Exploring Modes of Facilitative Support for GDSS Technology

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Abstract

The use of group decision support systems (GDSS) is rapidly growing. One key factor in the effectiveness of these systems may be the manner in which users are supported in their use of this technology. This paper explores two types of GDSS facilitative support: chauffeur-driven and facilitator-driven. In the former case, a person is used to reduce the mystique of the GDSS technology for users. In the latter case, a person assists the group with its group process in addition to reducing the mystique of the technology. The work unfolds a research story in which the original thinking of the research team to the effect that facilitator-driven GDSS facilitative support is superior is proven incorrect. The results of a pilot study caused the research team to reverse its thinking and hypothesize that, given the nature of the facilitation used and the task faced by the group, chauffeur-driven facilitation would have an advantage. The results of the experiment reported in this paper support this hypothesis. Arguments are presented to the effect that, to be effective in a judgment task environment, facilitation must be open and adaptive rather than restrictive.

Introduction

Only recently has technology been introduced that is intended to support groups in their work. Does the manner by which groups new to such technology receive support in their interaction with the technology affect their performance? This research uses an experimental approach in attempting to answer this question. The evidence not only suggests that the answer is “yes,” but also suggests that to fully achieve the potential benefits of group technology, much more work on the subject of “support” is justified.

Recently, there has been a substantial amount of research activity on the subject of group decision support systems (GDSS). Since 1988, GDSS research has been reported in a number of articles and conference proceedings (see George, et al., 1990, for a summary up to 1988. Other, more recent, examples include: Connolly, et al., 1990; Gallupe, et al., 1991; Grohowski, et al., 1990; Hiltz, et al., 1989; Ho and Raman, 1989; Mantei, 1989; Mennecke, et al., 1992; Nunamaker, et al., 1991; and Rao and Jarvenpaa, 1991). As reported in these sources, groups (or members of teams) interact to perform some sort of task. They are supported in the interaction by a set of computer hardware and software that constitutes the GDSS. In addition, support may be provided by a person who assists the group in using the GDSS. The literature, furthermore, reports that GDSS support takes various forms.

In some cases, the GDSS support involves a facilitator. In these instances, the facilitator directs the group members as to what GDSS features to use and when to use them. In other cases, the GDSS interaction may not be supported by a person and is user-driven. User-driven GDSSs give each group member full access to all system features at their workstations, which they can use in any way and in any order
Early in the program of GDSS research conducted at the University of Minnesota, experiments that did not examine user support when interaction took place with the system (e.g., Gallupe, et al., 1988; Watson, et al., 1988; Zigurs, et al., 1988—all were based on users interacting with the GDSS without the aid of an assistant (in the userdriven mode). No facilitation support of any type was provided to groups involved in these experiments. As some members of the GDSS research team (including the authors of this paper) observed the results of the Minnesota work and became familiar with what was being done by other GDSS researchers, the importance of the method by which users are supported in their use of the GDSS became apparent. This research team came to believe that, when using a GDSS for the first time, there are two problems that must be solved in order to have a successful outcome. First, users must overcome the mystique associated with a new (and unknown) technology. Second, they must provide a sound problem-solving process that is used by the group in its GDSS interaction, including the application of the GDSS technology.

This paper presents the results of a formal experiment in which two forms of GDSS support were tested: facilitator-driven and chauffeur-driven support. Because this study is part of a program of research, it goes beyond presenting only the results of the current study—it also relates the results of using facilitator-driven and chauffeur-driven GDSS support mechanisms to other approaches, such as no use of GDSS technology and use of GDSS technology with no support (user-driven approach). All the studies involve the same task. This capability, we submit, gives a richness to this study that typically is not present.

**GDSS Support Modes**

The term “support mode” is used to indicate the manner in which a group of individuals use a GDSS. Since we believe the manner in which group members are supported during their interaction with a GDSS has a profound effect on the outcome of use, it is important to further elaborate the several possible GDSS support modes and differentiate them from one another.

One form of GDSS implementation is to make all the system features and functions available at

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**GDSS Facilitation**

...wish. A less commonly used form of GDSS support is the chauffeur-driven approach. A chauffeur-driven GDSS involves an individual who, at the direction of the group members, implements features of the GDSS system for the group but does not assist the group with the process.

The purpose of this research is to shed some light on how a group’s performance is affected by the type of support provided to groups interacting with a GDSS. This is an important issue for several reasons:

1. GDSSs represent a new technology for most individuals. GDSS users are likely to be unfamiliar with both the technology and, in many cases, the meeting process structure that may be associated with a particular GDSS (or provided by a process leader supplemented with a facilitator). Thus, the manner in which GDSS technology is introduced and used (especially in an initial exposure) may have a significant effect on how the system is accepted and how successful its use is.

2. If the type of support provided to groups interacting with a GDSS is related to meeting effectiveness, then there are serious GDSS design (architecture) ramifications. At the one extreme, GDSSs that must be facilitated could be at a disadvantage compared to those without this requirement (and its associated process structure). At the other extreme, user-driven GDSSs may allow too much group process freedom and should be designed with some restrictiveness incorporated into the technology.

3. There is the possibility that GDSS research to date may (unintentionally) be presenting results that are an artifact of the type of GDSS support rather than the effect of the GDSS itself. In some cases, for example, the skill of a facilitator rather than the GDSS may have resulted in differences in GDSS outcomes.

4. Despite the considerable level of GDSS research activity noted above, the issue of how users are supported in their interaction with the GDSS technology and the nature of the support process remains unexplored. There is a definite need for greater understanding of how groups are exposed to GDSS technology and how the process around the technology is best managed.
Program of GDSS research conducted at the University of Minnesota, performed that did not examine an interaction took place with the Galuppo et al., 1988; Watson et al., 1988)—all were based on group members, after training on the system, can fully use it and its features in any way and in any order they wish in performing the group task. Examples of user-driven GDSS interaction include Galuppo et al. (1988) and Zigurs, et al. (1988). In these GDSS instances, there is no facilitative support.

In a second type of GDSS operation, a person, who is not a member of the group, is utilized to aid the GDSS session. In the facilitator-driven GDSS support mode, the facilitator directs the group members on what GDSS features to use, when to use them, and how to use them. In these instances, the facilitator influences how the group uses the technology (see Dennis et al., 1988 and McCullar and Rorhbaugh, 1999, for examples). We call the use of a facilitator “task facilitative support.”

A GDSS support mode that is less common than the two just discussed is the chauffeur-driven type (see Jarvenpaa et al., 1988). This form of support mode is similar to the facilitator-driven mode because it involves a person working with the technology who, as in the case of a facilitator, is not a member of the group. The role played by a chauffeur, however, is fundamentally different from that of a facilitator. A chauffeur, at the direction of the group, implements features of the GDSS system for the group. Whereas the facilitator acts as a process leader who plays a major role in how the group uses the technology in performing its task, the chauffeur does not affect the group process. The chauffeur merely implements the features of the technology upon directions from the group. We term the use of a chauffeur in a GDSS session to be “operational facilitative support.”

