

# The Application of Electronic Meeting Technology to Support Strategic Management

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## *Abstract*

*Strategic management is often performed by groups of managers. By improving the communication process of such groups, strategic management might be enhanced. This paper investigates the application of electronic meeting*

*systems (EMS) technology to support strategic management. Eight cases involving five organizations using an EMS facility are examined to: (1) determine how organizational groups use EMS for strategic management, (2) assess the overall effectiveness and efficiency of the EMS approach to strategic management, and (3) assess the capability of an EMS to address a variety of group process and communication issues in an organizational context. The findings indicate that EMS technology can address a number of the theoretical and practical concerns associated with strategic management meetings involving large heterogeneous groups of managers. Implications for the design of EMS to support strategic management are discussed, and opportunities for future research are identified.*

**Keywords:** Electronic meeting systems, decision support, group decision support systems, group support systems, strategic decision making, strategic management

**ACM Categories:** H.0, H.4.2., H.4.M, K.0

## **Introduction**

Strategic management (SM) is the process of formulating the goals and policies of strategy and overseeing its implementation (Bracker, 1980). During the 1970s and early 1980s, SM gained prominence and popularity. Fueled by ever-increasing complexity and competition in the corporate environment, managers responded to the excitement surrounding the strategy boom by adopting new and more complex planning systems and devoting more resources to SM. During the past decade, however, SM has come under attack because of the difficulties in successfully applying theory to practice. Corporate strategy staffs have been cut (*Business Week*, 1984), and several strategic methodologies once held in high regard have been challenged (Gluck, 1985).

SM is often performed by groups of managers (Schweiger, et al., 1989). Therefore, one approach to improving SM may be to enhance communication among the participating managers. Although information technology has been used to support SM for many years (e.g., Dhar, 1987; Mintzberg, 1967), its use to improve organiza-

tional communication and group processes associated with SM is a more recent phenomenon. Since the early 1980s, there has been a growing interest in the use of information technology to support group decision making associated with SM (Gibson and Ludl, 1988). Researchers have built and investigated a wide spectrum of systems under a variety of terms including group decision support systems (e.g., DeSanctis and Gallupe, 1987), computer-supported cooperative work (e.g., Kraemar and King, 1988), Groupware (e.g., Johansen, 1988), and Electronic Meeting Systems (EMS) (Dennis, et al., 1988). Many EMSs have been developed, including Xerox PARC's Cognoter (Stefik, et al., 1987), University of Arizona's GroupSystems (Nunamaker, et al., 1991), MCC's GROVE (Ellis, et al., 1991), and University of Minnesota's SAMM (DeSanctis, et al., 1992).

This paper examines the application of EMS technology to support face-to-face meetings for SM. It is divided into six sections. The first section reviews the SM, organizational communication, and group process literature to provide a theoretical foundation for the study. The next section reviews the group technology literature and develops research questions concerning EMS support for SM. The third section describes the methodology used to address the research questions, and the fourth section provides a brief summary of the eight cases (involving five organizations) that were examined in the study. The last two sections discuss the results of the study, draw implications for the design of EMS for strategic management, and identify key questions for future research.

## Strategic Management in Organizations: Concepts and Issues

What are the key concepts and issues related to the application of EMS to SM? To answer this question we must first understand the SM process, as well as the characteristics and needs of the participants involved.

### *Strategic management: The process*

Strategy is "the pattern or plan that integrates an organization's major goals, policies, and ac-

tion sequences into a cohesive whole" and typically involves a series of strategic decisions (Quinn, et al., 1988, p. 3). There are three key characteristics of a strategic decision (Schwenk, 1988). First, strategic decisions are poorly structured and non-routine; they cannot be solved by formulas or simple decision rules. Second, a strategic decision can have a great impact on the organization because it usually involves large resource commitments or affects the fundamental way that a firm approaches its operations. Third, strategic decisions are typically very complex and require a substantial amount of input about the competitive environment, the organization's capabilities, political stakeholders, and management values.

SM is the process that encapsulates this strategic decision-making activity. SM is iterative and continues throughout the life of the organization (Mintzberg, et al., 1976). While there are many models for the process of SM, the model suggested by Schendel and Hofer (1979) provides a particularly useful framework. They propose that the SM process is comprised of six inter-related activities: goal formulation, environmental analysis, strategy formulation, strategy evaluation, strategy implementation, and strategic control (see Table 1). The SM process does not end with strategy implementation, but continues as environmental and organizational conditions change over time.

Applying EMS to SM also requires an understanding of the decision-making behavior that underlies the process. Two perspectives on decision making have been proposed: the rational and the political (Allison, 1971). The rational perspective posits that an organization acts as a unified entity and makes its decisions objectively as a consequence of rational choice. Managers are viewed as making decisions in the best interests of the firm as a whole through a comprehensive consideration of all the issues involved. The rational approach to SM can be supported by highly structured techniques that attempt to help managers understand problems and make better decisions. Among such techniques are environmental analysis (e.g., Porter, 1980) and strategy evaluation techniques (e.g., Rumelt, 1979). Decision making from the political perspective is the result of bargaining among individuals and coalitions with special interests. Policy making is viewed as a process of conflict

Table 1. Activities of the Strategic Management Process

**Goal Formulation:** The goals of an organization are defined to provide a foundation for the development of the strategic plan. This activity involves an evaluation of economic criteria as well as recognition of the various organizational stakeholders.

**Environmental Analysis:** The "environment" consists of all the external entities and influences that are not directly controlled by the organization. Environmental analysis involves: (a) finding reliable sources of environmental data, (b) compiling and examining the data to identify trends, developments, and relationships, (c) monitoring environmental conditions, and (d) anticipating the future.

**Strategy Formulation:** This step encompasses the development of the organization's strategy and builds on the two previous steps. Formulation activities include: the identification of strategic issues, the generation of alternative courses of action, and the analysis of strategic approaches. The task of formulating strategy involves the application of analytical methods as well as methods that uncover the social and political impacts of strategic decisions.

**Strategy Evaluation:** This step is concerned with evaluating the content and action plans associated with a strategic plan, whether it is an existing strategy or a proposed strategy.

**Strategy Implementation:** The successful implementation of strategy depends on an organization's ability to make a strategy work in the operating environment. Hence, line managers are typically responsible for the management of implementation. Implementation is often viewed as behavioral in nature and considered to be a task requiring sensitivity to the social and political implications of change.

**Strategic Control:** Strategic control is somewhat similar to the evaluation step. However, strategic control is concerned with monitoring the implementation and outcome of a selected strategy, instead of the content of the strategy.

and consensus building that may or may not result in optimal outcomes for the organization as a whole. Stakeholder analysis is an example of a political approach to SM (Mason and Mitroff, 1981). In this process managers identify and understand the views of stakeholders (both inside and outside the organization) who have vested interests in the strategic direction of the organization.

### *Strategic management: The participants*

Rational techniques require input from all parts of the organization. This suggests that a large number of managers from throughout an organization should be involved with the SM process. Participation from many managers is also justified from the political perspective: if a wide

cross-section of the firm is represented, a greater variety of stakeholder concerns will be included, resulting in a strategy that is more likely to be accepted and implemented by key organizational coalitions. In addition, including managers from many hierarchical levels in many stages of the SM process fosters organizational learning, another major SM objective (Ackoff, 1981). Organizational learning arises from the individual growth and development of SM participants and is promoted by enabling individuals to better understand organizational goals.

