000).

**Limitations**

One limitation in qualitative research of this kind is the values of the researchers (Strauss and Corbin 1990). We believe that we have fairly and accurately analyzed the data, but researchers are often unaware of their biases. We have extensive experience with GSS and perhaps allowed our positive feelings to cloud our observations. The first author was the GSS facilitator and might have developed a bias toward the GSS teams. We attempted to mitigate this risk by having the second author have no direct interaction with the participants to bring a fresh set of eyes to the data.

A second limitation is that we studied six teams in one organization, which reduces generalizability, a problem common in field research (McGrath 1982). The organizational culture of this hospital might have set the stage for our findings. Would we find these same results had we studied a flatter organization (e.g., an Internet start-up)? It is also possible that these six leaders had such different leadership styles that it was not the impact of the GSS we were witnessing but the impact of these leadership styles on the teams. Finally, what if the teams were more similar at the start? In this case, the GSS teams scored lower in cohesiveness prior to the study; if they had started out more equal, would the GSS teams have performed better or worse?

Another limitation is the length of time these teams met. It is unclear if the team processes had stabilized or had reached a brief plateau prior to further evolution. Likewise, the GSS teams met in a special room in the building adjacent to AMC, so did the change in environment (and its impact on one’s physical comfort zone) play a role in the members’ ability to move away from their traditional structures and habitual routines? Had all of the teams met in the same room, would we have seen the traditional teams exhibit more of the attributes that emerged in the GSS teams?

**Implications for Practice**

One important implication for practice is that there is likely to be some loss in performance and dissatisfaction when a GSS is first introduced, due to the difficulty in adapting the new work processes into the team’s habitual norms. This should be explained to team members, and they
should be encouraged to address these feelings, to identify which features of the GSS can help or hinder their performance and to determine how the team can adapt them into new work processes.

Second, it may take experiential learning, rather than direct instruction, to help users truly understand a GSS (cf., Johnson and Rice 1987). Simply being told about the GSS was not sufficient to make members comfortable in altering their habitual routines. Experiential learning by sampling different GSS features was necessary before they could adapt the features into their processes. Training programs should be geared to hands-on use of GSS to expose participants not only to the commands and functions, but also to new GSS processes. Training in the work processes to perform a task with GSS is as important—if not more important—as training in using the GSS itself.

Third, teams using new technologies should be trained in appropriation—to recognize and capitalize on discrepant events to adapt their structures. We agree with Majchrzak et al. (2000) that discrepant events which highlight misalignments between needs and structures create opportunities for change. In our study, changes in structures were usually triggered by someone observing a misalignment and pointing it out to other team members. We speculate that the training programs which include the intentional introduction of misalignments and provoke discrepant events will prove the most powerful in helping teams learn to adopt new technologies.

**Implications for Future Research**

Our first and foremost implication for future research is the theoretical process by which GSS structures affect participativeness. We began by arguing that the structural features of parallelism, anonymity, and meeting memory created the opportunity for more equal participation, while the GSS spirit, fostered by the facilitator, induced teams to appropriate these structures in participative ways. Our results suggest differently: the teams dismissed the facilitator and made appropriation decisions independently. While the facilitator may play a key role in other settings, for project teams, the participative structures in the GSS, the presentation of a participative spirit, and a willingness by a majority of members to adopt more participative processes (even with a moderately resistant leader) may be sufficient for participative processes and outcomes to emerge.

Prior research has examined the triggers to appropriation (e.g., misalignments, discrepant events), and the malleability of the GSS itself (Leonard-Barton 1988; Majchrzak et al. 2000; Tyre and Orlikowski 1994). The appropriation processes here were also driven by misalignments and discrepant events with the GSS proving rather malleable, but was a more experimental, trial and error process than previous research has implied. We need to develop richer theory to explain how misalignments and trial and error guide appropriation.

Another issue is the role of the facilitator. The leader and team members assumed the role of the facilitator. If these results are typical, then the limited role of the facilitator has significant implications for developers of project team GSS. First, GSS must be designed to enable leaders with minimal training to operate them, rather than specially-trained outside facilitators. Guidance in selecting tools must be provided by the system or by training during implementation. Second, the fundamental design of most decision-room software that has formed the basis for much academic research may not be appropriate for project teams. Third, because much prior research has focused on systems requiring a facilitator, we may need to revisit much of this research to see what applies in a self-facilitated environment. More research is needed on the design of GSS without facilitators.

We need to rethink the theoretical role of the facilitator. We argued earlier that the facilitator embodied the spirit of ideal speech. Thus, the facilitator can be thought of as an appropriation agent—someone who shapes the way in which the team appropriates the GSS. Despite the fact
that the facilitator played a minor role for these teams, the facilitator was still seen as important. Orlikowski (2000) argues that the initial presentation of a technology to users has significant impacts on its appropriation and so the facilitator’s training was important. The leader also plays a key role in appropriation; almost every change in appropriation was led by—or sanctioned by—the leader.

This leads us to propose a model for the appropriation of GSS that extends the model of DeSanctis and Poole (1994) (see Figure 3). The spirit of the GSS (e.g., Habermas’ 1984) ideal speech) influences the structural features of the GSS. The features and spirit combine with the team’s existing structures and the structures desired by members (which may be different from the existing structures; e.g., members in this study desired more participative structures) to produce new work processes and emergent structures. Appropriation agents such as facilitators, trainers, and leaders moderate the impact of the structural features and spirit and the existing and desired structures. The emergent structures produce processes which in turn produce outcomes, and both the processes and outcomes influence the emergent structures (again moderated by appropriation agents).

**Conclusion**

We believe that this study offers two important conclusions. First, GSS use enables teams to turn more equal participation into more participative processes and outcomes that better reflect the interests of all members, not just those of the leaders. The reflection of more participative processes in project outcomes is exciting, because it
suggests that GSS use may affect organizational performance.

Second, the different processes in these project teams compared to special-event uses that form the bulk of prior GSS field research offer both challenges and opportunities. Many of the lessons learned and critical success factors from prior research failed in this setting. We believe that project teams have different needs for GSS tools than those designed for special event uses and that significantly more field research is needed on GSS project teams, both face-to-face and virtual.

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