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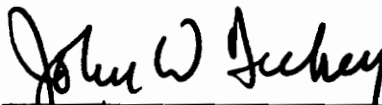
AND

DECISION PRODUCT QUALITY

A Comparative Study of A Group Support System:
CyberQuest™ and The Nominal Group Technique

By

Milton E. Lopes

Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University
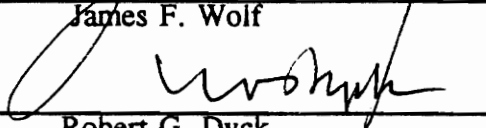in partial fulfillment of the requirement for the degree of

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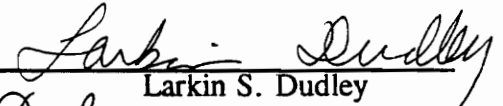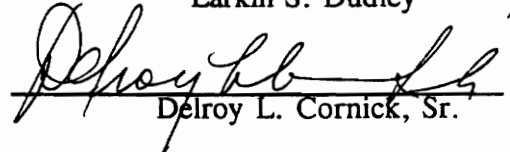
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A Comparative Study of A Group Support System:
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Milton E. Lopes

Commmittee Chairman: John W. Dickey
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(ABSTRACT)

This study's objective was to compare a Group Support System (GSS), i.e.,
CyberQuest, with the Nominal Group Technique (NGT). Its basic assumption was that
discussion outcomes are enhanced by decision interaction processes, the quality of group
facilitation, the intensity of group interaction, the effectiveness of the group meeting, and
the level of group satisfaction.

The GSS of choice in the study was **CyberQuest**, which was developed at
Virginia Tech by Professor John Dickey. Like most GSS, its purpose is to increase the
effectiveness of individual and multiple decision makers. Unlike most GSS which for
the most part feature various computerized problem solving tools, **CyberQuest** adds
hypermedia hardware/software systems to stimulative and innovative group facilitation
procedures and methodologies.

The unit of analysis was a group meeting. Eight groups of randomly selected Town officials and citizens were asked to develop policy recommendations that address the need to encourage the retention and growth of a mix of retail services in Blacksburg, Virginia. Four groups were exposed to **CyberQuest**. Four were not; instead they were exposed to a modified version of the NGT. Prior to the administration of the experiment, an expert panel was polled to determine the criteria by which the policy was to be judged.

The results of the experiment were not entirely favorable to **CyberQuest** sessions. There was no statistically significant difference between **CyberQuest** and NGT in decision product quality, quality of facilitation, or meeting effectiveness. Only group interaction and group satisfaction gave evidence of any statistically significant difference. There was sufficient evidence to conclude that the former was of greater intensity in **CyberQuest** driven sessions. On the other hand, there was evidence to conclude that the latter was greater in NGT driven sessions.

For it is by this one gift that we are most distinguished from brute animals, that we converse together, and can express our thoughts by speech......What other power could either have assembled mankind, when disbursed, into one place, or have brought them from wild and savage life to the present humane and civilized state of society; or when cities were established, have described for them laws, judicial institutions, and rights?

Cicero, <u>De Oratore</u>

In memory of two women, who, each in their own way,

contributed greatly to this work.

Mrs. R. Z. Simmons

1890 - 1965

Mrs. Imogene Gray Alexander

1921 - 1993

And

to the woman I love, my life's mate,

Gail Gray Lopes

and

our two beautiful little girls, soon to be women,

Teresa Michelle Lopes

and

Dominique Elizabeth Lopes,

without whose inspiration, love, joy, and distractions

this work would have little meaning.

Finally,

to all those, who, along the way, gave unstintingly of their time, concern, and

patience; my colleagues all.

Norton E. Long

In Memoriam

1910 - 1993

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ACKNOWLEDGMENTS

To several of my colleagues at the Institute of Community and Area Development (ICAD) at the University of Georgia, I owe a special debt, particularly Jim Feldt and Wesley Wynens, both of whom served on an expert panel; Joe Whorton, ICAD's director; and Charlie Clegg, ICAD's Associate Director, for giving me the time and encouragement to complete the document. But most of all it is to Pam Wilson that I owe much. Without her indefatigable energy, patience, good humor, and dedication, this dissertation could not have been possible. Pam went over and beyond the call of duty, working evenings and weekends in typing this manuscript and struggling through my hieroglyphics. Words cannot adequately express my gratitude.

Finally, I mention Norton E. Long, 1910-1993, one of the most brilliant and caring men I have ever met. I learned much from him. He was to have served on my committee. I join those many who miss him. Requiescat in Pace.

CHAPTER ONE

INTRODUCTION

This study's primary objective was to demonstrate how group discussion outcomes are enhanced by Group Support Systems (GSS)[1]. It examines the extent to which a GSS influences the quality of policy formulated as a result of public dialogue between and amongst citizens and public officials.

The GSS of choice in this study was **CyberQuest**, which was developed at Virginia Tech by John Dickey. Like most GSS, its purpose is to increase the effectiveness of individual and multiple decision makers by employing various computerized problem solving tools. Unlike most GSS, **CyberQuest** also employs several hypermedia hardware/software systems, i.e., telecommunications, video and audio technologies, aroma disks and other stimulative and innovative conference facilitation procedures, methodologies and group activities.

The general framework of this study was participatory democracy, which advances the propositions: (1) that citizens should play an active role in governance; and, (2) that they should take responsibility for many decisions now made solely by elected and appointed officials, particularly those decisions which are "messy" and call for "judgment" rather than

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[1]GSS represents both the plural and singular form.

expertise. It also calls for an engaged citizenry capable of reasoned and innovative public dialogue amongst itself and with a discerning public administration.

The study's general assumption was:

> In a participatory democracy, given a policy situation (task) that is "messy," strategic, complex, and uncertain, even ambiguous, its resolution or decision product depends on the group decision interaction processes employed, the quality of the group's facilitation, the extent to which the group members interact, the effectiveness of the actual meeting and the level of group satisfaction.

The decision interaction processes employed in this study were either **CyberQuest**, a GSS, or the Nominal Group Technique (NGT), a non-computerized technique for structured problem solving. It was hypothesized that the quality of the decision product would be greater in those groups in which **CyberQuest** was employed.

Importance of Topic

There is an ever growing need for intelligent and practical solutions to society's at times intractable problems. In most cases public officials acting alone cannot solve them; nor can citizens acting either as individuals or in groups. It is conceivable that qualitatively better solutions are obtained when both citizens and public officials act jointly. Accordingly, this study is directed at those engaged in fostering the public dialogue. It suggests that in the hands of a responsible public administration, a GSS becomes an instrument of facilitating that

public dialogue wherein interactions among many different sectors, organizations, and individuals create a sense of shared meanings, relationships, and purposes.

Unit of Analysis

The unit of analysis was a group meeting. A "situation mess" (Ackoff 1979b) was presented to eight groups of selected officials and citizens from the Town of Blacksburg, Virginia. Town officials were selected with the help of the Town's Planning Department. Citizens were initially selected at random from a list of citizens who had been or were currently active in civic organizations and activities. The realities of scheduling, however, resulted in a less random and more opportunistic selection.

Task

At a Fall meeting of the Blacksburg Town Council several strategic goals were identified. These goals were the result of citizen surveys, department work plans, and Council member priorities. In the October 1992 issue of About Town, the Town newsletter, the following statement was made: "The Council welcomes citizen comment, input, and suggestions." In that spirit the author requested of the appropriate authority (and was granted) permission to address one goal:

> "Develop .... commercial corridor strategies for South Main Street and the Downtown that encourage the retention and growth of a mix of retail services."

Each group's charge was the same, that is, to develop a policy recommendation in this area. Specifically they were asked (1) to generate policy ideas pertinent to the predetermined policy issue; (2) to prioritize these ideas; and (3) to outline an implementation strategy.

Methodology

Four of the eight groups used **CyberQuest**. Four used a variation of NGT (Delbecq et al. 1986) for group discussion. Nonparticipant observation was one of the means employed to study the influence of each of the independent variables. An exit questionnaire was completed by each participant. Each session was filmed and reviewed by two professionals in group dynamics to assess the quality of the group facilitation and the effectiveness and dynamics of the actual meeting. In addition a previously assembled expert panel determined the criteria whereby the decision product, i.e., citizen recommendations, was to be adjudged. A second panel was further asked to apply these criteria in determining the quality of each group's decision product.

Measures

To test the study's general research hypotheses an attempt was made to measure the quality of policy recommendations made by each group along six variables. The dependent variable was the quality of the decision product or policy recommendation advanced by each group. The five independent variables were (1) the decision interaction process employed,

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(2) the quality of the group's facilitation, (3) group interaction, (4) meeting effectiveness, and (5) group satisfaction. The variable "decision interaction process" was dichotomous in that a session was either one with **CyberQuest** or one without **CyberQuest**. In the latter event the NGT was employed.

Treatment of the Data

Both quantitative and qualitative analyses were employed in this study. Given the complexity of the subject-matter, several research instruments were created or adapted. Statistical analysis was done with the computer program NCSS Version 5.0.

What Follows?

In Chapter two - The Statement of the Problem - the study's rationale is delineated. Following a discussion of the research problem, the study's hypotheses are presented. It is concluded with applicable definitions and study limitations. The third chapter is a review of the theoretical literature undergirding GSS.

The fourth chapter is devoted to a discussion of the methodology employed in this study. The fifth presents the actual study and its findings. The sixth and final chapter, discusses the conclusions and implications drawn from the study.

CHAPTER TWO

THE PROBLEM

Significance of Study

This study is concerned with the extent to which technology enhances group discussion. Although the study's context is that of a local government, its focus is on group decision activities. It explores the feasibility of empowering citizens to do more than vote or attend public hearings, indeed to engage in dialogue with each other and their public servants on matters of no small consequence. It suggests that GSS are efficient means or tools to further this endeavor.

Unlike other studies which use students or business persons as subjects, this study used citizens and public administrators. It also dealt with a matter in which conceivably both citizens and public administrators have a stake, unlike other studies where subjects care little about either the matter under consideration or the study outcome. Presumably this factor has some relevance to the quality of discourse and the level of group interaction.

Theoretical Basis of the Study

The theoretical basis of this study is found in literature on group dynamics, which perceives the group as a combination of two systems: information processing and interactions and relationships.

The Group As An Information Processing System. As a system, the group is a collectivity of interdependent components called individual members or "a set of single organisms which, over a period of time, relate to one another face-to-face, processing matter, energy, and information" (Miller 1978, 515). It possesses structure, has a function, and evolves over time. It develops synergy only when it interacts - that is, "when individual members communicate with one another and when they become concerned with how their group fits into and interacts with the [larger entity]" (Ross and Ross 1989, 30)

As an information processing system the group engages in the systematic collection, storage, retrieval, analysis, and dissemination of information pertinent to its task. The information originates in the environment which is scanned (continuously) or probed (periodically) for gaps, disjunctures, incongruities, changes, shifts, and other interesting phenomena. The objectives of this activity are the timely discovery of opportunities and threats. The greater the uncertainty associated with the task, the greater the amount of information that must be processed during its execution (Galbraith 1972).

From an organizational perspective each level of decision maker in the group has different information requirements. For those on the operational level there is a need for information that will reduce unit costs (as much as constraints will allow), improve capacity planning, optimize distribution systems, cut turnaround time, improve scheduling and/or inventory control, and facilitate "paper flow." At mid levels, however, information is required for the proper allocation of resources and implementation of crucial strategies. To that end information technologies play a significant role in (1) environmental scanning, (2) internal monitoring, (3) local area and interorganizational networking, and (4) developing and sustaining competitive advantages.

At the level of policy analysis and formulation, group decision makers require "richer and larger quantities of information" (Daft and Lengel 1983). Rich information is that which helps clarify the uncertainty or ambiguity in the situation. It emanates from a variety of sources - orthodox and unorthodox. It is future oriented, focuses on the big picture, and is not necessarily very precise. What is important is that group decision makers are able to arrive at an acceptable common interpretation of the multiple levels of meaning embedded in a given situation .... and that they not repeatedly misread the environment, overreact, see complexity where it is not, or apply inappropriate resources to meet a perceived threat or opportunity (Daft & Macintosh 1981).

In society, group decision makers are certain to encounter innumerable unpleasantries. They must appreciate Huber's (1984a) admonition that "decision making in post industrial

organizations will be simultaneously more frequent, faster, and more complex, and will create decision task loadings qualitatively greater than those of the past." Galbraith (1972) tells us that as the level of uncertainty in the environment increases, more information is required. As more information is processed and as the several points of uncertainty confronting the group are properly diagnosed, the outline of an appropriate response emerges (internally and externally).

The group as a system of interactions and relationships. A somewhat similar perspective of the group as a system stems from the interactions and relationships amongst group members. As a social entity, a group is more than the sum of its parts, i.e., individuals. Gouran (1982) defines a group as:

> a small collection of people forming complex networks of interpersonal relationships that can be distinguished in terms of roles, status structure, patterns of authority, and the interdependence of members (p. 122).

The key terms in Gouran's definition are norms, roles, status structures, authority relations, and interdependence. Norms are the standards of conduct that define the appropriate behavior of group members. Roles are those norms that apply to individual actors, rather than the group as a whole. Status structures relate to the degree of importance members attach to each role. Authority relations refer to power based on the amount of control one has over resources that others value, i.e., the power to distribute and to withhold scarce resources. Finally, interdependence is an index of the extent to which one's behavior is determined by one's singular relationship to other group members (Gouran 1982).

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Four decades before Gouran, Barnard (1938) described a group as "something more or different from the mere sum of the interactions composing it" (41). Upon entering a group the individual tacitly accepts a "position of contact" with other group members. From this contact emerges social interactions between individual persons. These interactions are "consequences of cooperation," which bring about favorable or unfavorable changes in the individual and/or the group. If favorable, these changes become group resources. If unfavorable, they become limitations and possibly destructive of group cooperation. Hence in this sense the group is a system of social actions which interact with each individual within its scope, developing interdependencies as an inescapable part of cooperation (Mitchell & Scott 1985).

Discussion Techniques for Small Group Meetings

Nominal Group Techniques (NGT). A number of techniques have been developed to facilitate small group discussions. Van Gundy (1988) names forty-four such techniques. Among them are brainstorming (Osborne 1957), focus groups (Wilson and Hanna 1993), and buzz groups (Phillips 1948), each of which have as their aim the generation of information and ideas. Buzz groups have the additional aim of increasing member participation. Such a group is called an interactive group. Other techniques, such as NGT and Delphi, are designed to achieve more alternatives and higher quality decisions. Neither require group interaction. The latter is usually conducted by mail. The former was developed to enhance the benefits of small group deliberation and to address their acknowledged disadvantages.

The literature delineates these advantages and disadvantages. With respect to its advantages small group discussions (1) tend to bring about change in the attitude and behavior of participants; (2) result in important thinking and decision making; and (3) often result in decisions that are superior to those made by the individual working alone. On the other hand, disadvantages include (1) the loss of control by the individual; (2) the tendency of powerful individuals to dominate the group; (3) the spending of an inordinate amount of time on group maintenance to the exclusion of problem solving; (4) the spending of too much time on the pursuit of a single thought; and (5) the tendency to reach quick decisions before all dimensions of the problem have been thought through (Huseman 1977; Maier and Hoffman 1960; Van de Ven and Delbecq 1971).

NGT was designed to deal with these advantages and disadvantages (Delbecq and Van de Ven, 1971, 1975). Many interacting groups inhibit idea generation in that individuals generally feel uncomfortable sharing half thought-out ideas in ad-hoc groups where members seldom know each other. Additionally often there is dominance by a powerful member such that less dominant members are prevented from suggesting important dimensions of the problem (Taylor, et al. 1958). NGT also limits verbal interaction. This results in more fully thought out ideas and less dominance by more powerful members.

Interacting groups also tend to evaluate and elaborate on a problem dimension identified early in the procedure, resulting in other important dimensions never being brought

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to the forefront (Maier 1963). NGT delays such evaluating and elaborating until each individual has put forth his/her ideas and/or perspectives of the problem.

There is also a tendency for the group to focus on one dimension of the problem to the exclusion of others. In addition, most individuals tend to react to someone else's ideas rather than articulating their own. This relates to the earlier observation that much discussion centers on those ideas put forth early in the discussion. In these instances early ideas are often "idea dumps" of the obvious, rather than more thoughtful, more subtle, more creative ideas that usually come later in the process. Similarly "It appears to be a human tendency to seek solutions even before the problem is understood. This tendency to be 'solution minded' seems to become even stronger when there is anxiety over the nature of the decision" (Maier and Hoffman 1960). NGT forces the exploration of all the dimensions of the problem (Huseman 1977, 499).

NGT consists of six steps. They are:

1.   silent generation of ideas in writing;

2.   round robin recording of ideas;

3.   serial discussion for clarification;

4.   preliminary vote on item's importance;

5.   discussion of the preliminary vote; and

6.   final vote.

Silent generation of ideas. Following a reading of the problem statement, each member of the group silently and independently writes out his/her ideas. There is no discussion among group members.

Round robin recording. After five to ten minutes, each member (one member at a time) is asked for one key idea which is recorded on a flip chart or chalk board visible to all participants. This continues until all ideas have been recorded.

Serial discussion. At this point, each idea should be discussed for purposes of clarification, i.e., the meaning, importance, and logic behind it. The facilitator points to an idea and asks for comments or questions relative to that idea. Although the discussion should be open and frank, it should not be allowed to become a heated debate.

Preliminary vote on idea's importance. This step seeks to aggregate the perceived importance of each idea. One manner of doing this is to have group members rank, in order, their choices in terms of acceptability. These choices are tabulated and the results tallied.

Discussion of preliminary vote. If no one idea clearly emerges, the group engages in further discussion to attempt to reach some measure of agreement.

Final vote. This is the same procedure as in 4 above (Delbecq 1975, Van Gundy 1988, and Wilson and Hanna 1993).

NGT has been compared with other group discussion techniques. When compared to the technique called social judgment (Sherif, et al. 1965) it showed no difference in quality of decision or accuracy of prediction. However, satisfaction with the process was less (Rohrbaugh 1981). When compared to Delphi groups (Delberg, et al. 1986) it provided the best decision product (Gustafson, et al 1973). However, when compared to Dewey's reflexive model (Dewey 1910) NGT limited the occurrence of some communicative behavior through discussion rules, satisfaction was less, and there were fewer ideas (Jarboe 1988).

Brilhart and Galanes (1989) suggest that although NGT encourages idea generation from individuals, while at the same time "avoiding criticism, destructive conflict, and long winded speeches by verbose members, the distinct lack of interaction feels manipulative and unsatisfying to some people..." As a result, they modified the process to include more aspects of group deliberation. The process used in this study was further modified for the same reason. Prior to the actual employment of NGT, the group is encouraged to deal with the problem in terms of defining it as well as its causes and consequences, if left unattended. Following this definition, participants are further encouraged to generate the criteria for a satisfactory solution. Only after this activity does the original NGT process begin. However, it does not end with a final vote. Participants are asked to generate an action plan. The following is an outline of this modified NGT.

