

Experiences Using Group Support Systems to Improve Strategic Planning in the Air Force

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Abstract

Strategic planning is an essential part of establishing the Air Force's direction. Using a group support system for strategic planning is one avenue to make effective use of technology and improve the strategic planning process. This research implements a group support system (GSS) as a facilitation tool to improve the strategic planning process at Mountain Home Air Force Base in Idaho with the support of the 366th Wing. The project focused on learning multiple lessons when a group support system (GSS) augmented the current strategic planning process. Implementation of a GSS on the strategic planning process was expected to: (1) improve the quality of the strategic plan, (2) reduce time to completion, (3) increase satisfaction with the process, and (4) increase commitment to the strategic plans developed. Overall, computer-supported strategic planning improved the quality of the strategic

plans, reduced time to completion, and increased the satisfaction with the process. There was not a statistically significant increase in the level of commitment to implementation.

Mountain Home Air Force Base

In April 1991, the Department of Defense announced that Mountain Home Air Force Base in Idaho, would be the future site of a new Composite wing. Modern air warfare, as prosecuted 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 packages of strike aircraft, such as the F-16 Fighting Falcons and F-15E Strike Eagles, and bombers such as the B-1B Lancer. All aircraft must also be refueled in flight, which requires the integration of tanker aircraft such as the KC-135R into the attack.



F-16 Fighting Falcon





KC-135R Refueling Tanker

The 366th is the Air Force's only permanent Air Expeditionary Wing and home of the Air Force's (strike "first") Air Expeditionary Battlelab. With such diverse forces, the 366th Wing has to cover a broad spectrum when developing strategic plans. The components of an expeditionary wing require a diverse group of units to fulfill their mission as a unified team. One aspect of the 366th Wing's mission is to develop and implement a strategic plan for the entire 366th Wing.

Quality in the Air Force

In the United States Air Force, quality is a combination of leadership commitment and operating style that inspires trust, teamwork and continuous improvement. According to Dettmer (1995) quality has become a necessary condition, not a discriminator. At an Air Force Wing, quality is a thinking process which enables the entire unit to understand the effect of local actions and decision on the overall mission performance (Dettmer, 1995). Strategic planning is a process by which the entire organization envisions the future and develops a plan to weave quality into that future.

One method for an Air Force Wing to accomplish quality in a strategic planning process is to include a large number of the units in the development of the plan.



B1B Lancer

Unfortunately practical constraints such as time or scheduling typically limit the number people who can be involved in a group process. If there are 20 members of a squadron leadership team that plan to work on developing action plans for 15 or more measurable objectives in an eight-hour period, the team shares 480 minutes. That leaves 32 minutes for each target and 1.6 minutes of talk time for each person in the group. These calculations are made without considering lunch or breaks so the 1.6 minutes will actually be less than a minute. If a facilitator controlled the interaction so each person in the group had less than 1.6 minutes to discuss an action plan, the participants would not have contributed much to the discussion or the decision. Thus, there would be difficulty inspiring trust and enabling the unit to understand the effects of local actions on the overall mission.

Strategic Planning in the Air Force

Too often, strategic planning is treated as an annual paperwork exercise that has limited effect on the way organizations actually do business. Also the strategic planning process can frustrate the individuals who devote so much time to creating a product that usually only sits on a shelf. Few have promised that strategic planning would be easy, nor is there a guarantee of success.

If implementing strategic planning is so difficult, and takes so long, what incentive is there to do it? One important reason is that strategic planning helps organizations and individuals adapt to change. Change is not only certain, it is occurring at an accelerating pace. More than 80% of our technological innovations have occurred since 1900. Furthermore, it is predicted that the last fifteen years of this century will see at least as much technological change as the first 85! The Air Force has to be able to adapt to change more quickly than at any other time in history. But the Air Force must do more than just adapt to change. It must proceed proactively to decide what the future will be and shape it.

