FACE-TO-FACE GROUP DECISION SUPPORT SYSTEMS: A PARTNERSHIP BETWEEN TRADITIONAL GROUP PROCESS METHODOLOGIES AND COMPUTER TECHNOLOGY

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Abstract: Computer support of traditional group process methodologies has given rise to a particular class of Group Decision Support Systems (GDSS) which concentrates on face-to-face interactions of individuals in groups. Face-to-face systems increase the effectiveness of group decision making through structuring the group process. Experimental research has shown that GDSS systems are effective in enhancing group decision performance. GDSS systems are most productive when effective structured group process methods are appropriately supported by computer technology. IS educators and students can employ GDSS technologies through the use of a Microcomputer, an overhead data display, and an integrated software package. As future facilitators of the group process, IS students will be important disseminators of GDSS and accompanying group process methods.

KEYWORDS: Group Decision Making, Group Process, GDSS, Consensus, Strategic Planning

INTRODUCTION

The new DPMA curriculum model for the 90's marked a departure from previous curriculum models. It articulated the philosophy and underlying principles for the curriculum without detailing specific courses. An overall architecture composed of knowledge clusters details the body of knowledge that constitutes the curriculum. Another unique aspect of the curriculum model was the method by which it was developed. "Group decision support system (GDSS) tools were used to help facilitate the development of the model." (DPMA, 1990)

Several underlying principles of the curriculum speak to group decision support systems. "IS professionals must interact and understand a more diverse user group. Today and in the future, IS professionals will need ever improving communications and facilitator skills...IS professionals must understand the planning process as it relates the enterprise being served." (DPMA, 1990) The emerging GDSS technology promises to make group communications and decision making more effective. Introduction to GDSS can thus contribute to student curriculum outcomes. It can focus students' communication skills and foster planning skills by using traditional group process methods supported by technology.

This paper defines GDSS structure and objectives, surveys the current research and suggests a low cost alternative to working with GDSS in the classroom by supporting traditional group process methods with current microcomputer software and hardware.

GDSS DEFINITION, STRUCTURE AND OBJECTIVES

Group decision support systems are part of a broad class of emerging group work technologies. Two major systems streams support group work: computer mediated communication (CMC) and group decision support systems (GDSS) (Gallupe and McKeen, 1990). Group decision support systems use technology to support problem solving in group decision situations thereby improving the performance and effectiveness of the group (Vogel and Nunamaker, 1990).

Within GDSS, systems can be distinguished (Gallupe & McKeen, 1990) by proximity: face-to-face groups have a high degree of proximity while computer conferencing with no face-to-face component has a low degree of proximity. Face-to-face groups are more concerned with developing consensus; and computer conferencing focuses more on the achievement of high quality decisions by participants who are geographically dispersed.

Development of face-to-face GDSS systems is fairly new (Gallupe & McKeen, 1990). These new systems emphasize group interaction to achieve consensual decisions. Face-to-face groups, commonly know in GDSS literature as decision rooms, increase meeting effectiveness and participant satisfaction and reduce group process losses. The strategic decision making process is a natural focus of these systems because strategic level decisions are more consensual and political in nature (McGrath, 1986). Computer conferencing, with its focus on higher quality decisions, is more quantitatively and tactically focused.

DeSanctis and Gallupe (1987) have identified three levels of GDSS, each with an increasing degree of technological sophistication and more dramatic intervention into the process of group exchange have. Level 1 systems "provide technical features aimed at removing common communication barriers, such as large screens for instantaneous display of ideas, voting solicitation and compilation, anonymous input of ideas and preferences, and electronic message exchange between members" (p. 590). Level 2 systems "provide decision modeling and group decision techniques aimed at reducing uncertainty and 'noise' that occur in the group's decision process" (p. 590). Group structuring techniques are used here, including automated Delphi and NGT methods. Level 3 systems are "characterized by machine-induced group communication patterns and can include expert advice in the selecting and arranging of rules to be applied during a meeting" (p. 590).