TOPIC	ACTIVITIES
1. Problem-Causes	- Communicate problem/outcome statement - Discuss causes and consequences
2. Define Essential Criteria	- Generate criteria for satisfactory solution
3. Idea Generation	- Generate ideas silently and individually
4. Idea Recording	- Record ideas (in original words) in round robin rounds (one idea from each person in turn until all ideas are recorded. No discussion. Duplicates may be deleted here.
5. Idea Clarification	- Clarification of each idea meaning
6. Preliminary Vote: (Prioritization)	- Rate each idea on perceived importance and feasibility - Communicate/display results and select priority items; List.
7. Preliminary Vote: (Ranking)	- Rank the selected priority ideas - Communicate, display, discuss results of ranking.
8. Clarification of preliminary vote	- Clarify differing perceptions and discrepancy of preliminary voting results.
9. Final Vote	- Revote on priority ideas.
10. Action Plan	- Generate action plan issues and components: people, organization, external influences, processes, material, money, output, personal influences.
11. Ascertain consequences	- Ascertain and rate each consequence in terms of likelihood of occurrence and seriousness.
12. Implementation Plan	- Generate implementation plan that includes: dealing with/eliminating consequences, schedule and progress reporting, clear communication of instructions, assignments of responsibilities, timetables for measuring progress, feedback and follow-up systems.

Through this modification it was hoped that ideas could be generated without fear of criticism, reticent members could be brought forward, and the group would carefully scrutinize all dimensions of the problem, with the net result that better and more productive ideas would be forthcoming.

CyberQuest. Dickey (1991) describes **CyberQuest** as a hyper-media, multi-stimuli process which is used to guide the participant through a process of formulating or structuring problems, generating solutions, and, therefrom, designing strategic plans. "Cyber" is a Greek word meaning "pilot, guide, or control." "Quest" means "to search for." Developed at Virginia Polytechnic Institute and State University by John Dickey, **CyberQuest** employs computer data bases as well as video, audio, and even aroma discs. Participants can access a vast data base of information sources and analytical tools to help generate, evaluate, and implement organizational plans. **CyberQuest** can also be employed in conjunction with remote terminals, electronic mail, video and tele-conferencing, and fax communications. Dickey refers to **CyberQuest** as a problem solving and innovation support system.

CyberQuest involves a six-step procedure: Problem Definition and Analysis, Word Selection, Generation of Ideas, Idea Screening, Idea Packaging and Evaluation, and Reporting (Dickey 1991).

Step 1: Problem Definition and Analysis. In the simplest case, the user enters a short sentence to identify the main aim to be achieved, the client, and the time period in which this

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aim is to be accomplished. In many cases it may be necessary to structure the actual problem. This is done through a process called Situation Structuring which identifies the major elements of the problem, determines the important constructs in the situation, rates each element vis-a-vis these constructs, and statistically groups these elements to find an optimal balance between simplicity and homogeneity.

Step 2: Word Selection. The user is asked to pick four key words from a collection of about 200 **CyberQuest** "Key Words" to describe the aim proposed in Step 1. These words relate to groups of people, bodily functions, natural and manmade environments, and abstractions.

Step 3: Generation of Ideas. A match is sought between the selected "key words" and the vast array of describing "concepts" from such diverse areas as management, sociology, science fiction, engineering, physics, philosophy, religion, and the arts. The sources of these concepts include client experiences, general concepts, definitions, relations, proverbs, previous ideas, unique facts encyclopedias (printed text, video, CD-ROM), music, aromas, video discs, and various analytical tools such as quantitative systems, statistical programs, spreadsheets, simulations, expert systems, etc.

Step 4: Idea Screening. Each idea generated is screened according to whether it has been used before (successfully or unsuccessfully) and, if not, whether it is worthy of review and implementation, its importance, and the amount of effort called for to implement it.

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Step 5: Idea Packaging and Evaluation. The ideas are grouped into logical implementation "packages" according to similarity, complementarity, mutual benefits, and time sequence. Several implementation concepts and dimensions are employed, e.g. marketing, program linkages, financial considerations, legal concerns, organizational requirements, human and technical resources, socioeconomic factors, etc. Also employed are several evaluation guides, e.g., design, alternatives, timing, goals, constraints, etc. Detailed implementation strategies can be pursued through **CyberQuest**'s linkage with the program Planning Pro by Kepnoe Tregoe.

Step 6: Reporting. **CyberQuest** produces a variety of reports depending on the step in the process and the needs of the user.

In addition to the use of multi-media there are two other attributes that differentiate **CyberQuest** from other GSS. First, it encourages lateral thinking whereby the user is enabled to freely associate and connect with both interrelated and disparate ideas and/or domains in evaluating problems. A basic assumption of the process is that by broadening and stimulating the idea base or conceptual domain, applicable ideas will tend to flow more readily. This is contrary to the tendency in academic (substantive) theory building which demands focused, linear, rational, disciplined, differentiated, or bounded thinking.

A second attribute is not so readily perceived. Initially **CyberQuest** does not elicit conversation between participants, but rather focuses their attention on the problem itself, its

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formulation and the outline of a prospective solution. This avoids the usual posturing, circling of the wagons, and looking for hostages or allies that takes place in normal meetings. Only when the participants are fairly focused on the prioritization of ideas is dialogue between them encouraged. Already a commitment to the problem at hand has been established.

Nine years in the making **CyberQuest** has been used in over 450 "real world" cases in twelve countries. Its applications cover a wide range, from testing high-tech VLSI chips to improving policy evaluation/assessments for government agencies. It has been used to resolve narrow, highly technical problems, and conversely broad, unstructured, open ended issues. It also has been utilized in product design, strategic planning, opportunity enhancement, innovation exercises, value engineering, and community empowerment programs. This is the first time **CyberQuest** has been used in an experiment of this sort.

Both **CyberQuest** and NGT are designed to support and enhance deliberation with groups of six to ten people, and to assist in the development of decision product outcomes that are acceptable to the group as a whole. Both focus the effort of group participants toward the task by providing structure and feedback. Both provide a sequential series of steps for the group to follow. Both separate the idea generation phase from the prioritization phase. Both limit interaction during the idea generation phase. However, **CyberQuest** encourages interaction at the prioritization phase and thereafter. To address this problem the modified NGT employed in this study allowed group members to engage in full and frank

discussion after the final vote. Finally, both are designed to prevent criticism, destructive

behavior, and long-winded speeches by verbose group members.

It is now appropriate to discuss the research question wherein this comparison is

presented.

Research Question

Knowledge of the quality of the decision product which emerges from public meetings

between citizens and public administrators using a GSS will help determine the effectiveness

of that GSS in promoting the democratic process. Hence, this study's assumption was:

> In a participatory democracy, given a policy situation (task) that is "messy,"
> strategic, complex, and uncertain, even ambiguous, its resolution or decision
> product depends on the group decision interaction processes employed, the
> quality of the group's facilitation, the extent to which the group members
> interact, the effectiveness of the actual meeting and the level of group
> satisfaction.

Five hypotheses were drawn from this assumption:

> Hypothesis 1. **CyberQuest** driven discussions will achieve greater decision
> product quality than will NGT driven discussions.
>
> Hypothesis 2. The quality of facilitation will be greater in **CyberQuest**
> driven discussions than in NGT driven discussions.

Hypothesis 3. The level of group interaction will be of greater intensity in **CyberQuest** driven discussion than in NGT driven discussions.

Hypothesis 4. The effectiveness of the group meeting will be greater in **CyberQuest** driven discussions than in NGT driven discussions.

Hypothesis 5. The level of group satisfaction will be greater in **CyberQuest** driven discussions than in NGT driven discussions.

Decision product quality, here, is the dependent variable. The five independent variables are group decision interaction process, i.e., either **CyberQuest** or NGT, group facilitation, group interaction, meeting effectiveness and group satisfaction.

Definition of Terms

Situation messes. The reference to "situation messes" is taken from Ackoff (1979a). According to him

> managers are not confronted with problems that are independent of each other, but with dynamic situations that consist of complex systems of changing problems that interact with each other. I call such situations messes. Problems are abstractions extracted from messes by analysis; they are to messes as atoms are to tables and chairs (Ackoff p. 94).

Eden (1982) adds that "taken as a system problems do not exist in isolation; each affects the fate of the messes of which they are part. The solution to a mess is therefore not a simple sum of the solutions to problems that can be extracted from it" (p. 52). Rosenhead (1989) concurs and states: "It follows that optimal solutions to individual problems cannot be added to find an optimal solution to the whole mess: the behavior of the mess will depend

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on how the solutions to its various parts interact.... Instead of attempting to solve problems, we should be attempting to manage messes - which involves not solution but planning. If we insist on the solution mode, we will be relegated to problems which are nearly independent, while messes go inadequately managed" (p. 10). The task presented to group participants in this study is in essence a mess, a mix of interrelated problems that are real and perceived, ever changing, big and little.

Problem resolution. Most people use the words problem solving and decision making interchangeably. Each is different. One problem is a felt discrepancy or gap between the perception of a current situation and a desired situation. There is an assumption that there exists a person who feels the need to eradicate this discrepancy or bridge this gap.

Three conditions that characterize a problem: (1) there are available alternate courses of action from which to choose; (2) the choice of action can have a significant impact upon the future; and (3) there is some doubt as to which choice to make. Decision making, on the other hand is the selection of one or several of these alternate courses of action.

Problem solving is the activity associated with that selection. Problem resolution refers to participants' satisfaction with or confidence in the process, the quality of the decision product, the time required, and the number of alternative ideas generated (whether or not consensus was reached).

The following definitions relate to those variables that have particular relevance to this study. They are decision product quality, quality of facilitation, group interaction, meeting effectiveness, and group satisfaction.

Decision product quality. Decision product refers to the actual decision, or in this case the actual recommendation of each group. It is the tangible document that gives evidence of group discussion and deliberation.

Decision product quality for purposes of this study was determined by an expert panel of five persons chosen for their expertise in public administration and community planning. The criteria whereby this quality was to be ascertained follows:

1.   The decision product should be feasible, i.e., doable, (a) economically, (b) technically, and (c) politically.

2.   There should be an effective fit between the problem-mess and the proffered solution. In other words how focused is the solution, how relevant or appropriate is it, given present and future circumstances, resources and time? Will it accomplish the stated goal? Will it perform as intended. Does it appear to be efficient?

3.   It should be conceptually clear.

4.   It should be innovative.

5.   The decision should be compatible with community values and aspirations. It should meet normative standards of excellence, i.e., is it the right thing to do?

7.   It should demonstrate an understanding of the problem, its root causes, exogenous factors, limits, etc.

8.   The ideas should be <u>robust</u>, i.e., immune to chance events.

9.   The decision should be <u>acceptable</u> emotionally and intellectually to the various stakeholders, i.e., (a) those <u>town officials</u> who must execute the resultant policy-decision while at the same time carrying out other, at times conflicting, policies; (b) <u>consumers</u> who are expected to shop along the proposed commercial corridor; (c) <u>developers</u> who will be expected to build appropriate and attractive shopping and parking facilities along South Main Street and Downtown; (d) <u>present retailers</u> who hopefully will stay and expand their businesses; and (e) <u>potential retailers</u> who hopefully will relocate along South Main Street and Downtown.

10.   The decision should be <u>objective</u>. Given the same set of facts it should be comparable to the decision which would have been made by outside "experts."

Decision interaction process. The decision interaction process in this study was either of two types, a GSS or the NGT. A GSS combines communication, computer, and decision making technologies to support decision-making and related activities of work groups (DeSanctis and Gallupe 1987). The GSS of choice in this study is **CyberQuest**, developed at Virginia Tech by John Dickey in 1991. The NGT is a structured approach to problem solving developed by Delbeck, van de Ven, and Gustafson in 1975. Both **CyberQuest** and NGT have been discussed in detail above.

Quality of facilitation. Quality of facilitation refers to the effectiveness of the appointed facilitator in moving the discussion group to closure. Although the facilitator may be unfamiliar with the content material of the problem under consideration, he/she is cognizant of group processes. Unlike NGT sessions where there is only one level of facilitation, in **CyberQuest** sessions there were two levels of facilitation provided, i.e., a

discussion leader and a technical assistant or "chauffeur," who managed the technology and recorded the group's ideas. For purposes of this study, both levels of facilitation were considered as one with respect to facilitation quality. Both the discussion leader and the chauffeur were expected to work in tandem with each other.

Gallupe (1985) defines a facilitator as one who has the most impact on group interaction and influence on group members, and who attempts to move the group in the direction of specific goals. Clawson et al. (1993) suggests that an effective facilitator helps the group take responsibility for and ownership of meeting outcomes and results; listens to what the group is saying and tries to make sense out of it; clarifies goals, agendas, and definitions; integrates or helps organize information into themes; asks the right questions; keeps the group focused on the task and its outcome; creates and reinforces an open, positive, and, participative environment; demonstrates responsiveness and respect for people; is sensitive to their emotions and nonverbal signals; uses clear and concise language; is flexible, i.e., thinks on his/her feet, handles multiple tasks, tries new things; manages conflict and negative emotions constructively; and encourages and supports multiple perspectives.

In the case of GSS, the facilitator must be skillful in all of the above areas and more. The facilitator with a chauffeur, in the case of **CyberQuest**, matches the technology to the task and creates comfort with and promotes its understanding and its outputs. With the GSS acting as a catalyst for "interchange and discussion," the chauffeur must be skillful in operating the system while both being an active listener and observer of individual cues.

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This role of the facilitator-chauffeur is clearly important, yet it is a role that is not clearly understood, either by the traditional facilitators whose experience in GSS settings is limited or by group dynamics researchers who lack a familiarity with the potentials of GSS technology (Ackerman 1993; Beranck, et al. 1993). To add to this concern, the facilitator-chauffeur who uses **CyberQuest** must be comfortable with the often uninhibited and freewheeling nature of innovation and creativity (Dickey 1991). Dickey adds that the facilitator-chauffeur must also establish credibility with the group, be a teacher, be flexible, and be able to "keep the ball rolling."

Group interaction. Group Interaction includes the level of group participation, the extent to which it seeks to carry out its appointed task and to maintain the sequence of interactions among group members. This includes conflict and non-task behavior. Group interaction also relates to individual members seeking clarification of issues, exchanging information, and compromising. It also concerns the quality of communication, interpersonal characteristics, and the structure imposed by the GSS or other approaches.

Based on the work of Benne and Sheats (1948), this variable assumes that individuals play out basic roles in a group setting. The first of these roles relate to group tasks, the second to group maintenance. These roles include that of the person who initiates ideas to the group. This person often suggests different, often new and novel, approaches to the task. He/she is the creative thinker in the group. Another role is that of the individual who asks many questions that seek information or evidence that will allow the group to reach a

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judgment of the factual adequacy of the idea. A third role is that played by the expert who has at his disposal the knowledge or information needed by the group. He/she usually also has the research skills and analytical ability to evaluate this knowledge. Other group task roles include that of the person who constantly seeks clarification about what is being said, the summarizer who wants to make certain the group is on track, and the consensus builder who monitors the decision-making process.

Group maintenance roles include that of the harmonizer who helps the group manage conflict and other non-task behavior and maintains the sequence of interactions among group members. It also includes the gatekeeper who keeps that lines of communication open by tactfully managing the time each member has to express his/her ideas or opinions. The encourager is the person who "strokes" participants by recognizing and encouraging other group members. Three other roles are that of the compromiser, the standard setter, and the person who senses or monitors the feelings, moods, and relationships within the group (Wilson and Hanna 1993).

Meeting effectiveness. Meeting effectiveness refers to the extent to which the participants focus on the topic at hand. How relevant are their comments? Does the discussion engender trust and confidence, respect for individual differences of opinion, equal participation, etc.? How open is the communication among participants? How flexible and cooperative are they? Do they listen to each other? Are the comments pertinent and focused?

Meeting effectiveness also relates to the depth of analysis and the efforts made by group members to clarify, evaluate, or better understand the actual problem and its many ramifications such as its causes, consequences, and alternative solutions and their respective consequences. It is concerned with the exchange of information and/or lack thereof between and among members, the level of non-verbal behaviors, and the degree to which a few persons dominate the discussion. Finally, meeting effectiveness relates to the degree of cohesiveness and consensus in the group and the time it takes to arrive at a decision outcome. In this context, meeting effectiveness is also interested in how the group handles intrapersonal, interpersonal, and intergroup conflict.

Group satisfaction. Group satisfaction refers to the extent to which participants were satisfied with the actual meeting. Were they pleased with its results? Were they satisfied with the process used to move them along, i.e., **CyberQuest** or NGT? Would they be willing to meet with their group in the future to work on other policy problems?

Group satisfaction also refers to the extent to which participants perceive that they are free to participate in and contribute to the actual discussion. . .their perception of the progress their group made towards group goals; and the equivalency in status of the group members. Marston and Hecht (1992) define group satisfaction as a "holistic affective response to the success of behavior that are selected based upon expectations." This definition implies that satisfaction involves an individual's emotional state. It is an emotional response to group outcomes. It is based in large part on role expectations, their

appropriateness and effectiveness, should the behavior be successful. It includes issues relating to the level and quality of individual participation, the various types, directions, frequencies and duration of messages between participants, the extent of group feedback, interaction management, and the individual participant's motivation. It is affected by the quality of communication within the group. Is it negative or ambiguous, positive or clear? Do individuals have the feeling that when their turn comes to speak they can begin a message and be allowed to reach a conclusion within a reasonable time, or will they be cut off in mid-sentence.

Each of these variables is related per Figure 1 - Research Model. Herein the dependent variable is decision product quality. The independent variables are the decision interaction process, the quality of the group's facilitation, group interaction, meeting effectiveness and group satisfaction. The decision interaction process refers to either **CyberQuest** or NGT. Group interaction refers to task performance and maintenance activities by group members. Meeting effectiveness refers to the extent to which the participants focus on the topic at hand. Group satisfaction refers to the level of group satisfaction with the process and meeting outcomes. The combination of involved citizens and public officials are the only group characteristics salient to this study. The specific task will be described below.

