Title: **Using Group Support Systems for Strategic Planning with the United States Air Force***

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Abstract:
Strategic planning is a critical part of establishing an organization's direction. Although strategic planning is utilized throughout the United States Air Force today in various forms, group sessions can become time-consuming without structured planning and a focus on group communication. Computer-supported strategic planning, making effective use of technology, is one way to improve the strategic planning process. This research implements a group support system (GSS) as a communication tool to facilitate the strategic planning process. The researchers investigate effects of a facilitator's using technology to structure verbal and electronic communication, with the goal of increasing quality output and improving group member satisfaction. This project was completed at Mountain Home Air Force Base with the support of the 366th Wing. As predicted, a GSS facilitator's structuring verbal and electronic communication improved the quality of the strategic plan, reduced time to complete a strategic plan, and increased satisfaction with the strategic planning process. The results did not indicate increased commitment to implement the strategic plans developed by a group using GSS facilitation.

Keywords: Strategic Planning, Group Support Systems, GroupSystems, Air Force, Satisfaction, Decision Quality, Elecronic Meetings

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In the new millennium, the work of an organization often occurs within groups or teams [22, 152]. Consequently, cooperation and collaboration within groups is critical to an organization's effectiveness [23]. Group work offers a multitude of advantages to an organization through sharing information, generating ideas, making decisions and reviewing the effects of decisions [139]. Decision-making groups are social entities that require effective coordination of time and resources [173]. Generally, the goal of such groups is to determine an optimal solution to an issue. Ideally, the group, will reach a "better" decision than an individual, because the collective knowledge and skill of the group is typically greater than an individual's knowledge or skill [121,124, 181]. Also, making a decision in a group disperses individual accountability associated with decision-making.

The goal of much research on group interaction is to improve the group's ability to make quality decisions. According to Johanson and Swigart [109] the issue of quality is increasingly important in organizations yet the specific definition is elusive. The authors claim that "quality used to mean something well-made, crafted with the attention of a master...something fitted closely to its purpose, or something deliciously apt" (p. 92). Current organizations invert the traditional relation of time to quality and no longer support the concept that the longer one works on something the higher the quality. According to Beehtell [20], quality means continuous improvement in fundamental processes. In this study, quality is how close actual output meets the intended purpose. The objective is to analyze the strategic action plans against a criteria for what an ideal plan looks like to judge "quality" of the output from the strategic planning sessions.

Researchers have followed two general paths to meet this challenge [61]. One path is descriptive, investigating what groups do when making decisions. Specific variables associated with this type of analysis are communication behavior, group size, meeting length, participants' gender, and room arrangement [151, 157]. Descriptive research provides knowledge claims that indicate how decision-making groups interact. For example, Bales and Bales and Strodtbeck [14, 18] found that successful decision-making groups went through three interaction stages or

phases: orientation, evaluation, and control. Hence, several decades of researchers analyzed group interaction and described different phases of this interaction in varying detail [9, 17, 115, 162, 163, 166, 167].

A second path is prescriptive group research. This path uses knowledge claims from descriptive research plus logic to develop theories on how groups ought to interact when they are making a decision [54]. An implicit assumption of prescriptive theories is that decision-making is rational. Prescriptive theories suggest steps to reach a quality decision [44, 46, 170, 171]. These steps are based on a rational approach to decision-making [158]. Hirokawa [92, 93] reports that groups that follow rational decision-making approaches produce higher-quality group decisions than groups that do not follow decision-making prescriptions. Prescriptive theories are criticized because group members are assumed to behave rationally, and the standard structure of a prescriptive approach may limit creativity [12, 181].

Both descriptive and prescriptive approaches to group decision-making are helpful in developing methods that can improve the quality of group decision-making [61, 95, 97, 98, 142, 143, 144]. For example, descriptive research has shown that successful groups critically analyze assertions presented, while prescriptive theories often provide a structured process for critical analysis of the problem, as well as a process to generate alternative solutions. This study uses a systematic integration of these two lines of research to explain how a group support system (GSS) can be used to improve group decision-making quality and satisfaction with the group decision-making process.

The investigation is designed to achieve the following goals: (1) to conceptualize the various roles within structured communication when GSSs are used to improve a group's ability to make high-quality decisions; (2) to conceptualize the functions of a group facilitator's potential intervention strategies in managing groups using GSSs; and (3) to establish a context in which to investigate the impact on decision quality and satisfaction when a facilitator uses a GSS.

Group Decision-Making Communication

Groups are not static entities; they are processes that exist in and through members' activities [25]. Communication is a principal activity for groups, and argument is an important regulatory function in group interaction. Willard argues that society has mixed feelings about conformity, dissent, innovation, and rebellion. On the one hand, conformity leads to harmony, yet dissent and rebellion can lead to innovation [121, 123]. MacRae [120] argues that when public policy analysts engage in discourse with public leaders and citizens, the interaction should include both distinct adversarial and consensual discourse. Disagreement is desirable when it becomes a vehicle that produces innovative alternatives; yet, is unacceptable when it becomes a vehicle that slows the group down, creates disharmony, or drives the group to dissolve without reaching acceptable closure [121, 122].

Ideal Model of Group Decision-making

Adkins [5] developed an ideal model of group decision-making derived from van Eemeren, Grootendorst, Jackson and Jacobs' [172] ideal model of argumentative discourse. Used as a comparative set of standards, this ideal decision-making model is a set of decision rules and "higher order" conditions that represent a subject as it could be [101, 102]. One use of an idealized model is identifying mismatches between actual and ideal; these mismatches may suggest structures or techniques to diminish that gap [85]. MacRae [120] used the construct of comparing what is to what ought to be when he noticed that policy-making groups focused much of their energy on reaching a consensus rather than first generating and critiquing policies. He identified mismatches between ideal decision-making and actual decision-making, then proposed a method to bridge the gap between the two. MacRae suggests that policy-making groups be more critical of policies before reaching a consensus on which policy to choose. But convincing a group to be critical of policies in a public forum is difficult. Time constraints and social rules or norms inhibit participants' abilities to criticize proposed policies [121, 122, 131].

Uncritical Group Decision-Making Interaction

Researchers have found that interaction in decision-making groups is uncritical [131, 132]. Based on inferential errors, Gouran and colleagues [72, 73, 74, 75, 76, 78, 80, 81, 99] suggest

that groups may not be as vigilant in their interaction as previously assumed. An inference is a judgement concerning something unknown based on something known or assumed, or an unwarranted conclusion drawn from given information [72]. When a group member shares an inference with the group, the ensuing interaction typically does not take into account sufficient evidence either to support or contradict the inference. This type of interaction leads individuals in the group to accept unfounded statements as accurate, to reject critical information, and to provide little information for developing counter arguments in defense of the group's decision.

Canary, Brossmann and Sibold [21] and Meyers' [130] concept of structurational group argument, which views argument as a structured social practice produced and reproduced in an interaction, and found that simple argument was the most common type of argument used in both consensus and dissensus groups (approximately 53% and 57%, respectively). The structuration coding scheme [31, 32, 148, 155, 156, 164] defined a simple argument as an assertion (statement of belief or opinion), followed by a supporting elaboration, as well as amplification (explanation of inferential statements) or justification (statements offering norms, values, or rules of logic). According to Meyers, Sibold, and Brashers [133], the simple argument triplet (assertion-elaboration-amplification) is often not evaluated or challenged critically in a decision-making group.