An example may assist in differentiating between the facilitator and chauffeur roles. In a chauffeur-driven GDSS session, the group members might choose to begin by brainstorming. Upon entry of ideas, the members of the group could direct the chauffeur to delete duplicate items generated or to manipulate the GDSS to combine items that are logically related. The chauffeur, however, would not be active in suggesting candidate items to the group for consolidation. Next, the group might choose to vote yes or no on the ideas generated during brainstorming.

A facilitator, on the other hand, would become involved in directing process. For example, the facilitator could direct the group to begin by brainstorming. In addition the facilitator could, after the ideas are entered, become involved in the process by asking the group to consider consolidating items and even going so far as to propose candidate items (usually in the form of a question such as, “Should item 7 be combined with item 14?”), which avoids direct content involvement on the part of the facilitator. In contrast to a chauffeur, a facilitator directs the group in the steps used to perform its task, e.g., first to brainstorm on items, next to eliminate duplicate items and consolidate related ones, then to use a GDSS feature to prioritize the importance of the items. A facilitator would further suggest which prioritization approach (perhaps from several available) the group should use. As an example, a facilitator might direct a group to rank the items in importance (rather than voting on items as chosen by the groups in the chauffeur example). Whereas a facilitator might very well assist the group in using the technology (perform chauffeur functions), the chauffeur would not become involved assisting group process—the chauffeur would be limited to responding to directions from the group that involve manipulation of the technology.

Finally, it is not uncommon to employ a hybrid form of GDSS support. In such cases, both a facilitator and chauffeur are used. The facilitator works with the group and its process and directs a chauffeur who uses one of the GDSS workstations to manipulate the system features. This practice is efficient because it allows the facilitator to concentrate on process, but is obviously expensive because the cost of a chauffeur is added to that of a facilitator and, in addition, at least one additional workstation is required. The hybrid form of support would be classified as task facilitative support, shown in Table 1.

This paper examines differences between facilitator-driven GDSS support and chauffeur-driven support. However, as will be seen, the programmatic nature of the research stream (of which this study is a part) allows the results of using these two forms of GDSS support to be compared to using a user-driven GDSS, i.e., no facilitative support.
Table 1. Types of Facilitative Support

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<tr>
<th>Type of Facilitative Support</th>
<th>Type of Aid Provided By a Person</th>
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<tr>
<td>• No facilitative support (user-driven)</td>
<td>• None; the group manages the GDSS on its own</td>
</tr>
<tr>
<td>• Operational facilitative support (chauffeur-driven)</td>
<td>• Person (chauffeur) present who helps the group with the technology and not with the process</td>
</tr>
<tr>
<td>• Task facilitative support (facilitator-driven)</td>
<td>• Person (facilitator) present who helps the group with the process and, in some cases, the technology</td>
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Background

Our study, as with other work in the stream of GDSS research of which it is a part, builds off classical small group research (see Maier, 1970), with two important differences. First, the GDSS research involves the introduction of computer technology into the small group setting. Second, whereas classical small group research deals heavily with formal leaders having a legitimate social reason for their presence in the group, “leaders” in this study are not a part of the group (i.e., they perform the facilitator or chauffeur functions as just described). Our work is similar to small group research because our unit of analysis is the group, thus the sample, \( n \), is the group.

Also similar to classical small group research, the research focuses on group interaction in performing a problem-solving task. Because the task used in an experiment can affect the outcomes (McGrath, 1984), an understanding of the task employed in this research is useful before discussing the dependent variable employed in this and other studies in our research program.

Research task setting

For the sake of consistency and comparability, our experiment employed the “foundation” task used in a number of the Minnesota GDSS studies (for example, DeSanctis, et al., 1989; Dickson, et al., 1989; Watson, et al., 1988). The foundation task requires the group members to act as the Board of Directors for a charity that must allocate $500,000 among six worthy projects requesting funding. The foundation task was developed and validated by Watson (1987) to evoke high levels of conflict among competing values (e.g., religious, artistic, economic, etc.), based upon Allport, et al.’s (1970) competing values theory. Of course, there is no “right” answer to the allocation of the funds because personal values are involved. The nature of the six projects requesting funding is shown in Table 2. The table shows how the various projects reflect differing values.

The task of making the allocation of funds to one, some, or all of these projects has been found to

Table 2. Projects Requesting Funding From the “Foundation”

1. Purchase a new computer system for the county government in order to hold local taxes constant.
2. Purchase additional volumes for the community’s library system.
3. Create a tourist bureau to develop advertising and other methods of attracting tourism into the community.
4. Establish a community arts program featuring art, music, and dance programs for children and adults.
5. Establish an additional shelter for the homeless in the community.
6. Purchase art for display in the community’s art gallery.
be highly motivating to groups, whether they are undergraduate students, graduate students, or in other categories. More than 500 groups have worked on this task, and it meets the criteria of being highly motivating while at the same time not requiring any special knowledge or skill. Because the allocation involves group members' preference structures (values), the foundation task is a preference task. A preference task is a judgment task that requires group members to agree upon the way in which they distribute their preferences among competing alternatives.

**Definition of the outcome variable**

In the words of McGrath (1984), problem-solving tasks that involve individual preferences or values (preference tasks) are non-intellective. An academic committee choosing a new dean or a group of managers choosing from alternatives for packaging a new product are examples of group decision settings for which it is difficult to determine the decision quality at the time the decision is made. Contrasting this situation are intellective task settings in which there is a known best answer. In the latter case, measuring performance on the task is straightforward since outcomes under some condition can be compared to a standard (see Zigurs, et al., 1988, for an example of a GDSS experimental study employing an intellective task). Because preference tasks have no “best” answer, one of the major difficulties in using tasks of this sort in research is establishing appropriate variables to measure group performance.

One measure is the degree of consensus reached among the group members following the group’s discussion during the task and their group decision. Research has shown that reaching consensus in a group increases acceptance of and commitment to the decision (Dess and Orieger, 1987; Likert, 1978; Likert and Likert, 1978; McGrath, 1984; Tjøsvald and Field, 1983). Furthermore, implementation of a group decision is more likely to succeed when there is acceptance of the decision (Beckhard and Harris, 1977; Ginzberg, 1981). In the Minnesota GDSS experiments, post-meeting consensus has been used as the outcome measure of the group’s acceptance of the decision.

In these experiments, consensus is the degree of convergence among group members regarding the allocation of monies to various worthy project requests, or the fund allocation for the foundation task. A gauge for a group member’s commitment to the group’s final allocation or decision is how close a group member’s decision (allocation) matches the allocations of the other group members after the collective meeting (GDSS session). Group post-meeting consensus is calculated by combining the final decisions of the individual members. Thus, the measure of consensus among the group members on the fund allocation for the foundation task provides an indication of the likelihood of successful implementation of the decision. This measure of consensus functions as the major dependent variable in this study. Additional detail on the operationalization of constructs such as facilitation and chauffeuring, and on the measurement of consensus will appear later as the details of a pilot study and our expanded experiment are presented.

