A Case Study of Using Group Decision Support Systems in the Public Sector

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ABSTRACT

Most field studies of GDSS reported in the literature are from the private sector. We have conducted a series of case studies using a group decision support system, VisionQuest, in a local government. The study reported here is a unique case that involved agency directors in a budget reduction session. Post-meeting surveys and observations indicate that participants were satisfied with the meeting process and outcomes. In addition, we have identified critical success factors for implementing GDSS in the public sector.

INTRODUCTION

The economic downturn in the late 1980s and early 1990s has significantly impacted businesses, private and public alike. However, at the same time, citizens are requesting more services and quicker responses from state and local governments. Resistance to change, the size of bureaucracies, and the amount of "red tape" have made government very inefficient in providing services to the public [10]. Facing an eroded tax base and increased demand for services, government agencies throughout the country are forced to operate under a dramatically reduced budget. In order to overcome the financial crisis, they have launched business reengineering initiatives to streamline their critical business processes. The use of group decision support systems (GDSS) has enabled organizations to involve more people from cross-functional areas in their downsizing and business reengineering efforts [7]. In the 90s, government will be more results- and customer-oriented [10]. There will be more involvement and participation by citizens in the policy formulation process. GDSS, when used properly, can be an enabling technology that allows governments to become more competitive and more market-oriented. We have conducted a number of field studies using GDSS in the public sector. This article reports experience in using a GDSS to facilitate a budget reduction meeting in a county government.

GROUP DECISION SUPPORT SYSTEMS (GDSS): VISIONQUEST

Group Decision Support Systems (GDSS) are integrated computers and communications systems that implement group process techniques to support communication, coordination, and decision-making in team work [4,5]. The essence of GDSSs is to facilitate interaction among people. The GDSS used in this study is VisionQuest (VQ), a distributed GDSS product used to support business teams in their group decision making and communication processes [9]. Meetings can be viewed as forums for goal-directed dialogues. VQ is a system that uses an executable agenda and a set of group tools to support dialogues. A meeting coordinator usually creates an agenda and a users' roster in advance of the meeting. Participants in a VQ meeting are guided by the agenda that includes both automated tools and manual processes. During the meeting, the coordinator may enable or disable an agenda item to synchronize the meeting activities and change an agenda dynamically. Within a dialogue, information generated by one group tool may be exported to another tool. In addition, VQ allows participants to interact with each other at any time, in any place, enhancing communication across the organizational hierarchy.

There are nine tools available in VQ: Brainwriting (generate alternatives), Comment Cards (generate alternatives with comments), Compactor (group alternatives according to a set of pre-defined categories), Ranking (rank the relative importance of a set of alternatives), Rating (rate alternatives based on a 1-to-n scale), Subgroup Selection (select a subset of alternatives from a list), Vote (vote YES, NO, or ABSTAIN on a list of alternatives), Point Allocation (allocate quantifiable resources to a set of alternatives), and Scoring (a simple multi-criteria decision making tool). A typical decision

making process includes generating alternatives, organizing alternatives, and evaluating alternatives. Depending on the problem solving context, alternatives may be issues, problems, criteria, strategies, critical factors, suggestions, etc. Following is a description of the Brainwriting tool.

The Brainwriting tool, designed to support the brainstorming technique, allows participants to enter alternatives from their workstations simultaneously. Once an alternative has been entered, it appears in the public window so that all participants can view it. Since all participants can speak and listen at the same time, the communication channel is expanded. When participants read ideas generated by their colleagues, new ideas may be triggered and duplication can be minimized. Only the author of an alternative (or the meeting coordinator) can modify or delete a submitted alternative. The ability to create an agenda before meetings, the tool invocation function via the executable agenda, the process synchronization feature, and the direct access of group results by each individual have made it possible for participants to use VQ in a distributed fashion.

BACKGROUND OF THE STUDY

The county government involved in this study, located in suburban Washington, D.C., is one of the nation's largest and most prosperous public sector entities. It serves 830,000 citizens, occupies 400 square miles, has 10,500 employees, and consists of 96 agencies. It reluctantly faced its most critical fiscal crisis in the fall of 1991. The budget for the 1992 fiscal year was $1.385 billion and needed to be reduced by $30 million.