Meyers' [131] suggests two findings: (a) group members are often uncritical in their interaction; and (b) group argument is a social activity, guided by a set of social rules and norms. The predominant interaction in a decision-making group is an assertion followed by elaboration. Participants rarely disagree or ask for clarification or justification of assertions presented to the group. Meyers, Sibold, & Brashers [133] found that group members were not concerned with critically evaluating others' arguments or with developing their own arguments. Essentially, group members allowed most claims of inferences to go unchecked or untested.

Critical Decision-making Functions

Arguing from a functional perspective, Hirokawa [90, 94] suggests a group will reach a high-quality decision if it performs critical decision-making functions rather than simply

following a decision-making structure. A function is oriented to action, and structure is a static union of parts. Hirokawa provides four critical functions a group should satisfy when reaching a high-quality decision: (1) "the group needs to understand thoroughly and accurately the problem presented to it; (2) the group must marshal a range of realistic and acceptable alternatives; (3) the group must access thoroughly and accurately the positive consequences associated with each alternative choice; (4) the group must assess thoroughly and accurately the negative consequences associated with each alternative choice" [94, p. 205]. Each of these discriminating functions requires group members to interact in a critical manner. This interaction is likely to be hindered by social rules and norms that restrict critical interaction [100, 114, 131, 132].

Summary

Prescriptive methods such as Seibold's [154] rational reflection model have been designed to guide groups through specific processes in a logical manner. Groups led through a structured prescriptive model will produce a decision of higher quality than groups that do not follow a systematic approach to decision-making [30, 94, 121]. Descriptive approaches analyze decision-making groups' communication in order to understand how group decisions are made [29]. In general, group members do not use complex arguments to challenge assertions or build counter arguments when making decisions in groups. Disagreement, although disruptive to group interaction, is a desirable catalyst to produce complex arguments and innovative alternatives.

The Role of Group Support Systems in Decision-making Communication

In the ideal group decision-making model, Adkins [5] states that groups first need to picture the ideal group decision in order to recognize barriers to ideal decision-making. In addition, a vision of the ideal decision will help facilitators engineer tools or techniques that can bring actual group decision-making closer to ideal decision-making. A group support system (GSS) is a tool that can help a group structure the decision-making process and improve group communication [34, 47, 48, 52, 127, 128, 141, 174]. A GSS consists of networked computers, software designed to support group work, and an environment that promotes group interaction [c.f., 107]. Group support systems can provide a mechanism for structuring interaction in a

decision-making group and can improve the ratio between group process gains and losses [107, 138].

According to Nunamaker, et. al. [138], group process gains are more information, objective evaluation, synergy, stimulation and learning. Process losses occur with: air time fragmentation, attenuation blocking, concentration blocking, attention blocking, failure to remember, pressure to conform, evaluation apprehension, free riding, socializing, domination, information overload, incomplete use of information, and incomplete task analysis. These lists are not exhaustive but represent the concept of "group process gains and losses."

Communication Structure Using GSS Decision-making Tools

A typical GSS decision-making interaction may first use a divergent information-gathering software tool to collect a large number of ideas quickly. In general, there are two types of divergent software tools. The first uses electronic brainstorming software to regulate synchronous group communication [49, 68, 168]. This software allows a group member to type a response to a question on an electronic piece of paper. Once an idea has been typed on the "paper," the participant submits it to a central pool of "papers" and receives another "paper" in exchange. This second "paper" will have another group member's idea typed on it. At this point, the group member can add a second idea or comment on the idea previously submitted. The movement of "paper" is chronologically based.

The idea-swapping process continues until the group has generated a large number of comments. This type of divergent interaction is purposely structured to limit participants' communication with each other. The entire pool of ideas submitted to the group is never available to any individual; all a participant can view is one electronic piece of paper with its accompanying comments. Limiting a group member's exposure to submitted ideas in this way allows the group to generate a large number of ideas quickly, without having to take the time to read all comments submitted. In general, electronic brainstorming groups generate more ideas than do other types of groups [134]. Also, as the size of the group grows, the superiority of electronic brainstorming groups increases [49, 68, 168].

A second type of divergent information-gathering software tool allows group members to communicate in a more synchronous manner. Using this tool gives group members a window for submitting comments during the idea generation phase. Discourse is delayed while group members read everyone else's comments, but the eventual communication is more interactive. Group members build from dynamic interaction [50]. For example, participants can ask for clarification on a comment or foster disagreement on an issue. With this software tool, communication is more structured for question/answer or critique/defense interaction.

Parallel Communication

Another aspect of GSS software that influences group communication is its capability to enable communication in parallel. Ideally, in a 30-minute face-to-face idea generation exercise with a group of 10 people, there will be three minutes of talk time for each group member. In face-to-face meetings, however, some group members take more than their allotted three minutes to express their ideas and thus limit other group participants' talk time. Even using a stopwatch, it is difficult to limit some group members' talk time.

By contrast, using a group support system to communicate within the group gives each member a potential for 30 minutes of "talk time." This length of "talk time" must be balanced with read time for effective communication. Group support systems use network-linked computers that allow members to type in their ideas and read other ideas without traditional talk time restrictions. This computer-mediated communication lets a group member focus on getting an idea out to the group without immediately responding to other members' ideas. After all group members have submitted ideas to the group, they can read others' ideas or comments made on submitted ideas.

Anonymity

GSS divergent information-gathering tools also offer anonymous interaction. Group members can communicate without directly referring to themselves. A social norm that often influences group communication is that subordinates do not publicly critique a superior's idea or comment. This norm is particularly influential with hierarchical organizations like the military.

Using anonymous interaction limits the effects of this norm; consequently, communication can be direct and unaltered by politeness norms or status influences [39, 106, 108 169].

Communication Organization and Analysis Capability

Verbal interaction is often combined with software tools to help groups categorize collected information [71, 138]. Once categories have been developed, the group interacts to ensure that the intent of each category is understood. After defining the categories, the group often uses a polling tool to narrow the alternatives to a set of "top" choices. Voting results can be expressed with rank order, yes/no, five- or ten-point Likert scale, or multiple choice. The vote is typically anonymous and gives equal weight to each participant's ballot.

After narrowing the alternatives, group members typically engage in further electronic discussion to analyze the pros and cons of each alternative. This discussion is usually structured with a semi-synchronous communication tool. After the second round of discussion, group members vote a second time to choose the top alternative.

Summary

A GSS is a tool that can control communication flow and effectiveness. Some GSSs are designed to support a facilitator in guiding group interaction; others are designed for use without facilitators [145, 70]. The focus of this discussion is on GSS tools that help facilitators guide the decision-making process. Facilitators use the GSS to strategically intervene in a group's decision-making communication. A GSS facilitator's choices of tools, combinations of tools, and duration of use are strategic and affect the outcome of the group interaction. This investigation focuses on facilitated GSS-groups.