How should the SM process be conducted, given the large and diverse group of participants involved? One common approach is to organize a large set of committees, each of which addresses specific areas and generates results that are integrated by other committees (Ackoff, 1981). However, the SM process is an "equivocal" pro-

cess that is characterized by ambiguous situations involving multiple and often conflicting pieces of information, interpretations, and objectives. Given this high equivocality, it has been suggested that it is more appropriate to have one meeting of all those involved (Daft and Lengel, 1986). Such an approach offers the best opportunity to resolve differences and promote understanding.

### ***Strategic management: Communication across the hierarchy***

Communication between managers at different levels of a hierarchy can be problematic because of the differences in information, perspective, and understanding that exist between superiors and subordinates. This circumstance is a common organizational phenomenon referred to as "semantic-information distance" (Jablin, 1979). The presence of semantic-information distance can have an unfavorable impact on the SM process. For example, top management may not be aware of strategically pertinent problems and opportunities existing at the lower levels of operations, while line managers may be ignorant of top managers' views and expectations relating to strategic concerns. Semantic-information distance is prevalent in organizations because the different organizational status of superiors and subordinates contributes to the creation of a social context that regulates and influences communication behavior between hierarchical levels (Sproull and Kiesler, 1986). People in organizations respond by adjusting the target, tone, and content of their communications. Depending on who they are communicating with, such adjustments can constrain communication and increase semantic-information distance.

### ***Strategic management: Group process issues***

Three group process issues are important for SM groups. One issue concerns the size of group meetings. Research has shown that large group meetings are generally less effective and less satisfying to group members than small group meetings (Shaw, 1981). Shaw attributes these effects to the sharp decrease in equality of participation that occurs as group size increases.

A second issue is production blocking. When a group member "has the floor," he or she may block the generation or communication of opinions and ideas of others. Blocking has been identified as the most important factor in poor performance during exploration and idea generation activities (Diehl and Stroebe, 1987). There are at least three types of production blocking: attenuation blocking, concentration blocking, and attention blocking (Nunamaker, et al., 1991).

Attenuation blocking may cause members to forget or suppress their ideas because they seem less relevant or less important at a later time when they can contribute them. Concentration blocking occurs because members must concentrate on remembering ideas that they wish to present to the group and cannot process new information. Attention blocking occurs because members concentrate on listening to other people speak and do not formulate new ideas and comments.

Attenuation and concentration blocking are caused by the sequential nature of the spoken verbal communication channel (i.e., participants must take turns speaking), while attention blocking arises from the need to constantly monitor the verbal channel or risk missing important information. One implication is that a communication channel that permits parallel communication could help reduce the problems caused by blocking.

A third issue concerns participants who are apprehensive that their comments may be received by others in a negative way or who withhold ideas that are not "safe" (Diehl and Stroebe, 1987). This "evaluation apprehension" may be due to: the apprehensiveness of the individuals themselves, pressure to conform to the group's position (e.g., groupthink: Janis, 1972), or the statements of a powerful group member(s) (Shaw, 1981). Experimental studies have found that overall group performance can decrease when apprehensive members do not share information with the group (Shaw, 1981). Where there are power differences among members—as is the case with SM groups—there is likely to be more conformity within the group to the positions, ideas, and opinions of those group members with power (Shaw, 1981). Thus, group interaction could benefit from communication that would enable participants to submit ideas freely without evaluation apprehension.

## Applying EMS to Strategic Management

### *EMS studies of organizational groups*

SM is a complex process that often involves large groups of individuals possessing different knowledge, viewpoints, agendas, and hierarchical ranks. SM cannot easily be separated from its organizational context (i.e., the complexity of SM is difficult, if not impossible to simulate in a laboratory setting). Given the importance of organizational context to the study of EMS support for SM, this section begins with a summary of the findings of EMS studies involving natural groups in organizations.

To date, a relatively small number of published EMS studies have involved organizational groups. Included among these studies are a few in which an organizational group used an EMS for SM (e.g., Eden and Ackerman, 1989; McCart and Rohrbaugh, 1989; Nunamaker, et al., 1987). Although most of this research did not focus on the specific concerns of SM, it does shed light onto the general organizational use of EMS. In general, EMS use appears to increase effectiveness, efficiency, and satisfaction with the EMS process. Positive results have been attributed to the use of electronic communication media that enables parallel and anonymous communication, the ability to capture and organize electronic meeting input, the application of group process structuring techniques (e.g., brainstorming), and meeting facilitation. The results from these studies provide encouragement that EMS has the potential to be a valuable component in the SM process. However, there are a number of areas relating to the application of EMS to SM (and organizational groups in general) that remain to be explored: the specific needs of SM (e.g., EMS support for different SM activities and different decision-making perspectives), communication across the hierarchy, and the group meeting process (e.g., production blocking, evaluation apprehension).

Additionally, few studies have considered how organizational groups actually use an EMS. EMS facilities typically provide meeting participants with the ability to communicate via a variety of media channels (e.g., verbal speech, electronic

text, visual graphics). For planning groups performing idea generation and brainstorming tasks, Nunamaker, et al. (1987) found that communication using electronic media was far more prevalent than spoken verbal interaction. However, it is not clear whether this type of behavior would be found for other types of tasks required of SM groups such as the resolution of equivocal issues. If the electronic media channel is frequently used in EMS meetings, then it would be of interest to examine the nature of interaction behavior during EMS electronic communication sessions because interaction is a fundamental process associated with group behavior. While user interaction has been examined for an asynchronous electronic mail system (Finholt and Sproul, 1990), interaction behavior has not yet been explored in face-to-face organizational settings.

Another issue concerns the impact of EMS on the democratization of decision making. SM research suggests that SM decisions should be made by involving a team of managers in making SM decisions (Bourgeois, 1980). While a previous EMS case study indicates that EMS can be used to involve more managers in the SM process (Dennis, et al., 1990), it is not clear whether the EMS provided lower-level managers with a more active role in deciding SM policy. In general, what influence will EMS have on SM decision making? Will the EMS environment encourage top management to make SM decisions by a consensus vote involving lower ranking managers? Or will the EMS be used to gather input for SM decisions that will ultimately be made by the highest ranking managers?

### *Electronic media and social context*

The social context of a meeting can influence interpersonal communication (O'Reilly and Roberts, 1974). For instance, hierarchical status is a social context variable that may regulate and inhibit the exchange of information (e.g., a manager may be willing to debate an issue with a peer but not with a boss). In face-to-face meetings, people may perceive the social context through cues such as visual appearances, verbal inflection, and non-verbal behavior. The introduction of electronic communication media into an SM meeting may attenuate these social context cues and thereby have an impact on the

information exchange behavior of those who use the media.