**Comparing GDSS- and non-GDSS-supported groups**

The first study in the set of GDSS research was conducted by Watson, et al. (1988). In that study, post-meeting consensus among GDSS-supported groups was compared to that of manual groups and baseline groups (no support). The GDSS-supported groups were given training on the GDSS and subsequently used the technology to support work on the allocation task. The manual groups were given structural aids similar to the GDSS groups except that the aid was not computer driven. Instead, the manual groups were provided with flipcharts to display ideas publicly. The baseline groups were given no structural aids, flipcharts, or training. It was found that post-meeting consensus was highest for the manual groups (manual = .62; baseline = .55; user-driven = .51, where 1.0 means complete agreement). There was also a significant correlation between pre-meeting consensus and post-meeting consensus for the manual and GDSS groups, but not for the baseline groups. That study argued that the structure provided in the manual and GDSS treatments seemed to help the group to work toward achieving consensus. Computer support alone, however, was not suggested as sufficient in achieving consensus. Watson and his co-authors observed that the
GDSS groups experienced difficulty while working with the GDSS. They recommended that one way to help groups overcome some of the problems encountered during the GDSS session was to include a person to aid in use of the technology.

The pilot study

The recommendation offered by Watson, et al. (1988) was used for a pilot study. Additionally, the pilot study was motivated by thinking expressed earlier-namely that, to be effective, a GDSS has to overcome two problems: (1) the mystique of a new and unfamiliar technology, and (2) the potential for an inadequate decision process.

The pilot study was a first step to explore whether the inclusion of a chauffeur or facilitator in the GDSS groups would improve the group's ability to achieve consensus (Dickson, et al., 1989). The three modes of GDSS operation tested were user-driven, chauffeur-driven, and facilitator-driven. At the time of the pilot study, we believed that a user-driven approach would face both the problems of mystique of a new and unfamiliar technology and an uncertain group decision process, and would be the least effective GDSS support implementation. Chauffeur-driven support during the GDSS session was believed to lessen the mystique of the technology, but not necessarily result in a good process in using the GDSS. Facilitator-driven support, on the other hand, was anticipated to assist in using the technology and provide a (supposedly) good decision process. Thus, in terms of effectiveness, our hypothesis going into the pilot study was that a facilitator-driven GDSS would achieve the highest post-meeting consensus, followed by chauffeur-driven GDSS, followed by a user-driven GDSS. This assumed, of course, that the GDSS use was in the common “one-shot” situation (in contrast to repeated use of the technology).

In the pilot study, the number of groups, i.e., the sample size, for each treatment condition was five. The subjects were undergraduate students enrolled in a management information systems course that required group work. The group size ranged from three to five members. As in the Watson, et al. (1988) study, the foundation task was used as the problem-solving task in the pilot study.

Each subject read a short description of the situation and made an initial allocation of funds. Then the group met and, using the GDSS, the group arrived at a group allocation of funds facilitated-driven and chauffeur-driven groups had an individual playing the appropriate role. Two members of the research team were involved in chauffeuring and facilitating the groups in the pilot study. One person did all the facilitated sessions and one person did all the chauffeured sessions. Thus, in the pilot study, there was no way of separating out what is henceforth called a “guide” effect (the influence of an individual carrying out a GDSS support mode). The user-driven group had about 30 minutes of training on the GDSS system. This training involved explaining features of the GDSS that the group might wish to use and showed the group members how to perform systems functions such as deleting an item or modifying text. After training, the group members used the system in any way they desired to assist them in allocating the foundation funds to the various worthy causes. Training for the chauffeur-driven or facilitator-driven groups was similar to explaining and demonstrating the GDSS functions to the team members. Chauffeur-driven groups, of course, were free to pick and choose which functions to use (and how), whereas the facilitator directed the order and manner of use for groups receiving that treatment.

After the GDSS session, each subject repeated the allocation as an individual. Performing the computation on the individual data prior to the group session allowed calculation of "pre-consensus" score for each group. A similar calculation on the individual data collected after the GDSS session allowed calculation of "post-consensus" score. The consensus scoring procedure is based upon fuzzy sets and results in a score between zero (complete disagreement) to one (complete agreement). See Spillman, et al. (1980) and Watson, et al. (1988, p. 470) for a discussion of the fuzzy set algorithm that was used to calculate the consensus scores. The results from the pilot study appear in Table 3. The small number of groups in each treatment (5) did not support formal statistical testing. However, it was evident that the chauffeur-driven groups
A short description of the situation initial allocation of funds. Then, using the GDSS, the group allocation of funds. Facilitator-driven groups had an appropriate role. Two research team were involved in facilitating the groups in the person did all the facilitatesession did all the chauffeur sessions. In the pilot study, there was no way what is henceforth called the influence of an individual car support mode). The user-driven user-driven groups had an appropriate role. Two research team were involved in facilitating the groups in the person did all the facilitated sessions. After training, the group the system in any way they in the allocating the chauffeur-driven chauffeur-driven groups, of course, k and choose which functions to whereas the facilitator directed manner of use for groups receivent.

In each treatment (5) did formal statistical testing. However, that the chauffeur-driven groups had higher post-meeting consensus than the facilitator-driven groups and the user-driven groups. The average post-meeting consensus score for the chauffeur-driven groups was 0.668, while for the facilitator-driven groups and user-driven groups it was 0.557 and 0.490 respectively.

The pilot study achieved its purpose of detecting apparent differences in types of GDSS support, which provided encouragement to conduct a larger study that capitalized on what was learned from the pilot study. Of particular interest was the result that chauffeur-driven groups achieved higher levels of post-meeting consensus than facilitator-driven groups. Speculation about why the pilot study results did not conform to our original expectation took several forms. The most basic explanation for the results was most likely the small number of groups involved in the study, and the result was simply “by chance.” More elaborate explanations of the pilot study results involved the possibility that people involved in facilitating and chauffeuring the groups caused the effects and/or the nature of the facilitation process itself had influence on the result.

Because there were few procedures in place in the pilot study to explain why groups performed differently, the team could only speculate at this point in the research stream about why the outcomes were as observed. We decided to “rethink” our original logic in predicting outcomes (based upon mystique of the technology coupled with the nature of the decision process) and reexamine the issue of GDSS support by building on what we had learned in the pilot study (both in terms of explaining results and in conducting the experiment). As will be seen, we turned to the literature on small group research to support revising our arguments and developing formal hypotheses for the follow-on study. The expanded experiment considers only two types of GDSS support, chauffeur-driven and facilitator-

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<th>Table 3. Pilot Study Pre- and Post-Consensus</th>
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driven, since there are other studies that involve user-driven instances.

**Hypothesis Development**

The results of the pilot study indicated that there might, indeed, be an argument in support of chauffeur-driven groups achieving higher post-meeting consensus than facilitator-driven groups. Because this outcome was contrary to our original thinking, we decided that the work of others might support a revised position.