The Roles of a Group Facilitator

Using a facilitator to guide group decision-making interactions is a common practice because groups need help with process losses or relational concerns [11, 26, 62, 111, 153]. Group members commonly are not trained in group processes [112]. Also, relationships among group members may require mediation by an external source because of conflicts or power differences [4, 140]. Researchers have found that groups using GSS make decisions of higher-

quality when facilitated [70, 83, 96, 140, 177]. Group facilitators are not a panacea for all problems in decision-making groups, but they offer an external source of group process skills and expertise, which can be coupled with a meeting leader's subject knowledge to produce quality group decisions [153]. The functional component provided by a group facilitator is directly linked to the structure of a GSS.

Facilitator Functions

The task of facilitators in an electronic meeting generally is more complex than that of facilitators in a face-to-face meeting [125, 136, 137]. Often facilitators in electronic meetings must not only direct the meeting but also acquaint group members with features of the technology used to support the meeting. Consequently, in a GSS-supported meeting, a facilitator must play multiple roles [138]. During a meeting using a GSS, facilitators may serve as technical facilitators (responsible for operating the technology and instructing members about the technology), process facilitators (responsible for directing the meeting), or both [26].

Clawson, Bostrom, and Anson [35] surveyed facilitators and developed a typology of 16 facilitator functions, 13 of them common to both GSS and non-GSS meetings. The 13 functions are: promoting ownership and encouraging group responsibility; demonstrating self-awareness and self-expression; listening to, clarifying, and integrating information; developing and asking the right questions; keeping the group focused on outcomes; creating and reinforcing an open, positive, and participative environment; actively building rapport and relationships; presenting information to the group; demonstrating flexibility; planning and designing the meeting process; managing conflict and negative emotions constructively; encouraging and supporting multiple perspectives; and directing and managing the meeting. The three functions specific to technology-assisted meetings are: (1) appropriately selecting and preparing technology; (2) creating comfort with and promoting understanding of technology and technology outputs, and (3) understanding the technology and its capabilities.

The facilitator may be the group leader, a group member, or an individual who is separate from the group and neutral by decree [55]. The University of Arizona hosts thousands of

meetings that use GSSs and facilitators who are not members of the group. The traditional role of the facilitator is to provide technical support, plan an agenda, maintain an agenda, and set ongoing standards for how the GSS is used in an organization [138, 178]. A facilitator's first encounter with the group should be a meeting with the group's leader before the group convenes.

Facilitators as Communication Managers

The facilitator's central role in this pre-planning session is as a communication manager (i.e., as solicitor, organizer, integrator, and presenter of pertinent information used to determine the meeting's purpose and process). The facilitator and the group leader meet before the actual meeting to discuss the meeting's purpose, desired output and process to achieve meeting's goals [4]. From this pre-planning meeting, the facilitator will develop a detailed script that outlines the meeting's structure. This script should indicate specific phrasing of questions or topics to be addressed during the meeting, and stipulate how long the group should use each GSS tool. Also at the pre-planning session, the facilitator should meet with the highest level person(s) attending the meeting. This condition helps avoid a powerful participant's taking control of a meeting, voiding the agenda, and trying to run an unplanned meeting.

After the pre-planning meeting, the facilitator creates structure for the preplanned script and the actual group interaction by setting up GSS software tools before the meeting. During the meeting the facilitator monitors the group's process and makes software tool changes as required. When the group arrives at the GSS facility, the facilitator introduces the group to the tools and explains how the interaction will proceed. The facilitator then explains the agenda that will be used, discusses the structure of the meeting, shows how each step in the agenda relates to the meeting's ultimate goal, and provides technical information on how to use the software.

Communication Between Facilitators and Group Members

Little research has been conducted on the communication of facilitators in face-to-face meetings [96], or on the effect facilitators have on the communication behaviors of group participants. In an argumentation and group decision-making investigation, Brashers, Adkins, Meyers, and Mittleman [27] argued that "one aspect of the GSS that has notable potential for

improving arguments is the use of a facilitator, by making groups respond more critically to arguments advanced in the interaction, by encouraging further development of arguments put forward for group consideration, or by diminishing the influence of social conventions and norms on the decision-making process" (p. 17). When a facilitator uses a GSS there is an opportunity to employ systematic unobtrusive or obtrusive strategic communication to influence the group's decision-making behavior [6, 82, 149].

Summary

Facilitators use group communication theory to develop and implement communication strategies in order to help a group produce a desired outcome [1]. One of the central roles a facilitator plays during a group interaction is that of communication manager [4]. The facilitator continuously evaluates the interaction of group members to understand where the group has been, what is left to be accomplished and how tool or process interventions can be operationalized to help the group reach a desired outcome.

Research Hypotheses and Questions

A facilitator with an understanding of the way decision-making groups communicate and knowledge of how GSS structure affects communication can create strategic interventions to positively affect group outcome [2, 3, 56, 83, 177]. The sum of the literature argues for directional testing of the impact of a facilitator's implementing strategic communication interventions with a GSS as compared to groups that interacted naturally and made decisions using "typical" processes. The following predictions and question are proposed for facilitated groups using a GSS to make decisions.

H_1: The quality of the outcome for a group using a GSS facilitator will be higher than for a group using common decision-making practices.

H_2: Time required to complete the decision-making task for a group using a GSS facilitator will be less than for a group using common decision-making practices.

H_3: Group members using a GSS facilitator will be more satisfied with the group's interaction and outcome than a group using common decision-making practices.

R_1: How will the individual commitment to the group's decision be different between a group using a GSS facilitator and a group using common decision-making practices?

Context of Investigation

The investigation uses the context of strategic planning at Mountain Home Air Force Base in Idaho. Due to the Government Performance and Results Act (GPRA) mandate that all government organizations conduct strategic planning, emphasis is directed to the development of schemes and processes to support planning in large organizations. This research implements a group support system as a facilitation tool to improve the strategic planning process. The project was completed at Mountain Home Air Force Base with the support of the 366th Wing. This research context provided an environment in which a facilitator implemented and evaluated strategic communication interventions with a GSS.

Group Support System Environment

The Center for the Management of Information at the University of Arizona worked with Mountain Home Air Force Base to establish portable and permanent environments in which to use a group support system. The portable environment consisted of 12 networked laptops, a portable projector, and carrying cases for the equipment. When coupled with portable electric generation gear, this environment can be deployed anywhere. In the permanent GSS facility, 16 workstations were imbedded into a table, which could either easily "hide" the technology or graciously add its capabilities to the group's interaction. In addition, Citrix WinFrame technology was incorporated with video and audio conference capability for distributed interaction. The facility also included projection equipment, white boards, flip charts, cooling and heating controls, lighting controls and comfortable seating.

Facilities

Mountain Home Air Force Base (366th Wing). In April 1991, the Department of Defense announced that Idaho's Mountain Home Air Force Base would be the site of a new Composite Wing. Modern air warfare, as conducted so successfully in the Gulf War, requires aircraft of different types to fly together as a team. Air superiority aircraft such as the F-15C Eagle must sweep the sky of enemy fighters ahead of strike aircraft, such as F-16 Fighting Falcons and F-15E Strike Eagles, and bombers such as the B-1B Lancer. In addition, all aircraft must also be refueled in flight, requiring the integration of tanker aircraft such as the KC-135R.