In a (non-EMS) field study of electronic mail, evidence was found that the absence of social context cues in the electronic media tended to equalize status and hierarchical differences among communicators, resulting in new information exchange between organizational members and an increase in uninhibited communication behavior (e.g., playful messages, inflammatory remarks) (Sproull and Kiesler, 1986). While the asynchronous and dispersed nature of an electronic mail system is different from that of an EMS meeting room, the electronic media is a feature common to both systems. Thus, it is possible that groups performing SM using an EMS could experience similar effects with respect to interpersonal communication. Although EMS studies of organizational groups have not explicitly examined the topic of social context, one EMS field study found that groups using an EMS were strongly task oriented and rarely used the EMS media for socializing or play (DeSanctis, et al., 1992).

### *EMS and the group process issues*

The group process issues introduced earlier—participation, production blocking, and evaluation apprehension—are particularly relevant to large organizational groups. However, because of difficulties associated with studying organizational groups (e.g., lack of control, size limitations of EMS facility), researchers have usually investigated these issues with small groups of student subjects in laboratory settings.

There is some evidence that EMS use may result in more equal participation (Zigurs, et al., 1988), but the majority of studies have found few effects (Gallupe, et al., 1988; Jarvenpaa, et al., 1988; Watson, et al., 1988). Likewise, anonymity has been found to reduce evaluation apprehension in some situations (Connolly, et al., 1990), but has had few effects in the majority of cases (George, et al., 1990; Jessup, et al., 1990; Valacich, et al., 1992). Studies of production blocking have found that reductions in blocking increase performance (Gallupe, et al., 1990; Valacich, et al., in press).

Much can be learned from laboratory studies. However, EMS research in field settings may produce quite different findings. For example, a comparison of 25 laboratory studies and 10 field

studies with organizational groups revealed inconsistencies in the pattern of results for meeting effectiveness and satisfaction (Dennis, et al., 1991). Differences were attributed to the different research settings, in which organizational groups were larger and were involved with more complex tasks. Given the nature of SM in organizations, this comparison underscores the importance of gaining an organizational perspective of EMS application to SM through case and field studies.

### *Research questions*

As discussed above, the utilization and impacts of EMS technology may vary depending on the context of the application (e.g., experimental groups vs. organizational groups). This study is concerned with the application of an EMS to SM in the organizational context (i.e., naturally occurring organizational groups addressing SM issues). The first set of research questions concerns understanding how organizations use an EMS to support SM:

1. How do organizational groups use EMS technology to support the SM process?
  - a. How are the different types of communication channels utilized during the EMS meetings?
  - b. How do managers behave and interact during periods of electronic communication?
  - c. Does an EMS democratize the process of SM?
  - d. Does an EMS support multiple decision-making perspectives?

It is also important to assess how participants perceive the impact of EMS on the SM process. The impacts of the EMS process on effectiveness and efficiency are particularly relevant (Steiner, 1979). These considerations lead to the second research question:

2. What are the perceived impacts of the EMS approach to SM with regard to effectiveness and efficiency?

If the EMS is perceived to have an impact on the SM process, then it is of interest to explore specific ways in which EMS features may provide (or fail to provide) support for SM. In particular, how can an EMS address the issues of group pro-

cess and communication across the hierarchy? Such information may yield insights into the benefits and limitations of the EMS approach, and thus lead to implications for design of future EMS.

3. How does an EMS that provides electronic communication (i.e., parallel communication, anonymity, and recording of communication) address the needs of SM groups?
  - a. Does EMS address the group process issues of equality of participation, production blocking, and evaluation apprehension?
  - b. Does EMS address communication between superiors and subordinates?

## Methodology

The aim of this study was to investigate the application of EMS to the "messy" task of SM in the organizational context. The case study approach was selected because the research method is well suited to examine complex problems in natural settings (Yin, 1989).

### Sample

A diverse set of eight cases involving five organizations was examined. The groups were chosen deliberately based on four criteria. First, each was a group in which the group members had developed roles and relationships with one another over time. Second, each group was involved with at least one (but typically more) SM activity (i.e., strategy formulation, environmental analysis, etc.). Third, the groups were from organizations with different levels of previous experience with SM. Fourth, the groups were purposely chosen to represent a heterogeneous sample of organizations and SM activities; the organizations were drawn from banking, high-technology manufacturing, natural resources, utilities, and the public sector.

### EMS technology

The EMS used in this study was the University of Arizona's GroupSystems. This EMS had three components: the facility, the software, and the facilitator. The EMS facility provided 24 workstations arranged in two concentric rows of tiered seating capable of accommodating 48 participants

(with two people per workstation), arranged to focus attention at the front of the room. Each workstation had a hard disk and color graphics monitor, and was recessed into the work area. Two additional workstations served as the facilitator's console, used to control the GroupSystems software. A computer network linked all of the workstations, allowing participants to send typed comments to other group members via a computer-supported electronic communication channel. The facility also had a variety of visual and audio-visual media to support group communication including a large screen video display, overhead projector, white boards, and flip charts. The facility therefore provided support for electronic and visual forms of communication, as well as conventional verbal discussion. (For a more complete description of the facility, see Nunamaker, et al., 1991.)

The GroupSystems software provided a collection of user-friendly "tools" that supported different aspects of the meeting process, and had been widely used in corporate settings. The tools used by groups in this study are described in Table 2. The toolkit included tools that provided an electronic communication channel, as well as tools that characterized "mixed" channels of communication (i.e., an electronic channel designed to be supplemented with spoken verbal communication). The design philosophy was to develop general purpose tools to support generic group activities such as the management of group sessions, idea generation, idea organization, decision making, and policy development.

A facilitator was assigned to each of the meetings to provide a variety of services to the groups. The facilitator first met with representatives of each group to establish a meeting agenda and to select the appropriate software tools. The facilitator also provided guidance to group participants in the use of the EMS facility and software toolkit and ensured that the system was operating properly.

### Data sources and data collection

Data from four different sources helped to build a chain of evidence and permitted comparison of findings across sources. The sources of data were: observations, electronic meeting logs, questionnaires, and interviews. The actions of each group were observed and recorded by at least one researcher during the EMS meetings. System logs recorded all keystrokes at all workstations,

**Table 2. The GroupSystems Strategic Management Toolkit**

<p><b>Session Management Tools</b> (electronic channel)</p> <ul style="list-style-type: none"> <li>• <b>Session Manager</b> supports the facilitator and group leader(s) in developing an agenda and selecting the appropriate EMS tools to support it.</li> </ul> <p><b>Divergent Communication Tools</b> (electronic channel)</p> <ul style="list-style-type: none"> <li>• <b>Electronic Brainstorming (EBS)</b> supports idea generation by allowing group members to share comments on specific questions simultaneously and anonymously. Participants are encouraged to be creative or critical depending on the nature of the question and group objectives.</li> <li>• <b>Topic Commenter (TC)</b> facilitates idea generation (simultaneously and anonymously) on a structured list of topics. Participants enter, exchange, and review information on self-selected topics.</li> </ul> <p><b>Convergent Communication Tools</b> (mixed channel)</p> <ul style="list-style-type: none"> <li>• <b>Idea Organizer (IO)</b> helps group members identify and consolidate key items associated with previously generated text (e.g., ideas from EBS). Support is also provided for integrating external information with support items.</li> <li>• <b>Issue Analyzer (IA)</b> assists the group in identifying and consolidating ideas. Individuals initially identify topics that merit further consideration, and then the group condenses the combined topic list to a manageable size by using a chauffeured process.</li> </ul> <p><b>Decision-Making Tools</b> (mixed channel)</p> <ul style="list-style-type: none"> <li>• A <b>Prioritizing</b> tool provides a variety of prioritizing methods including Likert scales, ranking, and multiple choice. Group members cast anonymous ballots. Results are displayed in graphical and tabular formats for discussion.</li> <li>• <b>Alternative Evaluator (AE)</b> provides multi-criteria decision-making support via an interactive process. A set of alternatives can be examined under flexibly weighted criteria. Results are displayed in a variety of graphical and tabular formats.</li> </ul> <p><b>Policy Development and Evaluation Tools</b> (mixed channel)</p> <ul style="list-style-type: none"> <li>• <b>Policy Formation (PF)</b> supports the development of a policy or mission statement through iteration. Members contribute proposed wordings which are then edited through group discussion and returned to participants for further refinement. The process continues until consensus is reached.</li> </ul>
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providing complete transcripts of all electronic comments made during the meetings. Post-session questionnaires were completed anonymously by participants immediately after the meetings. Individual interviews were conducted with each group leader (usually the CEO of the organization) and typically several other participants. Interviews were conducted before each EMS meeting to gain a historical perspective of each organization and to identify the leader's objective for the EMS meeting. Follow-up interviews were performed several months after