The articulation of an Air Force Wing's strategic plan is a mechanism for communication that promotes the coordination of activities and goals across the organization. In an attempt to simplify the strategic planning process, many units in the Air Force have adopted a hybrid of some of the more popular models. The culmination of models and methods has produced a model that the 366th used to develop strategic plans. 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 the mission and goals of the organization. Target is a term used at the 366th to describe specific sub-objectives. The targets are necessary since goals and objectives are defined at the wing level. Subordinate units at the Group level specify sub-objectives (targets) and squadrons develop action plans to meet the Wing goals and objectives. When a subordinate unit hits a target the Air Force Wing's strategic plan is a step closer to completion.

Electronic meetings can help the Air Force adapt to change quickly by making group processes efficient. Air Force strategic planning teams need to meet and engage in planning processes that effectively coordinate time and resources to produce an optimal solution. A group support system (GSS) used in conjunction with facilitation expertise will demonstrate positive outcomes.

GSSs allow large numbers of participants to interact as teams across all levels of an Air Force Wing. The Air Force Wing's squadrons are directly linked to the Wing Command, Wing Groups and Wing Staff through the computer's repository. When the group interaction is anonymous, the Airman has a voice as loud as the most senior officer. 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 computer-mediated strategic planning process helps reduce the constraints associated with bringing a large group of people together to collaborate. Group support systems are technology designed to directly impact and change the behavior of groups to improve group effectiveness, efficiency and satisfaction (Nunamaker, Dennis, Valacich, Vogel, & George, 1991). GSSs have been designed to reduce the effects of the barriers to ideal group decision making (Adkins, 1994). According to Valacich, Dennis, and Nunamaker (1992), "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). When a GSS is applied to group decision making: (1) ideas can be exchanged between group members and organized into distinct categories, (2) the categories can be analyzed by group members exchanging information through electronic file folders, (3) consensus can be developed between group members, (4) data can be used and reviewed in future meetings, and (5) data can be exported to a superior or expert for critique or approval.

GSSs are being used with increasing frequency in a variety of organizations (c.f., Brashers, Adkins, & Meyers, 1994; Nunamaker, Briggs, Mittleman, Vogel, & Balthazard, 1997; Grohowski, McGoff, Vogel, Martz, & Nunamaker, 1990, study at IBM) where computer technology has been a vehicle for change. A GSS can have critical impacts on group interaction. For example, research has shown that in a face-to-face group meeting, 20% of the people do 80% of the talking because some group members are shy, of lesser status, intimidated, or too polite (Kirkpatrick, 1992). This lack of participation among group members may lead to lower overall productivity, or less critical evaluation of ideas. In an environment using a GSS, anonymous computer-mediated communication provides the opportunity for all group members to participate equally (Nunamaker, et al., 1991). Equal participation has the potential to improve the quality of interaction and perhaps to provide opportunity for more critical discussion of decision alternatives (Brashers, Adkins, & Meyers, 1994; Jessup & Valacich, 1993). Thus, people who have used GSS claim that these meetings are more effective than face-to-face interactions for group planning, problem solving, decision making, and group interaction (Dennis, Heminger, Nunamaker, & Vogel, 1990; Vogel, Martz, Nunamaker, Grohowski, & McGoff, 1990). GSSs were

designed to overcome barriers that influence group decision-making.

GroupSystems software is used in a GSS and was developed at the University of Arizona. GroupSystems software supports several different group tasks. This paper will focus on the support tools that are directly related to the process of computer-supported strategic planning. According to Nunamaker, Dennis, Valacich, Vogel, and George (1991) there is a common sequence of GSS use that is coupled with specific software tools. The standard GSS decision sequence is a five-stage process. First, a group leader meets with a facilitator to set an agenda for the meeting and decide what GroupSystem tools to use. Second, meetings usually begin with group members generating, exchanging, and evaluating ideas. Third, the ideas are organized into a manageable framework of distinct categories. Fourth, group members critique the categories. The emphasis in this stage is to understand the category and develop plans for how to activate the category. Fifth, group members attempt consensus building.

Typically, groups use an electronic brainstorming (EBS) tool to generate ideas. The tool is designed for group members to type in comments on a specific question shown on their screens. Once a group member enters in a comment the idea is randomly passed on to another group member. In addition, a list of all the ideas can be shown on the large screen in the front of the room and at each individual workstation. This tool is designed to allow group members to build on others' ideas without evaluation. Also, the tool can make all the comments submitted to the group anonymous.