Within this county government, there are four Deputy County Executives (DCE) who are responsible for Human Services, Management and Budget, Planning and Development, and Public Safety. The eleven agency directors under Human Services, who were requested to attend a three-day budget reduction work session at the end of 1991. The purpose of this work session was to develop a briefing package, recommending items to be eliminated or reduced for the FY 92 budget, to be used in the actual budget reduction sessions, for the Human Services Deputy County Executive. The Human Services agencies include such as Human Development, Health Department, Libraries, Recreation, Juvenile Courts, Extension, and Office for Children. Any cuts in these agencies would have a significant impact on daily services to the citizens.

The process of the budget reduction meeting consisted of five steps: (1) Pre-meeting preparation including planning the meeting agenda and generating each agency's budget reduction items and consolidating them into one list; (2) Discuss all potential budget reduction items; (3) Select viable budget reduction items; (4) Prepare the final consolidated list of recommended budget cuts; and (5) Generate creative

ideas to overcome the impact of the budget cuts. Steps one to three were accomplished in a traditional (i.e., non-computer-supported) meeting environment; steps four and five were accomplished using VQ.

STEP 1: Pre-meeting preparation including planning the meeting agenda and generating each agency's budget reduction items and consolidating them into one list.

The Deputy County Executive for Human Services planned to meet for three days with his agency directors and their key staff to discuss each agency's suggested budget reduction items and their potential impacts. As a group, they developed a consolidated list of recommended cuts for all Human Services. To increase his flexibility, the DCE asked each director to develop a multi-layered series of cuts of 25%, 30%, and 40% of their total budgets. Each agency's potential reductions, a total of 239 cuts, were loaded in a Lotus 1-2-3 spreadsheet.

STEP 2: Discuss all potential budget reduction items.

STEP 3: Select viable budget reduction items.

The Lotus spreadsheet was the basis of discussion and underwent numerous changes over the first two days of the meeting. By the third day, only 49 cuts were still under consideration. During the traditional meeting time, each director was accompanied by an assistant who provided back-up information and in many cases was better informed (on a detail level) about the agency's operations. The assistants were vocal and disgruntled when they were informed they would be denied access to the VQ meeting (due to lack of space and computer terminals). They expressed a sense of frustration at participating in the process for two and a half days, only to be removed at the critical point of finalizing the cuts. Several of the agency directors also expressed a reluctance to vote on cuts without their assistants present.

STEP 4: Prepare the final consolidated list of recommended budget cuts.

The original Lotus spreadsheet had been "imported" into VQ so that the line items could be prioritized individually. VQ was flexible enough to allow "marking and importing" into "Brainwriting" the final 49 cuts still under consideration into the prioritization discussions.

A short (less than 30 minutes) fun training exercise was used at the beginning of the GDSS session to teach the eleven participants how to use VisionQuest's tools. After reviewing the budget reductions in "Brainwriting," the majority of the VQ meeting was spent using the "Rating" tool to reflect the group's prioritization of the final cuts. The group was instructed "to rate using a scale of 5 (highest), 3 (middle), and 1 (lowest) each cut they thought should be included to reach the $15 million reduction." They were further in-

reach the $15 million reduction." They were further instructed that those cuts receiving a rating of 5 should definitely be included in the reduction package while those receiving a rating of 1 should definitely not be included. Using a high rating to indicate a reduction was considered appropriate in this case since the group had spent two and a half days discussing and identifying cuts and their thought process was one of prioritizing reductions.

STEP 5: Generate creative ideas to overcome the impact of the budget cuts.

In order to give the group an opportunity to use VisionQuest's brainstorming activity and vary their experience, as well as record their comments on the fiscal situation they were facing, participants were given unrestricted access to several Brainwriting "dialogues." The dialogues included: possible mitigation strategies to deal with the budget cuts; alternative service delivery concepts such as program redesign, privatization, assumption by non-profits; opportunities for consolidation among functions or groups. The final Brainwriting activity asked each director to assume he/she were the County Executive for a day and could enact any measure, then list the ten best ideas to save the County money. This activity was intended to conclude the meeting on a positive note. Several participants liked this exercise so much that they requested to come back the next day to contribute additional ideas to this Brainwriting activity.