the EMS meetings (i.e., after the organizations had begun using the results from the EMS-supported SM meeting) to gain a sense of the lasting impacts of the EMS. During these interviews, each of the group leaders was also asked to compare the capabilities of the EMS approach to SM with his or her organization's conventional (non-EMS) approach to SM using a validated set of indicators developed by Venkatraman and Ramanujam (1987). Based on these four sources of data, detailed case histories for each organization were developed.



## Data analysis

Given the nature of the research issues and the sources of data, a predominately qualitative analysis was used to examine the data and identify common themes across the groups. As most of the key findings rely on observations and interviews with participants (with supporting evidence from questionnaires and system logs), much of the results of the study employ description and the use of excerpts from interviews and system logs. While this type of analytic approach does not embody the precision and economy of presentation associated with more quantitative laboratory studies, it attempts to offer an added measure of richness consistent with our research objectives.

The system logs were coded to determine the degree of interaction during periods of electronic communication and the amount of non-task related messages.<sup>1</sup> Because electronic interaction can be characterized by the extent to which messages stimulate a reply (Finholt and Sproull, 1990), the degree of interaction was assessed by examining each electronic message to determine whether it explicitly replied to another message. A message was defined as an explicit reply only if it included at least one of the following features: (a) a remark that made a direct reference to the reference number of another message; (b) a remark or argument that expressed support for a specific comment; (c) a critical remark or critical argument that expressed opposition to a specific comment; and (d) a message that requested clarification of an idea expressed in another message. The overall level of group interaction for an electronic session was assessed by dividing the number of electronic "replies" by the total number of electronic messages in a session. Electronic messages were also coded as being task or non-task oriented. A message was coded as non-task if it was off the topic and had no discernible relevance to any type of work-related task (e.g., "How about lunch?").

The coding of the electronic logs was performed independently by two of the coauthors. One coded all of the electronic logs. The reliability of this rater was assessed by the second who coded a random subset of the logs (20 percent of the logs;

<sup>1</sup> Refer to the coding scheme described by Connolly, et al. (1990).

four out of the 20 Electronic Brainstorming (EBS) tool logs and six out of the 31 Topic Commenter (TC) tool logs). Inter-rater reliability was adequate (0.98).

## Case Summaries

A brief summary of the eight cases is provided in this section (see also Table 3). Each of the five organizations had undertaken some previous formal SM activities prior to the EMS-supported meetings, except as noted below. All names are pseudonyms.

ABC Inc. is a commercial lending firm based in the southwestern United States, with more than \$1.6 billion in outstanding loans. ABC's first EMS meeting lasted two days and focussed on establishing strategic goals, environmental analysis, and management evaluation. Thirty-one managers participated (including all of ABC's top executives). Twenty-seven managers returned to the EMS facility six weeks later to address strategy formulation. Two years after the second meeting, ABC returned for a third EMS meeting for strategy evaluation and formulation (24 participants).

Gamma Corporation is an international corporation that manufactures and sells electronics components throughout the world (\$150 million in annual sales). Gamma had extensive experience with the process of SM, having conducted annual SM meetings for many years. Gamma's first SM meeting using the EMS facility lasted three days and included the activities of goal formulation, strategy evaluation, and short-term action planning. The 31 participants in the meeting included the CEO plus vice-presidents and senior managers. Gamma returned with 27 high-level executives the following year for another two-day meeting focusing on environmental analysis, strategy evaluation, and strategy formulation.

Desert Utility is a southwestern United States-based utility company that serves several major utility markets in the desert Southwest and also operates a savings and loan subsidiary. The objective of the EMS meeting was to reassess the organization's strategic objectives and environment and formulate an overall strategy for the organization. Desert Utility was not experienced in the process of formal strategic planning. The two-day SM meeting consisted of goal formulation,

Table 3. Summary of Case Examples

Organization	Group Size	Duration	Activities*	Supporting Tools**
<b>ABC Meeting 1</b> <i>Tangible Outputs of Meeting:</i> 1. Prioritized list of corporate goals 2. Prioritized list of issues relating to company strengths, weaknesses, opportunities, threats, and constraints (ranked by short-term and long-term priority) 3. Evaluation of 12 senior executives (for 17 specific characteristics)	31	2 days	GF EA Mgmt. Eval.	EBS, Prioritizing TC, IA, Prioritizing AE
<b>ABC Meeting 2</b> <i>Tangible Outputs of Meeting:</i> 1. Strategies to promote competitive advantage 2. Commitment to implement strategies (or results of further study) by specified date	27	1 day	SF	TC
<b>ABC Meeting 3</b> <i>Tangible Outputs of Meeting:</i> 1. Specific proposals to improve linkages between departments 2. List of new market opportunities 3. Evaluation of current strategy	24	1 day	SF SE	EBS, TC EBS, TC
<b>Gamma Meeting 1</b> <i>Tangible Outputs of Meeting:</i> 1. List of opinions for corporate goals 2. Evaluations of nine divisions' 5-year plans 3. Evaluations of eight divisions' 1-year plans 4. Prioritized list of short-term actions (ranked by benefits, time order, and feasibility)	31	3 days	GF SE SF	EBS, IA TC EBS, IA Prioritizing, TC
<b>Gamma Meeting 2</b> <i>Tangible Outputs of Meeting:</i> 1. List of opinions on competitive environment and corporation 2. Evaluations of two strategic business units' plans 3. List of resources and support from staff departments (i.e., MIS) needed to be successful 4. List of actions to take advantage of Europe 1992	27	2 days	EA SE SF	TC TC, EBS TC
<b>Desert Utility</b> <i>Tangible Outputs of Meeting:</i> 1. List of key organizational goals 2. List of organizational strengths and weaknesses 3. List of key strategic issues for short-term (12-24 months) and long-term (5-10 years)	29	2 days	GF EA SF	EBS, IA EBS EBS, IA
<b>Medical Center</b> <i>Tangible Outputs of Meeting:</i> 1. List of key organizational goals	19	1 day	GF	EBS, TC, AE
<b>County Government</b> <i>Tangible Outputs of Meeting:</i> 1. Working draft of a county mission statement 2. Prioritized list of the key issues facing the county 3. Alternative strategies to address each of the top five issues 4. Action plan for future stages in SM process	18	1 day	GF EA SF	PF TC, IO, Prioritizing TC

\* GF = Goal Formulation; EA = Environmental Analysis; SF = Strategy Formulation; SE = Strategy Evaluation.