**Examination of other studies**

Other than the pilot study there is, at this writing, only one other study that considers facilitation as the manipulated variable. Anson (1990) compares groups provided with GDSS support only, facilitator support only, a combination of both facilitator and GDSS support, and no support. He found GDSS support and facilitator support equally effective, but did not find any added benefit from their combination. On all three dependent variables—performance gain scores, attraction to group, and process perceptions—the combined GDSS and facilitator treatment was not any better than groups provided with only GDSS support. Anson does not consider the role of a chauffeur in his study. Because this area of the GDSS research provided so little assistance, we decided to explore the area of group dynamics to increase our understanding.

The group dynamics literature provides ample evidence that interventions in group process (without the computer element) can be used to improve group effectiveness. Process interventions include training group members or leaders (Hall and Williams, 1970) and using non-group members as discussion leaders or facilitators (e.g., Maier and Hoffman, 1980; Maier and Maier, 1957; Miner, 1979; White, et al., 1980). The study by Maier and Maier (1957) is pertinent to our interests. They investigate two types of discussion techniques adopted by most group leaders that relate to the quality of group decisions. Leaders adopting the "developmental" technique for group discussion produced more high-quality decisions than did leaders using a "free" discussion technique. The free discussion technique was described as one "in which the leader poses the problem, then conducts the discussion in a permissive manner without making value judgments, but merely helps the group reach agreement on a solution" (p. 320). This technique allows the members much leeway in how the decision process should be conducted during the meeting. In the developmental discussion technique, the leader breaks the problem into parts so that each part of the problem is discussed separately before the final decision is made.

The two discussion approaches adopted in the Maier and Maier (1957) study can be considered parallel to the type of process aid used in the GDSS support in our work. In the chauffeur-driven support mode, the chauffeur acts as a passive leader who allows free discussion in the group. As in the free discussion approach, the chauffeur-supported group decides on the process it wants to use during the GDSS session. In the facilitator-driven support mode, the facilitator guides the group through specific steps in the decision-making process. Maier and Maier found that the more structured "developmental" treatment was more effective in improving decision quality than the "free" discussion approach.

The task employed by Maier and Maier, however, is of an "intellectual" nature (that is, there is a desired right answer). Because the foundation task used in our work is of a "non-intellectual" nature (there is not a correct answer), the Maier and Maier results may not apply. Indeed, Maier and Maier suggest that the results may be more in favor of the "free discussion approach for tasks that called for higher emotional involvement in individual group members" (p. 323). The foundation task is value-loaded and thus creates a condition of emotional involvement. For example, we observed that one subject cried when the group refused to allocate sums in line with the subject's values. In a task like the foundation task, acceptance of the group decision is the prime concern rather than objectively measured decision quality.

The problem paradigm (see Figure 1) combines the dimensions of group acceptance with task quality. Group acceptance ranges from low to high consensus. Task quality is dependent on the nature of the task. Tasks with an objective decision require high task quality. On the other hand, for tasks that do not have an objective decision, low task quality is acceptable. Maier (1970) describes the decision-making climate needed under the four combinations of these two dimensions.
y helps the group reach its decision (p. 320). This technique provides a 
unlimited amount of how the decision-making process can be 
achieved during the GDSS facilitation process. The problem is discussed 
how the final decision is made.

Approaches adopted in the study can be considered 
process aid used in the GDSS facilitation process. Maier and Maier 
"developmental" and "effective in improving decision quality" discussion approach.

Maier and Maier, however, argue that there is a 
Because the foundation is of a "non-intellectual" 
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Maier purports that both acceptance and deci 
sion quality should be considered in evaluating a group's decision. When the decision reached 
must be adopted or implemented by the group members, a considerable amount of emotional 
investment is added. Acceptance of the decision 
by the group members, therefore, is of paramount 
importance. While the use of experts can 
enhance decision quality, it is participation of 
those who implement the decision that can 
increase acceptance. Both Type 1 and Type 4 
problems require an expert's role in ensuring an 
objectively good decision. Type 3 problems do 
not require any group process, and a mere flip of the coin should solve such problems. Type 2 
problems call for high acceptance of the decision 
to ensure successful implementation of the decision. The prescription for intervention for Type 2 
problems is participation in a fair decision-making process (Maier, 1963) on the part of those 
who will be implementing the decision; the 
intervention of an "expert" is not necessary. The 
free discussion technique is, therefore, more suited for Type 2 problems because it allows the 
group to determine how the decision process 
should be managed without any restrictions laid 
out by the leader, as in the developmental discussion technique.

The type of task setting employed in this paper 
is represented in the Type 2 quadrant. The foundation task does not require a good objective 
decision but does need high acceptance by and 
consensus among the group members to ensure 
successful implementation of the decision. The 
role of the facilitator in this task may be viewed 
by group members as intrusion of an "expert" 
opinion, at least regarding the decision process. 
Thus, the group members may perceive the rigid 
process resulting from the inclusion of the 
facilitator to be less desirable than the free 
approach associated with the chauffeur in the 
decision-making process.

More contemporary thinking provides additional 
evidence in expecting a chauffeur-driven support 
mode to achieve greater consensus than the 
facilitated mode. We think the concepts intro 
duced by Silver (1990) regarding "restrictiveness" and "decisional guidance" in decision 
support systems are relevant as one considers 
facilitation in association with GDSS technology. 
In the following discussion, the "guide" and the 
role played by the guide should be considered 
as a part of the GDSS. Silver defines "system 
restrictiveness" as:

---

Figure 1. Problem Paradigm (Based on Maier, 1970)
The degree to which and the manner in which a Decision Support System limits its users' decision-making processes to a subset of all possible outcomes (p. 52).

"Decisional guidance" he defines as:

The degree to which and the manner in which a Decision Support System guides its users in constructing and executing decision-making processes, by assisting them in choosing and using its operators (p. 57).

DeSanctis, et al. (1989) examine how the degree of restrictiveness in the use of the GDSS can affect group consensus. High restrictiveness was implemented by instructing the group members to follow an exact set of steps when using the GDSS. Low restrictiveness allowed the group to choose the manner in which the GDSS was to be used. DeSanctis, et al. (1989) found that restrictiveness did not improve group consensus. They also note that excessive restrictiveness may cause groups to lose their sense of ownership and control over the technology. Thus, excessive restrictiveness may reduce the consensus rather than enhance it.

Clearly, in our pilot study, the facilitator-driven GDSS support mode in comparison with the chauffeur-driven mode had higher levels of decision guidance according to the above definition. Moreover, if the guide and the role the guide played are considered to be a part of the GDSS, then the facilitator-driven mode very likely was also considered by the groups to be more restrictive because they were not free to choose whatever tool they wanted whenever they wished. Our results, supplemented by discussion with the subjects, suggested that the facilitated groups felt more restricted and constrained than those that were chauffeured. Similar evidence suggested that the level of discomfort with being strongly guided and feeling more restricted caused the facilitation process (as we implemented it) to be less effective in achieving our anticipated higher levels of post-meeting consensus.