In addition to EBS, there are two other tools that can be used for idea generation and

evaluation. The first tool is topic commenter (TC). This tool function is like a set of index cards with topics written across the top of each card. A participant selects a specific topic card, enters comments and reads the comments submitted by other group members. The second tool, group outliner (GO) is very similar to TC but GO allows the group members to develop multiple sets of index cards in an indented outline structure. Usually, but not always, TC or GO are used after EBS as an organizational tool.

The idea generation tools, EBS, TC, and GO, are engineered to reduce the traditional constraints of a face-to-face meeting such as status pressure and turn taking obstacles. GSS provides a bridge over status and turn taking barriers so groups can develop exhaustive lists of ideas and solutions that solve problems and answer the group's questions.

Additional idea organization can be done with the categorizer tool. This tool provides a two-phase approach to idea organization. First, the tool allows group members to develop and analyze a list of categories and supporting ideas for each category in a number of different windows. New ideas can be generated with this tool and ideas from the EBS session can be incorporated into different categories. Second, the categories and the various supporting ideas in each category are consolidated. The consolidation process involves verbal interaction between the facilitator and the group members. The categories are usually analyzed for redundancy and combined into new or existing categories without deleting ideas.

After the categories have been created and analyzed the group attempts to build a consensus by using prioritizing tools. There are a variety of methods available to rank

categories (e.g., yes/no, multiple choice, rank, agree/disagree scale). Alternative analysis enables the group to rate the alternatives in a multi-dimensional matrix then presents the results to the group on their individual screen and on the large projection screens in front of the room. Group survey allows each group member to fill out an electronic questionnaire. The questionnaire is usually preconstructed and designed to assess either a specific characteristic of the group (e.g., cohesiveness, level of group trust) or information about the available alternatives (e.g., are you satisfied with the alternatives). A group facilitator operates most of the GroupSystem tools and GSS technology.

The Role of Facilitation in Group Support Systems

A meeting facilitator has multiple roles during a meeting (Brashers, Adkins, & Meyers, 1994, Nunamaker, et al., 1991). For example, the facilitator may be the group leader, a group member, or an individual that is separate from the group and neutral by decree. In most of the meetings that use GSS at the University of Arizona the facilitator is not a member of the group. The 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 (Nunamaker et al., 1991).

Typically the facilitator's first encounter with the group is with the group's leader before the group meets. The facilitator and the group leader meet prior to the actual meeting to discuss the purpose of the meeting and make a plan to blend the GSS' tools with the intended goals for the meeting. A product from this meeting is a detailed script that outlines the structure of the group's meeting. The script indicates the specific phrasing of the questions or topics that will be addressed

during the meeting, the group support system software tools that will be used and the length of time each tool is to be used by the group. After the preplan meeting the facilitator mediates between the structure of the preplan script and the actual group interaction by setting up the GSS' software tools and monitoring the group's process during the group's meeting.

When the group meets at the group support system facility the facilitator introduces the group to the tools and explains how the interaction is going to proceed. After introducing the tools, the facilitator explains the question or topic that is going to be addressed and discusses the structure of the meeting with the group. For example, the facilitator may tell the group that the EBS tool will be used to analyze the criteria against which Wing goals will be rank ordered. The technical role of the facilitator is to set up the software with the specific criteria and tell the group how EBS works. That is, tell the group that all the ideas are submitted anonymously (if that option is going to be used). Explain how EBS randomly passes each individual's ideas around to different group members, how a group member can comment on another group member's idea and then pass the original idea with comment on to another group member.

As a process monitor the facilitator keeps track of how long the group has been using a tool, suggests ways to increase productivity when using the tool, and tells the group when to move on to another tool. The role of the facilitator is multifaceted. On one hand, a facilitator needs to have the technical knowledge and skill to use the tools provided in a GSS. On the other hand, a facilitator needs to be able to communicate with the group's leader to develop an agenda that