Figure 1 Research Model

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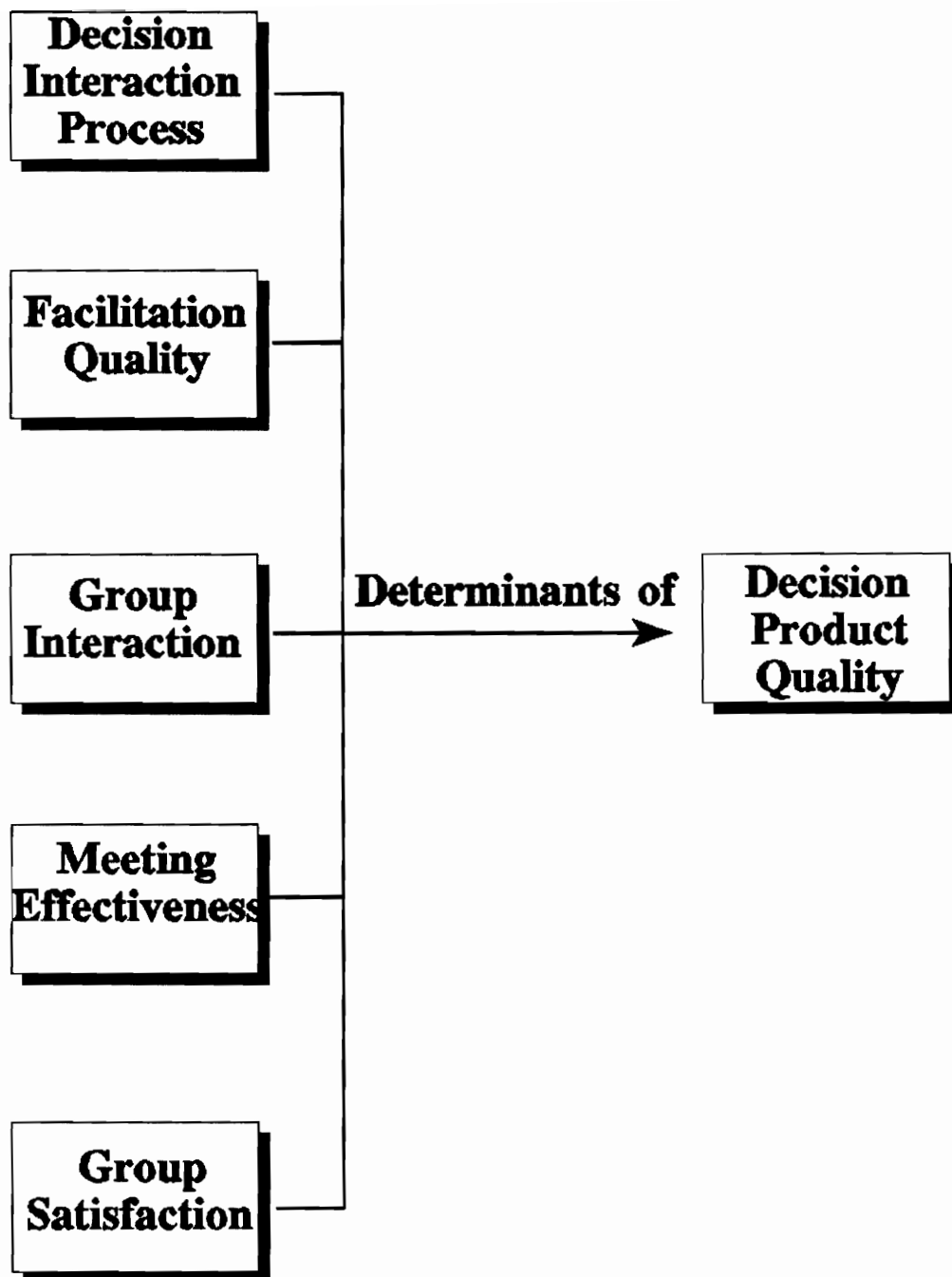
Study Participants

Participants in this study included both citizens and public officials. Citizens were either retired persons living in Blacksburg, university employees, business persons, housewives, or Town employees. They may or may not have known each other. All were active in public affairs. They served on community boards, were active in community activities, or had run for public office. Public Officials in this study referred to those Town officials designated by the Town Manager as members of his management team. They included heads and assistant heads of Town departments.

Delimitations and Limitations of the Study

This study was limited to the influence of technology and facilitation on the decision process. Its definition of decision product is limited to a set of ideas or recommendations to be presented to the Town's Planning Department. It did not consider a host of other variables such as the knowledge quotient of group or individual members, their traits, their preferences, or such topics as faulty decision making or group polarization. Nor did it consider the context or environment in which the decision is made.

Summary

By way of summary this chapter postulates that systems theories that focus on information processing perspectives, and interaction/interrelationship perspectives underlie GSS. It hypothesizes that GSS technologies such as **CyberQuest** produce higher quality decision products than does NGT. It further hypothesizes that in those sessions in which **CyberQuest** is used, the quality of facilitation, group interaction, the effectiveness of the meeting, and group satisfaction - all will be greater than will NGT when joined by these same independent variables.

A review of the literature follows. It precedes the discussion of the study's methodology and findings.

CHAPTER THREE

REVIEW OF THE LITERATURE

Group Support Systems: Overview of the Theoretical Literature

Although the literature is growing it needs to be noted at the onset that the theoretical development of GSS has not kept apace of its technological development. This has been primarily because of the preponderance of operation research or management theorists who have been engrossed in trying to fit GSS to decision or problem solving processes in groups. It has not generally been recognized by them that GSS is but one response to the multi-dimensional nature and social richness of what is called "work."

Contemporary literature is just beginning reflect this fact. GSS is now recognized as a technology based, not only on technical principals, but also organizational behavior and theory, more specifically group dynamics as a subset thereof. As a social technology, GSS can be either an enabler or a constraint on the effectiveness of group meetings and group interaction. DeSanctis and Poole (1992) suggest three schools of thought underlying GSS: the Decision Making School, the Institutional School, and the Social Technology School.

Decision-Making School. The Decision-making School, promulgated for the most part by management science theorists, has held sway from the beginning. Rooted in the positivist tradition it starts with the presumption that decision making is "the primordial

organization act." DeSanctis and Poole add, "it emphasizes the cognitive processes associated with rational decision making and adopts a psychological approach to the study of technology and change." This school with its systems engineering view of technology and decision making focuses on hard-line determinism and relatively static models of behavior. That is to say, it is based on the belief that certain effects either inevitably follow from the introduction of technology or its interaction with the situation. The failure to achieve predetermined outcomes reflects a failure of the technology or its proper manipulation (Gutek, Bikson, and Mankin 1984). Hence, decision theorists prefer positivist research which measures in quantitative terms the effects of technology manipulation on decision product outcomes. The decision-making school emphasizes "systems rationalism" (Rice 1984); technology design (Dennis, et al. 1988; DeSanctis and Gallupe 1987; Huber 1984b 1990); and the effectiveness of GSS technology (Jaroenpaa, Ras, and Huber 1988; Watson, DeSanctis, and Poole 1988; Connolly, Jessup, and Valacich 1990; Gallupe, DeSanctis, and Dickson 1988). Although the decision-making school leads other schools in terms of output, much of its literature is inconclusive and often contradictory.

The Institutional School. The Institutional School approaches the study of technology as an opportunity for change, rather than as a causal agent of change (DeSanctis and Poole 1992; Barley and Tolbert 1988; Kling 1980; Perrow 1986). This school's primary focus is on social structure and process. It does not believe that technology contains any inherent powers to shape or determine human cognition and behavior. It believes instead that human beings "generate social constructions of technology using resources, interpretive schemes and

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norms embedded in the larger institutional context" (DeSanctis and Poole 1992). DeSanctis and Poole add that many institutionalists emphasize discourse or dialogue in generating social constructions of technology. In this view human interaction assumes more importance than technology. The literature espousing the institutional approach is growing: the study of communities and society as a whole (Giddens 1979; Selznick 1969); organizations (Kling 1980); social information processing theory with its emphasis on the social construction of meaning (Fulk, et al. 1987; Salancik and Pfeffer 1978; Walther 1992); symbolic interactionism with its emphasis on the role of communication in the creation and preservation of social order (Reichers 1987); process-oriented methods rather than outcome studies and ideographic, interpretive reports rather than nomothetic research designs (Barley and Tolbert 1988); the interplay between technology and power distribution, politics, stratification, and other social processes (Barley 1986; Finley 1987; Robey, Vaverek, and Saunders 1989; Walther 1992).

The Social Technology School. The Social Technology school integrates the above two schools. It holds that technology has structures in its own right, but social practices moderate its effects on human behavior (Gutek, et al. 1984). Within this school there are four theoretical perspectives. Sociotechnical systems theory contends that the impact of technology depends on how well social, i.e., organization and technology structures are optimized (Bostrom and Heinen 1977; Hiltz and Johnson 1990; Passmore 1988). Structuration theory has been used to explain the adoption of information technologies, specifically groupware by organizations, and the organizational transformations which take

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place over time (Giddens 1979; Barley 1986 1990; Orlikowski and Robey 1991; Robey, et. al. 1989; Lyytinen and Ngwanyama 1992). Structural symbolic interaction theory explores interpersonal interaction within the context of technology structures such as GSS (Saunders and Jones 1990; Trevino, Lengel, and Daft 1987). Adaptive structuration theory attempts to explain the dynamism by which technology and social structures mutually shape each other over time (Barley 1986; DeSanctis and Poole 1992).

Overview of the Research Literature on GSS

Descriptive Literature. DeSanctis and Gallupe (1987) describe three levels of group decision making.

In Level 1, GSS provides technical features aimed at removing common communication barriers. These features include large screens for instantaneous display of ideas, voting solicitation and compilation, anonymous input of ideas and preferences, and electronic message exchange between participants. These features are found in meeting rooms commonly referred to as "computer supported conference rooms" or electronic board rooms. Level 1 systems improve the decision process by facilitating the exchange of information among participants.

Level 2 GSS provide automated planning tools or other aides normally associated with individual DSS. Modeling tools to support analyses are also made available. These include

statistical methods, budget allocation models, etc. In addition group structuring or idea generation techniques such as NGTs or Delphi Technique are automated.

Finally, a Level 3 GSS builds on the preceding levels and incorporates expert systems, the selection and application of formal decision procedures and rules as well as computer-mediated communication systems which actually filter and structure information exchange.

The PLEXYS Planning System, an example of Level 2, was developed at the University of Arizona. It combines advanced microcomputer technology with an understanding of the knowledge requirements for organizational planning, thus enabling participants to elicit, represent, store and manage internal and organizational planning information, qualitative and quantitative planning decision aids and a variety of information structuring and analysis models. PLEXYS provides support for facilitating group creativity and for all phases of the planning process from initial formulation of the planning problem or task to implementation of the plan (Applegate, et al. 1987; Vogel and Nunamaker 1990; Nunamaker, et al. 1989). This GSS encompasses decision rooms, decision conferences, computer supported conference rooms, teleconferencing, and EMS (Nunamaker 1989; Gray and Olfman 1989).

Gray and Olfman also describe several other GSSs at the Claremont Graduate School, the University of Minnesota, and XEROX' Palo Alto Research Center. Claremont's GSS

uses touchscreens to create a nearly typewriter-free decision making system. The University of Minnesota's SAMM was built for small group decision making experiments. XEROX's "COLAB" system is designed to explore how the computer can support collaborative design work in small face-to-face meetings; input is by way of a mouse.

Bostrom and Watson (1990) describe the Collaborative Work Support System (CWSS) at the University of Georgia. The University of Georgia's CWSS is in essence a computer-augmented project aimed at improving the effectiveness of team meetings.

Two other applications of GSS are reported in the literature. Jelassi and Foroughi (1989) discuss Negotiation Support Systems (NSS) which emphasize computerized assistance for situations in which there is strong disagreement on factual or value judgments among group members. They focus on negotiating structuring issues which must be factored into the design of a NSS. They discuss (1) the behavioral characteristics of participants and their varying perspectives of negotiation, (2) the communication needs of different bargaining settings, (3) how to determine each party's real interest(s), and (4) how to generate options for mutual gain, and data accuracy and consistency. Following a series of negotiating theories which underlay NSS, Jelassi and Foroughi provide a comprehensive survey of existing negotiation software. They conclude by calling for future research based on data from experimental studies and empirical testing of actual usage of NSS.

Experimental studies. There is not much literature on experiments using GSS. To date most experiments are out of the decision-making school mode. Gray (1987) reports four papers that have dealt with this subject, Kull, 1982; Lewis, 1983; Gray, 1983; and Gallupe 1986.

Kull described a simulated decision exercise wherein a group of senior executives were presented with a known decision similar to one faced by a well known publicly held company. The simulation proved uncomfortable and unreal. One of the conclusions of the researchers was that simulating known decisions does not provide much insight about GSS. Another conclusion was that it is not a good idea to use a GSS with people who neither know one another nor much about the system. Too much time must be spent developing mutual trust and developing a familiarity with the system.

The conclusion that it was not good to use a GSS with people who did not know each other was contradicted by Gray, then of Southern Methodist University. He ran a series of exercises using SMU's now defunct Decision Room. The subjects were executive MBA students. They knew each other and were rather close-knit. The exercises involved acting out decision scenarios on corporate financial policy, purchase of equipment, company reorganization, and construction of a new refinery. Gray found that "the participants concentrated on ideas that were promising and buried poor ideas; groups developed new alternatives and were able to use the GSS tools provided to evaluate them; several people working at a single terminal reinforced ideas; performance on these subgroups seemed better

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than all individuals working alone. Advance preparation, ease of equipment use, and a professional environment are critical to successful interactions using the GSS."

Lewis's experiment at the University of Louisville involved ninety undergraduate students who were asked to develop a way to alleviate the university's financial crisis. Van de Ven and Delbecq's NGT was employed with one group. A GSS was used with another group. Lewis's conclusion was that where a GSS was used the suggestions were more feasible than when one was not used. More alternatives were generated and there was less dominance by a single person or leader.

Gallupe found that there was no difference in the time it took to reach a decision between those who had access to a GSS and those who did not. However, the former generated more alternatives, and the quality of their decisions were generally superior, particularly with respect to difficult decisions. Additionally, the discussions tended to be more focused; however, the level of satisfaction with the decision making process and their confidence with their decision was less in those groups with GSS.

Applegate (1987) set out to "design, implement, and evaluate the technical feasibility of a prototype GSS to include (1) automated, networked planning tools for idea generation, idea structuring and analysis and idea prioritization; (2) process management tools to assist the planning session facilitator in structuring, conducting and analyzing planning sessions; and (3) a knowledge management system that enables storage, representation and

management of the idea categories, supporting statements and idea ratings." Her study used participant observation and structured observation research to analyze (1) the dynamics of the idea generation process during idea generation phase; (2) the influence of the technology (facilitating factors and inhibiting factors) on the idea generation process; and (3) the satisfaction of the planners with the idea generation model (Electronic Brainstorming) as a group tool. She found that brainstorming by computer changes group dynamics, particularly in the areas of group interaction and group participation. The level of both group interaction and group participation were high and appeared to increase equality of participation. Social inhibitions seemed to be neutralized. It was unclear whether the efficiency of the idea generation process was helped or hindered during computer brainstorming. The unfamiliarity of the computer as a tool for thinking and decision making may have been a deterrent to effective idea generation.

She concluded that the computer does not replace the need for face-to-face discussion for analysis and structuring of ideas, or the development of group consensus on a single solution or plan. Nor does the computer replace the need for on-the-spot "hard copy" reports of the compiled list of ideas generated by the group prior to the analysis of the ideas. She also found that, for the most part, there was a high level of satisfaction among users in terms of the process and outcomes; the key was interaction rather than solo activity.

Pinsonneault and Kraemer's (1989) review of the research literature shows that GSS affect group processes in three ways: (1) it focuses the individual's efforts on the task and

increases the depth of analysis, task-oriented communication, and efforts at clarification; (2) it increases the overall quantity of effort put into the decision process by the group, and decreases the domination of the group by one or a few members; and (3) increases consensus reaching. "These impacts seem to increase the quality of decisions which, in turn, increases the confidence and satisfaction of group members towards the decision." Turoff and Hiltz (1982) had found that there was more task-focused communication and less joking and laughing in GSS supported group.

Pinsonneault and Kraemer report that most of the research in GSS fails to monitor the role and effect of the facilitator. They suggest that a facilitator might "affect group processes and outcomes in two ways: (1) intentionally, by playing an active role in planning, conducting, and facilitating the process, or (2) unintentionally, by (a) his/her mere presence, which changes the atmosphere or the relationships between group members, or, (b) by being a good versus bad facilitator, i.e., being able, or not being able to provide the information required by the group members."

Zigurs (1989) analyzed the impact of GSS on group processes by using the technique of interaction analysis. She was particularly interested in influence behavior in small groups of decision makers. The independent variables were the GSS as a channel through which interaction takes place, and other situational factors such as the task, the group's structure, and member characteristics. The intervening variable was the group interaction process

wherein influence behavior occurs. The dependent variable was group outcomes. Influence behavior was defined in terms of "procedural statements" i.e.,

"1.   initiation behavior - setting or initiating agendas;

2.   goal oriented behavior - concerned with group goals or group jurisdiction;

3.   integrative behavior - summarizing and integrating contributions of others;

4.   implementation behavior - representing an action orientation toward getting the task done; and

5.   process behavior - dealing with procedural movement of the group."

The experiment compared various groups with GSS and various groups without GSS. All groups were assigned an intellective task, i.e., solving problems by finding the correct answers (McGraph 1984). The GSS was configured such that one program ran on a public screen, the other on individual group members' networked terminals. Using audiotapes and written transcriptions of the group interaction, every verbal act of each group member was classified according to a ten-category system for coding interaction.

Although expensive and time consuming, Zigur's analysis revealed that GSS has a significant impact upon group processes, the types of messages communicated among members, the types of problems with which groups struggle, and the linkages between verbal behavior and decision quality.

A number of other experiments have dealt with anonymity as a feature of GSS particularly when decisions are to be made by groups dispersed in terms of geography and time. Hiltz, Turoff, and Johnson (1989) compared the results of experiments using GSS in face-to-face meetings where anonymity was not a given, and those where anonymity was assured. They found that in both modes the quality of decisions were comparable, but in the former situation agreement on decisions was greater. Where anonymity was present there was a greater tendency to produce a type of communication that supported high quality decisions, and less of a tendency to produce communication that lead to group agreement. In the situation where anonymity was assured there was less dominance by any participant yet less satisfaction with the decision. It also tended to produce less consensus.

Several researchers have attempted to gauge the effectiveness of GSS. Among them are McCartt and Rohrbaugh (1989). Selecting for analysis a cross section of decision conferences hosted by the Decision Techtronics of the State University of New York between 1982 and 1985, they assessed perceived conference effectiveness. They found that the most effective decision conferences appear to be those in which participants found real benefits and in which there were opportunity for open and extended discussion. Where these two elements were not present, the meeting was a failure.

Mantei (1989) found that three additional elements dramatically effected the level of participant interaction. Observing executive behavior at Electronic Data Systems Corporation's (EDS) Capture Lab the author found three design elements to be of

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significance. They were seating arrangements, the design of the individual computer interfaces, and the various electronic blackboard access protocols.

Nunamaker, et al. (1988) found that when compared with meetings where GSS were not employed, GSS-supported meetings were more effective and efficient and participants were more satisfied. Although several other researchers corroborate these findings, many point out that there is a paucity of research on group meetings in real world settings, particularly with respect to stages of group development and cohesion, how the structure imposed by the technology affects group processes and behavior, and the quality of group decisions. Others call for empirical studies of how GSS affects attitudes of group members, how it changes group structures, controls communication patterns, modifies strategies, and determines the skills and knowledge individual members will call upon (Pinsonneault and Kraemer 1989; Sigurs, Poole, and DeSanctis 1989; Jaroenpaa, Ras, and Huber 1988).

Conclusion. The literature is limited insofar as it is driven thus far by management science theorists with their engineering perspectives, as has been observed above. Although sociologists such as Ngwenyama and Lyytinen (1993) and Lyytinen and Ngwenyama (1992) are beginning to take interest in advanced information technologies such as group decision support systems, other social scientists are sitting on the sidelines. This includes psychologists, anthropologists, etc.

A second observation with respect to the literature is the differing approaches to GSS. One group promotes self-managing GSS that provide their own facilitation; another promotes GSS that require a single chauffeur/facilitator who manages the technology and the process; third promote systems that require both a chauffeur for the technology and a facilitator for group processes. This makes it difficult to properly replicate studies, because of the inconsistency in GSS attributes. This leads to a third observation, i.e., the difference between a linear approach and a lateral approach to GSS design. These observations underscore what seems to be two camps in GSS, one represented by Arizona's PLEXYS the other by **CyberQuest**.