\*\* See Table 2 for names, abbreviations, and descriptions of the tools.

environmental analysis, and strategy formulation. Twenty-nine high-level managers (including the CEO) from throughout the organization participated.

A regional medical center located in a southwestern U.S. city of 400,000 people utilized the EMS for a half-day meeting. The objective of the meeting was to formulate strategic goals for the provision of healthcare services in surrounding rural areas. The group of 19 consisted of administrators (from different hierarchical levels) and medical staff (e.g., physicians).

An Arizona county government used the EMS for one day as part of a two-day strategic management retreat. All 12 of the county's elected officials, as well as four senior appointed officials participated in the meetings. Because the group had no prior experience with SM, two of the major objectives of the meeting were to initiate the county's first SM planning cycle and to educate participants about SM. Another objective was to promote cooperation among the separate offices of the county government. The group performed goal formulation, environmental analysis, and strategy formulation.

The most common SM activities across the five organizations were strategy formulation (performed by six groups), goal formulation (four groups), and environmental analysis (four groups) (see Table 3). The number of participants ranged from 18 to 31. All group leaders reported that the number of managers involved in the EMS-supported SM meetings was higher than the organizational norm for SM meetings. All but one of the groups included members from at least three levels of organizational hierarchy and a number of different functional areas (the exception was the county government group, which was comprised of a peer group of elected officials and administrators).

## Results and Discussion

This section analyzes the cases to address the three research questions mentioned earlier. First, the ways in which EMS is used by organizations performing SM is examined. Then, the perceived effectiveness and efficiency of EMS support for SM is evaluated. Last, the capability of EMS to address the group process and communication issues discussed earlier is explored.

### *The application of EMS to SM: How is the technology used?*

#### **Communication Channels: Description and Usage**

The groups used three types of communication: electronic, verbal (i.e., speech), and mixed (i.e., a combination of electronic and verbal). The pattern of communication channel usage for each group was agreed upon between the leader and the EMS facilitator during the pre-session planning. Specific communication channels and the accompanying software tools were prescribed based on the meeting agenda and the objectives of the group (see below). Depending upon the dynamics of each meeting, agendas were occasionally adjusted during the meetings by the leader and facilitator to meet changing needs.

Divergent activities, such as problem exploration or idea generation, used primarily electronic communication because the objective was to rapidly collect many ideas, information, and opinions. Tools oriented to divergent communication (such as EBS or TC; see Table 2 for description) were used for this phase of SM activity. For activities requiring convergent communication, such as consensus building and idea organization, the objective was to resolve multiple and possibly conflicting viewpoints (i.e., equivocality). Situations such as these called for verbal discussion and clarification of issues. The Idea Organizer and Issue Analyzer tools were found to be appropriate because they supported a mix of electronic and verbal communication to take advantage of the beneficial aspects of each. The Prioritizing and Alternative Evaluator tools were other mixed channel tools used in some situations to establish overall group priorities and assess the degree of group agreement through an anonymous polling procedure. At times groups chose to communicate solely by verbal means (e.g., leader addressing the group, participants making presentations), and used the EMS as an "electronic blackboard" to record and structure the spoken verbal input.

While the pattern of channel usage was a function of meeting goals, agenda, and software used, participants almost always utilized the communication channel that was prescribed. In some respects, this observation was not unexpected because the facilitator could control the availabili-

ty of the electronic and mixed media, making it impossible for participants to use these channels unless the whole group was supposed to be using the media. However, participants could have rejected the electronic media and interacted by talking to one another. This did not happen; when private conversations did occur, they usually involved short verbal comments between individuals who were seated next to one another. For example, a group member would quietly interrupt a neighbor to make a comical remark or to point out and comment upon an electronic message on the workstation.

The proportion of time spent using the communication channels is presented in Table 4. Electronic channel use ranged from 25 percent to 93 percent; mixed channel usage ranged from 0 percent to 51 percent; and the spoken verbal channel use was 7 percent to 75 percent. In short, no single communication channel consistently dominated the others. Even organizations that used the EMS more than once emphasized the use of different communication channels for each meeting. For example, the mixed channel was used the most for ABC's first meeting, while the verbal channel and electronic channel were predominant in the second and third meetings, respectively.

The logs reveal that the electronic channel was primarily used to generate ideas and identify key issues; it was not typically used to resolve equivocal issues. Equivocal issues raised via the electronic channel were generally discussed verbally during verbal or mixed communication that followed the electronic sessions. In half of the cases studied (ABC meeting 1, Desert Utility, County Government, and the Medical Center) communication was about evenly distributed between electronic media and verbal or mixed media. In these cases, electronic sessions involving idea generation were typically followed by verbal discussion or mixed media sessions (of comparable length) in which the managerial input was organized and the equivocality associated with the ideas was resolved. In cases where the electronic channel was most heavily used (ABC meeting 3 and Gamma meeting 1), the objective of the meetings was to solicit managerial input rather than to resolve differences or reach conclusions. When the verbal channel predominated (ABC meeting 2 and Gamma meeting 2), group leaders wanted their

respective groups to leave the EMS meeting with a common understanding about the ideas and issues that had been identified using the electronic media.

### Electronic Communication Behavior and Interaction

The logs show that the vast majority of electronic comments were task focused. The proportion of non-task electronic messages ranged from 0 percent to 5 percent (see Table 5). Since groups typically did not talk during electronic communication sessions, we concluded that little social interaction occurred during electronic sessions. However, the break time following these electronic sessions was important to the participants for socializing; in several cases when the agenda did not call for a break following an electronic session, groups spontaneously took one.

Despite the task-oriented nature of electronic communication, the majority of the electronic sessions included a few messages that were not task focused. Most such comments were innocuous and playful, but some were inflammatory and/or profane. In most cases, neither the playful nor inflammatory messages appeared to be disruptive—such uninhibited comments were ignored by participants.<sup>2</sup>

All of the groups spent at least 25 percent of their meeting time using the anonymous electronic communication media (see Table 4). Did this communication consist of one-way, "stand alone" messages, or did participants respond to other messages and thereby interact via the electronic channel? The system logs show that the managers did interact using the electronic channel. The typical electronic "conversation" consisted of a series of two to six messages.

The amount of interaction (i.e., the proportion of electronic messages explicitly responding to another message) varied across the cases (see Table 5) and appeared to be a function of the objective of the electronic session, as well as the software utilized (TC or EBS). In general, less interaction was found when using the structured

<sup>2</sup> In only one case did uninhibited messages elicit an explicit response: a series of off-color comments was followed by a call by a participant for "a little more professionalism."