The components of an expeditionary wing, such as the 366th, require a diversified group of units to complete the mission as a unified team. With such diverse forces, the 366th Wing must develop its strategic plan with broad strokes. Over 10,000 people are stationed at Mountain Home Air Force base under a command with a wing staff, four groups, 24 squadrons, and hundreds of flights. The 366th Wing is a diverse organization with varied forces that require an integrated strategic plan to guide actions.

Organizational Structure. Understanding the environment of this research requires knowledge of the United States Air Force's structure. Led by a three- or four-star general officer

(O-9 or O-10), the Air Force's Air Combat Command (ACC) is responsible for more than 100,000 personnel. An Air Force Wing is responsible for 5,000 to 10,000 personnel; it is led by a one-star general officer (O-7). The wing level comprises five groups. Each group incorporates 1,000 to 3,000 personnel, and is led by a colonel (O-6). Below that, Air Force squadrons include several hundred members, led by a lieutenant colonel or major (O-5 or O-4). Finally, the "flight" comprises 100 or fewer members and is led by a captain or lieutenant (O-3 or O-2).

Statement of the Problem

Strategic planning in various forms is currently utilized throughout the United States Air Force; however, without clear direction or structure, planning sessions can become time-consuming. Computer-supported strategic planning that makes effective use of technology is one way to improve the strategic planning process [176].

Quality in the United States Air Force. In the United States Air Force, quality is a combination of leadership commitment and operating style that inspires teamwork and continuous improvement [119]. According to Dettmer [45], quality has become a necessary condition, not a discriminator. Within an Air Force Wing, quality is a thinking process that enables the entire unit to understand the effect of local actions and decisions on overall mission performance [45]. Strategic planning is a process by which the entire organization envisions the future and develops a plan to achieve a desired end state. Again in this study, quality is operationalized as how close actual output meets the intended purpose. The objective is to analyze the strategic action plans against a criteria for what an ideal plan looks like to judge "quality" of the output from the strategic planning sessions.

One method by which an Air Force Wing can achieve quality in a strategic planning process is to include a large number of the wing's units in the plan's development. Unfortunately, however, practical constraints such as time and/or scheduling typically limit the number of people who can participate in a group process. Consider the following example. If 20 members of a squadron leadership team intended to develop action plans for 15 or more measurable objectives during an eight-hour period, the team would share 480 minutes. That leaves 32

minutes for each target and 1.6 minutes of talk time for each person in the group. Factoring in time for lunch or breaks, actual talk time would fall below one minute per person. If a facilitator controlled the interaction, allotting less than 1.6 minutes per person to discuss an action plan, no participant would be able to contribute much to the discussion or the decision. Thus, it would be difficult to inspire trust within the group and enable the unit to understand the effects of local actions on the overall mission.

Strategic Planning in the Air Force. Due to the Government Performance and Results Act (GPRA) mandate that all government organizations use strategic planning, more emphasis is directed toward the topic as organizations search for the best methods to develop strategic plans that integrate with organizational operations. Few have promised that strategic planning will be easy, and there is no guarantee of success in the best of circumstances. Too often, organizations treat the planning process as an annual paperwork exercise with limited effect on the way they actually do business. In these cases, the process can frustrate individuals who devote time to creating a product that only sits on a shelf.

An Air Force wing's strategic plan is a mechanism for communication that promotes the coordination of activities and goals across the organization [109, 175]. In an attempt to simplify the strategic planning process, many Air Force units, including the 366th, have adopted a hybrid of some of the more popular planning models. Strategic planning requires a unit to establish a vision for the future, institute a mission statement, develop goals based on the mission, create objectives to meet the goals, establish targets, and write action plans to guide the unit in accomplishing its mission and goals.

Target is a term used at the 366th to describe specific and measurable sub-objectives. Targets are necessary because goals and objectives are defined at the wing level and are not necessarily measurable. In the context of this study, goals are broad general intentions that are intangible abstract concepts that support the organizational vison. In traditional strategic planning, objectives are narrow, precise, and focused that can be measured. But in the strategic planning structure for the 366th Wing, objectives were one level of abstraction below goals and

not required to be measurable. At the group level, subordinate units specify sub-objectives (targets), and squadrons develop action plans to meet the wing's mission, goals and objectives. When a flight achieves a target, the 366th Wing moves one step closer to completing its mission.

Facilitators using GSS to implement strategic communication processes during planning meetings can help the Air Force adapt to change quickly by making its group processes efficient [176]. Air Force strategic planning teams need processes that effectively coordinate time and resources to produce an optimal solution. Used in conjunction with strategic communication and facilitation expertise, a GSS will achieve positive outcomes [21, 51].

A GSS allows large numbers of participants to interact as teams across all levels of an Air Force wing, fully participating in the development and implementation of its strategic direction. The wing's flights and squadrons are directly linked to Wing Command, Wing Groups and Wing Staff through the computer's repository. When group interaction is anonymous, an airman's voice becomes as loud as the most senior officer's. This type of interaction allows the experience and education of senior officers to mix with the unconstrained views of junior officers who are often less influenced by traditional “old ways.” The GSS methodology developed in this research project allows the Air Force to produce quality strategic plans with effective use of resources.

Computer-mediated Strategic Planning

A facilitator using a computer-mediated strategic planning process helps reduce the constraints associated with bringing a large group of people together to collaborate. A type of specialized technology, group support systems are intended to directly influence and change the communication behavior of groups in order to improve group effectiveness, efficiency and satisfaction [138]. GSSs have been designed to reduce the effects of barriers to ideal group decision-making [5, 113]. According to Valacich, Dennis, and Nunamaker [169], "a group support system (GSS), is described as an environment that contains a series of networked computer workstations that enable groups to meet face-to-face, with a computer-supported electronic communication channel used to support or replace verbal communication" (p. 49-50).

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Methods

This investigation was conducted with the cooperation and support of the 366th Wing at Mountain Home Air Force Base in Idaho. Results of implementing a strategic communication process on computer-supported strategic planning were examined. A facilitation methodology for Air Force strategic planning was established using senior leadership at the 366th Wing. The Wing Command at the 366th Wing consists of a general officer (O-7), five colonels (O-6) and the command master sergeant (E-9). There are five group-level units: Wing Staff (WG), Operations Group (OG), Logistics Group (LG), Support Group (SPTG), and Medical Group (MDG). Each group is responsible for a number of squadrons; there are 24 squadrons in the wing. In each squadron are a number of flights, which are represented by squadron leaders. Wing Command, three groups (OG, LG, SPTG), the 366th Wing staff, and 24 squadrons participated in this study. Seven external quality improvement officers from other U.S. Air Force bases evaluated the 20 squadron-level strategic plans using a quality scale.

Satisfaction questionnaires derived from Jarboe's [103, 104, 105] work were used to assess the squadrons' satisfaction with the group process used to develop the strategic plan. Participants using a GSS to develop a strategic plan were asked to evaluate the impact of the technology on the strategic planning process in an open electronic forum. The squadrons that did not use the GSS to develop a strategic plan filled out Jarboe's group communication satisfaction questionnaire, then watched a video of the computer-supported strategic planning process. Afterwards, participants were asked to provide open-ended data on how they thought the GSS process would have affected the strategic planning process in their own squadrons.