GDSS systems attempt to address several traditional face-to-face group process problems, such as: dominance of discussion by one member of the group, influence of high-status members of the group, low tolerance of minority opinions, inability to access information bases, and keeping the group on task (DeSanctis & Gallupe, 1987). Beauclair (1989) also identifies several negative aspects of the group process, including: "diffusion of responsibility, deindividuation, pressures toward group consensus and problems of coordination" (p.321).

GDSS, therefore, seeks to structure individual and group participation and to increase group performance effectiveness. "A GDSS aims to improve the process of group decision making by: removing communication barriers, providing techniques for structuring decision analysis, and systematically directing the pattern, timing, or content of discussion." (DeSanctis & Gallupe, 1987, p. 589) DeSanctis and Gallupe (1987) also note that structuring the group process affects decision outcomes through increasing member participation, focusing group problem identification, avoiding conformity pressures, and helping to keep the group on track. Group decision making is primarily a process of information exchange and GDSS changes the pattern of interpersonal communications. It is an intervention into the natural group process; its objective is to make group decision making more effective.

This has been the focus of structured group process methods over the past 35 years and the primary benefit of structured group process before the advent of computerized support. In discussing the history of GDSS research, Vogel and Nunamaker (1990) point out the role of group dynamics in GDSS development and Huber's (1982) formulation for group effectiveness:

Actual Group Effectiveness =
Potential Group Effectiveness
- Group Process Losses
+ Group Process Gains.

Well structured group process methodologies (Brainstorming, Nominal Grouping Technique (NGT), and Delphi method) were developed to reduce group process losses and increase group process gains. Because they were well structured, they lent themselves to computerized support.

The structure and objectives of GDSS are still being identified and clarified through experimental research. Most experimental and experiential research is concerned with the impact of system configurations on group communications (DeSanctis & Gallupe, 1987).

EXPERIMENTAL RESEARCH

Experimental research involving GDSS is still in preliminary stages. Many researchers are testing systems with students in order to develop initial research hypotheses, formulate research agendas, and develop performance measures.

Several controlled experiments on the effectiveness of Nominal Grouping Technique methods have been performed with Students. Control groups used no process methodology; groups with manual process methods in booklet form and groups with computerized process tools then tested the effectiveness of GDSS on group decision making. These experiments attempted to determine whether gains in the effectiveness of decision making are a result of structuring the decision process and to what degree computer support is significant. (Lewis, 1987)

Results showed that the computer-supported groups achieved significant gains in decision quality and satisfaction through use of a computerized decision process. The groups using a manual version of the system in booklet form performed worse than the groups with no support at all because they found the booklet difficult to understand and use. Consequently, their performance was the poorest of the three groups.

A similar study (Beauclair, 1989) involved four groups of students ranging from no support to complete support by computerized GDSS. Beauclair (1989) reports no significant statistical difference in outcomes of the groups. Beauclair (1989) speculates that the absence of significant performance differences between groups may be due to the size of the groups involved, which were small -- 3 to 5 people. Larger groups are noticeably more effective with support. Other significant factors included the decision situation used, which was a typical group decision exercise, and the student groups involved, which had no stake in the outcome of the process.

Clearly more experimentation is needed in this area. The Lewis (1987) results indicate that computer technology can make cumbersome manual processes more effective than no process at all. Beauclair's (1989) results indicate that more experience is needed with larger groups in situations in which the outcome is important to the participants. Gallupe and McKeen (1990) suggest that research should investigate the use of GDSS in actual organizational settings.

Preliminary results have shown that the use of computer systems to support groups in face-to-face situations can improve the quality of decisions made (Gallupe & McKeen, 1990). The effectiveness of GDSS systems may be measured in terms of decision quality and timeliness, participant satisfaction with results, cost or ease of implementation, member commitment to implementation, and the group's willingness to work together in the future (DeSanctis & Gallupe, 1987). Gallupe and McKeen (1990) measure the effectiveness of decision performance by the criteria of decision quality, speed, and choice shift.