Table 4. Relative Distribution of Media Channel Usage (Percentage)

Media	Group and Meeting Number							
	ABC	ABC	ABC	Gamma	Gamma	Desert	County	Medical
	1	2	3	1	2	Util.	Gov't.	Center
Verbal	15	75	7	14	72	16	28	8
Electronic	49	25	93	64	28	45	40	44
Mixed	36	0	0	22	0	39	32	48

Table 5. Characteristics of Electronic Communication Sessions

	Group and Meeting Number								
	ABC	ABC	ABC	Gamma	Gamma	Desert	County	Medical	
	1	2	3	1	2	Util.	Gov't.	Center	
<b>Sessions Using TC</b>									
Number of Sessions		1	2	4	17	4	NA	2	1
Number of Messages		253	405	379	1915	699	NA	147	85
Messages/Minute		3.2	4.5	3.2	3.2	5.2	NA	1.8	3.4
% Non-Task		2	2	1	1	0	NA	5	1
% Responses		2	0	2	1	1	NA	5	0
<b>Sessions Using EBS</b>									
Number of Sessions		1	NA	8	2	2	5	NA	2
Number of Messages		284	NA	749	624	555	1737	NA	314
Messages/Minute		4.2	NA	5.2	6.4	9.3	7.2	NA	5.2
% Non-Task		1	NA	2	2	4	2	NA	5
% Responses		33	NA	34	15	27	27	NA	6

**Note:** NA indicates that no electronic sessions were conducted using this tool.

TC tool (0 percent to 5 percent). In the TC sessions, the managers were asked to generate ideas and observations relating to predefined and focused topics using a set of uniquely named index-card-like windows to make comments. Higher interaction was observed for electronic sessions involving the EBS tool (from 6 percent to 34 percent). The EBS tool was used for communication sessions in which the objective was to promote discussion on open-ended questions (e.g., "Is there an inherent conflict in [our organization's] dual objectives of being both the premier provider and the low-cost producer?"). Interaction was encouraged by the facilitator for these EBS sessions and by the EBS software itself because the interface provides users with two windows—one used for viewing messages, the second for user input. The task of responding to other EBS messages was aided by the fact that all messages were automatically assigned a message identification number.

### Strategic Decision Making

Decisions were typically not settled in the EMS environment. In only one case (ABC) was a preliminary strategic action plan resolved during the EMS meeting. For this group, the electronic medium was initially used to collect and organize managerial input on each division's strategic direction and the strategic linkages across divisions. Following a short break, each divisional management team met privately in a non-automated conference room for approximately one and a half hours to formulate a preliminary strategic plan for its division, and then reconvened in the EMS room to present and discuss its plans with the entire group. During this final session the group used the visual media of the facility (e.g., overhead projector, whiteboards), but did not utilize the electronic media. Electronic media was used for the early investigative stage of the planning process, but a more conventional

face-to-face meeting approach was used to resolve the strategy.

EMS use did not appear to democratize SM. The top management team from each organization retained its customary role as the final decision maker for SM. While strategic direction was never determined by a vote or consensus of the SM groups, it was evident that the information exchanged during the EMS meetings had an influence on strategic decision making. Each of the leaders mentioned in follow-up interviews that the top management team used the output of the EMS meeting (e.g., organized system logs, voting outcomes) as key input for its decisions.

The case examples showed that the EMS could help managers raise SM issues from both the rational and political perspectives. The EMS was useful in treating SM in a rational manner through the application of structured techniques. The EMS also appeared to assist in surfacing political concerns relevant to SM. Interviews with leaders revealed that sensitive political issues were raised by participants using electronic communication (e.g., the closure of an entire corporate division, the transfer of responsibility for a successful product from one department to another). While the EMS was used to raise issues of a political nature, we did not observe any situations in which a political issue was resolved within the EMS environment.

### *Perceived impacts of EMS use on the SM process*

The questionnaire and interview data indicate that all eight groups considered the EMS approach to SM to be successful. The majority of participants (74 percent–96 percent) perceived the automated approach to be an improvement over traditional methods (see Table 6). Interviews with each of the five leaders provided a similar finding: all five considered the EMS approach to be better than previous non-automated methods. Most participants were also satisfied with the computer-aided SM process (responses ranged from a low of 50 percent for Gamma (meeting 1) to a high of 93 percent for the county government group). Only a small fraction of each group was dissatisfied with the EMS approach. Improved efficiency was also seen as a key impact of the EMS. Four of the five leaders mentioned that

EMS use greatly accelerated the SM process. For example, the group vice president of Gamma commented after the session: “The process allowed us to do in three days what would have taken months to do.”

Research suggests that a group’s effectiveness in performing SM depends upon its abilities to identify, extract, and use the potential contributions of its members (Mason and Mitroff, 1981). In the cases studied, the overriding goal of each group was to tap into its managerial “knowledge base” to generate and explore ideas related to SM because no one member of the group had all the necessary information and opinions. The case data indicate that the EMS was successful in attaining this objective for these groups. A large majority of participants from each organization felt that the EMS helped their group to generate ideas (the questionnaire responses ranged from a low of 78 percent for ABC meeting 3 to a high of 100 percent for the county government) and identify key ideas (responses ranged from 70 percent for ABC meeting 3 to 100 percent for the county government).

The improvement in efficiency for these groups can be attributed to several features of the EMS. First, the electronic communication channel made it possible for many managers to participate in the SM process at the same time. As a result, each organization was able to rapidly collect and organize input from its managers in one meeting, thus saving the time and effort associated with coordinating input gathered in a more piecemeal fashion (i.e., through separate SM meetings) (Mintzberg, et al., 1976). Second, the implementation of structured SM techniques via the software tools (e.g., ABC’s implementation of the SWOT (“Strengths, Weaknesses, Opportunities, and Threats”) environmental analysis technique using the Topic Commenter tool) appeared to help groups stay focused on the task at hand and pinpoint critical issues. Last, the design of the tools facilitated the rapid organization of the results into reports that could be distributed to participants shortly after the end of each session (turnaround time was typically a half hour). According to the CEO of Desert Utility: “We got instant feedback through the hard copy printouts and analysis that was provided. The computer eliminated the cross-referencing we had to do before. That alone saved us an enormous amount of professional hours.”

Table 6. Post-Session Questionnaire Results  
(Responses are in Percentages)