In the strategic plan structure for Mountain Home AFB the Wing Command is responsible for developing a vision, mission, goals and objectives. Group staff developed measurable targets to support each objective and squadrons developed measurable action plans to accomplish the objective. The computer-supported strategic planning process at the 366th Wing occurred at three major levels: 1) wing-level strategic planning, 2) group-level strategic planning, and 3) squadron-level action planning.

At the wing level, members of the Wing Command met off site and used a mobile LAN consisting of a projector and networked laptop computers running GroupSystems software. The process of conducting the computer-supported strategic planning session included: on-line discussion of the function of mission and vision statements; review of prior mission and vision statements in parallel with the other participants; group authoring of new mission and vision statements; the use of a nominal group technique; and anonymous voting to select the final statements [44, 56, 171]. The wing's goals were placed in a hierarchical tree structure so objectives that supported each goal could be generated in parallel.

Objectives were reviewed against three categories: 1) This is not an objective, but is a candidate for group-level review, 2) This is an objective that requires additional work, or 3) This is an objective as written. GroupSystems' Categorizer tool and verbal discussion were used to accomplish this task. The facilitator structured the communication to focus the group on evaluating potential objectives against the criteria, not the ideas presented. This command-level session served as a trial run for group and squadron-level sessions; only open-ended comments were collected.

Group-level strategic planning was accomplished in a similar fashion. The commanding officer of each group attended the command-level offsite session and presented to his staff a tree structure of wing goals and objectives. Each wing group developed targets in parallel and reviewed them against three criteria: 1) This is not a group-level target; 2) This is a group-level target that requires work; or 3) This is a group-level target as written. Targets were refined as needed, and the group then moved on to the next objective. Once again, GroupSystems' Categorizer tools were used to accomplish these tasks, and only open-ended comments were collected.

Seven squadrons used the GSS and 17 squadrons used natural methods to facilitate action plans. The action-planning for each of the seven squadrons utilizing the GSS followed a methodology that included review of the action plan definition; review of the function of an action plan; discussion of the action plan template; review of wing and group goals, objectives,

and targets; development of potential action plans in parallel; and finally, comparison of action plans to criteria. The unit's commanding officer conducted a review of the wing's vision, mission, goals, objects, and group targets. The facilitator reviewed the action plan definition and function.

Action plans were defined as a link between day-to-day workplace activities and the wing's vision, mission, goals, and objectives. They had to be simple and easy to apply, yet meet the needs of the squadron. Action plans also had to be directed at processes that could be measured, analyzed, and improved. The design of the action plans ensured they were acceptable, attainable, and could be implemented. An action plan template was used to provide consistent information to the group. Each action plan included a description, metric, milestone, success criteria, responsible authority, resource identification, and feedback mechanism. Initially the action plan was to be submitted with only a description, a potential metric, milestone, and success criteria. Prior to the group interaction, the facilitator defined a metric (something you can measure), a milestone (when will you measure?), success criteria such as, how do you know when you are at the top of the mountain?, responsible authority (who is going to get this done?); resource identification (what do you need that you do not have?), and feedback mechanism (who or what will tell you how you are doing on this action plan?).

Participants

Overall the planning process included 226 participants from the 366th Wing at the command, group, and squadron levels. The squadron level had 139 participants (Males=105, Females=21, n/a=13). The mean age of these participants was M=35.4 with a range of 21 to 56 years of age. Most squadron participants were not experienced with computer-supported meetings (69 had no experience; 29 had participated in one prior computer-supported meeting; nine had participated in more than one computer-supported meeting; and 32 did not answer the question). Representatives from 20 of 24 squadrons from the 366th Wing participated in the research project. Seven squadrons (N=92) used computer-supported strategic planning methods, and 13 squadrons (N=47) used traditional strategic planning methods to develop their strategic

action plans. One Logistics Group squadron was not able to turn in action plans prior to the evaluation. The medical group was composed of four squadrons that worked as a unit to create action plans rather than each squadron's working independently. The medical group plan was treated as one squadron plan in the analysis. Ten external quality improvement (QI) officers from Air Force bases around the United States were asked to review the strategic plans. Seven of ten QI officers responded. These reviewers came from Minot AFB, North Dakota; Barksdale AFB, Louisiana; Ellsworth AFB, South Dakota; Holoman AFB, New Mexico; Nellis AFB, Nevada; Offutt AFB, Nebraska; and Davis-Monthan AFB, Arizona. The reviewers had a mean of M = 20.1 years of service in the Air Force and a mean of M = 2.96 years working on strategic planning. Each GSS squadron developed action plans in parallel and reviewed them against three criteria: 1) This is not a squadron-level action plan, 2) This is a squadron-level action plan that requires work, or 3) This is a squadron-level action plan as written. If the squadron-level action plan did not meet the defined criteria, it was moved off the screen and not considered as a potential action plan.

Dependent Variables

Quality. A six-item action plan quality questionnaire was created to help the reviewers evaluate the action plans each squadron developed, inter–item $\alpha = .96$, inter–rater $r_I = .76$. The instrument used a seven-point Likert format bounded by strongly agree/strongly disagree. The reviewers' questionnaire measured the quality of the action plans, as well as achievability, buy-in, how well they addressed the targets, and how clearly they were measured.

Satisfaction. The modified Jarboe [103, 104, 105] 14-item satisfaction questionnaire was used to measure the group's satisfaction with the strategic planning process. The Jarboe scale uses a seven-point Likert format bounded by strongly agree / strongly disagree. Reliability for the measure using Cronbach's [41] coefficient alpha was .74. Commitment to implementation of the action plans was measured with a four-item scale using a Likert format. The commitment-to-implementation scale had an initial coefficient alpha of .38, but when one item was dropped, the three-item scale had a coefficient alpha of .89. The dropped item contained the words "buy-in,"

which were conceptualized as a synonym for commitment implementation. Post-hoc review indicated commitment to implementation and "buy-in" may not have been synonyms terms. Commitment to implementation was analyzed with a three-item Likert format scale bounded by strongly agree / strongly disagree.

Time to Completion. Time to completion was measured by asking each non-GSS group member to estimate how long it took the squadron to complete the strategic planning process. Several of the GSS facilitated groups had scheduled two or three eight- to twelve-hour days to complete the strategic planning process. All GSS groups completed the strategic planning process in less than eight-hours.

Study Design and Analysis

Hypothesis one: The quality of the outcome for a group using a GSS facilitator will be higher than for a group using common decision-making practices. Each of the 20 squadrons' action plans will be rated by seven QI officers, so a correlated t-test will be used with GSS use paired against the quality scale.

Hypothesis two: Time required to complete the decision-making task for a group using a GSS facilitator will be less than for a group using common decision-making practices. The reported average number of hours for non-GSS groups will be calculated and compared against the known maximum eight-hour period the GSS groups used to develop action plans.

Hypothesis three: Members of a group using a GSS facilitator will be more satisfied with the group's interaction and outcome than members of a group using common decision-making practices. Each squadron member will report satisfaction with the group interaction independently. An independent sample t-test will compare GSS facilitated squadrons' and non-GSS facilitated squadrons' assessment of satisfaction with the group interaction.