Hypotheses

Based upon the results obtained in our pilot study combined with the logic presented by Silver (1990) and by Maier (1970) in supporting quadrant 2 (in Figure 1), our major hypothesis for the expanded study became:

H1: Groups that are chauffeur-driven (technology-aided, non-prescriptive process) will achieve a greater post-meeting consensus than those groups that are using facilitator-driven (technology-aided, prescriptive process).

In addition to the main hypothesis, two additional hypotheses of secondary interest are proposed. Recall that, in the pilot study, one person played the facilitator role, and another played the chauffeur role. Because of this design, it was not possible to determine if the results were related to the individual playing a particular role or to the role itself. In the expanded study, the design was modified to see if groups serviced by one “guide” performed differently compared to those served by another “guide.” Nothing from the pilot study nor from the literature suggested any differences in overall performance introduced by the person playing the guide role (assuming that the group members are reasonably well-matched on items such as age, experience, gender, etc.).

H2: The groups will not differ in performance based on the person serving the role of the “guide.”

The other secondary hypothesis addresses an interesting point that bears significant importance when the experimental results are discussed later—the nature of the facilitator-driven process employed in the pilot study and carried through to the expanded study. The facilitator-driven role used in the pilot (and described more fully in the next section) was not “rich” or flexible. Rather, it was fixed and procedural. This type of role might be found in practice, such as when a facilitator follows a set script and closely adheres to features provided by a particular technology. This all suggests (and relates to Table 1), that facilitative task support needs to be expanded to structured task support and flexible task support.

This study considers only the structured facilitative task support. In the pilot study and in the expanded experiment, the facilitators primarily prescribed the steps to be used in performing the task and their order (which was based upon a theoretical “good” decision-making procedure—see the “Manipulations” section in this paper). Additionally, the facilitators made sure the group members clarified their individual positions and that the group was satisfied with the completeness of the various phases of their work. Had the facilitator role (as used in our experiment)
are chauffeur-driven, non-prescriptive driven, a greater post-meeting produces those groups that are us-
which interest are proposed. The study, one person played another played the chauffeur-driven process.
Hypothesis, two additional hypotheses are proposed. The study, one person played another played the chauffeur-driven process, the design was not possible. Results were related to the particular role or to the role assigned in the study, the design was pilot study suggested any differences that were introduced by the person (assuming that the group was well-matched on items such as age, gender, etc.).

H3: There will be no interaction effect between the form of GDSS support mode and the guides providing the support mode.

To test the major hypothesis and its underpinnings as well as the secondary hypotheses, an expanded experiment involving modes of GDSS support was conducted.

The Experiment

The previous material describes the background to this experiment and the pilot study, as well as detail about variables, measurement, and procedures. This section concentrates only on elaboration of and differences from the material presented thus far. A summary of the specifications for the expanded experiment is shown in Table 4. There were no differences among treatment groups in terms of demographic data such as age, gender, work experience, etc.

**GDSS environment**

The SAMM (Software-Aided Meeting Management) system was the GDSS used to support performance of the task (see DeSanctis & Dickson, 1987; Dickson, et al., 1992; Zigurs, et al., 1988). The SAMM system configuration at the time of the experiment consisted of an NCR supermicrocomputer supporting from three to nine user terminals (only a maximum of six were used for this experiment). An LCD display panel in conjunction with an overhead projector displayed output on a large public screen visible to all group members. Group members sat at a horseshoe-shaped conference table, and their personal workstation displays were recessed on shelves at the back of the conference table such that group members had good eye contact with one another and could see the public screen without interference. The SAMM software supports problem definition, establishment of decision criteria, definition of alternatives, and evaluation of alternatives. The latter support functions include alternative rating, ranking, and voting. Thus, the software was appropriate for preference decision making as represented by the foundation task.

To further elaborate how SAMM is used, consider the following example. Suppose a group were generating the criteria to be used as the basis on which to allocate funds. Each group member enters candidate criteria (as many as they choose) at their own workstation. When all the members are finished entering the criteria, they might direct the chauffeur to display the items generated onto the large public screen. Typically, much verbal discussion would take place at this point. To eliminate duplicates, restate unclear items, or combine two or more similar items into one item. Continuing, the chauffeur does the deletion and/or modification of items under the direction of the group members. Once agreement is reached through the discussion that the list of criteria is complete, the importance of each item might be assessed through weighting.

Next, each group member uses the evaluation module and chooses the weighting option. The list of criteria is displayed on the screen of the individual workstation. The group members perform the following steps.

<table>
<thead>
<tr>
<th>Table 4. Attributes of the Experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjects: MBA students</td>
</tr>
<tr>
<td>Independent Variables: Support mode (facilitated vs. chauffeured) &amp; guide (Guide A vs. Guide B)</td>
</tr>
<tr>
<td>Number of Groups per Cell: Nine</td>
</tr>
<tr>
<td>Total Groups: Thirty-six</td>
</tr>
<tr>
<td>Number of Members per Group: Three to six</td>
</tr>
<tr>
<td>Task: “Foundation”</td>
</tr>
</tbody>
</table>

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ceed to weight each item in the list. The procedure is to allocate 100 points among the items. After all the group members are finished, the chauffeur displays the common weighting on the large screen. Each item is listed with its average weight and the range of the weights. Frequently, the chauffeur is asked to display the items in ascending or descending order based on average weight. Again, discussion takes place on the results and, depending on the outcome, the group could decide to reweight based upon the discussion (such as changing criterion due to identifying a misunderstanding of its meaning). In the latter case, the group might decide to go back and modify the statement of the criterion before reweighting. Or, the list of criteria might be reduced (by eliminating criteria with low weights) and another weighting performed on the remaining items. Other voting tools such as rating and ranking work in a similar fashion. Note that in addition to the electronic communication channel, there is much verbal discussion that takes place in using the SAMM system.

Manipulations

The difference between facilitation and chauffeuring has already been discussed, as has the difference between "flexible" facilitation and the "structured" facilitation that was used in this experiment. To more fully understand the nature of our experimental manipulation of this variable, actions performed by the "guides" is briefly elaborated on.

In the facilitated support mode condition, a person totally conversant with the GDSS software led the group through the task, implemented the software features for the group, and instructed the members on how to use the software when it was required by the members. Moreover, the facilitator imposed the decision-making process on the group by guiding them using the following sequence of steps:

1. Definition of problem;
2. Generation of decision criteria;
3. Weighting and, if necessary, reweighting of decision criteria;
4. Use of evaluation tools to decide which projects (which the guide had previously entered into the system) should be considered for funding;
5. Allocation of the funds to the projects considered worthy of funding based on group consensus.

The process represented by these steps comes from the extensive study of multiple criteria decision making (see MacCrimmon, 1973; Minch and Sanders, 1986; Narasimham and Vickery, 1988). This specific set of steps is used in many additive forms of multicriteria decision-making models.

The facilitator did not vary the process in accordance with what any group did or to fit particular situational needs. Further, the use of "structured" facilitation allowed control over this manipulation, which would not have been the case had each group received differential facilitation.