Many researchers have noted performance advantages for groups using GDSS systems. Traditional group process methods supported by computerization make the processes easier to use and learn (Lewis, 1987). Electronic NGT is more efficient and produces fewer errors than manual operations (VanGundy, 1987). Vogel and Nunamaker (1990) found that "for larger groups, effectiveness of automated support becomes particularly apparent in eliciting and organizing large numbers of issues associated with a complex question. Without structured automated support, larger groups tend to 'falter' and fail to work efficiently or effectively." (p. 26)

Gallupe and McKeen (1990) find that GDSS enhances individual participation. GDSS systems provide different communication channels for group members. A 'richer' mode is provided remote participants, and more democratic participation is found in face-to-face groups. Paradoxically, GDSS use both heightens and diffuses conflict in groups. Anonymity of input plays an important role in enhancing individual participation and heightens potential conflict. Conflict once heightened is then diffused in the consensual nature of the group process. (Vogel & Nunamaker, 1990)

> ***Actual group process effectiveness is increased when traditional group process methods are supported by computer technology.***

Performance advantages, large group effectiveness, and enhanced individual participation represent gains in group process outcomes and reduced group process losses as a result of employing group decision support technology. These initial findings indicate that actual group process effectiveness is increased when traditional group process methods are supported by computer technology.

While most experimental studies have involved networks with individual CRTs (Vogel & Nunamaker, 1990), other studies suggest that keyboarding and computer literacy are a problem in GDSS situations (Beauclair, 1989). McGrath (1986) notes that not all decision rooms require individual CRTs. There is a need for group decision support systems that do not overemphasize the role of elaborate hardware and software. Micro computer support can be used for recording and updating proposed solutions.

The new GDSS technology is similar to traditional group process methodologies but is faster and contains more processing and output options (VanGundy, 1987). Gray (1987) suggests that a new focus to GDSS research is needed -- group process issues. GDSS must be careful to avoid inhibiting the group process. Current methods of computerizing NGT and Delphi methods are crude, and new ways of getting group consensus need to be created. Researchers must design the human technologies of group process as carefully as the machine components.

GDSS TECHNOLOGY AND THE CLASSROOM

A variety of GDSS tools are being used to implement GDSS. Lewis and Keleman (1988) report advantages to using commercially available integrated software packages (Symphony, Framework, GURU, Encore, and Smartware): they are in use by corporations already, they provide easy development because of built in features, and professional developers' experience with the packages facilitates development. McGrath (1986) reports that many individual decision support systems are in fact being used to support group decisions.

In a classroom setting, I use Framework III running on a PC attached to a data display panel that projects the video output to a large screen via an overhead projector. This is the only hardware and software required for group planning sessions. I introduce this process to students during the planning component of a database course. The technique is useful in connection with a case study and can be used for both strategic planning exercises and in guiding students through an exercise in functional decomposition of a business organization. I also use the process in a graduate course in information systems for managers.

I divide the planning process into four sessions: situation analysis, issue and trend analysis, strategies, and tactical implementation. (Kolb, Rubin & McIntyre, 1984) (Spencer, 1989)

Besides the overall framework for the planning sessions, I design specific procedures for the group to follow in each session. These procedures are based on several well-known group process methodologies: brainstorming, nominal grouping technique, the Delphi method, and consensus decision-making. (Spencer, 1989) These methods help structure the group process, insure individual participation, and enable the formation of consensus.

A three step process is used in the formation of issues, trends and strategies. The first step combines brainstorming and nominal grouping techniques for the generation of ideas, issues, and alternatives. The second step orders the data into groups of related items. The third step is to name the categories of data that have emerged. The last step is critical to the decision making process and formation of group consensus. (Spencer, 1989)

Participants individually brainstorm responses on 3x5 cards; responses are then recorded on the microcomputer. The overhead display panel transforms a personal computer into an electronic decision room. This process retains the values of the nominal grouping technique of polling and, like the Delphi method, keeps input anonymous. Framework III's idea processor is used here. Each brainstorm response is entered on a separate frame in outline format.