Contribution of this Study to the Literature

It is anticipated that this study will make several additions to the literature. First, it is hoped that it will determine whether or not there is any difference between the computer based **CyberQuest** and one of the better known non-computer based group discussion techniques, viz NGT. Second it should determine which of several variables actually drive **CyberQuest** and NGT.

Before discussing the study's findings, its methodology will be presented in Chapter Four.

CHAPTER FOUR

METHODOLOGY

Research Design

Objective. As mentioned above, this study's primary objective was to compare a GSS such as **CyberQuest** with the more traditional NGT.

The study's basic assumption was:

In a participatory democracy, given a policy situation (task) that is "messy," strategic, complex, and uncertain, even ambiguous, its resolution or decision product depends on the group decision interaction processes employed, the quality of the group's facilitation, the extent to which the group members interact, the effectiveness of the actual meeting and the level of group satisfaction.

From this assumption the following are hypothesized:

H_1 HYPOTHESIS 1. **CyberQuest** driven discussions will achieve greater decision product quality (DPQ) than will NGT driven discussions.

H_0 STATISTICAL HYPOTHESIS 1. There is no statistically significant difference between the means in **CyberQuest** driven sessions and NGT driven sessions with respect to decision product quality (DPQ).

H_1 HYPOTHESIS 2. The quality of facilitation (FQ) will be greater in **CyberQuest** driven discussions than in NGT driven discussions.

H_0 STATISTICAL HYPOTHESIS 2. There is no statistically significant difference between the means in **CyberQuest** driven sessions and NGT driven sessions with respect to facilitation quality (FQ).

H_1 HYPOTHESIS 3. The level of group interaction will be of greater intensity in **CyberQuest** driven discussion than in NGT driven discussions.

H_0 STATISTICAL HYPOTHESIS 3. There is no statistically significant difference between the means in **CyberQuest** driven sessions and NGT driven sessions with respect to group interaction (GI).

H_1 HYPOTHESIS 4. The effectiveness of the group meeting will be greater in **CyberQuest** driven discussions than in NGT driven discussions.

H_0 STATISTICAL HYPOTHESIS 4. There is no statistically significant difference between the means in **CyberQuest** driven sessions and NGT driven sessions with respect to meeting effectiveness (ME).

H_1 HYPOTHESIS 5. The level of group satisfaction will be greater in **CyberQuest** driven discussions than in NGT driven discussions.

H_0 STATISTICAL HYPOTHESIS 5. There is no statistically significant difference between the means in **CyberQuest** driven sessions and NGT driven sessions with respect to group satisfaction (GS).

Table 1 sets forth the research hypotheses. Table 2 provides a listing and definition of the variables salient to this discussion.

TABLE 1

Research Hypothesis

GSS (CQ)	NGT
FQ >	FQ
GI >	GI
ME >	ME
GS >	GS
DPQ >	DPQ

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TABLE 2

DEFINITIONS

Each "Case" is a session with either **CyberQuest** or NGT

DIP	Decision Interaction Processes (1 = CQ; 2 = NGT)
Facil#	Facilitator number (1 = "A"; 2 = "B")
DPQ	Decision Product Quality. The mean of ratings (on a scale from 1-5) over 15 criteria developed by a first panel of five experts and adjudged by a second panel of five experts. N=5 observations per group
FQ	The Quality of Facilitation. The mean of ratings (on a scale of 1-5) over 16 different criteria as adjudged by two observers/judges for each session. N=2 observations per group
GI	Group Interaction. The mean of ratings (on a scale from 1-5) of 12 criteria as adjudged by two observers/judges at each session. N=4-6 observations per group
ME	Meeting Effectiveness. The mean of ratings (on a scale from 1-5) over twenty-four criteria as adjudged by two observer/judges for each session. N=2 observations per group
GS	Group Satisfaction. The mean of ratings (on a scale from 1-5) over thirteen criteria as adjudged by the participants in each session. N=4-6 observations per group

Unit of Analysis and Subjects

The unit of analysis was a group meeting. A "situation mess" (Ackoff 1979) or task was proffered to eight groups of select Town officials and citizens. Forty-eight citizens and Town officials were recruited to participate in the experiment. Sixteen participants were Town officials selected with the help of the Town's Planning Department. Thirty-two were citizens selected from a list of previous and current members of civic organizations. Four citizens and two officials were assigned to each discussion group, subject to their availability. Only three participants were familiar with **CyberQuest**.

Task

At a September 1992 planning meeting of the Blacksburg, Virginia Town Council four strategic goals were identified. These goals were the result of citizen surveys, department work plans, and Council member priorities. The investigator-researcher requested of the appropriate authority (and was granted) permission to address the following goal:

> "Develop .... commercial corridor strategies for South Main Street and the Downtown that encourage the retention and growth of a mix of retail services."

As mentioned above, each group's charge was to (1) generate policy ideas pertinent to the above goal; (2) prioritize these ideas; and (3) develop an outline of an implementation strategy.

Methodology General Procedures

Instrument Design. Prior to the actual experiment an expert panel of individuals engaged in urban planning and design was convened to determine the attributes of a quality decision product. They identified several attributes such as feasibility, relevance, clarity, and innovativeness. This second panel was to apply these attributes to each session's work product. See Exhibit A for a copy of the instrument which was developed for use by the second panel.

Four other instruments were designed. A Task Performance Worksheet and a Group Maintenance Worksheet (Ingals 1972, 137-138) were adapted to gauge the extent to which each participant interacts with other members in the group. The Task Performance worksheet looks at how often each participant initiates ideas, seeks information, gives his/her opinions, clarifies or summarizes ideas, and tests for consensus. The Group Maintenance Worksheet looks at each individual's attempt to reconcile disagreements, to keep open the channels of communication, to be friendly, to

compromise, to respect group norms, and to express his/her feelings. A third instrument was designed to measure the effectiveness of the group meetings. This instrument focused on the level of trust and confidence among group members, the extent to which they worked through conflicts, used everyone's abilities, or inhibited/permitted the free flow of ideas. This instrument also focused on the effectiveness of the facilitator by looking at such criteria as how he/she presented information, built rapport, demonstrated flexibility, managed conflict, and demonstrated leadership. An Exit Questionnaire, the fourth and final instrument, was designed to be completed by group participants. It focused on their satisfaction with the process; confidence in the decision product; willingness to work with their group in future endeavors; and their opinion regarding the implementation prospects of their decision product. See Exhibits B, C, and D for copies of each of these instruments.

Design of Discussion Sessions. Each session was designed to last three hours. Two research associates were assigned as participants and observed each session. Each observer completed one of the above mentioned Task Performance and Group Maintenance worksheets. They were asked to sit on the outside of the group of participants, and were instructed not to engage them in conversation during the session.

Nonparticipant observation, according to Nachmias and Nachmias (1987), follows the basic procedures of participant observation. This approach refers to the process whereby the researcher "attempts to share the world view and to adopt the perspectives of the people in the situation being observed" (p. 289). It can be either structured or unstructured. The former is when the observer works from a checklist or other type of schedule that imposes a set of concepts, categories, and codes on the process of observation. Data obtained thereby are appropriate for testing hypotheses. This approach assumes that the investigator fairly well understands the complexities of the phenomenon under study. Unstructured observation, on the other hand, avoids imposing order on the process. It seeks to "obtain an unfiltered view, in so far as that is possible, of social behavior." The information thus obtained is generally qualitative. This method is appropriate for descriptive research (Mannheim and Rich 1986).

The **CyberQuest** sessions took place at Virginia Tech's University Center for Innovation Research and Support (UCIRAS). Because of time constraints the PC version, i.e., non-multi-media, of **CyberQuest** was provided. Upon arrival at UCIRAS, subjects were greeted by the research-investigator. The purpose of the session was explained by the facilitator. This was followed by an explanation of the **CyberQuest** process by the Chauffeur. It was then suggested that there be no criticism of another person's ideas and that the wilder the ideas, the better. The assigned problem was introduced and the process began. Each session was video-taped for future reference and

observations. Refreshments were made available. Following the three hour session the exit questionnaire was completed by each participant (see Exhibit D).

The NGT sessions were held at a separate location in a facility reserved by the University for graduate students. As in the preceding sessions participants were greeted by the researcher-investigator. The purpose of the session was explained by the facilitator. Writing materials were distributed. The assigned problem was introduced and the process began. As with the **CyberQuest** sessions each session was video-taped. Refreshments were also made available. Following the three hour session the exit questionnaire was completed by each participant.

Experimental Procedures

There were two facilitators. Each led two sessions with **CyberQuest** and two using NGT.

For **CyberQuest** sessions the facilitator was joined by a "chauffeur." This chauffeur managed the technology and recorded the group's ideas. The facilitator, on the other hand, managed the "process," that is, led the discussion process and kept the group on time and on the subject. When all the ideas had been generated, the software

enabled the group to proceed on to prioritization and the identification of implementation strategies.

The nontechnology sessions were conducted using the NGT. Individuals were asked to write down their ideas and then share them with the group in a round robin fashion until all the ideas had been presented and recorded on newsprint. Again when all the ideas had been recorded the group was to proceed on to prioritization and implementation strategies.

These sessions took place over an eight day period. Table 3 describes the characteristics of each session. The actual sessions were administered by the above mentioned research associates.

Post Experiment Activities

Upon the completion of all experiments copies of each group's work product, a summary of the criteria set by Panel A and the above mentioned instrument were sent to a second panel of five persons. Their charge was to apply these criteria and to rate the entirety of each report on a scale of 1 (very poor) to 5 (excellent). They were also asked to rank the eight groups. This evaluation was not designed to react to individual ideas. It was assumed that it was entirely possible that there could be some extremely

TABLE 3

SESSION CHARACTERISTICS

Session	Technology	Facilitator
1	CQ*	A[0]
2	CQ	B[0]
3	CQ	A[0]
4	CQ	B[0]
5	NGT+	A
6	NGT	B
7	NGT	A
8	NGT	B

*CyberQuest
+NGT
[0] Includes Chauffeur. With exception of Session 3, this was the same person.

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good ideas in a report. However, these might be offset by several "bad" ideas. The average thus could be an overall poor rating, and a low ranking among the groups.

It was anticipated that the combination of the Task Performance/ Maintenance Functions Worksheets, the Exit Questionnaire and the filming of group sessions would neutralize the possible effect of observer and facilitator bias on the internal and external validity of this study. Because they were not present at the actual sessions, it was further thought that the third expert panel of group dynamic specialists would provide an extra measure of objectivity. It was this last group that reviewed each film to determine the effectiveness of each meeting.

Measures

The objective of this research was to compare **CyberQuest** and NGT. In each instance, the study's variables were measured using a five point Likert scale. Those variables included the independent variables decision interaction process (i.e., **CyberQuest** or NGT), the quality of facilitation, group interaction, meeting effectiveness, and group satisfaction influenced the quality of the decision product outcome, the dependent variable. For this experiment, group characteristics and task were held constant. Table 4 identifies each variable, what it refers to, who applied the measurements, and the appropriate scales.

TABLE 4

VARIABLES USED IN STUDY

Variable	Operative Issue	Scale
Decision Interaction Process/GSS	Either CQ or NGT is used	Dichotomous
Facilitator	Either Facilitator A or B	Dichotomous
Quality of Facilitation	Refers to the extent to which the facilitator helps the group	1 - 5
Group Interaction	Relates to: Task performance by group	1 - 5
Meeting Effectiveness	Determined by Expert Panel #3	1 - 5
Group Satisfaction	Result of participant completion of exit questionnair	1 - 5
Decision Product	Determined by Expert Panel #2 following criteria set by Expert Panel #1	1 - 5

An important issue relating to measurement is that of scale. Is the scale nominal, ordinal, internal, or ratio? The data presented in the study is ordinal. However, it is treated as equal-appearing interval data using a modified Likert interval scale of 1-5. The data is equal appearing by virtue of an assumption made by the researcher that the distances between any two numbers on this scale are of known size and that the mean of the variable being scaled is normally distributed by the Central Limit Theorem. This assumption that the level of measurement was interval enabled the researcher to use common parametric statistics such as means, standard deviations, and correlations, as well as common statistical tests such as ANOVA and F-tests.

Acknowledging the ordinality of the data, it was decided to also employ a non-parametric method, viz. the Kolmorgorov-Smirnoff Two Sample Test (K.S.) which assumes that:

1.   both variables contain random samples;

2.   there is no paring among observations within and between samples;

3.   the results are exact, if continuous; and

4.   the measurement scale is ordinal.

Three other reasons for applying the K.S. are (1) because in this study the measurement is somewhat weaker than that of the actual interval scale; (2) because by

using parametric tests, it is possible to "add information" and create thereby distortions to the data; and (3) because the K.S. is sensitive to differences of all types that may exist between two distributions (Hintz 1992).

Treatment of the Data

Both parametric and nonparametric statistics were applied to the data collected during the study. NCSS Version 5.03 Statistical System was used. This procedure allowed for a statistical summary of means and standard deviations for each set of data across groups. To test the significance of these means an ANOVA was used with Treatment 1 being either **CyberQuest** or NGT and Treatment 2 being either Facilitator A or Facilitator B. Following this analysis, the K.S. was run as a back-up to the ANOVA for the reasons stated above. Finally, a series of multiple regressions were run to determine the relationships between the research variables.

The statistical analysis was followed by a qualitative analysis of each group. Each film was reviewed so as to identify those events and dynamics not readily captured in a quantitative research instrument.

Summary of Methodology

The methodology employed in this study was multi-faceted. Both quantitative and qualitative analysis were employed to compare **CyberQuest** with NGT with respect to the dependent variable DPQ which was assumed to be function of four independent variables, FQ, GI, ME, and GS. This involved determining the task to be studied and securing from the Blacksburg Town Administration permission to deal with this task.

Prior to actual sessions, a list of citizens who had participated in civic affairs was sought from the Town Planning Department. Using this list, citizen participants were randomly selected and requested to participate in the experiment. This resulted in eight groups of four citizens per group. With the cooperation of the Town Administrator, Town officials were enlisted as participants. This resulted in two such officials per session.

A panel of four persons was convened to determine the criteria by which the judge decision product quality. A second panel of five persons was recruited to review each group's work product. Other participants were enlisted. They included two facilitators, a chauffeur, and two research associates per session.

The locations were secured, as was equipment and supplies such as a video recorder, flip charts, and writing material. The facilitators and research associates underwent a brief orientation. Lastly, research instruments were developed. They included one for each variable. FQ was part of the ME instrument.

The actual group meetings were designed such that four groups were to use **CyberQuest** and four were to use NGT. This called for different physical set-ups and locations. Research associates were given appropriate instructions with respect to GI observation, managing the equipment, and administering the exit questionnaire.

Post session, the instruments measuring GI and GS were collected, analyzed, and reduced to statistical raw data. The film of each session was prepared and packaged for analysis. Panel 2 was sent a formatted copy of each group's work product together with an appropriate instrument. A third panel of two group dynamic specialists was convened to review each film and to gauge ME and FQ. They were provided with appropriate instruments.

When all instruments had been collected, statistical analysis began. Each instrument was reduced to raw data and run through the following statistical routines so as to provide base line data on a group by group basis, summary statistics for means and standard deviations, ANOVA, and K.S. determined if there was any statistically

significant difference between each variable's means, and Multiple Regressions to determine the strength of the study's underlying assumptions.

Each group's film was viewed by the researcher, once for a general overview and the second time to identify key quantitative aspects of the group meeting. In Chapter Five is discussed the finds of this research activity.

CHAPTER FIVE

THE STUDY AND ITS FINDINGS

General

This experiment was designed to determine if a technology driven meeting produced a decision product of greater quality than a meeting in which technology was not the driving force.

Eight experimental groups were assembled to provide comparisons. Four groups used **CyberQuest**. Four groups did not. Instead they used a modified NGT. Each group was lead by an appointed facilitator, one relatively weak in terms of skills and experience, the other relatively strong in the same respects. Each facilitator led two sessions in which **CyberQuest** was used and two sessions in which NGT was used.

On average there were six participants per group. Each group was to consist of four citizens, for a total of thirty-two, and two public administrators, for a total of sixteen. Actually three citizens failed to show up for two sessions, as did two public officials for as many sessions. In only one event was there less than five participants. All total there were forty-three participants. Only three participants were familiar with **CyberQuest**. Each of them were team officials.

Each group was asked to (1) generate policy ideas relating to the development of commercial corridor strategies for Blacksburg, Virginia's South Main Street and Downtown, (2) prioritize them, and (3) develop an implementation strategy outline.

Table 4 above provides a listing of definitions and abbreviations salient to this discussion. There are five variables: Decision Interaction Processes (DIP), Facilitation Quality (FQ), Group Interaction (GI), Meeting Effectiveness (ME), Group Satisfaction (GS), and Decision Product Quality (DPQ).

Results

The following findings are drawn from the experimental portion of this research. Each finding is paired with its applicable hypothesis. The appropriate detailed statistical summaries are found in Appendix I. These summaries are reconfigured to enable the execution of ANOVA and Multiple Regression protocols (see Appendix II).

H_1 HYPOTHESIS 1. **CyberQuest** driven discussions will achieve greater decision product quality (DPQ) than will NGT driven discussions.

H_0 STATISTICAL HYPOTHESIS 1. There is no statistically significant difference between the means in **CyberQuest** driven sessions and NGT driven sessions with respect to decision product quality (DPQ).

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FINDING: There is insufficient evidence to conclude that there is any difference between the means of **CyberQuest** and that of NGT with respect to DPQ (2.77 vs. 2.83). A further test of the means was made using the K.S., a non parametric statistic. A one-tailed test at $p > .025$ indicates that the null hypothesis should be accepted.

H_1 HYPOTHESIS 2. The quality of facilitation (FQ) will be greater in **CyberQuest** driven discussions than in NGT driven discussions.

H_0 STATISTICAL HYPOTHESIS 2. There is no statistically significant difference between the means in **CyberQuest** driven sessions and NGT driven sessions with respect to facilitation quality (FQ).

FINDING: There is insufficient evidence at the $p = .05$ level to conclude that there are statistically significant differences between the quality of facilitation in **CyberQuest** and NGT (1.78 vs. 2.18). This finding is supported by an ANOVA. An additional test of the means was made using the K.S. A one-tailed test at $p > .025$ indicates that the null hypothesis should be accepted in that there is no statistically significant difference between **CyberQuest** and NGT with respect to FQ.

H_1 HYPOTHESIS 3. The level of group interaction will be of greater intensity in **CyberQuest** driven discussion than in NGT driven discussions.

H_0 STATISTICAL HYPOTHESIS 3. There is no statistically significant difference between the means in **CyberQuest** driven sessions and NGT driven sessions with respect to group interaction (GI).

FINDING: There is insufficient evidence at the $p = .05$ level to conclude that there is a statistically significant difference between the group interaction in **CyberQuest** and NGT sessions. (2.15 vs. 1.70). This finding is supported by an ANOVA. A K.S. one-tailed test at $p > .025$ supports this finding. However, there is sufficient evidence at the $p = .10$ level (ANOVA) to conclude that there is a significant difference between **CyberQuest** and NGT with respect to GI. Therefore, at the $p = .10$ level the null hypothesis should be accepted. At the $p = .05$ level it should be rejected.