Research question one: How will the individual commitment to the group's decision be different between a group using a GSS facilitator and a group using common decision-making practices? Each squadron member will report his or her level of commitment to implement the

action plans independently. An independent sample t-test will compare the GSS facilitated squadrons' and non-GSS facilitated squadrons' assessment of commitment to implement.

Manipulation of Independent Variable and Procedure

Seven squadrons (N = 92) used a facilitator and computer-supported strategic planning methods, and 14 squadrons (N=47) developed strategic plans without external influence. In October and early November, the computer-supported strategic planning groups each met in the GSS facility on base between 0730 and 0800. Squadron commanding officers felt comfortable with the facilitator as a result of prior work together on the group level and in the pre-planning meetings.

Procedure

The facilitator began the session by verbally describing the entire base strategic planning process from command, to group, to squadron and flight. The command officer then explained the details of [their] prior work, with an emphasis on the group targets. After the review of targets, the facilitator used a PowerPoint presentation to describe an action plan, explain the reason for creating one, and describe the GSS process. Each GSS squadron developed action plans in parallel and reviewed them against three criteria: 1) This is not a squadron-level action plan; 2) This is a squadron-level action plan that requires work; or 3) This is a squadron-level action plan as written. If the squadron-level action plan did not meet the defined criteria, it was moved off the screen and not considered as a potential action plan.

The GSS facilitator followed this planning process, between 0800 and 0830 the group began the planning process. At approximately 0930 and 1030 the group took two 15-minute breaks. Between 1130 and 1230 the group took a one-hour lunch break, followed by afternoon breaks at 1330 and 1500. Six squadrons adjourned by 1600. One did not adjourn until 1730 because it was not prepared for the event. Several of the squadrons had two or three days planned to develop action plans and canceled the additional days after the first session because the task was complete. Each flight leader is a member of the squadron and would lead their flight

in completing actions developed. After every session a participant completed a paper-based questionnaires and provided open-ended anonymous feedback on the GSS.

Because Air Force strategic plans cover the calendar year, all squadrons were required to complete the planning process by December. In January the Mountain Home Air Force Base strategic plan was published, and data were collected from squadrons that did not use GSS. The published strategic plan contained each squadrons contribution regardless of whether the squadron used GSS or traditional methods to develop the action plan. The base QI officer asked squadrons that did not participate in the GSS sessions to complete a questionnaire on strategic planning. Squadron commanders were asked to distribute the questionnaires to members who participated in the strategic planning effort and to return the completed questionnaires in three days.

All squadron members who did not participate in GSS sessions were asked to attend a session to review the potential impact of GSS on strategic planning in the Air Force. Sessions were held two to three times a day at varying intervals over a three-day period. Twenty-two participants (N=22) representing seven squadrons attended these sessions. The researchers began each review session by asking the participant if he or she had completed the strategic planning questionnaire. If the participant had not completed the squadron survey they completed it on the spot. Each group then watched a five- minute video of a group using a GSS to develop strategic plans. After viewing the video, participants completed a five-item open-ended survey.

Results

The hypotheses were tested by independent t-tests, a correlated t-test, and compared averages based on observation and self-report. Hypothesis 1, which predicted that the quality of the outcome for a group using a GSS facilitator would be higher than for a group not using a GSS facilitator, was tested with a correlated t-test, with GSS facilitator-use paired against the quality scale. The means for each rated squadron's action plans were calculated using the six-item quality instrument, then compared using the variable, GSS facilitator or no GSS facilitator. Hypothesis 1 was confirmed. The correlated t-test revealed that squadrons using a GSS

facilitator to structure verbal and electronic communication produced higher-quality strategic plans than squadrons without GSS facilitation, $t(6) = 3.47$ $p < .01$, $^2 = .61$. Hays [84] argues omega-squared is a conservative estimate of the strength of the relationship and is appropriate in this study due to the interest in the population vice the sample.

Hypothesis 2, which predicted that the time required to complete the decision-making task for groups using a GSS facilitator would be less than for a group not using a GSS facilitator, was tested with mean evaluation. Hypothesis 2 was confirmed. The reported average number of hours for non-GSS facilitated squadrons ($N = 43$) to produce action plans was $M = 17.6$ hours; the known maximum for GSS-facilitated squadrons to develop action plans was $M = 8$ hours.

Hypothesis 3, which predicted that squadron members using a GSS facilitator would be more satisfied with the group's interaction and outcome than members of a group not using a GSS facilitator, was tested using an independent sample t-test. The t-test compared the effects of a facilitator's using a GSS to structure verbal and electronic communication with a non-GSS squadron's assessment of satisfaction with the group interaction. Hypothesis 3 was confirmed. The t-test revealed that squadrons using a GSS facilitator to structure verbal and electronic communication were more satisfied with the strategic planning interaction and outcome than squadrons not using a GSS facilitator, $t(137) = -2.16$ $p < .05$, $^2 = .03$.

The research question asked how will individual commitment to the group's decision be different between a group using a GSS facilitator and a group using common decision-making practices? On individual commitment to implement the squadron's decision, there was no significant difference between groups using a GSS facilitator and groups using common decision processes. The independent sample t-test compared the effects of a facilitator's using a GSS to structure verbal and electronic communication with common squadron decision processes on the variable of individual commitment to implement the action plans.

Discussion

The United States Air Force is a global organization of more than 360,000 members [53] with a crucial mission to protect the vital interests of the United States and its allies. Strategic

planning is vital to establishing the direction of this military organization. Understanding what the enterprise is; what the organization does; where it is going; and whom it serves requires definition of a vision, mission, and goals [57]. A commonly agreed-upon vision and related goals are crucial factors that provide unity to the organization's direction and begin behavior to accomplish the mission [24, 60, 161]. The framework presented in the first chapter posited that GSS facilitation controls communication flow and effectiveness in decision-making groups. In this investigation, hundreds of participants interacted in structured decision-making groups using a GSS to develop coordinated plans designed to guide the United States Air Force into the next year. The analysis indicates that a GSS facilitator can effectively control group communication to produce high-quality output in a manner that is satisfying to participants and in less time than required by traditional face-to-face groups.

Summary of the Findings

In this investigation, squadrons that used GSS facilitation produced higher-quality action plans than squadrons not using GSS facilitation. This result suggests that when generating action plans with squadrons in the United States Air Force, the quality is likely to be higher when a GSS facilitator is used. Cohen's [36] work suggests the effect size of the relationship between groups in the sample is large. Effect size is a measure of the strength of a relationship. Consequently, one can assume the high-quality output generated by group interaction is a product of quality group decisions made by GSS-facilitated groups. These results, coupled with the findings that GSS-facilitated squadrons developed the action plans in considerably less time and were more satisfied with the group process than non-GSS-facilitated squadrons, suggest that the United States Air Force should consider institutionalizing an appropriate structure for using GSS facilitators to develop strategic plans across the entire organization. A critical, yet often overlooked, component of strategic planning is to bring the organization's vision and goals to all organizational members [110]. This research demonstrates an effective structure to take strategic vision down to actions at the appropriate levels of the organization.