Question	ABC 1 N = 27			ABC 2 N = 23			ABC 3 N = 24			Gamma 1 N = 26			Gamma 2 N = 22			Desert Utility N = 30			County Gov't. N = 14			Totals N = 166		
The computer-aided process is better than the manual process.	Agree	96	78	74	85	77	93	85	77	93	85	85	77	93	85	85	77	93	85	85	77	93	85	85
	Neutral	0	13	13	15	14	3	15	14	3	15	0	14	3	15	10	14	3	15	10	14	3	15	10
	Disagree	4	9	13	0	9	3	0	13	0	3	0	9	3	0	5	9	3	0	5	9	3	0	5
I am satisfied with the computer-aided process.	Agree	89	88	82	50	82	90	50	82	90	93	82	82	90	93	81	82	90	93	81	82	90	93	81
	Neutral	7	8	5	35	9	7	35	9	7	7	9	9	7	7	11	9	7	7	11	9	7	7	11
	Disagree	4	4	14	15	9	3	15	9	3	3	15	9	3	0	8	9	3	0	8	9	3	0	8
I feel committed to the group's decision.	Agree	85	88	21	69	NA	62	69	NA	62	79	NA	NA	62	79	68	NA	62	79	68	NA	62	79	68
	Neutral	15	4	68	19	NA	31	19	NA	31	21	NA	NA	31	21	25	NA	31	21	25	NA	31	21	25
	Disagree	0	8	11	12	NA	7	12	NA	7	0	NA	NA	7	0	7	NA	7	0	7	NA	7	0	7
The computer-aided process helps the group generate ideas.	Agree	93	96	78	92	NA	83	92	NA	83	100	NA	NA	83	100	90	NA	83	100	90	NA	83	100	90
	Neutral	7	0	4	4	NA	10	4	NA	10	0	NA	NA	10	0	5	NA	10	0	5	NA	10	0	5
	Disagree	0	4	18	4	NA	7	4	NA	7	0	NA	NA	7	0	5	NA	7	0	5	NA	7	0	5
The computer-aided process helps the group identify key ideas.	Agree	85	92	70	77	NA	79	77	NA	79	100	NA	NA	79	100	83	NA	79	100	83	NA	79	100	83
	Neutral	15	4	13	15	NA	18	15	NA	18	0	NA	NA	18	0	12	NA	18	0	12	NA	18	0	12
	Disagree	0	4	17	8	NA	3	8	NA	3	0	NA	NA	3	0	5	NA	3	0	5	NA	3	0	5
The role of the facilitator is important to group planning.	Agree	82	63	56	77	50	73	77	50	73	100	50	50	73	71	71	50	73	71	71	50	73	71	71
	Neutral	18	25	22	19	36	14	19	36	14	0	36	36	14	0	19	36	14	0	19	36	14	0	19
	Disagree	0	12	22	4	14	13	4	14	13	0	14	14	13	0	10	14	13	0	10	14	13	0	10

Note: No questionnaires were given to the Medical Center.

## How does EMS support SM? Benefits and limitations

### Equality of Participation

Equality of participation appeared to be one of the key success factors of EMS support for SM. The electronic logs and visual observations provided evidence that all participants from all organizations actively participated in the SM process. "Equal levels of participation" was mentioned during interviews as an important aspect of the EMS. The interviewees reported a number of benefits from increased participation, including improved information sharing, collection, synthesis, and presentation. The electronic channel also appeared to have had an impact on the distribution of participation compared to the verbal discussion sessions. During verbal discussions we observed that three to five people typically dominated the conversation and that three to five people always were silent. A comparison of the distribution of participation during the electronic and verbal sessions thus indicates that there was a broader distribution of participation using the electronic channel.

The capabilities of the electronic channel allowed all managers the same opportunity to provide input at any time during the periods of electronic communication. The parallel channel also made it impossible for any one individual to limit the contributions of others and thereby dominate the discussion. A steady stream of input via the parallel channel was observed for the groups. As indicated in Table 5, all but one of the groups averaged at least three messages a minute over the course of their electronic sessions (i.e., a new message was introduced to the group every 20 seconds or less). Despite the large amount of user input, the leaders indicated that the structure provided by the software helped the participants to communicate in an orderly fashion.

Seven out of the eight cases relied on the Topic Commenter (TC) tool. This tool provided structure to SM techniques designed to help managers focus on the key issues related to specific SM activities. According to a manager from ABC, such structure helped the meeting participants to stay on track and fully explore the relevant issues in a rational manner. This suggests an important implication: EMS software may be a useful vehicle for introducing and ap-

plying normative SM techniques into the organizational meeting environment.

### Production Blocking

The electronic media of the EMS appeared to minimize the unfavorable effects associated with the three types of blocking (attenuation, concentration, and attention). At no time did it appear that the group work was constrained by attenuation or concentration blocking. This finding is attributed to the parallel electronic media, which allowed participants to submit their comments without having to wait their turn to contribute. We observed that these groups readily adapted to the protocol of simultaneous electronic communication. At the start of each electronic session, almost all managers would immediately enter input, suggesting that they were eager to share their ideas with their group. At later stages in the session, participants entered additional ideas or paused to reflect upon and comment on ideas submitted by others. The ability to record electronic communication seemed to reduce attention blocking. Several interviewees mentioned that they liked being able to spend time formulating thoughtful input into the SM process without having to worry about missing the contributions of others. Observations indicated that managers stayed in touch with the group as a whole by alternately composing their own input and then reading the comments submitted by others.

Redundancy of ideas is a potential by-product of parallel communication that could contribute to group inefficiency because of replication of effort. A qualitative examination of the electronic logs indicates that very few of the messages appeared to be redundant. We attribute this to the unbounded nature of the SM issues that were discussed (i.e., there were no simple answers to the issues) and to the diverse nature of the SM groups.

### Evaluation Apprehension

It appears that participants experienced relatively little evaluation apprehension during electronic communication. All five leaders reported that anonymity encouraged more open and more active participation in the SM process. According to some of the leaders, the anonymous channel elicited controversial views and ideas that had not



been surfaced in previous meetings. The CEO of Desert Utility noted: "Because the process is anonymous, the sky's the limit in terms of what you can say, and as a result it is more thought provoking. You'll probably discover some things you might not want to hear, but need to be aware of." In general, participants appreciated having the opportunity to air their viewpoints without fear of recrimination. One manager used the system to thank the CEO for "having the guts to let us do this!"

There are, however, aspects of anonymity that might limit—rather than promote—communication. For example, anonymity can make it difficult, if not impossible, for managers to get credit for contributing valuable ideas. We might expect some managers to be reluctant to introduce their ideas via an anonymous forum, leading to the withholding of those ideas. However, no leader or participant expressed this concern. We attribute this to the fact that all the meetings involved a combination of electronic and verbal media. Hence, managers who wanted to ensure recognition for their contribution could claim an idea during verbal discussion. Participants could also circumvent anonymity by adding their name to their electronic messages, but this was done for only six electronic messages out of almost 8,000 messages across the eight cases.

#### Communication Across the Hierarchy

The cases demonstrate that EMS technology can help support communication between different levels in organizations, particularly upward communications. Four of the organizations had distinct hierarchies. Each of their group leaders felt that the EMS approach was better than the non-automated approach in helping line managers to communicate their concerns upward to top management. Group leaders from three of these four organizations also considered EMS to be an improvement over a conventional SM process for communicating top management's expectations downward to line managers (the fourth group leader was unsure). These findings are consistent with those of Sproull and Kiesler's (1986) field study of electronic mail, in which status equalization due to the reduced social context of electronic media resulted in an increase in information exchange between organizational levels.

There were three important by-products from this improved communication: organizational learning, a reduction in semantic-information distance (i.e., improved understanding between superiors and subordinates), and managerial commitment to the SM meeting outcome. Representatives from all five organizations interviewed felt that the EMS approach helped to foster organizational learning. The comments by the CEO of Gamma illustrate the favorable impact of the EMS approach on organizational learning and semantic-information distance: "A lot of education happened that previously hasn't happened. . . . People walked in with narrow perceptions of the company and walked out with a CEO's perception."