H_1 HYPOTHESIS 4. The effectiveness of the group meeting will be greater in **CyberQuest** driven discussions than in NGT driven discussions.

H_0 STATISTICAL HYPOTHESIS 4. There is no statistically significant difference between the means in **CyberQuest** driven sessions and NGT driven sessions with respect to meeting effectiveness (ME).

FINDING: There is insufficient evidence to conclude that there is a statistically significant difference at the $p = .05$ level between meeting effectiveness in **CyberQuest** and NGT sessions (2.34 vs. 2.52). This is supported by ANOVA. A one-tailed K.S. also supports this finding at the $p > .025$ level. Accordingly, the null hypothesis should be accepted.

H_1 HYPOTHESIS 5. The level of group participant's, satisfaction will be greater in **CyberQuest** driven discussions than in NGT driven discussions.

H_0 STATISTICAL HYPOTHESIS 5. There is no statistically significant difference between the means in **CyberQuest** driven sessions and NGT driven sessions with respect to group satisfaction (GS).

FINDING: There is evidence to conclude that there is a statistically significant difference between **CyberQuest** and NGT driven discussions with respect to group satisfaction (3.6 vs. 3.87). This is supported by an ANOVA. A one-tailed K.S. also supports this finding at the $p > .025$ level. Therefore, the null hypothesis should be rejected and the research hypothesis accepted.

Table 5 summarizes the ANOVA and Kolmogorov-Smirnoff Two Sample Test findings. Table 6 summarizes the results of the K.S., showing test statistics and point of rejection.

The Role of the Facilitator

Another finding of importance to this study was the role of the facilitator. By applying the ANOVA it was found that there was sufficient evidence to conclude that there was a statistically significant difference between the means of the two facilitators in every instance, except GS where there was no difference. With respect to DPQ there

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TABLE 5

ANOVA AND K.S. TWO SAMPLE SURVEY
(Statistical Hypothesis)

	CQ	NGT	ANOVA	K.S.
DPG	2.77	2.83	NS	NS
FQ	1.78	2.18	NS	NS
GI	2.15	1.70	S*	NS
ME	2.34	2.52	NS	NS
GS	3.60	3.87	S*	S*

$\alpha^* = .05$

TABLE 6

KOLMOGOROV-SMIRNOFF TWO-SAMPLE TESTS
$(Fx_1 > Fx_2 \quad \propto = .025)$

Variable (CQ and NGT)	Test Statistics	Point of Rejection	Decision
DPG	.15	.41	Accept Ho
FQ	.25	.62	Accept Ho
GI	.09	.41	Accept Ho
ME	.50	.62	Reject Ho
GS	.53	.41	Reject Ho/ Accept H_1

is ample evidence at the p = .1 level that there is a statistically significant difference between the two facilitators (2.47 for Facilitator A vs. 3.13 for Facilitator B). As regards interaction between **CyberQuest**, NGT and the two facilitators there is also evidence that there is a statistically significant difference at the p = .05 level. This difference is not found in those sessions that were **CyberQuest** driven, but in NGT sessions where Facilitator A's mean is significantly lower than Facilitator B's (2.13 vs 3.54).

There is evidence to conclude that there is at the p = .05 level statistically significant differences between the two facilitators (1.78 for Facilitator A vs 2.79 for Facilitator B) with respect to FQ. However, the evidence is inconclusive with respect to the interaction or differences between **CyberQuest** or NGT and Facilitator A or Facilitator B.

There is sufficient evidence at the p = .10 level to conclude that among the two facilitators, with respect to GI, there is a significant difference (2.1 for Facilitator A vs 1.75 for Facilitator B). However, with respect to the interaction between **CyberQuest**, NGT and the two facilitators, it cannot be concluded that there are any significant differences.

Once again, there is a statistically significant difference at the p = .05 level between Facilitator A and Facilitator B (2.02 vs 2.82 respectively) with respect to ME. Also there is sufficient evidence at the p = .05 level to conclude that there is a statistically significant difference with respect to the interaction between **CyberQuest**, NGT, and the two facilitators (1.57 for Facilitator A vs 3.07 for Facilitator B).

There is insufficient evidence to conclude that there is any difference between the two facilitators or in the interaction between them and/or **CyberQuest** or NGT.

Table 7 summarizes the differences between the two facilitators. Table 8 summarizes the interaction between CQ-Facilitator A, CQ-Facilitator B, NGT-Facilitator A, and NGT-Facilitator B. All ANOVAs are found in Appendix III.

Multiple Regressions

To determine if there was any validity to the study's basic assumption, a series of multiple regressions were run to determine the strength of the relationship between the six variables or the research model. See Figure 1 in Chapter Two.

Five variables, GSS, FQ, GI, ME, and GS were assumed to be directly related to Decision Product Quality.

TABLE 7

ANOVA - Facilitator A and B

	Fac A	Fac B	ANOVA
DPQ	2.47	3.13	S**
FQ	1.17	2.79	S*
GI	2.10	1.75	S**
ME	2.01	2.84	S*
GS	3.74	3.73	NS

$* = p = .05$
$** = p = .1$

TABLE 8

ANOVA - Interaction and Facilitator

	CQ		NGT		ANOVA
	Fac A	Fac B	Fac A	Fac B	
DPQ	2.81	2.73	2.13	3.54	S*
FQ	1.14	2.42	1.20	3.16	NS
GI	2.45	1.84	1.76	1.65	NS
ME	1.55	3.12	2.47	2.56	S*
GS	3.59	3.62	3.89	3.84	NS

The first two multiple regressions run related to **CyberQuest**. DPQ was seen as a function of FQ, GI, Me, and GS. It was found that there was no correlation between these variables. However, a stepwise regression reported out at the $p = .10$ level that there was a low correlation between GI and DPQ in **CyberQuest** sessions. That regression gives

$$DPQ = .85 + .65*GI$$

with R Squared $= .38$, $p = .10$, and Root Mean Square Error (RMSE) $= .79$

The second multiple regression run related to NGT. Again DPQ was seen as a function of FQ, GI, ME, and GS. Again, no correlation was found. However, a stepwise regression reported out, at the $p = .14$ level, a low correlation between FQ and DPQ. That regression gives

$$DPQ = 1.53 + .53*FQ$$

with R Squared $= .33$, $p = .14$, and RMSE $= .87$.

The basic finding of these regressions is that there is not in either **CyberQuest** nor NGT a good linear fit between the dependent variable DPQ, and the independent variables FQ, GI, ME, and GS. However, GI plays an important role in **CyberQuest** sessions, while FQ plays an equally important role in NGT. See Tables 9 and 10 for these regressions.

Next a multiple regression was run to determine if there was a linear relationship across all eight groups between the dependent variable DPQ and the independent variables DIP, FACIL, FQ, GI, ME, and GS. Table 11 provides the baseline data for this regression. It is drawn from the statistical survey found in Appendix II which delineates each variable's means across observations.

The resultant regression was not favorable. There was no correlation. However, a stepwise regression removing FACIL and GI yielded

$$DPQ = 10.94 + .63*DIP + .65*FQ - .52*ME - 2.42*GS$$

with R Squared = .93, p = .04, and RMSE = .25. See Table 12 for this regression.

The general conclusion one draws from this multiple regressions is that when Facil and GI are removed, there is, across all groups, a very strong correlation between all variables.

The finding that GI is significant in **CyberQuest** sessions and FQ in NGT sessions, is consistent - in part - with earlier ANOVA findings which pinpointed GI as important to **CyberQuest**. GS does not show up as a key driving variable in NGT. Instead, regression analysis points to FQ as the key to understanding NGT. The significance of FQ is further referenced in the discussion under the role of the facilitator.

TABLE 9

MULTIPLE REGRESSION - CYBERQUEST

Dependent Variable = DPQ - CyberQuest

Independent Variable	Parameter Estimate	Standardized Estimate	Standard Error	Seq. R-Sqr	Simple R-Sqr
Intercept	.85	.00	.98		
GI	.65	.62	.34	.38	.38

ANALYSIS OF VARIANCE REPORT

Dependent Variable = DPQ - CyberQuest

Source	DF	Sums of Squares (Sequential)	Mean Square
Constant	1	56.89	56.89
Model	1	2.31	2.31
Error	6	3.73	.62
Total	7	6.04	.86

Root Mean Square Error = .79
Mean of Dependent Variable = 2.67   F-Ratio = 3.71
Coefficient of Variation = .30   Prob. Level = 0.10

R Squared = 0.38

TABLE 10

MULTIPLE REGRESSION - NGT

Dependent Variable = DPQ - NGT

Independent Variable	Parameter Estimate	Standardized Estimate	Standard Error	Seq. R-Sqr	Simple R-Sqr
Intercept	1.53	.00	.74		
FQ	.53	.58	.30	.33	.33

ANALYSIS OF VARIANCE REPORT

Dependent Variable = DPQ - NGT

Source	DF	Sums of Squares (Sequential)	Mean Square
Constant	1	57.96	57.96
Model	1	2.27	2.26
Error	6	4.59	.76
Total	7	6.85	.98

Root Mean Square Error = .87
Mean of Dependent Variable = 2.69   F-Ratio = 2.97
Coefficient of Variation = .32   Prob. Level = 0.14

R Squared = 0.33

TABLE 11

ALL GROUP BASELINE DATA

Group	DIP	FACIL	FQ	GI	ME	GS	DPQ
1	1	1	1.00	3.13	1.78	3.50	3.08
2	1	2	1.69	1.57	2.64	3.62	2.57
3	1	1	1.31	1.81	1.32	3.68	2.56
4	1	2	3.16	2.31	3.60	3.62	2.91
5	2	1	1.13	2.20	2.71	3.69	2.45
6	2	2	3.38	1.49	2.65	3.77	3.84
7	2	1	1.31	1.32	2.23	4.17	1.80
8	2	2	2.9	1.84	2.48	3.90	3.28

TABLE 12

MULTIPLE REGRESSION - All Groups

Dependent Variable = DPQ

Independent Variable	Parameter Estimate	Standardized Estimate	Standard Error	t-value (b=0)	Prob. Level	Seq. R-Sqr	Simple R-Sqr
Intercept	10.9	.00	2.19	4.99	.016		
DIP	.63	.55	.26	2.40	.09	.00	.00
FQ	.65	1.04	.12	5.29	.013	.49	.48
ME	.52	-.57	.18	-2.89	.063	.60	.031
GS	2.43	-.86	.63	-3.83	.031	.93	.11

ANALYSIS OF VARIANCE REPORT

Dependent Variable = DPQ

Source	DF	Sums of Squares (Sequential)	Mean Square	F-Ratio	Prob. Level
Constant	1	63.23	63.22		
Model	4	2.45	.61	10.18	.04
Error	3	.18	.06		
Total	7	2.63	.38		

Root Mean Square Error = .25
Mean of Dependent Variable = 2.81
Coefficient of Variation = .08

R Squared = 0.93

Qualitative Descriptions

To add to these statistics and to provide a "flavoring" of what actually happened in each of the group meetings the following is a brief narration of each session as filmed by the research associates. Note the first four groups used **CyberQuest**, the last four NGT.

Group 1. At the start of computer input, i.e., choice of key words, participants sat at the edge of their seats, straining to see the monitor. Considerable initial interest in the process was shown. Facilitator A was inordinately quiet, probably because of an unfamiliarity with the technology.

In the beginning several participants were disengaged. A few appeared to be uncomfortable with the technology. Several had their arms folded. One person's eyes were closed. Perhaps he was sleeping. Others were engaged in good nature "ribaldry."

During the "idea dump," two participants were very vocal. Leadership began to emerge from the group, the appointed facilitator having all but "disappeared." The chauffeur became more involved in the process. The group became very excited and

involved. Though poorly defined, the dialogue took off. The effects of **CyberQuest** were hard to discern.

Town officials and citizens meshed quite well. Town officials clearly bought their expertise and experience to bear, while citizens provided their perceptions and judgments. However, comments of both parties were often off point. Some individuals did not seem to understand what they were there to do. Frequently before ideas could get out, the group started debating. The session resembled a developmental discussion group rather than a facilitated session. There was much repeating. A few people dominated the discussion.

At the end of the second hour people were tired. Accordingly, idea screening was short-changed by the chauffeur. During the little prioritization that did take place, the group was very quiet, very deliberative, very serious. They attempted to clarify and to modify a number of ideas. Their comments were interesting, e.g. "What does this mean in relation to this?" "There must be some kind of magic going on in there." "There is some formula being applied by the program." The dialogue became very pointed, very focused.

Group 2. This group was demonstrably different than the preceding group. Facilitator B attempted -- quite successfully -- to set the stage by trying to put everyone

at ease. Unlike the previous night's facilitator, who sat amongst the participants, this one stood in front of the them. The facilitator took charge and was self-effacing, but had some difficulty with the charge. There was some confusion with respect to geographic boundaries, specific commercial sectors of Main St., etc. It did not seem that Facilitator B spent adequate time dealing with this problem defining phase.

Just as with the previous evening's participants, people shifted forward in their seats to see the monitor screen and to thereby "get into the process." However, this group was not as boisterous. They were rather reticent, difficult to "open-up." There is a question whether the facilitator, who was obviously not as conversant with the technology as the chauffeur, over talked to compensate for this lack of familiarity. However, on balance the facilitator made valiant attempts to provoke, to "pull-out" ideas, to explain, and to clarify. Notwithstanding, the group appeared very linear, not given to lateral/associative thinking processes.

Unlike the evening before, there was not much leadership emanating from the two town officials. Their body language, i.e., twirling of thumbs, slipping back into their chairs, led one to think that they would rather have been somewhere else. Only three people appeared engaged....despite the best efforts by the facilitator.

At the break there was considerable discussion, most of it on point. There were lots of new ideas and considerable dialogue. People seemed to open up. Those who said little during the session, at this time seemed to have a great deal to say. They seemed more loose. There was much laughter and joking. Contrary to instructions, the chauffeur used video to generate more ideas. Only the PC version was to have been used. Greater interest was apparent at this point. A great number of new ideas were put forth. It should be noted, however, that these ideas seemed to have come from only three people. The Town officials were not among them.

During the prioritization phase the discussion heated up even more. The feeling was that here "the rubber meets the road." Interestingly at this point two of the "outside three" became engaged. In retrospect too much time had been spent on idea generation and the chauffeur demonstrating the other attributes of the program. A substantial amount of time was wasted, making it impossible for the participants to get to the implementation phase.

Group 3. Again at the onset the group was fairly quiet. Facilitator A was a bit more active. It took about thirty minutes before the participants got into the process. Unfortunately because the facilitator failed to set ground rules early on, criticism of ideas started to take place. Not until ten minutes elapsed did the facilitator intervene. The

group needed frequent summarization; A did not provide it. Interaction was zero to nonexistent.

Once again the Town officials provided no leadership during the idea generation phase. Once again they asserted their analytical abilities during the prioritization phase. Interestingly they also manifested this involvement physically, by pushing to the edge of their seats so as to better interact with the monitor's screen. With their involvement, comments became more freewheeling. After the break, during which there was considerable on-point discussion, the overall tenor of the session picked up considerably.

Facilitator A appeared to be limited by the technology. The chauffeur was more in control. The facilitator seemed totally unaware of group processes in general and the **CyberQuest** process in particular. Nor did A know how to accomplish the task. Interaction was poor; everyone was confused over the **CyberQuest** process; there was absolutely no attempt to clarify anyone's points. In fact the technology accentuated the bad facilitation.

Group 4. The tone appeared to be more professional. Facilitator B was more relaxed and more "facilitative." B's comments were less scattered, Only one Town official showed up. One of the participants was so involved that he got down on the

floor, the better to view the monitor. Once again, though engaged, the Town official was rather quiet. On balance the group moved along quite smoothly. They were friendly and involved. Everyone participated at some level. Yet there was some conflict among the participants particularly when one individual tended to give voice to multiple and often irrelevant opinions. Notwithstanding, the conflict was handled both by the facilitator and the participants with considerable humor and obvious good will.   The facilitator kept things moving along rather smartly.

The citizens, at least initially, were in the driver"s seat. The Town official became a source of information, historical overview, background, political, and administrative perspectives, etc.

As with previous sessions during the break there was considerable dialogue. Afterwards there was much laughter; the session became very "freewheeling." Yet the group was focused and the comments quite relevant. Though the smallest of the groups, there was much interaction and information sharing. The facilitator showed greater comfort with the task. There was much learning from B's experience with group two.

Group 5.   This was the first of the nonCyberQuest sessions.   Once again Facilitator A was insecure. No introduction or ice breaker was provided. A was boring and lifeless. At the onset, A turned away from the participants and assumed the role of

recorder. Trying to combine the facilitative role with that of a recorder proved to be too daunting. The result was long periods of silence. The group got out of hand....went its own way. Along the way the facilitator became lost.

Apologizing for a lack of knowledge with respect to the subject matter, Facilitator A got involved in the content of the discussion, thereby trying to exercise some form of "control." Additionally A ignored the NGT that had been assigned and tried to adapt the **CyberQuest** format. It did not work.

There was inadequate discussion or definition of the issue or problem. A's writing on the newsprint was virtually unreadable. The newsprint was not posted. A failed to have the group review their suggestions and remove those that were redundant. It was difficult to tell when one group task ended and another began. It seemed that A was anxious to finish, to get done in two hours.

It should be noted that although Facilitator A did prioritize the ideas, in the documents provided the researcher there was no indication that this had taken place. During this prioritizing the group was very "noisy."

Group 6. This was also a different sort of session. For all of an hour the group discussed the issue without any attempt to record any comment. This discussion was not

very focused. Indeed it was often poorly moderated - at least initially. Notwithstanding, a great many ideas surfaced. Facilitator B was frequently into the content. During this discussion, B stated that the purpose of this phase in the discussion was to give rise to "theme focuses" or market segments each of which would call for different strategies. It became apparent that this was a strategy session. The facilitator assumed that the participants were knowledgeable about the issue. B asked many questions, most of which were quite pertinent.

Not until an hour had passed did the facilitator begin to introduce a modified NGT. Interestingly the process from this point forward was very smooth, and fast paced. The group seemed a lot happier once round-robin idea generation started. Because of the way the voting was carried out, the group appeared to be quite satisfied. Much conflict and/or multiple and concurrent conversation ensued. The facilitator handled it quite well. When challenged, B was able to defend this approach, make appropriate clarifications and get the process back on track.

Group 7. This was a very informal and articulate group. Again Facilitator A assumed the role of the recorder. There was no introduction or icebreaker, nor was there any attempt to steer the group in any way. They went their own way. Also there seemed to be some confusion regarding instructions and definition of the problem. The group moved quickly into silent generation of ideas. Well into the idea generating task,

the group realized that they never had a chance to talk about task/issue/problem definition. When they did, the facilitator exerted no control and they just went where they wanted to go. It seemed that A had no clear design of what to do. This became very obvious during what was to have been the round robin phase. Indeed, it never occurred.

Two participants began to question the propriety or appropriateness of the problem. This called for some reclarification of the initial problem. There was considerable conflict, all but ignored by the facilitator. A made no attempt to help this attempt at clarification, although given many opportunities to do so by one of the participants who several times suggested that the group address the written question of the researcher. He suggested that by going off tangent they invalidated the experiment and violated its spirit.