In the chauffeured treatment, the person acting as the guide did virtually the same thing as above with one major exception. The GDSS features were displayed on the public screen for the group to see. Each feature and its purpose were explained verbally to the group. The group was assured that it would be told how to use the feature by the chauffeur as necessary. The group, during the session, used the features if felt were useful. The person playing the chauffeur role made all the keyboard entries for the group with the exception of entering of criteria, individual weightings, ratings, and voting (exactly in the same manner as in the facilitator-driven treatment). In this mode of GDSS support, the group was free to decide what system features to use, and how and when to use them. A completely non-prescriptive process was intended in this manipulation.

The "guide" roles

One major change from the pilot study was that the guide played both the facilitator and chauffeur roles. This change was made to add some assurance that the results of using a particular mode of GDSS support would hold for differing individuals acting as a chauffeur or a facilitator. Each person was randomly assigned half the groups using the facilitated treatment and half the groups using the chauffeured treatment. The individuals were matched as closely as possible (both were female, approximately matched in age) and were trained to follow the same procedures in each treatment.

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Dependent measure

The dependent measure used in this study was post-meeting consensus and was calculated as described in the pilot study, as a number between zero and one. In that study, as well as the expanded study, a score of 1.000 represents complete agreement among the members of a group on the projects funded and the amount given to each project.

Method

The expanded experimental procedure differed in one important way from the one employed in the pilot study. For this experiment, individual allocation data was collected from the subject pool, and then groups were formed to meet certain pre-consensus standards. We wanted no extremely high or extremely low pre-consensus groups. Groups outlying in pm-consensus scores (> .40 or < .15) are rare, but with individuals randomly assigned to groups and groups randomly assigned to treatments, it is possible to lose some experimental control due to groups (or treatments) having great initial agreement or disagreement. Note in Table 3 that the user-driven pilot study treatment groups had much lower pre-consensus scores than either of the other treatments. The table also shows that chauffeured group number 1 had very high initial agreement compared to the other groups (and, in fact, was the only team to have a drop in its consensus score after the GDSS session).

By collecting individual preconsensus data, then forming groups, and then assigning these groups to a treatment cell, we were able to obtain an initial balance on pre-consensus (both in terms of the score expected from any given group and the scores in any cell of the experiment). The preconsensus scores used to analyze the experimental results, however, were the result of a second round of individual allocations made just prior to commencing the experiment (see below).

The subjects involved in this study were MBA students enrolled in several sections of an introductory course in information systems and decision sciences (see Table 4). Students from both day and evening sections participated in the study. During one class session, student participation was solicited and, for those agreeing to participate, the foundation task was administered. This took approximately 10 minutes. The allocations just described were used to form the students into three- to five- (in one case six-) person teams based upon pm-consensus scores. (As a result of this procedure, many of the students did not know one another and had not worked together previously as a group.) Group size averaged five members, to be consistent with previous studies in the Minnesota GDSS research stream. One of the studies (Watson, 1987) found no differences in group performance in groups with three to four members. In this study, where there was variation in group size, the research results were analyzed for a size effect to ensure that group size did not confound the findings. Like the Watson results, group size was not significant (p = .6295), so the issue of group size is not considered in the “Results” section that follows.

The teams were scheduled into two-hour experimental sessions in the GDSS laboratory. After the entire group had arrived for an experimental session, each person read the foundation task again and individually allocated the funds to projects. This data was used to calculate the team’s pm-consensus score used for analytical purposes (rather than the data gathered in class, which was the basis on which teams were formed). At this point in the experiment, the members of the group were told to decide, as a group, how the funds should be allocated to the projects. For the next 1.5 to 2.0 hours decision making as a group was undertaken working with the GDSS and either a chauffeur or a facilitator. When the group reached a final decision, the guide recorded the final group decision. Upon completion of the task, each group member was given another sheet listing the six projects and again was asked to individually allocate the $500,000 as an individual. These data were used to calculate the post-consensus scores.

Results

For the sake of completeness, Table 5 shows the entire set of pre- and post-consensus by each GDSS support mode and “guide.” In interpreting the results, the discussion, and the conclusions, several limitations should be noted. First, only one particular GDSS implementation, the SAMM system, was used. Other GDSS systems having...
Table 5. Pre- and Post-Consensus Scores By GDSS Support Mode and Guide

<table>
<thead>
<tr>
<th>Guide A</th>
<th>Facilitator-Driven</th>
<th>Chauffeur-Driven</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Consensus</td>
<td>Post-Consensus</td>
</tr>
<tr>
<td>Size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.2371</td>
<td>0.2336</td>
</tr>
<tr>
<td>4</td>
<td>0.2296</td>
<td>0.3219</td>
</tr>
<tr>
<td>6</td>
<td>0.2305</td>
<td>0.3240</td>
</tr>
<tr>
<td>5</td>
<td>0.2917</td>
<td>0.3242</td>
</tr>
<tr>
<td>3</td>
<td>0.3352</td>
<td>0.4591</td>
</tr>
<tr>
<td>4</td>
<td>0.3370</td>
<td>0.5529</td>
</tr>
<tr>
<td>3</td>
<td>0.2764</td>
<td>0.6260</td>
</tr>
<tr>
<td>4</td>
<td>0.2512</td>
<td>0.6665</td>
</tr>
<tr>
<td>3</td>
<td>0.1513</td>
<td>0.6549</td>
</tr>
<tr>
<td>Mean:</td>
<td>0.2600</td>
<td>0.4646</td>
</tr>
<tr>
<td>Guide B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Keeping all these limitations in mind, there are several general results of note that can be seen from examination of Table 5. First, the objective stated above of limiting the variability of pre-consensus scores was achieved. Second, with the exception of one group (Guide A, the first facilitated group) all the groups had increased consensus after the use of the GDSS. The exception group, in essence, did not change its consensus. Third, two groups (one Guide B facilitated group and one Guide A chauffeured group) had perfect agreement following the GDSS session. Fourth, it should be noted that, as in the pilot study, each guide had superior postconsensus when acting as a chauffeur rather than as a facilitator. These results agree with those of the pilot study. Moreover, these results are statistically significant.

Cronbach and Furby (1970) argue in their paper that difference scores are seldom useful as dependent variables. Change scores obtained from subtracting pre-test scores from post-test scores can lead to fallacious conclusions, primarily because such scores are systematically related.
The groups had increased their use of the GDSS. The exception was Guide B, who did not change its use. Guide A chauffeured groups following the chauffeur-driven facilitation method. The results demonstrate the effectiveness of balancing the treatment groups on pre-consensus. Because pre-consensus did not vary significantly across treatment groups, further analysis was conducted using only the post-consensus measure.

A multiple F test was performed on all main effect means. No transformation on the variables was required to satisfy the assumptions of this test. Table 6 shows the analysis of variance results for the effects of GDSS support mode, guide, and the interaction of those variables on post-consensus. Examination of the table shows, first, that there was no significant interaction effect. H3 is supported, which means that one guide was not significantly better than the other in implementing a particular GDSS support mode. Second, H2 is supported, which indicates that, overall, one guide was not superior to the other in achieving higher levels of post-consensus.