Commitment also seems to have been enhanced. The majority of participants from all but one of the groups indicated that they were committed to the meeting outcome (see Table 6). This commitment can be important for the implementation of strategic plans, since the EMS allows line managers responsible for implementation to take part in the SM process (Ackoff, 1981). As noted by the CEO of ABC: "The shared experience created awareness and 'buy-in' [to the strategies developed]." In one case (ABC meeting 3) most of the managers (68 percent) reported that they were neutral with regard to commitment to the group's decision. As indicated in Table 4, a very large portion of this meeting (93 percent) was conducted using the anonymous electronic media channel. While we cannot generalize or draw causal conclusions from such limited data, it may be possible that extensive use of the electronic media has an unfavorable impact on participant commitment to decisions because it may be difficult to bring issues to closure electronically. To encourage commitment to a group decision a certain level of verbal face-to-face communication may be required.

## Conclusions

### *Summary and generality of findings*

This study provides some insight into the ways that large and diverse organizational groups can use EMS technology for SM. We found that SM groups utilized different patterns of media channels depending on the focus of the meeting. Typically, the electronic media was used to generate ideas, while the verbal and mixed chan-

nels were used to discuss issues. We also found that during electronic sessions, groups were task focused and that interaction varied depending on the electronic tool used and the session objective. The EMS was not used to democratize SM because top management retained control of decision making. The EMS did support the use of SM techniques for rational decision making and appeared to help groups raise political issues. However, political issues were not resolved in the SM environment for the cases studied.

An examination of the case data suggests that EMS technology can be used to support large SM groups in an effective and efficient manner, a finding consistent with other EMS studies involving organizational groups. This study also builds on previous research by investigating the ability of an EMS to address the communication and group process needs of the organizational groups performing SM: equality of participation, production blocking, evaluation apprehension, and communication across the hierarchy. The findings from this study suggest that the favorable perceptions of EMS may be attributed to the capability of EMS to support groups with respect to these needs.

To what extent can the findings from this study generalize to other organizations and their practice of SM? The organizations studied here were relatively diverse, having been drawn from several types of industries and the public sector. Two had moderate prior experience with SM, one had extensive experience, and two had no experience. The tasks included four of the six SM activities in Table 1 (not included were the activities of implementation and control). Most groups were hierarchically structured, although members of the county government group were peers. The groups were relatively large, ranging in size from 18 to 31 members. There appear to be few obvious characteristics that restrict the generalizability of these findings to other SM situations; however generalizability remains a concern.

This study has some limitations. The research did not directly compare the EMS group approach to "control" groups using a non-automated approach. Instead, group leaders and participants were asked to compare their past experiences with SM groups to their experiences using the EMS. While the case study design provided us

with rich data from multiple sources (i.e., interviews, questionnaires, electronic logs, observations), the qualitative nature of the study does not lend itself to rigorous statistical analysis and causal inference. Finally, the sample was relatively small, involving five organizations and eight cases.

### *Implications for design of EMS to support SM*

The results of this study suggest that a multimedia EMS design and a generic EMS toolkit can be useful EMS design components for supporting the SM process. The combination of electronic, verbal, and visual media offered by the EMS facility appeared instrumental in providing effective support for large SM groups. Specific features cited as being beneficial were the parallel electronic communication channel, anonymity, the automatic recording of all electronic communication, and the physical facility configuration. The generic software EMS toolkit was also found to be very useful for supporting SM groups. By using the various tools in the toolkit we found that: (1) a variety of SM activities could be supported; (2) the appropriate degree of structure needed to support a given group and activity could be provided; and (3) different combinations of electronic and verbal communication could be provided to address the demands of the task. While more specialized software tools (such as those that support specific SM analytical techniques) may further enhance the capability of EMS to support SM, it appears that a generic toolkit can address many of the needs of SM groups.

### *Issues for future research*

One of the objectives of this study was to identify research issues related to the practical application of EMS in organizations. There is one question requiring more investigation: How do user perceptions of EMS change over time? This study examined two organizations (ABC and Gamma) that met in the EMS facility on multiple occasions. In each of these cases the proportion of group members who rated the EMS to be an improvement over their organization's manual SM process dropped from the first meeting to the subsequent meetings (see Table 6). Although the

decreases were not large (a drop of 22 percent for ABC and 8 percent for Gamma) and the overall assessment of the EMS remained quite high, it does suggest that the extremely favorable perceptions of first-time EMS users may decrease slightly with experience. These decreases could be due to the different SM activities that were performed in the different meetings. On the other hand, the first-time users may have been more favorably influenced by a "novelty effect." For the two organizations in this study that returned to the EMS, we note that the decrease in rating did not appear to dampen enthusiasm for EMS technology. In fact, one organization (ABC) is now building its own EMS facility and the other (Gamma) has returned to the Arizona facility several times for additional (non-SM) meetings. A larger sample of repeat user groups is needed to more fully evaluate this issue.

This raises another issue: What are the benefits and limitations associated with repeated organizational use of EMS technology? In particular, would the EMS benefits cited by the participants in our study hold up over more extended use of EMS? For example, consider the organizational utility of having frequent access to an EMS with an anonymous communication channel. For the cases studied, anonymity was identified by managers as an advantageous feature because it helped to surface new opinions and ideas. We would expect that organizational groups would have an ongoing need for a communication mechanism to aid in the surfacing of new opinions and ideas. Such a scenario would indicate that frequent access to an EMS with anonymity is desirable (e.g., a purchase of an on-site EMS). However, it is possible that managers may only need to "purge" their thoughts on an infrequent basis. In this case, it may not be as critical to have frequent access to an EMS with anonymity. As another example, we found that use of an EMS for SM may improve communication across the hierarchy and provide managers with a "CEO's perception" of an organization. What long-term impact might this type of benefit have on issues such as company performance, the delegation of organizational decision making, and the development of management personnel? Longitudinal studies in a field setting are needed to learn more about the impacts related to repeated use of EMS in organizations.

While the EMS was used to raise issues involving political decisions, we observed that these issues did not appear to be resolved by groups within the EMS environment. For example, one group generated the idea of closing a corporate division via the electronic channel. Although this issue was later discussed during a verbal session, the group did not resolve the issue while in the EMS environment. In a follow-up interview we learned that a corporate reorganization had ultimately occurred following a period of debate and bargaining that had taken place after the group returned to their office. Could an EMS offer support for the debate and bargaining that may be associated with SM decision making? Research examining the application of EMS to negotiation activities offers encouragement that EMS may be able to support this aspect of SM (Herniter, 1991), but the value added by the technology is presently unclear. Further investigation into this application area of EMS for SM groups is desirable.

In this study, effective SM meetings were conducted for group sizes ranging from 14 to 30 people. Managers from two of the larger groups commented about "information overload," indicating that the threshold for group size was approached during these meetings. While this study demonstrates that EMS can support large groups, additional research in the laboratory and the field is needed to explore the upper limit on group size as well as the advantages and disadvantages associated with large EMS groups.

This study suggests that EMS can have a beneficial impact on the SM process. However, despite the favorable findings of this study, there can be no guarantee that EMS will produce a successful organizational strategy. Nonetheless, EMS does show potential for addressing several issues that bear on the SM process. As indicated in the foregoing discussion, there are many questions that remain to be answered regarding the application of EMS to the organizational context. We hope that this study will draw attention to some of the issues that are relevant to the practical application of EMS in organizations, and prompt more research in this potentially important area.

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