For a time one participant was clearly dominant. This dominance introduced considerable tension, and much conflict between him and another participant. The others were clearly uneasy. The facilitator did nothing. One particular participant seemed dismayed and not really amused by the laughter and asides of the dominant member and one other participant. Much comment was unfocused, and irrelevant.

There was an attempt to come to closure and develop a full blown plan; however, this did not show up in the final work product. It should be noted that this process seemed to work. Those participants who were inactive during the idea generation phase came to the fore. This included those who were from the Town government. They were more active, more involved, and raised really good and pertinent questions. There was also an attempt by the facilitator to record the questions raised by the participants The once dominant person became less dominant.

Group 8. This was a repeat of group six; however, the group was much slower, never getting to the point of packaging. The facilitator failed to keep things moving. However the systematic idea evaluation process employed was quite good. The main question was: how did the group stay awake? The facilitator's control of the group was good, but not enough.

Summaries - Comparison between Statistical and Qualitative Analysis

Hypothesis 3 asserts that GI would be greater in **CyberQuest** sessions than in NGT sessions. Although the data is not supported at the $p = .05$ level by either ANOVA or the K.S., when $p = .10$, ANOVA shows that there is evidence to suggest that there is a statistically significant difference between GI in **CyberQuest** and in NGT sessions. The edge would go to the former. Even the K.S. two tailed test shows that

at the p = .05 level, the test statistic of .35 is close to the point of rejection .41. This is further underscored in the multiple regression where the **CyberQuest** session GI was found to be the operant independent variable behind DPQ, albeit at a low level of correlation.

The qualitative analysis focused in large measure on GIs or group dynamics. It noted aspects of the process that were neither anticipated by the study nor could readily have been reduced to statistics. It identified differences in meeting phases, participant frames of reference, skills and abilities, thinking patterns and role perceptions and expectations. Noting that both **CyberQuest** and NGT driven meetings go through definite phases, the qualitative study points out that these phases "bring out" different personalities. For example, during the idea generation phase those persons with high creativity or ideaphoria proclivities, "right brained" and generalist frames of reference tended to dominate. But at the time of prioritization those who were more analytical, "left brained" and specialist frames of reference tended to dominate. The latter were, more often than not, the Town officials, who became, at this point, sources of information, historical overview, back grounds, facts, and political perspectives. During the idea generation phase lateral or associative thinking patterns prevailed. During the prioritization phase, linear thinking patterns were at play. Additionally there were some dynamics whose analysis were not provided for in any of the study's instruments. These dynamics included nonverbal behavior, and eye to eye contact. Group members were

more attentive to each other in NGT sessions, and disagreements surfaced more readily. However, expressing ideas outweighed sensing the needs of fellow participants during **CyberQuest** sessions. All of this gives an added dimension to GI and also ME.

In Hypothesis 5, the assertion that GS would be greater in **CyberQuest** sessions did not bear out. Instead GS was greater in NGT sessions. This finding was supported by the qualitative analysis. In **CyberQuest** sessions the technology seemed intrusive. Both facilitators appeared to be intimidated. Although initially curious, group members, in time, seemed unimpressed. Only when the chauffeur went beyond his instructions and showed other aspects of the system, did their curiosity reach another level. However, all this did was add to the impression that rather than a facilitated and focused meeting, these sessions were more like a developmental meeting. Some individuals failed to grasp what was going on. They did not appear to know whether this was a demonstration or a discussion. Time was up before the participants came to grips with either the subject or the purpose of **CyberQuest**. It was not until the fourth and final session that the technology and the facilitator began to mesh and not to interfere with the meeting's progress.

Technology was not the problem with NGT sessions. Even though one of the facilitators appeared to have been not "in charge," participants simply went their own way. It was as if they were on what they perceived to be familiar ground.

Unfortunately, the prescribed NGT format was employed only in part. This explains why A's session seemed more open and free wheeling. This was not, however, the case with Facilitator B who for the most part followed the prescribed NGT format. The net result was two successful sessions. It was apparent that there was great general satisfaction with the meetings. This was unlike the **CyberQuest** sessions in which most of the participants seemed to have a detectable amount of misgivings - read that dissatisfaction.

Related to both GI and GS is the group socialization factor. With the presence of refreshments, and timely breaks, participants were given the opportunity to "open up." In each instance participants were even more lively after the break. Looking at this one begins to see how group dynamics ultimately, even though indirectly, affect DPQ.

Finally, although there was no statistically significant difference between FQ in **CyberQuest** and NGT, a qualitative analysis supports the multiple regression finding that there is a close correlation between FQ and DPQ in NGT sessions. This analysis demonstrates how the energies of the facilitator are often transmitted to the participants. If he/she was listless, the group, at least initially became listless. If he/she was energetic, the participants became energized. In addition, the very position or posture of the facilitator impacted the group. In one session, the facilitator sat "outside" the group. In another session the facilitator stood "inside" the group. In still another

session, the facilitator turned away from the group to write on the newsprint. In each instance the facilitators all but determined his/her role not only in the discussion, but also in its outcome. If "inside" with the discussants, the facilitator has a better opportunity to "facilitate" and to affect the decision product.

On balance, the qualitative data supports the quantitative findings. It suggests that statistical analysis is not enough to provide a sense of what really goes on in a small group meeting. It brings out new dimensions and provides the researcher with a sense of direction and hence better understanding of both **CyberQuest** and NGT.

In this chapter the study's findings were presented, first, from a statistical perspective. They were then presented from a qualitative perspective. These presentations were finally followed by a comparison of the quantitative and qualitative findings.

In Chapter Six the study's conclusions and implications will be discussed.

CHAPTER SIX

DISCUSSION: CONCLUSIONS AND IMPLICATIONS

Introduction

This study's objective was to determine whether or not there were any differences groups in the quality of decision making in small in which **CyberQuest** was used as compared with small groups in which NGT was used.

In this study it was assumed that **CyberQuest** driven sessions would result in decision outcomes that would differ from NGT sessions. It was further assumed that the underlying causes of this difference were traceable to the technology.

This chapter begins with a comparison of the study's findings to the literature. The study's conclusions and implications are next discussed. This is followed by an assessment of the study's strengths and weaknesses. It ends with a suggested research agenda.

Comparison to the Literature

For the most part the use of **CyberQuest** tracked the findings in the literature. Hypothesis 1 postulated that **CyberQuest** or GSS sessions would be superior to those sessions which used the NGT. This assertion is generally borne out by the bulk of GSS literature. Lewis (1983) concluded that GSS sessions produced more feasible suggestions in greater quantity than non-GSS sessions. Gallupe (1986) found that GSS users tended to generate more alternatives and higher quality decision products than non GSS users. However, Applegate (1987) was not certain if GSS helped or hindered the idea generation process. She thought that participants' unfamiliarity with GSS as a tool for thinking and decision making explained her uncertainty. She concluded that non-GSS techniques such as NGT were not replaced by GSS technologies. Pinsonneault and Kraemer (1989), in their review of the literature, claimed that GSS decision products were greater than non-GSS decision products for three reasons: (1) GSS focuses the individual on the task; (2) as a result large expenditures of effort are expended, decreasing thereby the possibility of dominance by one or more members; and (3) all of this leads to a greater depth of analysis and increased consensus.

This study tends to agree with Applegate. Participants were unfamiliar with GSS. They were more familiar with traditional discussion methodologies such as NGT. This results in an inference that increased DPQ is not necessarily attributed to GSS alone.

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There are other explanatory factors. This is supported in the multiple regressions that clearly show the DPQ is highly correlated with DIP, FQ, GI, ME, and GS.

The study's <u>Hypothesis 2</u> asserted that FQ would be higher in GSS (**CyberQuest**) sessions than in NGT sessions. No difference was found. Pinsonneault and Kraemer contend that this is an area of minimal study. They suggest that the facilitator greatly affects group processes and outcomes in several ways. Note, these comments apply equally to the chauffeur, if there is one. The facilitator and/or chauffeur may affect the group when they plan, conduct or facilitate the actual meeting. They may do so unintentionally by virtue of their relationship to group members, or simply by being a good versus bad facilitator/chauffeur.

Although an ANOVA reports that there was a definite difference between the two facilitators, this difference does not really matter when choice of facilitator was input into a multiple equation with DPQ as the dependent variable and Facil #, DIP, FQ, GI, ME, and GS as independent variables.

Pinsonneault and Kraemer's (1989) findings would indicate that the facilitator's impact is on the group not the DPQ. The facilitator influences the atmosphere and the relationship between and among group members. Applegate (1987) on the other hand, suggests the DIP is a help to the facilitator in structuring and conducting meetings.

Hence, DIP and FQ, it would seem, are related to ME, whereas FQ by itself is correlated with GI. This research also implies that the choice of facilitator impacts FQ which was of greater significance in NGT sessions than in GSS sessions, although an ANOVA showed that there was no statistically significant difference between the measure of FQ and either **CyberQuest** or NGT sessions.

Hypothesis 3 asserted that GI would be of greater intensity in **CyberQuest** sessions than in NGT sessions. There was evidence that this was the case. This coincides with Applegate when she found that brainstorming by computer changed and often increased group dynamics in GI and group participation. In her study she also found that group social inhibitors were neutralized. Pinsonneault and Kraemer also found an increase in GI in the literature. Zigurs' (1989) research found a link between GI and decision quality. GI is also connected to the individual facilitator in this study. Greater liberties were taken of the weaker of the facilitators who brought little to the process. This could account for the greater amount of GI in the **CyberQuest** sessions. However, this is not borne out in the interaction between **CyberQuest**, NGT and the two facilitators. One possible explanation is that NGT was designed to inhibit social interaction. **CyberQuest** was not.

The NGT protocol requires that there be little discussion during the idea generation phase. However, in this study preliminary discussions were allowed so as to

enable participants to spend more time (1) orienting themselves to the group and to the process, and (2) dealing with the problem and its many aspects. However, once this was accomplished, participants were to abide by the NGT process until the final vote had been taken. Thereafter, they were once again encouraged to interact. Because of time constraints the effects of the NGT process probably carried over into the implementation phase where the interaction was to have taken place. The net result was a reduction in the expected level of interaction.

Hypothesis 4 asserted that ME would be greater in **CyberQuest** sessions than in NGT sessions. There was no evidence supporting this claim. This finding is not consistent with Turoff and Hiltz (1982) or Pinsonneault and Kraemer (1989) who found that there was greater task-focused communication in GSS groups. Nor does it agree with Zigur's analysis that GSS had a more significant impact upon meeting effectiveness or group process. Finally the study does not agree with Gallupe's observation that GSS provides a more focused structure.

Conceivably the reason for this could be traced to Kull's (1982) point that it is not a good idea to use a GSS with people who neither know one another nor much about GSS. Kull states that too much time is spent developing mutual trust and a familiarity with the system. Another reason could be found in Gray's (1987) suggestion that advance preparation and a professional environment were two of the three keys to

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successful interactions using GSS. Participants in this study were not provided with any preparatory documentation. The location or site of the experiments were academic rather than professional.

Finally, Hypothesis 5 asserts that GS would be greater in **CyberQuest** sessions than in NGT sessions. Satisfaction was greater in NGT sessions. This compares with Gallupe's findings where satisfaction and confidence in the decision was less in GSS groups. It is contrary to Applegate who found a higher level of satisfaction by GSS users in terms of process and outcomes. She traced this result to the effect of GI. Pinsonneault and Kraemer also found that as DPQ increased, the confidence and satisfaction of group members using GSS also increased. This study does not support either Applegate or Pinsonneault and Kraemer. It finds no connection between GI and GS.

There are two points of departure with the literature. The first deals with the issues raised by Lewis (1993). The second deals with research subjects. Lewis concluded that when a GSS was used more alternatives were generated, they tended to be more feasible, and there was less dominance by any one person. In this research the number of ideas generated by **CyberQuest** and NGT was about equal. There was no difference in feasibility. And with but one exception, **CyberQuest** sessions were not dominated by any one person. This was not the case, however, with NGT sessions,

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where in several instances at least one person was clearly dominant. This last finding would seem to indicate that the NGT procedure was incorrectly applied in that it was partially designed to avoid the dominance of any one individual.

The second point of departure with the literature is that the preponderance of studies in GSS have used students rather than mature working adults as subjects. Also the studies have not dealt with real world issues nor have the group meetings taken place in real world settings (Pinsonneault and Kraemer 1989; Zigurs, Poole, and DeSanctis 1989). This study used working adults. The issue was very real to the citizens of Blacksburg, Virginia. Herein lies a possible explanation as to why GSS technology failed to meet with the same success as in reported studies. An interesting observation of the qualitative portion of the study is, that although curious, participants were less accepting of the computer than one takes for granted among younger people.

Conclusions/Implications

In terms of the specific research questions there was no statistical significant data to conclude that there was a difference between **CyberQuest** and NGT. On balance, **CyberQuest** by itself does little to improve the quality of decision-making by a small group. Its effectiveness is seen only when the meeting in which it is used is effective. The key to this effectiveness is in the quality of facilitation. There is a direct and

substantial correlation between that quality and the interaction of the group. A by-product of the quality of facilitation is group satisfaction, which has a substantial and direct correlation with the decision interaction process employed. The obvious inference is that in the hands of an able facilitator, who knows something about the topic and who is knowledgeable about group dynamics, whatever the decision interaction process, be it a GSS or NGT, the quality of the decision product quality is increased.

It is clear that FQ results from the abilities and personality of the facilitator. It is also clear, at least in the case of **CyberQuest**, that the efficacy of the GSS technology is a result of the abilities and skills of the chauffeur. To have consistently high DPQ the facilitator/chauffeur needs to be able to capitalize on the technology by recognizing and accepting the structure it provides while at the same time recognizing his/her role or obligation to provide for "human" support.

This leads to a consideration of the proper training of the facilitator/chauffeur of technology-augmented discussions. This study gives support to the contention that the role of the facilitator/chauffeur is integral to GSS, despite the fact that the majority of systems are designed to enable groups to fend for themselves. Whereas the technology provides structure and influences task focus and meeting management, the facilitator provides support to the human processes of the group, intervening where and when appropriate, helping the group to stay on task or initiating change strategies because of

a given situation or unforeseen event.   However, to be effective, the facilitator should be knowledgeable about and skilled in the use of GSS software and hardware and in the structuring of meetings, materials, and processes (Bostrom et al. 1991).

In addition to the central role of the facilitator the study's findings, particularly the qualitative portion, imply that more needs to be known about the proper alignment of lateral and linear thinking processes in terms of meeting effectiveness.   The latter seems to be most appropriate for idea generation when innovation and creativity are highly valued.   The former takes precedence at later stages in the meeting.   This calls for the facilitator to recognize that not only are participants defined by their roles and the expectations that ensue from these roles, but they are also defined by their personalities and right-brain/left-brain attributes.

Another implication is drawn from the observation that at times the technology is invasive.   Acknowledging the factor of cultural difference, perhaps a lesson could be learned from the British.   In America there is a penchant for high tech with respect to GSS.   The British approach is decidedly high touch.   This approach is exemplified by the what Austin (1986) calls the POD, an octagonal room wherein group members sit around a circular table.   On the walls are conventional chalk boards or self-copying whiteboards, and two screens for displaying 35mm slides, overhead transparencies, drawings and printed material, videotapes and output from computers.   The only

computer present is under the control of the moderator or facilitator. They may also have a hand-held controller with which to turn displays on and off, or to adjust the light levels. The emphasis is on providing a problem solving environment where technology supports participants who interact directly with each other. This points up a distinctive area of difference in **CyberQuest's** and other GSS approach where individuals interact with each other mainly through a computer model. The British approach is group-centered (Phillips 1990).

A final implication drawn from these findings relates to theory. As has been mentioned above GSS has been largely driven by management and computer science adherents. Few attempts have been made to discuss GSS from a sociological or psychological perspective. Ngwenyama and Lyytinen (1993) stand out in this regard. DeSanctis and Poole (1992) have also been prominent in this endeavor. Needed is an effort to address the role of GSS from other than a technological perspective. A better understanding of cooperative work, interactions between work processes, ad hoc groups and social change or action, personality types and their impact upon group dynamics....all of these topics are pertinent to a better understanding of the potential of GSS.

Strengths, Weaknesses, and Limitations of the Study

Strengths. On balance the use of two facilitators proved not only practical, but it also avoided the wide ranging differences in facilitating styles and abilities of eight separate facilitators. This approach also served to underscore the significance of the technology in the hands of a strong facilitator.

Another strength of the study was the willing cooperation of all participants, ("real" people, not students) citizens, town officials, non-participant observers, facilitators, and panel members, both criteria setting and group dynamics experts. Although experiments, participants dealt with a very real issue. The experts were the town officials. Each - both citizen and town official - played their roles very well.

Weaknesses. In this study the role of the facilitator presented several design problems: (1) the lack of consistency between the two facilitators in terms of facilitation methodology, and, (2) the lack of consistency in the quality of the facilitation. Greater attention should have been paid to training the facilitator and observers, attending to contextual details such as room set-up to include at least three flip charts and ample wall space, a more discussion-inducing seating configuration, a large over-head screen for **CyberQuest**, engaging the services of a professional camera-person and in the drafting of research instruments.

As mentioned above, Facilitator B was somewhat more familiar with the **CyberQuest** technology. Facilitator A had never seen this technology, save for a very cursory overview provided by the researcher several days prior to the onset of the experiments. Similarly Facilitator B was conversant with the subject matter. Facilitator A was not at all conversant with the subject matter. The net result was a lack of consistency in the quality of the facilitation. Greater attention should have been paid to training the facilitators in the rudiments of facilitation and the differences between facilitating a technology driven-meeting and one using fairly traditional methods. Both facilitators should have been more conversant and hence comfortable with **CyberQuest** and NGT. Even though each facilitator was given the format for the **CyberQuest** and NGT methodologies there should have been an opportunity for a dry run. Perhaps each facilitator should have been furnished a "script" for both **CyberQuest** and NGT sessions.

This is a very serious issue in that it raises the question to what extent does the facilitator undermine the conclusions reached in this study. Another part of the concern is that the chauffeur might have been a contaminating factor. The research design called for the chauffeur to simply tend to the operation of the technology and to capture the ideas and nuances of group member contributions. This requires considerable listening skills and precludes his involvement with the discussion process which was the purview of the facilitator. This was not the case particularly in those instances where the facilitator had lost control.

Limitations. Upon reflection it appears that **CyberQuest** would have been given a more sympathetic "hearing" had the entire program been employed. Obviously this would have necessitated somewhat longer sessions, but the payback might have been considerably greater. Perhaps these sessions could have been held over a series of ten weekends. In this vein there should have been ten sessions of **CyberQuest** and ten of non**CyberQuest** to provide for adequate statistical analysis. Also because of the size of the monitor screen **CyberQuest** deprived the group of reviewing its entire scope of output whereas non**CyberQuest** sessions allowed each individual to review and reconsider at his/her own pace the posted newsprint.

One additional observation is that two facilitators per session would have been most appropriate, one for process observation and control, the other for facilitation of the discussion. Ideally there would be the same facilitator for all sessions. Finally, it would have been most proper to have proffered some form of financial remuneration to all participants. Perhaps that alone would have upgraded the quality of the experiment. This is not without precedent and it is in line with the payment of citizens when they act as jurors.