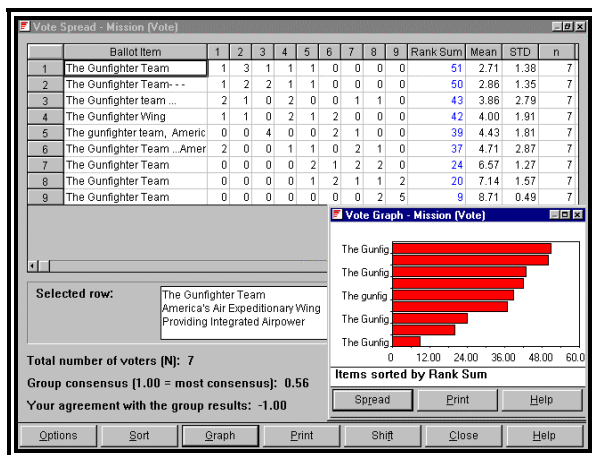
meets the group's goals and to perform the agenda at the meeting. In an ideal situation determining the goal of the meeting and designing the process that the group should go through to achieve the desired outcome should be simple, but in actuality it is a complex communication task.

Methods Overview

The study reported here is a case study at the 366th Wing on computer-supported strategic planning. A facilitation methodology for Air Force strategic planning was established using senior leadership at the 366th Wing. At the 366th Wing there is a Wing Command and 5 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 and there are 24 squadrons in the 366th Wing. The first author worked with the 366th Wing command, three groups (OG, LG, SPTG), the 366th Wing staff, and seven squadrons using computer-supported strategic planning methods and a group support system. Seven external Quality Improvement officers evaluated 24 squadron level strategic plans. Quality questionnaires were administered to all squadrons ($\alpha=.93$). Open-ended data were collected from squadrons using both traditional and computer-supported strategic planning methods. A panel of seven experts using a quality scale evaluated all squadron action plans.

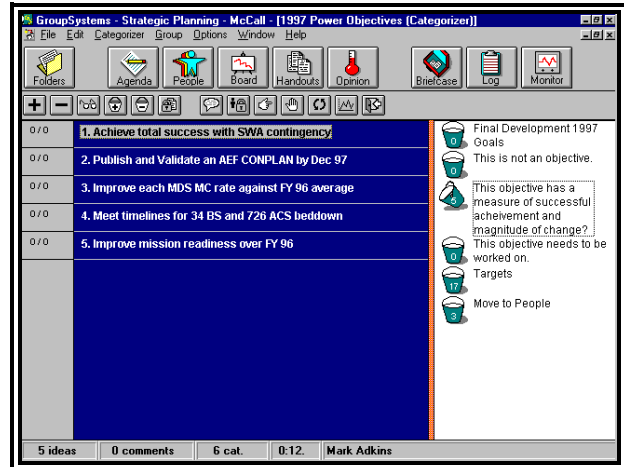
The computer supported strategic planning accomplished by the 366th Wing included three major areas: 1) Wing level strategic planning, 2) Group level strategic planning, and 3) Squadron level action planning. At the Wing level, members of the Wing Command met off site and used a deployable LAN consisting of networked laptop computers

running Novel Netware and GroupSystems. The process to conduct the computer-supported strategic planning session included: the discussion of the function of mission and vision statements on-line; review of 1996 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 for the Wing. An example of the voting results is shown below.



Using a Polling Tool to Develop a Mission Statement

The Wing Command then brainstormed ideas for Wing goals using the previously developed mission and vision statements as a guide. Anonymous voting on the goals and refinement of the highest rated goals resulted in a final list of goals, which were used as a basis for the development of Wing objectives.



Using Categorizer and Criteria to Develop Objectives

The Wing goals were placed in a hierarchical tree structure so those objectives that supported each goal could be generated in parallel. The objectives were reviewed against three criteria that had been developed previously: 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. The GroupSystems Categorizer was used to accomplish this task.

The Group Level strategic planning was accomplished in similar fashion. A tree structure of Wing goals and objectives was presented to the Group staff members for each of the Groups. Each Group staff 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. The targets were refined as needed and the group then moved on to the next objective. Once again, the voting and categorizer tools were used to accomplish these tasks.

The Squadron Level 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 the Wing and Group goals, objectives, and targets, development of potential action plans in parallel, and finally comparison of action plans to criteria.

Action plans were defined as a link between day-to-day work place activities and the vision, mission, goals, and objectives of the Wing. Action plans should meet the needs of the squadron while being simple and easy to apply. They also had to be directed at processes that could be measured, analyzed, and improved. The design of the action plans was such that they were implementable, acceptable, and attainable. The action plan template used included a description, metric, milestone, success criteria, responsible authority, resource identification, and feedback mechanism.