The findings of higher-quality decisions and greater satisfaction in less time are consistent with prior research [2, 3, 56, 83, 177]. The expectation that individual commitment to implementing the squadron's decision would increase for GSS-facilitated groups was not supported. A critical assumption associated with this concept is that if an individual has the opportunity to fully participate in the process used to develop the plan, that person will be highly committed to implementing the plan [86, 87].

In the United States Air Force, considerable effort and training go into the development of effective leader and follower roles [165]. Leadership is a quality that can be characteristic both of individuals and within social systems [119, 163, 182]. Because leaders can lead only if followers follow [88, 67], members of the United States Air Force, in the pursuit of excellence, train to become effective leaders and loyal followers. Consequently, one reason commitment to implementation may not have been supported in this investigation is that when a squadron develops an action plan, the social norms of the United States Air Force require a high level of commitment to implementation regardless of an individual's participation in the process. In fact, the concept of full participation by a large number of individuals from differing ranks and categories (officer and enlisted) is an unfamiliar one in traditional military structure.

For more than 65 years, organizational and small-group communication researchers have investigated ways to improve communication so that groups and organizations can make quality decisions in a timely manner [33, 58, 66, 87, 116, 117, 118). This investigation focused on four components of group decision-making: appropriate structure, GSS facilitation, satisfaction, and quality.

Developing and implementing an appropriate group decision structure requires a keen understanding of the decision-making task the group faces, as well as the ability to implement strategic communication interventions as group interaction progresses [150, 153]. Building on a decades-strong foundation of research on decision-making structures [14, 14, 15, 16, 17, 18, 19, 30, 56, 63, 64, 65, 159, 179], the GSS facilitator in this investigation was able to work with the leaders of an organization of approximately 10,000 people to develop a group decision-making

structure that involved a large number of organizational members in a critical decision-making task. The assumption in this investigation is that participation in the decision-making process by as many stakeholders as possible is critical to the development of high-quality strategic plans [47, 59, 87, 126]. Developing appropriate decision-making structures is one part of a two-act play.

In addition, a GSS facilitator must implement the decision-making structure so that the group can make high-quality decisions. This investigation provides evidence that in facilitated groups, appropriate decision-making structures can be created and implemented even with large numbers of participants involved in the process. A facilitator who understands the way decision-making groups communicate and knows how GSS structure affects communication can strategically create interventions to positively influence group outcome [160].. Wheeler and Valacich [177] found that the facilitator provides process guidance critical to helping the group navigate the appropriate structured group technique to produce required deliverables. A facilitator is most influential when keeping a group within the intended spirit and use of a structured technique. Aakhus [1] stresses that facilitators apply group communication theories when implementing communication strategies to help the group produce deliverables. This investigation provides evidence that GSS facilitators manage communication interactions using technology, communication strategies, and appropriate decision structures to produce quality group decisions in less time than it takes groups working without a GSS facilitator to arrive at such decisions.

Satisfaction with the communication among group members and with the group process is another essential ingredient for successful group interaction [10, 40, 42, 43. 77, 86, 91]. From a communication perspective, group members should leave a group interaction with a sense of fulfillment gained from satisfying communication and tasks accomplished [10]. In this investigation, squadrons that used GSS facilitation comprised an average of 14 members, who were more satisfied with their group's interaction than members of groups that did not use GSS facilitation. Group size was not a variable investigated in this study, but it affects satisfaction

[68, 138]. As a relational component of group interaction, satisfaction may vary depending on the size of the group and the use of GSS. In this study, GSS facilitation generated an environment in which participants could achieve high-quality interaction without the stress of time pressure [13]. This situation led to a satisfying group decision-making experience that produced high-quality decisions.

A final factor in producing quality decisions is that groups must gather accurate information in a timely manner and allow members full participation in the analysis of that information [126, 129]. According to Wittenbaum [180], group members tend to share common knowledge rather than unique knowledge when interacting in decision-making groups. Based on this investigation, the researchers speculate that squadron units took advantage of the parallel-process capability of a GSS and shared the majority of its "common knowledge" electronically. Recall, the group generated potential action plans for each target, then deleted duplicate plans and plans not meeting the "action plan" criteria. Afterwards, the group verbally discussed what changes needed to be made to potential action plans to transform them into actual action plans for the squadron. The researchers speculate that during this phase, group members exchanged unique knowledge that helped produced high-quality action plans.

Significance and Limitations of Claims

This research framework provides a heuristic function of integrating various bodies of communication and management information systems (group support systems) literature to address GSS facilitators' use of communication strategies to improve group decision-making. A majority of the published empirical research was conducted within the context of a controlled environment, with student participants completing tasks purporting to be salient. By contrast, this investigation was conducted in existing groups with a history of working together daily on significant tasks. Furthermore, the strategic planning task had immediate and significant impact on the participants' work lives [37]. Thus, researchers were able to apply analytical approaches based in theory on existing groups at a point when actual, important decisions were being made.

This research extends previous research by offering support to a number of claims [38]. First, GSS facilitation is a mechanism to engage large groups (10-20 members) in interactions that are interrelated with large organizational goals such as strategic planning. Second, GSS facilitation produces high-quality decisions in a shorter time than would otherwise be possible, and group members are satisfied with the process. Being satisfied with the process and happy with the outcome may foster other successful organization-wide group activities.

Using an experienced GSS facilitator within the context of actual strategic plan development was critical to the success of this project. Prior to the facilitator's being granted full access to Mountain Home Air Force base, the facility's commanding general tested the GSS facilitator's ability to perform under pressure and produce the required output. Several months before the strategic planning event, the facilitator conducted a one-hour demonstration of GSS facilitation for the general and his command staff of colonels and senior enlisted personnel. The topic for this demonstration, along with a process to move the group through several GSS tools, had been chosen during a preplanning session with a lieutenant colonel and his staff. At the beginning of the actual demonstration, the general approved the topic and requested complete output in one hour, exactly, as timed by a precise digital clock. As a result of this strict time constraint, the demonstration, though ultimately successful, was also stressful for the facilitator.

Another significant component of this investigation was the large number of people affected. As previously stated, Mountain Home Air Force Base comprises approximately 10,000 personnel. The design plan for these structured strategic planning sessions enabled thousands of organizational members to actively participate in the development of a strategic plan for the entire base. This investigation included only the command group, group-level, and squadron-level personnel. A future plan will involve all squadrons and flights in the process, thus likely expanding the potential group size considerably.

A significant limitation of this investigation involves the sample and the GSS facilitator. The sample is a single United States Air Force Wing, with a composite air expeditionary mission. At the time of this investigation, this configuration represented unique tasking for an

Air Force Wing. The majority of other wings typically consist of a single air frame (or group of similar planes) and a well-defined mission. Consequently, the structure for strategic planning used in this investigation may not prove as significant when used at other Air Force wings and/or with other organizations.

Second, the context of strategic planning in this investigation was unique since the strategic planning process lent itself nicely to a "whole" base-wide collaboration project. Third, the same individual served as GSS facilitator for all squadron groups. Because any individual possesses unique qualities or characteristics, the researchers recommend caution when considering reported results beyond this sample. Also, the GSS facilitator had complete, prior knowledge of the experimental design and intended outcome. In the future, facilitators must acquire this knowledge through training in order to assist all 24 squadrons and associated flights in developing action plans. In short, the ability to generalize the findings of this investigation is limited by the context and the single facilitator.