DATA COLLECTION AND ANALYSIS

Data collection was accomplished through several means: 1) a paper and pencil questionnaire given to participants immediately following the VQ session; 2) personal interview and written survey with the meeting broker, the primary person working with the facilitator to develop the meeting agenda, in this case, the Executive Assistant for the Deputy County Executive; and 3) the authors' observations of the meeting process and participants' reactions and comments. The participant questionnaire was designed to collect demographic data about the participants' age, gender, position level and job function, and typing and computer experience. It also gathered information about the group history such as how frequently they met in the past. The five point scale agree/disagree questions were intended to measure the effectiveness of the GDSS meeting along several variables:

(1)Preparation and support, including understanding purpose, training and support from the facilitator;

(2)Task effectiveness, including whether the meeting accomplished its purpose, the number of unique alternative ideas generated;

(3)Satisfaction with the meeting process, including level of particpation, communication, effects of anonymity, and conflict;

(4)Satisfaction with meeting results, including confidence in re"sults and commitment to the re"sults;

(5)Satisfaction with computer support, including impact of the computer; and

(6)Willingness to use GDSS again.

Table 1

Demographic Data

Group Composition	7 male; 3 female
Level of Management	10 Executive/Top level
Average Age	53
Typing/Keyboard Experience	7 Casual/Hunt and Peck 2 using a computer daily
Experience in this group	9 more than 3 months; 6 meet weekly

Ten of the eleven agency directors completed the post-meeting questionnaire. Table 1 depicts descriptive statistics of the demographic data. The group composition was 70% male, 30% female, 100% executive/top level management. The average of those who identified their age was 53. Seventy percent of the group described their typing proficiency as only "casual" or "hunt and peck." Forty percent had used a computer fewer than 10 times with only 20% using a computer daily. Ninety percent of the participants had been a group member for more than three months with 60% stating they met on a weekly basis. Seventy percent of the group felt that limited typing and computer experience was not perceived as a hindrance to the computer supported meeting. Eighty percent of them felt the computer commands were easy to remember and felt they had sufficient training in the use of the software. These findings are consistent with Grohowski, et al.'s study at IBM [6].

Table 2 presents descriptive statistics of perceived effectiveness of the GDSS meeting. Ninety percent of the group felt that they had a clear understanding of the meeting purpose and the facilitator kept the meeting moving. Eighty percent felt their training was sufficient and the facilitator provided clear instructions for the computer. Seventy percent of them felt the meeting accomplished its purpose and only 10% felt this meeting generated more non-task related comments than traditional meetings. Although 60% of the group stated that the anonymity of the software encouraged them to participate more, only 20% felt their level of participation was actually higher in this meeting than in traditional meetings. Although the group gave a low rating to the gen-

Table 2

Descriptive Statistics of Perceived Meeting Effectiveness

Question	Percent Agreed	Average/ Std Dev
Preparation/Facilitation/Training		
I had a clear understanding of the purpose of this meeting.	90	4.4 / 0.66
The facilitator kept this meeting moving toward its purpose.	90	4.3 / 0.90
My training in the use of the software was sufficient.	80	3.9 / 1.04
The facilitator provided clear instructions for the use of each screen or tool.	80	4.2 / 0.98
Task Effectiveness		
The meeting accomplished its purpose.	70	3.8 / 0.87
The group generated more unique alternative ideas in this meeting than in traditional meetings.	10	2.8 / 0.60
The group discussed more thoroughly issues raised.	0	2.1 / 0.83
This meeting generated more non-task-related comments than traditional meetings.	10	2.8 / 0.63
Satisfaction with Meeting Process		
My level of participation was higher in this meeting than in traditional meetings.	20	3.0 / 0.89
The anonymity of this meeting encouraged me to participate more.	60	3.3 / 1.19
The group was generally more able to reach consensus.	30	3.4 / 1.28
There was more pressure to conform to group opinion in this meeting.	10	1.8 / 0.92
There was greater conflict in the computer-supported meeting than in traditional meetings.	0	2.2 / 0.63
Satisfaction with Meeting Results		
The results of this meeting reflect my inputs less than a traditional meeting.	20	2.7 / 1.19
I feel more confident in the results reached in the computer-supported meeting than in traditional meetings.	10	2.3 / 0.78
This computer-supported process increased my commitment to the results of the discussion.	10	3.7 / 0.64
Satisfaction with Computer Support		
This meeting was enhanced by computer support.	80	3.9 / 0.83
The computer was a hindrance.	0	1.8 / 0.79
The computer commands were hard to remember.	10	2.2 / 0.75
I was satisfied with the process of this computer-supported meeting.	90	4.2 / 0.60
Willingness to Use GDSS Again		
I would be willing to participate in a computer-supported meeting again.	80	4.1 / 0.70