Participants

There were 226 participants from the 366th Wing. At the squadron level there were 139 participants (Males=105, Females=21, n/a=13). The mean age of the squadron participants is \bar{M} =35.4 and a range of 21 to 56 year of age. The majority of the squadron participants had participated in one or less computer supported meetings (N=107). Representatives from 22 of 24 squadrons participated in the research project. Seven squadrons (N=92) used computer- supported strategic planning methods and 17 squadrons (N=47) used traditional strategic planning methods. There was a panel of seven external Quality Improvement officers used to review the squadron's action plans. The reviewers have a mean of \bar{M} =20.1 years of service in the Air Force and a mean of \bar{M} =2.96 years working on strategic planning.

Dependent Variables

A six item quality questionnaire (α =.94) was created for the reviewers to evaluate the action plans each squadron developed. The reviewers' questionnaire measured the quality of the action plans, achievability, buy-in, how well the action plans addressed the targets, and how clear the plans are measured. The 26 item satisfaction questionnaire (α =.93) measured satisfaction with the strategic planning process and commitment to the strategic plans produced. Time to completion was measured via a questionnaire and actual measurement.

Results

The squadrons, which used group support systems (GSS) to develop strategic plans, developed higher quality strategic plans than those squadrons that did not use GSS ($t(7)$ =3.47, $p<.05$). There was no significant difference for commitment to implementation between the GSS and the non-GSS squadrons. Squadrons that used computer-supported strategic planning were more satisfied with the strategic planning process than those squadrons that used traditional strategic planning ($t(137)$ =-2.28, $p<.05$). The strategic planning process took an average of 17.7 hours for squadrons that did not use GSS and less than 8 hours for those squadrons that used GSS.

Discussion

The external evaluation of the quality of the squadrons' strategic plans provides a strong indication that strategic plans created with computer-support are higher in quality than

those strategic plans produced without the use of GSS. In addition to high quality, the computer-supported strategic plans addressed the Group's targets well and provided an action plan that had a specific measurable. Squadrons that used the computer-supported strategic planning methodology saw an increase in satisfaction with the overall strategic planning process. Also, there was a significant increase in the number of ideas generated and incorporated into the process as compared to traditional face-to-face strategic planning. The increase in satisfaction with the process should lead to higher quality strategic plans and greater more detailed participation in the planning process.

Less time was used to develop action plans when the computer-supported strategic planning methodology was used. The non-GSS squadrons used perceptual data and the GSS groups' used actual data regarding time to completion. These data are fair to compare as several GSS users commented, in open-ended questionnaires, on how fast the strategic planning went when they used GSS. In the past, GSS have been shown to take advantage of parallel processing and decrease the time to completion so it seems reasonable that the same results are found in this case study. There was not a significant difference between GSS and Non-GSS groups regarding commitment to implementation. When a participant is asked, "I am compelled to implement the action plan," the squadron members' Air Force training should dominate the group's thinking and the squadron should be committed to the strategic plan regardless of how the plan was developed.

Overall the study provides support for the claim that computer-supported strategic planning can assist the United States Air Force in planning for the future. Computer-

supported strategic planning allowed a Wing of several thousand people to meet and develop a holistic strategic plan in less than three months. Computer-supported strategic planning allowed each level of the wing to build on previous level's ideas and comments. GSS allowed hundreds of people to be directly involved the strategic planning process. Involving large numbers of personnel in the planning process helps produce a high quality product that could not be developed practically using traditional face-to-face methodology. Computer-supported strategic planning assisted the United States Air Force in developing higher quality strategic plans in less time than traditional strategic planning methods.

Future Directions

The computer-supported strategic planning methodology needs to be tested using multiple facilitators at a number of different United States Air Force Bases. The additional testing will provide generalizability for the computer-supported strategic planning methodology. In addition, researchers should work with Wing staffs and Groups to improve on the strategic planning process developed in this study. Investigators should focus on the link between objectives to targets and action plans. The link between these items is critical to developing a Wing wide strategic plan.

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