The next step deviates at this point from the nominal grouping technique of voting. Voting is counter-productive to building a consensus, because it forces a group to chose one idea over another. Ordering the data into categories on the other hand, forces a comprehensive solution, a gestalt. Webster (1971) says a gestalt is "a structure or configuration of physical, biological, or psychological phenomena so integrated as to constitute a functional unit with properties not derivable from its parts in summation." (p. 351) A gestalt seeks to integrate diverse ideas into a larger whole. The gestalt serves as a foundation for group consensus.

There are two ways to form a gestalt. The first approach seeks to form the gestalt as a unique integration of the data. This is the bottom up approach. The group compares individual data items and assigns each a number that represents a category. This is accomplished in Framework III by editing the data item and entering an arbitrary number at the beginning of the text. Once the group reviews all the data, it is reorganized by associated number. Framework III has a sort function that makes the reorganization of the data into subcategories an instantaneous process. The participants then discusses related data items and name the category to which they belong. This categorization can then be used to reorganize the outline into a rational grouping of data items.

This approach is useful when a problem or solution needs a new synthesis because it forces a group to avoid pigeon-holing ideas into static categories. The group forms its consensus in the struggle to name the data categories in such a way that each insight is maintained.

The second approach is top down approach. This approach first identifies the categories and then regroups the data accordingly. The categories may be traditional or derived from group reflection on the data. Data items that do not fit must be formed into new categories or subsumed under existing ones. This process works particularly well with decomposition of business functions, processes, and activities.

Both approaches are normally used in the course of a session. The micro computer plays a unique role in the process. The facilitator can easily categorize data items on the computer. Framework III allows 20 data items to be viewed at one time in 25 line mode. By scrolling the data up or down on the monitor, previous pages of data may be displayed. This gives the group easy access to all brainstormed items. Results are then printed, photocopied, and distributed to small working groups for further consideration.

This GDSS provides several advantages. First, only the group facilitator need have mastery of the technology. Group participants need not be computer literate or have special expertise. The supporting computer system hardware and software is inexpensive and portable.

Group decision processes can use software created for individual decision support tasks. Framework III integrates several functions in one software program: an idea processor or outliner, a word processor, a spreadsheet, a data base manager, a telecommunications package, and graphics. The package is also available for academic or student uses at a reduced price.

The system is flexible and adaptable to supporting a variety of group process methodologies. The idea processor supports brainstorming and gestalt techniques. The spreadsheet supports prioritization, budgeting, and scheduling functions. Group facilitators can use the telecommunications facility to gather data from remote databases or individuals for group consideration. The word processing functions can support group writing processes.

Most importantly, the computer system provides immediate feedback in support of group communication. The feedback becomes visual by using the overhead display panel as an electronic blackboard. The facilitator can easily display and manipulate brainstorm lists. Groups can easily perform gestalt activities through built-in sorting capabilities. Group leaders can quickly print, photocopy, and distribute reorganized lists to support small group work. Finally, facilitators can produce the final work product on both disk and paper for immediate distribution.

CONCLUSION

IS faculty and students can play two important roles in relation to this new technology: research into group process issues and support and dissemination of GDSS.

IS students and faculty have been at the forefront of GDSS research and should continue that role. GDSS systems can be created from existing integrated software tools and used to support a variety of group process methods. More controlled investigations are needed to determine the relative contributions of structured group process methods versus computer technology components. Faculty can engage students in GDSS planning projects involving non-profit groups in order to gain real organizational experience.

Lewis and Keleman (1988) feel that GDSS can be important for the dissemination of group process methods. Groups do not frequently use group process techniques like NGT because of unfamiliarity, tradition, and the expense of outside consultants. GDSS could substitute for outside expertise in group process methods.

As future facilitators of the group process, IS students have an important role to play in the dissemination of GDSS. It is important, therefore, that group process methodologies be refined and appropriately supported by hardware and software. We must provide them with the techniques and tools that most effectively support group decision making.

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