Notes: (1) Sample size is 10; (2) Ratings are on a scale 1–5, 5 = Strongly agree, 1 = Strongly disagree; (3) Percent agreed includes all responses of ratings 4 and 5.

eration of more unique alternative ideas and the thorough discussion of issues raised, both the observers and the meeting broker feel that this is explained by the fact that the budget reduction meeting consisted primarily of rating activities and involved little of idea generation and the typical interchange of traditional meetings. The group found VisionQuest an effective support tool for this activity, 80% stating that the meeting was enhanced by computer support, 90% expressing willingness to participate in another such meeting.

OBSERVATIONS

Observations of the Meeting Broker

The meeting broker who has worked with this group of agency directors for several years, offered his explanations of some of the directors' responses to the questionnaire. Their scores on questions of task effectiveness might be lower than expected because the group was rushed going into this (VisionQuest) session; it was the culmination of two intense days conducted without using GDSS. Their agenda focused the majority of their time using VisionQuest's Rating tool in which they had little opportunity to generate and discuss ideas. The fact that they had a high number of neutral responses to questions may be due to their lack of certainty on "how they [their agency's budget reductions] fared" and how the group's recommendations would be used by their Deputy County Executive. This was more of an "advisory" meeting than a true decision making meeting; the participants were producing a group recommendation which the sponsor would take to the actual county level budget reduction session. These directors never knew how their list of recommended cuts compared to the DCE's final list. The broker suggested the subject matter and level of trust in the business agenda may influence the participants' thought about the tool (GDSS).

When asked about the compatibility of the GDSS environment with the established norms and the organizational culture, the meeting broker responded that these were "at odds to some degree." He observed that "this group is very verbal and they have a strongly cultivated political perspective that pervades most group communication with a subtle but significant focus on who is saying something, in addition to what is being said." He added that "these are titular heads of their particular discipline and as such, they are the last to take off their agency hats and join hands to do things collaboratively and across agency lines." He felt the GDSS environment could help accomplish this by de-politicizing the group's work.

In a discussion about the use of GDSS for this particular meeting, the broker responded that this business agenda could not have been accomplished outside the GDSS environment.

"The core group has never done this work before or since. I estimate it would have taken an order of magnitude increase in time of 10 to 100 times the effort if it is at all do-able in the manual environment. Using VisionQuest saved us a minimum of 12 to 15 days over conducting serial interviews with each agency director, for example. The competitive feel of the interactive session, the opportunity to bring all the directors to the table as opposed to having them isolated, the interactive linking influence of rating, the synergy caused by the different kind of media, made the meeting more compelling and engaging for the group, causing them to spend more time on the task than they ordinarily would have. VisionQuest's speed, ease and de-politicizing focused the rating of the budget cuts on the basic information not on emotional appeal of the human services programs."

The meeting broker believes use of GDSS in the county will "prove more successful over time as the prominence of the media fades and the focus turns to the business agenda and the substance of the meeting. After a few meetings the participants will not only be focusing more on the substance of the meeting, they will be helping to shape the business agenda." We have already observed this occurring with participants of multiple GDSS sessions in the county.

Observations of Authors

Through post session interviews and surveys, we found that meeting participants had greater concentration and sense of seriousness and adhered more closely to the meeting agenda than in traditional meetings. Each time an activity is completed in VisionQuest, participants return to the on-screen agenda. This may help keep the group focused and move the group through the meeting with less "going off on a tangent." By returning to the agenda it reinforced the group's "place" in the entire meeting as well as their sense of accomplishment in what was completed and what was to come. Although the group was not questioned in detail about their communication and group interaction, we noted that the group had established communication patterns and had developed positions related to one another. Their discussion reflected the fact that elmination of three intense days discussing budget reductions that would alter their agencies' way of doing business and interaction with each other. In addition, some of the directors commented that a few of participants had not been completely forthcoming about offering items to be cut from their budgets; there was a perception among the group that these agencies did not fare as well as the others, i.e., the group chose to cut more items from those agencies whose directors had not "played by the rules."

One agency was perceived to have benefited from the process of being open, i.e., his agency budget had fewer cuts than expected.