One other possible limitation in this study was the relative homogeneity of the participants. Most group members were well educated white males. Only two participants were non-white. Three citizen-participants were female; three Town officials

were also female. More than fifty percent of group members were affiliated with Virginia Tech as faculty or staff. The average age of the citizen-participant was 50+, while the average age of the Town officials was 40+/-.

Finally three overlooked variables seemed to have somehow crept into the research. As implied above age appeared to have something to do with the level of participant satisfaction. It was as if the older one was, the less likely was one to "take to" the technology. This is not to say that the participant's curiosity was not piqued. But it obviously was not their preferred way of doing business, i.e., running a meeting. This variable should prove an interesting one in future studies. The second overlooked variable appears to be that of personality. Each participant brought to the session a distinct personality which either meshed or clashed with other participants. Some were more active or involved than others. Others were rather sanguine and hence not afraid to "go out on a limb" with their suggestions. Still others were more reflective, and hence less forthcoming with their suggestions. Town officials appeared less ready to put forth suggestions, but quite ready to provide backgrounders and the like as to why previous positions had been taken by the Town. They were also very active during the prioritizing and packaging phases of the discussion.

A third overlooked variable was that of gender. The preponderance of participants were male. In fact only six out of forty-three were female. With the

exception of perhaps two, these women were quite reticent. Their impact was minimal at best. Several questions are obvious. Were they cowered by their more aggressive male counterparts? Did their gender or role expectations dictate this low level of participation, or their attitude towards a GSS? This question also has application to the quality of facilitation, in that one facilitator was male, the other female. Does this fact make a difference in facilitation quality?

Recommendations — A Research Agenda

In the preceding section, several items were suggested as appropriate for further research. They included possible cultural differences in approach to GSS by Americans and by the British. This concern would apply, of course, to other groups. An interesting questions would be: is GSS appropriate in South Africa where whites and blacks have never communicated with each other as equals. Does equality of status play into this concern? Does custom play a part where there is little social intercourse between groups? A second research is that of group composition, i.e., age, race, gender, personality, and occupational roles. How do they relate to DPQ in **CyberQuest** and NGT settings?

In Chapter Three it was pointed out that with respect to the theoretical development of GSS there was, in essence, three schools of thought: the decision-

making school, the institutional school, and the social technology school. It was further pointed out that the bulk of research has been carried out by the decision-making school. Clearly this study falls into this school. However, in this section is put forth a research agenda that, though respectful of its contributions, seeks to transcend the decision-making school.

The first opportunity presented by the institutional school which emphasizes social dialogue as an instrument of change that goes beyond more decision making to fostering collaborative implementation, or praxis. This research agenda calls for the study of ways that GSS might aid citizens to interpret and contend with, often, overwhelming problems such as institutional racism and socioeconomic power distribution, ethnic and tribal conflict, and policy issues of many stripes and hues. The emphasis here would be on finding ways to foster dialogue, shared meanings, and conflict resolution among a diverse, at times cynical, and severely stratified citizenry. It is in this vein that this study calls for research of GSS in the public sector. Very much related to this area is research about the stuff of public dialogue, i.e., messes. How can GSS provide ways by which to deal with these messes?

GSS in the Public Sector. By making the citizen responsible for some of the business of governance, democracy increases his competence and his feeling for the

common good or public interest. Political participation forces the citizen to frame his private interests in terms of the public interest (Mill 1958).

The citizen shares with the Public Administrator and elected officials a responsibility to maintain the integrity of this activity. He does so through public dialogue which is synonymous with participative democracy. The public administrator serves as a focal point and sets the tone of the dialogue and orients the shifting coalitions of private interests towards a notion of the common good rather than the least common denominator or agreement among the most powerful. This dialogue leads to shared governance between citizen and Public Administrator

Through shared governance citizens play an active role in determining the collective decisions affecting the public interest. This role is realized in citizen advisory groups or task forces, formal public hearings or informal public meetings or workshops, or public information programs or computer-based teleconferencing opportunities. The question here is what, if any role, can GSS play in the furtherance of shared governance. A major part of this question relates to the role of public administrators vis a vis this technology. What new roles must they learn. We would suggest that one role is that of facilitator. As facilitator, the Public Administrator encourages public dialogue. Neither referee nor umpire, he/she facilitates rational and extra-rational discourse about the public welfare or common good and builds, thereby, coalitions.

Messes. People who use GSS don't make decisions so much as engage in managing "messes" within which are discrete and sometimes mixed problems. Unfortunately the solution to each problem - be it discrete or mixed - does not always add up to a solution. Ofttimes the solution (perceived or real) of one problem (perceived or real) adds to the complexity of another problem (again perceived or real) or even gives rise to another problem which had been unforeseen at the onset of the process. What we can best hope for is some way of managing our way through the mess. Rather than problem solution, consensus/commitment to a path through the mess conforms more to reality. Rosenhead (1989) concurs: "Instead of attempting to solve problems, we should be attempting to manage messes - which involves not solution but planning. If we insist on the solution mode, we will be relegated to problems which are nearly independent, while messes go inadequately managed" (p. 10).

The question here is how to construct or design a GSS that aids in the managing of messes, rather than solving problems or reaching decisions. One possible approach is suggested in the next research recommendation.

The second research opportunity is in the social technology school which attempts to integrate the decision making theorist with the institution school. Few attempts have been made to discuss GSS from a sociological or psychological perspective. Ngwenyama and Lyytinen (1993) stand out in this regard. DeSanctis and Poole (1992) have also been

prominent in this endeavor. Needed is an effort to address the role of GSS from other than a technological perspective. A better understanding or work, cooperative work, interactions between work processes, ad hoc groups and social change or action, personality types and their impact upon group dynamics, lateral and linear thinking processes, and meeting effectiveness. All of these topics are pertinent to a better understanding of the potential of GSS.

This paper suggests that there is still much work to be done in the decision-making school, but the social technology school should inform it. There is a need for research that will build on **CyberQuest** as a technology to effectuate innovation and creativity both at the group and organizational level. This research would continue to study such issues as cultural differences, group composition, gender and racial differences in group composition and participation and the role of the technology facilitator and the process facilitator. It would, however, place these concerns in another dimension by discussing GSS in terms of frames of reference, levels of creativity, personality types and organizations as composites of right and or left brained people.

GSS, Frames of Reference, Levels of Creativity, and Personality Types. Mess finding is more art than skill. It is concerned with sensing and identifying in the environment challenges, concerns and opportunities. Success often depends on one's frame of reference and level of creativity. The two frames of reference are generalist

or specialist. Generalists tend to be more holistic in their approach; whereas those who call themselves "specialists" tend to be more narrow in their focus. Creativity is linked with divergent and convergent abilities. Most people possess at least one of these abilities. The truly creative possess both. The former is an aptitude for organizing information or detailed planning, doing things logically and systematically. The latter is an aptitude for perceiving a common relationship among ostensibly discrete ideas. Divergent activities relate to creative thought or imagination and the ability to think long range or to see distant goals or the possibilities in a situation with great clarity. Convergent activities relate to analytical and diagnostic abilities (Smith, et al. 1983).

Another school of thought would have it that a person's "mess finding and dealing" abilities are intimately related to personality styles. Myers-Briggs, a respected personality assessment instrument, utilizes Jung's (1923) distinction between two ways of taking in data (sensation S or intuition N) and two ways of coming to conclusions about this data (thinking T or feeling F). Since these two dimensions are independent, they can be divided into four personality types: (1) sensation-thinking [ST]; (2) sensation-feeling [SF]; (3) intuition-thinking [NT]; and (4) intuition-feeling [NF]. Mitroff and Kilmann (1978) has equated each of these types with four styles of inquiry: analytic scientist (ST); conceptual theorist (NT); particular humanist (SF); and conceptual humanist (NF). Each of these types differ in their epistemologies, their opinions

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regarding the aims of science, their preferred modes of inquiry, and their personal dispositions (Weick 1985).

The question is how to construct or design a GSS that takes into account these attributes. An allied question is whether or not incorporating these considerations in a research design effects the decision process as well as the decision outcome. For example it would have been interesting had at the onset of this research each participant been administered a Myer-Briggs MBTI. Each personality type would then have been tracked during the experiments to determine whether or not there is empirical evidence for the assertion that different personality types come forth at different phases of the meeting.

How We Really Make Organizational Decisions and How GSS Can Help. In occidental culture rational thought processes are a much sort after reality. Recent research demonstrates that by accentuating these processes we deny ourselves access to other realities. The question is how to take advantage of these other realities through GSS.

One of those realities is somewhat unorthodox and not readily found in the literature. It views the organization, hence group, as a brain. It refuses to stand in awe of "the rational decision", giving greater weight to the right decision.

It argues that the organization is a living, vibrant organism comprised of human beings, technologies, and systems, all seeking equilibrium, purposeful direction, and meanings amidst environmental uncertainty, complexity and equivocality. In that most every aspect of organizational functioning depends on information of one sort or another, the principle guiding force behind the organization's success or failure is its information processing capacity. In fact organizations are information processing, communications, decision making and learning systems. These systems come together in a sort of "organizational brain." In that the organization is essentially a collection of human beings each possessing a brain, it follows that its subset, the group, is also a collection of brains, each with its own unique attributes.

Recent research tells us that the human brain resembles two halves of a walnut - two similar appearing, convoluted, rounded halves connected at the center (Corballis and Beale 1976; Gazzaniga 1972; Paredes and Hepburn 1976; Edwards 1979). The two halves are called respectively the "left hemisphere" and the "right hemisphere." These hemispheres are joined or connected by the corpus callusum, a thick nerve cable composed of millions of fibers. This corpus callosum provides communications between the two hemispheres and allows the transmission of memory and learning. Together with the two hemispheres it is involved in higher cognitive functions. Each sphere engages in a complementary fashion with the other in different highly complex modes of thinking.

Each sphere perceives reality in its own way. The corpus callosum melds or reconciles these two perceptions thereby preserving our sense of one person or unified being.

The left hemisphere of the brain is the seat of language and speech. Its mode is analytical, verbal, sequential, symbolic, linear and objective, quite suited to the closed systems discussed above. Highly rational, it is that side of the brain that abstracts, counts, marks time, and plans step-by-step procedures. Contemporary education has seen fit to develop this sphere at the expense of the right hemisphere.

The right hemisphere or creative side of the brain is concerned with how one "sees," imagines or recalls things, or how parts go together to make a whole. It is that side of the brain which is at home with metaphors, dreams, new ideas, or combinations of ideas, new "leaps of insight." Its mode is intuitive, subjective, relational, holistic, atemporal, and spatial. Unlike the left hemisphere it thrives on ambiguity, uncertainty and equivocality.

Applying this left-right hemisphere, corpus callosum analogy to the group as a collection of human brains, it becomes apparent that the group could be skewed in its make-up to a preponderance of left or right brained persons. It is most likely to be skewed to the former. Resultingly the decisions arrived at by left brain persons are very analytical, rationalistic, sequential, etc.

It would seem that a group made up of left brain persons results in homogeneity. All would be of the same mind set. There would be a built-in intolerance for ambiguity, diversity and equivocality. Uncomfortable with the ill-defined or in following hunches, there would be a tendency to stick with what has worked in the past. Uncertainty would be filtered away. Relevant change signals would be suppressed because they do not fit some preconceived logic. A research program addressing this issue would have direct relevance to the efficacy of GSS, as would a research study of a group made up of right brain persons.

It would seem that right brained groups would, emphasize aesthetics and intuition, would be highly creative, imaginative, evocative and informal. To its members inconsistencies and seemingly incompatible information would often lead to new perspectives. What appears to be messy logic to the left brain person, to his right brain counterpart would be quite acceptable. Decisions arrived at would be holistic, insightful, far-reaching. However, groups made up of all right brained persons might arrive at decisions that have little basis in reality.

This concern has particular relevance to GSS studies given the observation that individuals who appeared to be highly imaginative during the idea generation phase were replaced during the prioritization phase with individuals who appeared to be more analytical or diagnostic. Hence, the question here is how does or can a GSS such as

CyberQuest integrate both hemispheres? How does it balance the rational and the creative? To what consequences?

Summary

This chapter began with a summary of the conclusions found in this study. It then drew several implications from these conclusions. This was followed by several observations about the study's strengths, weaknesses and limitations. The chapter ended with several suggestions for further research in GSS.

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EXHIBITS

AND

APPENDICES

EXHIBIT A

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RATING INSTRUMENT

Feasible	1	2	3	4	5	Infeasible
- Economically	1	2	3	4	5	
- Technically	1	2	3	4	5	
- Politically	1	2	3	4	5	
Relevant	1	2	3	4	5	Irrelevant
Clear	1	2	3	4	5	Confusing
Innovative	1	2	3	4	5	Ordinary
Consonant with community values	1	2	3	4	5	Not consonant
Understands the problem	1	2	3	4	5	Does not understand
Robust	1	2	3	4	5	Weak

Acceptable to stakeholders	1	2	3	4	5	Unacceptable
- Town Officials	1	2	3	4	5	
- Consumers	1	2	3	4	5	
- Pres Retailers	1	2	3	4	5	
- Pot'l Retailers	1	2	3	4	5	
- Others	1	2	3	4	5	
Objective	1	2	3	4	5	Biased/partial

EXHIBIT B

WORKSHEET #1

<u>TASK FUNCTION</u>   <u>GROUP MEMBERS</u>

TASK FUNCTION	1	2	3	4	5	6	7
1. INITIATING - proposing tasks or goals; defining a group problem, suggesting ideas.	1	2	3	4	5	6	7
2. SEEKING INFORMATION - requesting facts, asking for expressions of opinion; seeing suggestions and ideas.	1	2	3	4	5	6	7
3. GIVING INFORMATION - offering facts, information, opinions, and ideas.	1	2	3	4	5	6	7
4. CLARIFYING AND ELABORATING - interpreting ideas or suggestions, defining terms indicating alternatives.	1	2	3	4	5	6	7
5. SUMMARIZING - pulling together related ideas; offering a decision or conclusion for the group to accept or reject.	1	2	3	4	5	6	7
6. CONSENSUS TESTING - sending up a trial balloon to test for a possible decision or conclusion.	1	2	3	4	5	6	7

WORKSHEET #2

TASK FUNCTION	GROUP MEMBERS						
1. HARMONIZING - attempts to reconcile disagreements; reducing tensions.	1	2	3	4	5	6	7
2. GATE KEEPING - helping to keep communication channels open; facilitating the participation of others.	1	2	3	4	5	6	7
3. ENCOURAGING - friendly, warm, and responsive to others; non-verbal or verbal approval or acceptance by expressions.	1	2	3	4	5	6	7
4. COMPROMISING - admitting error; modifying in the interest of group cohesion or growth.	1	2	3	4	5	6	7
5. STANDARD SETTING AND TESTING - testing whether group is satisfied with its procedures; pointing out explicit or implicit norms which have been set.	1	2	3	4	5	6	7
6. SENSING AND EXPRESSING FEELINGS - sensing feeling, mood, relationships within the group; sharing own feelings with other members; soliciting feelings of others	1	2	3	4	5	6	7

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EXHIBIT C

MEASURE OF GROUP EFFECTIVENESS

(Please circle your response to the following observations regarding the sessions you are about to view. Thank you.)

1.   High suspicion and little confidence among group members   High trust and confidence among group members

               1   2   3   4   5

2.   Every person for him/herself   Genuine concern for each other

               1   2   3   4   5

3.   Guarded, cautious communication   Open, authentic communication

               1   2   3   4   5

4.   Objectives not understood   Objectives clearly understood

               1   2   3   4   5

5.   Group denies, avoids or suppresses conflicts   Group accepts conflicts and "Works through them"

               1   2   3   4   5

6.   Everyone's abilities, knowledge, and experience are not utilized by the group   Everyone's abilities, knowledge, and experience are utilized by the group

               1   2   3   4   5

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7.   Facilitator imposes control   Group controls itself

                            1   2   3   4   5

8.   Restrictive, pressure   Free, supportive, respect for individual
         toward conformity   differences

                            1   2   3   4   5

9.   Group members go their   Group members get strength from one
         own individual ways   another

                            1   2   3   4   5

10.   The group inhibits flow   The group permits free flow of ideas
         of ideas

                            1   2   3   4   5

11.   The atmosphere is tense   The atmosphere is relaxed and
         and uncomfortable   comfortable, even jovial

                            1   2   3   4   5

12.   Group discussion is minimal   Group discussion is frequent and usually
         and frequently not pertinent   pertinent

                            1   2   3   4   5

12a.   Minimal   Frequent

                            1   2   3   4   5

12b.   Not pertinent   Pertinent

                            1   2   3   4   5

13. Group members do not listen to each other   Group members listen to each other

         1   2   3   4   5

14. Competitive relationship among group members   Cooperative relationship among group members

         1   2   3   4   5

15. Discussion is dominated by one or two persons   There is adequate and equal participation by all

         1   2   3   4   5

16. Discussions are unfocused   Discussions are very focused

         1   2   3   4   5

17. Group discussion of issues are limited   Group discussion is open and extended

         1   2   3   4   5

18. Few efforts by group at clarification   Frequent efforts by group at clarification

         1   2   3   4   5

19. Overall quality of group effort is unsatisfactory   Overall Quality of group effort is superior

         1   2   3   4   5

20. Unsatisfactory level of   Superior level of facilitation
    facilitation

                        1   2   3   4   5

21. Nonverbal behavior/cues   Nonverbal cues indicate involvement
    indicate noninvolvement

                        1   2   3   4   5

22. Minimal efforts to exchange   Maximum efforts to exchange
    information   information

                        1   2   3   4   5

23. Confusion regarding stages   Clearly demarcated stages of decision
    of discussion making process   making process

                        1   2   3   4   5

Answer either 24 or 25, not both:

24.   If this is a session wherein **CyberQuest** is used.....the influence of the technology, in terms of group dynamics (group interactions and group participation), is:

inhibitative   facilitative

1   2   3   4   5

25.   If this is a session wherein CyberQuest is not used.....the influence of the traditional group process employed, in terms of group dynamics, is:

inhibitative   facilitative

1   2   3   4   5

26.   Additional comments regarding this group session

ADDENDUM

Does the Facilitator

1.	Promote Ownership and Encourages Group Responsibility	1	2	3	4	5
2.	Demonstrate Self-Awareness and Self-Expression	1	2	3	4	5
3.	Listen to, Clarify, and Interpret Information	1	2	3	4	5
4.	Develop and Ask the "Right Questions	1	2	3	4	5
5.	Keep Group Focused on Outcomes/Tasks	1	2	3	4	5
6.	Create Comfort with and Promote Understanding of the Technology Outputs	1	2	3	4	5
7.	Create and Reinforce an Open, Positive and Participative Environment	1	2	3	4	5
8.	Actively build Rapport and Relationships	1	2	3	4	5
9.	Present Information to Group	1	2	3	4	5
10.	Demonstrate Flexibility	1	2	3	4	5
11.	Manage Conflict and Negative Emotions Constructively	1	2	3	4	5
12.	Understand Technology and Its Capabilities	1	2	3	4	5
13.	Encourage/support Multiple Perspectives	1	2	3	4	5
14.	Direct and Manage the Meeting	1	2	3	4	5

Adapted Bostrow (1993)

EXHIBIT D

EXIT QUESTIONNAIRE

Member No. _____   Date _____ Time _____

Please answer the following questions about the meeting you just attended. There are no right or wrong answers. This is not a test. We are interested in your opinions about the meeting. Please circle the answer that best agrees with your opinion. Your answers will be kept confidential. Thank you.