Further, H1 is also supported. There was a significant difference (p < .039) in the effect of the support mode on levels of post-consensus in the hypothesized direction. The test indicates that the mean post-consensus for the chauffeured groups (overall mean = 0.650) was significantly higher than the mean post-consensus for the facilitated groups (overall mean = 0.500). Again, as in the pilot study, the chauffeur-driven mode of GDSS support achieved higher levels of post-consensus than the facilitator-driven mode.

Before discussing these findings, the presentation of some additional comparative results is useful to provide a total perspective. As mentioned in the "Introduction," this experiment is part of a larger program of research, which makes it possible to relate these results to other GDSS support modes such as user-driven systems with no support, structured manual support, and no use of GDSS technology (baseline).

Table 6. Analysis of Variance Results for Effect of GDSS Support Mode and "Guide" on Post-Consensus

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>ss</th>
<th>df</th>
<th>F</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>0.341</td>
<td>3</td>
<td>2.60</td>
<td>.068</td>
</tr>
<tr>
<td>H1. Support Mode</td>
<td>0.202</td>
<td>1</td>
<td>4.63</td>
<td>.039</td>
</tr>
<tr>
<td>H2. Guide</td>
<td>0.046</td>
<td>1</td>
<td>1.05</td>
<td>.314</td>
</tr>
<tr>
<td>H3. Support Mode X Guide</td>
<td>0.093</td>
<td>1</td>
<td>2.14</td>
<td>.154</td>
</tr>
<tr>
<td>Error</td>
<td>1.393</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1.739</td>
<td>35</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R² = 0.20
Table 7. Pre- and Post-Meeting Average Consensus Scores for the Foundation Task Across Several Studies

<table>
<thead>
<tr>
<th></th>
<th>Pre-Consensus</th>
<th>Post-Consensus</th>
<th>N</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline Groups</td>
<td>0.27</td>
<td>0.55</td>
<td>27</td>
<td>Watson, et al., 1988</td>
</tr>
<tr>
<td>Manual Groups</td>
<td>0.25</td>
<td>0.62</td>
<td>26</td>
<td>Watson, et al., 1988</td>
</tr>
<tr>
<td>Pilot Study</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User-Driven Groups</td>
<td>0.26</td>
<td>0.49</td>
<td>5</td>
<td>Dickson, et al., 1989</td>
</tr>
<tr>
<td>Facilitator-Driven Groups</td>
<td>0.39</td>
<td>0.56</td>
<td>5</td>
<td>Dickson, et al., 1989</td>
</tr>
<tr>
<td>Chauffeur-Driven Groups</td>
<td>0.34</td>
<td>0.67</td>
<td>5</td>
<td>DeSanctis, et al., 1989</td>
</tr>
<tr>
<td>User-Driven Groups</td>
<td>0.27</td>
<td>0.43</td>
<td>19</td>
<td>DeSanctis, et al., 1989</td>
</tr>
<tr>
<td>Facilitator-Driven Groups</td>
<td>0.25</td>
<td>0.50</td>
<td>18</td>
<td>Current Study</td>
</tr>
<tr>
<td>Chauffeur-Driven Groups</td>
<td>0.23</td>
<td>0.65</td>
<td>18</td>
<td>Current Study</td>
</tr>
</tbody>
</table>

The first two entries in Table 7 are from studies reported by Watson, et al. (1988). The subjects of the study were undergraduate business students. Three- and four-person groups were in the “baseline” treatment. The study used “established” groups, rather than forming groups on an ad hoc basis, to control pre-consensus. The baseline groups simply went into a conference room and, unaided, decided as a group how to allocate the funds. Thus, the baseline treatment serves as a level of performance against which any other manipulation can be compared. Groups receiving the manual treatment went to the same conference room but were given a suggested process to follow in their decision making and were aided by flipcharts. The manual treatment employed the same decision process as the GDSS treatment but did not utilize technology.

The next three entries in Table 7 replicate the results of our pilot study that were presented in Table 3. These are presented with the other results as reference points. Recall that in the pilot study the subjects were undergraduate students. Furthermore, a small number of groups were involved in that study. These two factors reflect the relatively high pre-consensus scores in two of the treatments in the pilot study.

The user-driven results are from the study by DeSanctis, et al. (1989). The subjects in this study were undergraduate students and, like Watson, et al. (1988), they used existing groups having a history and a future. These results are presented for reference rather than those in the Watson, et al., study because the SAMM version used by DeSanctis, et al. (1989) was identical to the one used here, whereas the Watson, et al. (1988) study employed a prior version of the software. Note from Table 7 that, as predicted earlier in this paper, the user-driven GDSS did yield the lowest levels of post-consensus. Because of differences in the subject pools used (e.g., undergraduate vs. graduate) and the way in which groups were formed, it is inappropriate to test the differences statistically, but the results support the logic presented earlier.

The last two lines of the exhibit replicate the results of this study that were presented earlier. in total, the data in Table 7 serve to put these results in perspective. As noted previously, in the pilot study the chauffeur-driven GDSS support achieved higher levels of consensus than facilitator-driven GDSS support. Because the results of the expanded study replicate those of the pilot, it is clear that the initial effect was not due to an alternative explanation, but was due to the specific environment created during the chauffeur-driven manipulation. The discussion that follows revisits our original thinking, evaluates the results and their implications, and attempts to draw implications from these results.
patterns of results

The results (as summarized by Table 7) are as anticipated given the task setting, GDSS technology, and group size involved in this research. Overall, in a "one-shot" GDSS use, a user-driven mode of operation (i.e., no facilitative support) achieved the lowest level of post-consensus of the support modes tested. Given this outcome, coupled with the results concerning facilitation and chauffeuring, one can speculate that the GDSS technology and its aforementioned "mystique" must be overcome in order to achieve performance levels superior to unaided groups.

In support of this chain of logic, there was improvement in achieving consensus that resulted from imposing a chauffeur to ease the group's use of the technology. As mentioned previously, in this instance, the groups were free to use whatever decision approach they wished. Thus, if a group were to use a GDSS system on only one occasion, the use of an individual to "drive" the technology for the group without excessively structuring the decision approach appears to be a very good practice.

In cases where the group is to make repeated use of the GDSS (say as a foundation making repeated 'decisions involving the allocation of funds, or a quality team meeting over the course of a year to recommend solutions to a given problem), two thoughts come to mind based upon the results. One is that it may be possible to begin the group's use of the GDSS with a chauffeur and then make the transition over time to the group taking over its own "driving" of the system. Alternatively, the low post-consensus achieved by the user-driven groups suggests that, in the absence of chauffeuring, training and assistance may be of great importance in achieving higher levels of performance.