Within each of VisionQuest's prioritization tools, the participants can move freely between their own response and the group results. This enables them to gain instant feedback on the group's position on issues as well as compare their own prioritization in relation to the group. We observed instances of consensus building as participants viewed their response to the group results then returned to the tool to change their response. Participants frequently commented that they did not realize there was so much agreement among the group.

There has been a transfer of knowledge developed during the VisionQuest sessions that has carried over to traditional meetings. During traditional meetings we observed people repeating group communication "rules" they had learned in VisionQuest sessions, expressed in such statements as "We don't have to agree with your comments, we only have to listen and understand them" or "We can vote on them later, right now we just have to understand your ideas."

IMPLEMENTATION OF GDSS IN THE PUBLIC SECTOR

We believe several factors have contributed to the success of this GDSS implementation in the public sector. These strategies could be models for other GDSS implementations in the public sector as well as the private sector.

1. Address critical issues faced by the organization. Many GDSS meetings conducted so far were related to business reengineering, process improvement, and information engineering that are the high priority issues in the county. The county's strategic planning committees have been involved in evaluating GDSS as part of the technology infrastructure for the county.

2. Emphasize facilitation skills in conducting GDSS meetings. The primary facilitator had been formally trained in group facilitation and started to apply skills she learned in the GDSS environment. A process facilitator will enhance the group's communication, behavior, and decision quality and process and solution satisfaction [1].

3. Ensure infrastructure support. Most meetings were held in a training center operated by the county's cooperative computer center. The information center's branch manager has been very supportive to the use of GDSS. The county is considering the development of a dedicated group decision meeting room to secure future availability of the necessary computing infrastructure.

4. Integrate GDSS with other applicable methods and match methods and tools with the meeting needs. We have used several GDSS products and techniques in supporting meetings. Each GDSS agenda has been "customized" to best support the meeting purpose.

5. Use multiple channels of communications. Verbal communication has been emphasized as part of the GDSS supported meeting. We have structured agendas to build in opportunities for verbal communication to help the group develop a shared understanding of the issues. In approaches to solving complex problems, it is critical to allow sufficient time for iterative discussions [1,2].

6. Take a responsive approach in promoting the technology. After the first one or two groups were invited to use GDSS to support their meetings, by word of mouth, many participants started to request the use of GDSS to support their own important meetings. Top county executives were invited to observe or participate in GDSS meetings after there were enough "success stories." The county had planned to purchase a GDSS product before we started this research project, however, the budget situation prevented the purchase. This awareness of GDSS paved the way for the introduction of VisionQuest to the county.

7. Gain broad base support. We have used GDSS to support various meetings in all four Deputy County Executive areas. We have also included participants from people at different levels of the organization to increase support. Meeting participation has been almost equally distributed through executive, middle manager and first line positions.

8. Plan GDSS meetings carefully. We have tried to support meetings that were part of a team process involving upper level managers. Several pre-meeting planning sessions were held with each meeting broker to review and revise the agenda. Each meeting was preceded by a training session using a non-related "fun" topic to familiarize participants with the computer interface before they tackled the problem at hand. Typically, we started meetings with tools and processes that were not very complex to encourage users to feel comfortable in the GDSS environment.

9. Collect users' feedback. We have used surveys and informal participant interviews as well as formal interviews with meeting brokers to collect users' feedback to improve facilitation skills and tool usage. The empirical assessment of user's satisfaction toward the process and outcome of GDSS meetings helps the justification of investment in GDSS in the county. Participant feedback also has been used to help shape future meeting agendas.

CONCLUSION

Budget cutting is a very political process that requires elaborate negotiation and can cause hard feelings among managers competing for scarce resources. By using a GDSS (e.g., VisionQuest) in conjunction with traditional meeting processes, we found that top managers in the public sector were satisfied with both the processes and the outcomes of the budget reduction meeting.

Since the use of VisionQuest for budget reduction talks, we have used VisionQuest in conjunction with Interpretive Structural Modeling as part of the Interactive Management Process [8, 11] in facilitating the business reengineering of several critical business processes in the county government. The preliminary results show that the use of VisionQuest is very effective in eliciting ideas and evaluating ideas, while ISM can be used quite effectively in formulating the underlying structures of a complex problem [3]. Further research is needed to identify better ways to integrate GDSS and business reengineering tools.

There have been very few opportunities to conduct GDSS research beyond the university or laboratory setting. The results of these meetings conducted in the public sector will provide an important contribution to the growing interest in the GDSS environment.

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