Directions for Future Research

According to Niederman and Volkema [135], the organizational meeting represents a primary means of communication across a work group; little empirical research exists on facilitator communication interventions and strategies. Continued research along the vein of strategic planning in the United States Air Force offers a unique opportunity to evolve and study the role of the facilitator [111]. In future research, it would be useful to investigate individual communication interventions and strategies employed by a GSS facilitator [79, 96, 146, 147]. Understanding how, when and what communication intervention to use when facilitating a GSS group could dramatically increase a facilitator's effectiveness.

Computer-supported strategic-planning methods should be tested using multiple facilitators at a number of different Air Force bases. This additional testing would provide generalizabilty for computer-supported strategic-planning methodology. In addition, researchers should work with wing staffs and groups to improve the strategic planning process developed in

this study. Specifically, investigators should focus on the links between objectives, targets and action plans. These links are critical to developing an integrated wing strategic plan.

Furthermore, future research should focus on using GSS in distributed environments in order to capture more participants and allow for additional "prework." This extra preparation would help ensure that subsequent face-to-face meetings would be more satisfying and take less time to produce quality decisions. Participants, facilitators, and technology developers face several challenges with distributed collaboration efforts, however. First, there is a technological challenge in the area of communication. Distributed environments require back-channel communication media, which allow co-located facilitators to determine how the interaction is proceeding and plan for the next step in the process. In many distributed environments, however, group participants use all available communication media. For example, the teleconference occupies the phone line, the video channel displays the group, and members exchange ideas via the computer-mediated channel. In addition, participants need back-channel communication to ask "private" questions of one another and/or to inform the facilitator on how the session is progressing. By contrast, in face-to-face environments, people can exchange feedback in whispers and analyze the session for facilitators during breaks. In distributed environments, back-channel communication remains difficult given the communication media typically available at meeting facilities.

Second, in a distributed environment, GSS facilitators face the dilemma of facilitator influence. On one hand, facilitators are thought to remain a "neutral" party in meetings; on the other hand, they do influence the substance of the discussion [27, 82]. For example, facilitators significantly affect participants' abilities to make sense of the working environment. When Aakhus, Adkins, and Glynn [2] created two distributed environments in order to explicitly direct the content of a discussion in a particular manner, they found the task more challenging in a distributed session than in a face-to-face meeting because of limitations on the facilitator's ability to evaluate and analyze the impact of meeting interventions.

Third, a multitude of technical challenges is associated with distributed collaboration. These challenges include connecting distributed sites to a common server or Web site; establishing consistent audio, video, and data connectivity; setting up a session on a "terminal server;" establishing appropriate "privileges" for users; and obtaining appropriate "plug-in" components for individual users' work stations. The connectivity issue revolves around different types of network protocols and security requirements (firewalls) used by various organizations, as well as communications-industry "standards." Consistent audio, video, and data connectivity is a constant challenge, with potential critical impact on distributed collaboration. Losing a video teleconferencing session happens more often than it should, and reconnecting is seldom a trivial task when 30 disconnected participants are waiting. Setting up a distributed meeting using either Web-based applications or software like Terminal Server requires technical expertise, understanding of organizational security requirements, and knowledge of participants' interconnectivity requirements.

Several field studies address the challenges and rewards linked with distributed collaboration [7, 8, 28, 98]. This research suggests that understanding the requirements to effectively facilitate a distributed collaboration session should be at the forefront of further research into distributed collaborative technologies. The results of the investigation of strategic planning in the Air Force indicate there are significant rewards for pursuing distributed collaboration efforts.

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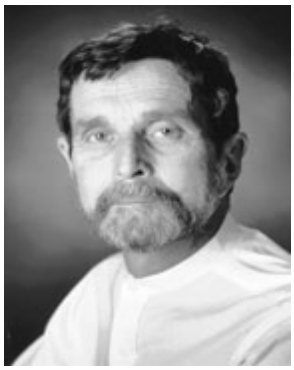
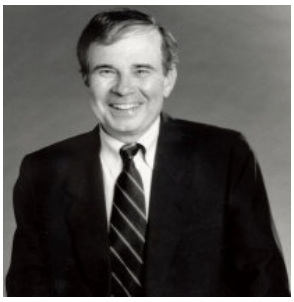
Biography:

Mark Adkins is the Director of Research at the University of Arizona's Center for the Management of Information (CMI). In 1986, Mark began teaching and conducting research in the fields of Communication and Information Technology. Mark has a doctorate degree from the Department of Communication at the University of Arizona and is a GroupSystems® facilitator. Dr. Adkins is working with the United States Navy on how joint operations, combining Navy, Army, Marine and Air Force units, will be organized, controlled and coordinated. Mark has worked with CMI staff and U.S. Navy Commander Third Fleet to develop a virtual environment between the Civil Military Operations Center and the Joint Medical Center on the USS CORONADO. He is working with a team from CMI, Commander in Chief U.S. Pacific Fleet and Space and Naval Warfare Systems Center San Diego to develop and deploy a prototype software, CommandNet, to improve situation awareness in, across, or between a battle group or an amphibious group. A recent research focus is on developing embedded facilitation requirements using The Skilled Facilitator Approach for effective group interaction across time and space.



Professor Burgoon recently retired from the University of Arizona College of Medicine. Since that retirement he has accepted the named position of The Jay F. Nunamaker, Jr. Senior Fellow, Center for the Management of Information, University of Arizona, Tucson. He is now also The Miller Family Distinguished Guest Professor at Michigan State University in East Lansing. He is a Member, Arizona Cancer Center, Tucson and Professor of Medicine [inactive], University of Arizona. He is one of 32 Fellows of the International Communication Association and was recently given the third National Communication Association Mentor Award for his work with doctoral students over the past 32 years. Dr. Burgoon has published 17 books, and over 300 articles, chapters, papers, and manuscripts. He was active in NIH funded research over the course of his career.



Jay F. Nunamaker, is a Regents Professor and the Soldwedel Professor of MIS, computer science and communication at the Eller College of Business and Public Administration. He came to the University of Arizona in 1974 and founded the MIS department, served as department head for 15 years, and developed the B.S., M.S. and Ph.D. programs. Nunamaker established campus-wide instructional computer labs and attracted academic leaders in the MIS

field to the University faculty. Under Jay's leadership, the department achieved national recognition as a top 5 ranked MIS department. He was elected as a fellow of the Association of Information Systems in 1999. In 1998 he was recognized as one of the top four most productive MIS researchers for the past five years, based on the number of papers in the top journals. He was featured in the July 1997 Forbes Magazine issue on technology as one of eight innovators in information technology. Dr. Nunamaker is known for his research in collaboration systems and knowledge management. He specializes in group decision-making and deliberation, automation of system development, databases, expert systems and systems analysis and design. His research is shaping the way we will work in the 21st Century. He has received more than $35 million in research grants over the last 20 years. Jay Nunamaker's research has led to several major breakthroughs in collaboration and automated systems analysis and design, and he is known for testing his theories and systems in the "real world." His information systems and laboratories can be found on Navy ships, in third world countries, in corporate businesses throughout the world and in the White House.