Overall the results suggest that, even with some training in GDSS use, groups do not immediately perform at high levels in using the technology. Clearly, some "handholding" can assist performance. It appears that the best approach is to attempt to ease the transition to a new technology without being overly restrictive on how it is used. At the other extreme, to simply show groups how to use a GDSS and then turn them loose (if the technology can operate in the purely user-driven mode) is likely to be quite ineffective. The pat-
tern of results suggests that as organizations move to adopt GDSS technology, appropriate resources must be made available to ease the transition into the new technology. A favorable outcome to note, however, is that the highest levels of performance were achieved using an individual playing a support function (chauffeur), which should be a great deal easier to staff (and probably less expensive) than that of facilitator.

**Individuals acting as guide**

Discussion points (2) and (3) above relate to the individuals playing the role of guide in using a GDSS. We found no overall differences among the two people serving as guide in this study, nor did we find a statistical interaction between the guides and the modes of support. However, in considering the guide role, some interesting insights arise from this study.

It makes sense to believe that, because of individual characteristics or skills, one person might be a better facilitator than another. On the other hand, it is hard to think of reasons why one person would be a better chauffeur than another. In short, given familiarity with the GDSS, one person ought to be just as good as another in carrying out the group's instructions regarding inputs to the GDSS (the chauffeur function). If one accepts these arguments, imagine our surprise at the difference in the level of post-consensus achieved by Guide A vs. Guide B in the chauffeur support mode. Although the interaction between guide and support mode was not statistically significant, the level of post-consensus achieved (0.74) by Guide A compared to Guide B (0.56) is notable and startled the research team.

As a matter of fact, as the experiment progressed, the high levels of post-consensus being achieved by Guide A became apparent. These results could have been explained had they been achieved in the facilitator mode (e.g., individual differences or differences in the degree of restrictiveness or decision guidance provided), but this outcome occurring in the chauffeur mode was puzzling. Why was this happening when the chauffeurs were simply executing the wishes of the group? After considerable reflection, one of the research team members proposed a novel answer to the question. Consistent with hypothesis 1, he suggested that perhaps Guide B, in performing the chauffeur function, might actually be exhibiting some behaviors that were more like structured facilitative support, whereas Guide A was not exhibiting these behaviors (she was strictly executing orders from the group).

Although this explanation could not be formally tested, the team did observe both guides as they chauffeured a few of the groups near the end of the data collection period (the observation was such that it did not interfere with the overall integrity of the experiment). Although it is anecdotal evidence, we found that Guide B appeared more directive when chauffeuring. Had Guide B not acted somewhat as a facilitator when chauffeuring, the results indicating the benefits of GDSS support through the use of a pure chauffeur might have been even stronger.

Overall, the results (both formal and informal) indicate that an individual familiar with the technical aspects of a GDSS can be of considerable assistance to a group using the system by easing the group into the use of the technology without imposing norms on how the group should use the technology. This means that substantial improvement can be made in group use of a GDSS for the first time if a chauffeur is used. This person should be careful to chauffeur and not to facilitate.

**Facilitation revisited**

We have saved the most important and most complex issue for last. Conventional wisdom would support arguments that having a good facilitator to assist in the use of a GDSS should improve the performance of groups involved with such a system, especially if it is the first time the group has encountered the GDSS technology. There are two benefits facilitation should achieve. First, it eases the group into the use of unfamiliar technology and, second, it provides a good process (tailored to the task) for the group. However, fairly strong evidence has been collected that suggests that something is wrong with the above notions regarding facilitation. Evidence suggests that it is the nature of the facilitation process that is related to group outcomes using a GDSS.

Based upon the results achieved using a chauffeur-driven GDSS, it's safe to say that reducing the mystique associated with the GDSS technology is of benefit to a group using this
... performing the chauffeur role be exhibiting some behaviors like structured facilitation. Guide A was not exhibiting these behaviors (she was strictly viewing the overall process while chauffeur-driven support would achieve higher levels of post-consensus than facilitator-driven support, the Maier and Maier (1957) notion of "free discussion," representing the chauffeur-driven approach, appeared more appropriate to the task. The results tend to support the view that the rigidity of our facilitation manipulation did not allow sufficient free discussion on the part of the groups.

Silver's (1990) theoretical propositions also were confirmed. The facilitator-driven approach used in this study had, in Silver's terms, high levels of restrictiveness and decisional guidance. Since our intent was to promote change in consensus formation, it would be better to give the group flexibility through a minimally restrictive GDSS with low levels of decisional guidance. The fact that facilitation was inflexible (restrictive) and had high levels of decisional guidance supports the superiority of a chauffeur-driven support mode in achieving higher levels of group consensus. The discussion above on the differences in post-meeting consensus achieved by Guide A and Guide B in providing chauffeur-driven support further supports this point, i.e., Guide B achieved lower levels of post-meeting consensus than Guide A by exhibiting some behaviors in chauffeur that were restrictive and provided decisional guidance.

If we are to follow up on this speculation, the onus is on our research group to fully exploit Silver's theory in the context within which we are working. Since his explanatory framework shows promise, we must work with and refine measures of restrictiveness and decisional guidance in order to see if the facilitative task support is made more understandable employing this rationale. This follow-up is only one activity of several planned in order to explore the important implications of the research results generated to date.

In order to more fully understand GDSS support modes and successful use of these systems, we intend to:

1. Andreassen, et al. (1999) have implemented and examined the effect of restrictiveness in group decision heuristics in a GDSS environment on consensus decision making.
GDSS Facilitation

1. Test the use of a facilitator-driven GDSS support mode that is much richer and more adaptive than those used to date—in other words, explore the flexible GDSS facilitative task support condition. The intent is to explore Silver’s framework for DSS and change as an explanatory model and to develop the measures necessary to implement the model in a GDSS context.

2. Test the use of chauffeuring as a means of successfully infusing the use of a GDSS, which, after several periods, will be used in the user-driven mode. We intend to test a chauffeur-based implementation against a training-based GDSS implementation.

3. Explore the baseline group issue. We intend to examine why the unaided baseline groups have such high levels of post-meeting consensus and why GDSS supported groups have difficulty in exceeding these levels.

In conclusion, the results suggest some practical guidelines that can be offered for GDSS use (again with the caveat that our results are associated with a particular type of task setting, GDSS technology, and group size). Tentative practical guidelines include:

1. Be very careful in choosing GDSS facilitators and ensure that these individuals have enough good facilitation process training to be effective. As we have shown, simplistic and rigid GDSS facilitation may be detrimental to achieving high levels of GDSS success. Appropriate facilitation appears to be especially important given that most of the current GDSS use is in conjunction with highly judgmental tasks (e.g., strategic planning, identifying problems, causes, and potential solutions).

2. Consider the use of chauffeurs during “one-shot” GDSS experiences or during early stages of repeated GDSS use. Until people really learn and adopt GDSS technology, easing them into such systems may be best implemented through the use of a chauffeur.

3. Recognize that achieving effective use of GDSSs requires substantial organizational support (such as GDSS chauffeurs and carefully selected and trained facilitators) and goes far beyond simply acquiring the technology and training groups to use the features provided by the technology.

References


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