1.   To what extent were you satisfied with today's meeting?

1	2	3	4	5
extremely dissatisfied	rather dissatisfied	somewhat satisfied	rather satisfied	extremely satisfied

2.   To what extent was today's meeting effective in terms of the progress made toward the stated goals of the task?

1	2	3	4	5
not at all	very little	somewhat	a great amount	totally

3.   To what extent was agreement achieved amongst the group members in today's meeting towards the stated goals.

1	2	3	4	5
not at all	very little	somewhat	a great amount	total agreement

4. To what extent would you say you understood the issues and problems discussed in these meetings?

    At the beginning of the meeting?

1	2	3	4	5
not at all	barely	more or less	for the most part	totally

    At the end of the meeting?

1	2	3	4	5
not at all	barely	more or less	for the most part	totally

5. How often did you feel free to participate in and contribute to today's meeting? (i.e., the opportunity to speak when a relevant idea came to your mind.)

1	2	3	4	5
never	rarely	sometimes	often	always

6. Do you accept the results of the group's efforts?

1	2	3	4	5
not at all	barely	more or less	for the most part	totally

7. How confident are you in the eventual success of the policy set at this meeting?

1	2	3	4	5
not at all	barely	more or less	rather confident	extremely confident

8. To what extent were you satisfied with the group decision support system, **CyberQuest**, which was the principle component of the process used to set this policy?

1	2	3	4	5
not at all	barely	more or less	rather satisfied	extremely satisfied

9. How willing would you be to work in the future with this same group?

1	2	3	4	5
not at all	barely	more or less	for the most part	totally

10. How satisfied were you with the time it took your group to develop its policy decision?

1	2	3	4	5
not at all	barely	more or less	rather satisfied	extremely satisfied

11. In terms of cost and ease of implementation, what do you think are the probabilities of implementing the policy decision your group developed?.

1	2	3	4	5
absolutely zero	rather slim	fair	rather good	absolutely positive

12. How committed are you to the policy decision your group just developed?

1	2	3	4	5
not at all	barely	more or less	rather committed	absolutely committed

APPENDIX I

STATISTICAL SUMMARIES BY VARIABLE

DECISION PRODUCT QUALITY STATISTICAL SURVEY

CRITERION	MEAN-CQ (N=20)	SD	MEAN NGT (N=20)	SD
Economic Feasibility	2.90	1.33	2.90	1.37
Technical Feasibility	2.90	1.29	3.05	1.47
Political Feasibility	2.80	1.32	2.75	1.48
Relevance	2.90	1.48	2.90	1.62
Clarity	3.00	1.34	3.10	1.65
Innovative	2.80	1.77	2.35	1.46
Consonant with Community Values	2.75	1.25	3.00	1.30
Understanding of the Problem	2.65	1.31	2.85	1.53
Robustness	2.65	1.39	2.75	1.41
Acceptable to Town Officials	2.70	1.42	2.65	1.35
Acceptable to Consumers	2.60	1.47	2.75	1.37
Acceptable to Present Retailers	2.55	1.19	2.85	1.39
Acceptable to Potential Retailers	2.80	1.20	2.90	1.41
Acceptable to Others	2.85	1.23	2.95	1.28
Objective	2.70	1.30	2.75	1.21

*N = 20 for each criterion
TOTAL CRITERION = 15

MEANS OVER ALL CRITERIA **CQ = 2.77   SD = 1.09**
NGT = 2.83   SD = 1.24

FACILITATION QUALITY STATISTICAL SURVEY

CRITERION	MEAN-CQ (N=8)	SD	MEAN NGT (N=8)	SD
Discussion Focus	2.13	.99	3.38	1.30
Promotes Group Responsibility	1.75	1.16	2.00	1.31
Self-Awareness	2.50	1.20	2.25	1.16
Listens	1.50	1.07	2.13	.99
Asks Right Questions	1.63	.92	2.00	1.07
Group Focused	1.88	.83	2.25	1.39
Helps Understand Technology	1.75	.89	2.00	1.07
Open, Positive Environment	2.25	1.39	2.25	1.39
Builds Rapport	2.00	1.31	2.25	1.39
Present Information	1.25	.46	2.13	.99
Demonstrates Flexibility	1.875	1.36	2.00	1.07
Manages Conflict	1.25	.46	2.00	1.20
Understands Technology	1.00	.00	2.125	1.13
Encourages Multiple Perspectives	2.00	1.31	2.25	1.39
Manages Meeting	1.75	.89	2.25	1.39
Demonstrates Leadership	2.00	1.20	1.63	.52

*N = 8 for each criterion
TOTAL CRITERION = 16

MEANS OVERALL CRITERIA   CQ = 1.78   SD = .89
NGT = 2.18   SD = 1.07

GROUP INTERACTION STATISTICAL SUMMARY

CRITERIA	MEAN-CQ (N=22)	SD	MEAN NGT (N=21)	SD
Initiating	2.41	1.59	1.71	.72
Seeking Information	1.91	1.06	1.14	.48
Giving Information	3.50	1.54	2.86	1.11
Clarifying and Elaborating	1.68	1.17	1.67	.48
Summarizing	1.18	.50	1.52	.98
Consensus Testing	1.68	1.43	1.67	1.32
Harmonizing	2.68	1.17	1.43	.93
Gate Keeping	2.09	1.41	1.67	1.11
Encouraging	3.05	1.59	2.95	1.56
Compromising	1.86	.83	1.10	.30
Standard Setting	1.82	.80	1.14	.48
Sensing and Expressing Feeling	2.23	1.45	1.57	.75

*N=22 or 21 for each criterion

TOTAL CRITERIA = 12

MEANS OVER ALL CRITERIA   CQ = 2.17 SD = .81
NGT = 1.70 SD = .47

MEETING EFFECTIVENESS STATISTICAL SUMMARY

CRITERION	MEAN-CQ (N=8)	SD	MEAN NGT (N=8)	SD
Relevance of Comments	2.75	1.16	3.13	.99
Goal Orientation	2.38	1.30	2.63	.92
Trust and Confidence	3.13	1.13	3.25	.71
Concern for Each Other	1.75	1.39	2.50	1.41
Open Communication	2.25	1.39	2.38	.74
Understand Objectives	2.00	1.07	2.63	.74
Accepts Conflicts	2.88	2.03	2.75	.71
Abilities Utilized	2.00	1.07	2.63	.74
Control by Group	2.00	1.41	2.25	.89
Respect for Differences	2.13	1.37	3.13	.35
Strength from Each Other	2.75	1.28	3.25	1.28
Flexible Group	3.63	1.41	3.75	.89
Relaxed Atmosphere	2.38	1.19	2.50	1.20
Frequent/Pertinent Discourse	2.00	1.41	3.00	1.07
Members Listen	2.63	1.06	2.63	.92
Cooperative Relationship	1.75	1.16	1.50	.53
Equal Participation	2.00	1.20	1.75	1.16
Open Discussion	3.13	1.46	3.38	1.30
Frequent Clarification	2.75	1.16	2.63	.74
Group Effort	2.00	1.20	1.63	.74
Nonverbal Behavior	2.13	1.36	1.00	.00
Exchange of Information	2.38	1.51	2.50	1.20
Decision Stage Demarcation	1.88	1.56	2.13	.83

MEETING EFFECTIVENESS STATISTICAL SUMMARY (cont.)

CRITERION	MEAN-CQ (N=8)	SD	MEAN NGT (N=8)	SD
Focused Discussion	1.88	1.25	2.0	.83
CQ: Influence	1.88	1.36	N/A	N/A
NGT: Influence	N/A	N/A	1.50	.93

*N=8 for each criterion
 TOTAL CRITERIA = 24

MEANS OVER ALL CRITERIA
CQ = 2.34   SD = .40
NGT = 2.52   SD = .30

CQ =   SD
NGT =   SD

GROUP PARTICIPANT SATISFACTION STATISTICAL SUMMARY

CRITERIA	MEAN-CQ (N=22)	SD	MEAN NGT (N=21)	SD
General Satisfaction	3.73	.94	3.95	.92
Meeting Effectiveness	3.18	.73	3.71	.73
Understanding of Issues in the Beginning	3.77	.53	4.00	.45
Understanding of Issues at the End	3.45	1.01	3.67	.73
Feel Free to Participate	3.91	.43	4.29	.47
Satisfied with CQ	4.55	.67	N/A	N/A
Satisfied with NGT	N/A	N/A	4.71	.47
Agreement Achieved	3.91	.29	4.19	.51
Accept Results	2.82	.59	3.04	1.32
Confident of Decision's Success	3.45	.74	3.52	.51
Work With Group in Future	4.09	.81	4.24	.62
Satisfied with Time	3.32	.99	3.81	.60
Ease of Implementation	3.00	.69	3.14	.79
Commitment to Decision	3.64	.58	3.95	.67

*N= 22 and 21 for each criterion
TOTAL CRITERIA = 13

MEAN OVER ALL CRITERIA
 CQ = 3.60 SD = .77
 NGT = 3.86 SD = .32

APPENDIX II

STATISTICAL SUMMARY ACROSS VARIABLES
BY OBSERVATION

STATISTICAL SUMMARY

Observation	DPQ	FQ	GI	ME	GS
1	1.80	1.00	3.67	1.76	3.31
2	4.00	1.00	3.42	1.80	3.46
3	2.80	1.69	2.33	2.80	3.38
4	2.80	1.69	3.33	2.48	3.77
5	4.00	1.38	3.92	1.24	3.69
6	2.33	1.19	2.08	1.40	3.38
7	1.60	3.13	1.83	3.44	3.92
8	2.00	3.19	1.75	3.76	3.69
9	4.00	1.19	1.08	2.83	3.54
10	2.93	1.06	1.08	2.58	3.15
11	1.33	3.38	1.50	2.71	3.77
12	1.00	3.50	1.92	2.58	3.62
13	3.67	1.38	1.83	2.63	3.69
14	2.27	1.19	1.17	1.83	3.23
15	4.47	2.89	1.33	2.42	3.77
16	3.53	2.89	2.25	2.54	4.08
17	3.00		2.00		3.77
18	1.73		2.08		3.54
19	4.53		2.50		3.77
20	1.60		2.67		4.08
21	3.40		1.83		3.62
22	2.00		2.25		3.00
23	2.93		1.83		3.92
24	2.93		2.92		3.38

Observation	DPQ	FQ	GI	ME	GS
25	1.00		2.00		3.69
26	1.87		2.08		3.62
27	4.00		2.17		3.85
28	3.40		1.58		4.00
29	4.87		1.50		3.85
30	4.93		1.25		3.85
31	2.00		1.50		3.92
32	1.40		1.33		3.15
33	3.20		1.75		3.38
34	1.40		1.33		3.62
35	1.00		1.47		4.38
36	1.60		1.25		4.31
37	4.0		1.17		4.38
38	3.47		1.42		3.77
39	4.33		2.25		3.92
40	2.93		1.25		4.08
41			2.17		4.23
42			1.25		4.00
43			2.33		3.85
44					
Count	(40)	(16)	(43)	(16)	(43)

KEY: Observations (n) per group
        DPQ - 5
        FQ - 2
        GI - 4-6
        ME - 2
        GS - 4-6

APPENDIX III

ANOVA - BY VARIABLE

ANOVA (GLM)
Decision Product Quality

Source	DF	Sum Square	Mean Square	F-Ratio	Prob > F
A (CQ/NGT)	1	0.04	0.04	0.03	0.85
B (Facil A/FacilB)	1	4.40	4.40	3.74	0.06
AB	1	5.63	5.63	4.78	0.03
Error	36	42.36			
Total (adj)	39	52.42			

Source	Term	N	Mean	Std. Error
	All	40	2.80	
A: (CQ-NGT)	CQ	20	2.77	0.24
	NGT	20	2.83	0.24
B: (Facil A-Facil B)	Facil A	20	2.47	0.24
	Facil B	20	3.13	0.24
AB: (CQ-NGT/Facil A-Facil B)	CQ-Facil A	10	2.81	0.34
	CQ-Facil B	10	2.73	0.34
	NGT-Facil A	10	2.13	0.34
	NGT-Facil B	10	3.54	0.34

ANOVA (GLM)
Quality of Facilitation

Source	DF	Sum Square	Mean Square	F-Ratio	Prob > F
A (CQ/NGT)	1	0.64	0.64	2.90	0.11
B (Facil A/FacilB)	1	10.46	10.46	47.74	0.00
AB	1	0.45	0.45	2.06	0.18
Error	12	2.63	0.22		
Total (adj)	15	14.18			

Source	Term	N	Mean	Std. Error
	All	16	1.98	
A: (CQ-NGT)	CQ	8	1.78	0.17
	NGT	8	2.18	0.17
B: (Facil A-Facil B)	Facil A	8	1.17	0.17
	Facil B	8	2.79	0.17
AB: (CQ-NGT/Facil A-Facil B)	CQ-Facil A	4	1.14	0.23
	CQ-Facil B	4	2.42	0.23
	NGT-Facil A	4	1.20	0.23
	NGT-Facil B	4	3.16	0.23

ANOVA (GLM)
Group Interaction

Source	DF	Sum Square	Mean Square	F-Ratio	Prob > F
A (CQ/NGT)	1	2.08	2.08	5.04	0.03
B (Facil A/FacilB)	1	1.37	1.37	3.31	0.08
AB	1	0.68	0.68	1.63	0.21
Error	39	16.14	0.41		
Total (adj)	42	20.62			

Source	Term	N	Mean	Std. Error
	All	43	1.93	
A: (CQ-NGT)	CQ	22	2.15	0.14
	NGT	21	1.70	0.14
B: (Facil A-Facil B)	Facil A	22	2.10	0.14
	Facil B	21	1.75	0.14
AB: (CQ-NGT/Facil A-Facil B)	CQ-Facil A	12	2.45	0.19
	CQ-Facil B	10	1.84	0.20
	NGT-Facil A	10	1.76	0.20
	NGT-Facil B	11	1.65	0.19

ANOVA (GLM)
Meeting Effectiveness

Source	DF	Sum Square	Mean Square	F-Ratio	Prob > F
A (CQ/NGT)	1	0.15	0.15	1.09	0.32
B (Facil A/FacilB)	1	2.54	2.54	18.08	0.001
AB	1	1.98	1.98	14.08	0.003
Error	12	1.69	0.14		
Total (adj)	15	6.36			

Source	Term	N	Mean	Std. Error
	All	16	2.42	
A: (CQ-NGT)	CQ	8	2.32	0.13
	NGT	8	2.52	0.13
B: (Facil A-Facil B)	Facil A	8	2.02	0.13
	Facil B	8	2.82	0.13
AB: (CQ-NGT/Facil A-Facil B)	CQ-Facil A	4	1.57	0.19
	CQ-Facil B	4	3.07	0.19
	NGT-Facil A	4	2.47	0.19
	NGT-Facil B	4	2.56	0.19

ANOVA (GLM)
Group Satisfaction

Source	DF	Sum Square	Mean Square	F-Ratio	Prob > F
A (CQ/NGT)	1	0.74	0.74	7.79	0.01
B (Facil A/FacilB)	1	0.002	0.002	0.02	0.88
AB	1	0.02	0.02	0.17	0.68
Error	39	3.7	0.09		
Total (adj)	42	4.47			

Source	Term	N	Mean	Std. Error
	All	43	3.73	
A: (CQ-NGT)	CQ	22	3.60	0.07
	NGT	21	3.87	0.07
B: (Facil A-Facil B)	Facil A	22	3.74	0.07
	Facil B	21	3.73	0.07
AB: (CQ-NGT/Facil A-Facil B)	CQ-Facil A	12	3.59	0.09
	CQ-Facil B	10	3.62	0.10
	NGT-Facil A	10	3.89	0.10
	NGT-Facil B	11	3.89	0.10

APPENDIX IV

GROUP WORK PRODUCTS

Group One

Current Ideas and Notes

- Idea 1—Reasonable access
- Idea 2—Good transportation system
- Idea 3—Pleasant environment, pedestrian friendly
- Idea 4—Create a new image
- Idea 5—Retention of value
- Idea 6—Good Parking system
- Idea 7—Upgrading real estate values
- Idea 8—Encourage local ownership and occupancy of the properties
  - ✓ Tax policies
- Idea 9—Product mixes
- Idea 10—Students vs. residents
- Idea 11—Consolidate planning process, working with Christainburg planning process
- Idea 12—Seasonal marketing programs
- Idea 13—Take advantage of the University facilities and environment
- Idea 14—Plan a retirement community
- Idea 15—Design architecturally attractive buildings
- Idea 16—Build "drawing cards"
- Idea 17—Alternative uses of existing buildings
- Idea 18—Ask Tech to locate offices in commercial areas
  - ✓ Locate incubators spinning out of CRC in empty retail spaces and environment
- Idea 19—Turn commercial building into town offices
- Idea 20—Discount software stores
- Idea 21—Build inside public spaces
- Idea 22—Recreational and entertainment businesses
- Idea 23—Zone mixed use areas
- Idea 24—Rezone the commercial areas
- Idea 25—Commercial condominium
- Idea 26—Town sponsors purchase of the properties
- Idea 27—Town acquires the properties and sells shares
- Idea 28—Be innovative

- Idea 29—Less zoning regulation, free-fire zone, enterprise zone
- Idea 30—Full economic developer
- Idea 31—Everybody sells
- Idea 32—More publicity
- Idea 33—Strategic marketing studies, gap analysis and recruit the right people
- Idea 34—Small business incubator in an empty business space

Goals

- Idea 1—Reasonable access
- Idea 8—Encourage local ownership and occupancy of the properties
  - ✓ Tax policies

Prioritization

- Idea 2—Good transportation (72)
- Idea 1—Access (56)
- Idea 7—Real estate value (40)
- Idea 17—Alternative use (40)
- Idea 12—Marketing program (36)
- Idea 5—Retention of value (35)
- Idea 10—Student residents (10)
- Idea 4—New image (9)
- Idea 9—Product mix (8)
- Idea 3—Pleasant environment (5)
- Idea 8—Ownership (0)

Plan

Market

- Idea 1—Reasonable access
- Idea 2—Good transportation system
- Idea 3—Pleasant environment, pedestrian friendly
- Idea 4—Create new image

- Idea 9—Product mix
- Idea 12—Seasonal marketing programs
- Idea 16—Build "drawing cards"
- Idea 25—Create new image
- Idea 28—Be innovative
- Idea 29—Less zoning regulation, free-fire zone, enterprise zone
- Idea 31—Everybody sells
- Idea 32—More publicity
- Idea 33—Strategic marketing studies, gap analysis and recruit the right people

Land Use

- Idea 2—Good transportation system
- Idea 3—Pleasant environment, pedestrian friendly
- Idea 5—Retention of value
- Idea 6—Good parking system
- Idea 8—Encourage local ownership and occupancy of the properties
- Idea 11—Consolidate planning process, working with Christainburg planning process
- Idea 14—Plan a retirement community
- Idea 15—Design architecturally attractive building
- Idea 28—Be innovative
- Idea 17—Alternative uses of existing buildings
- Idea 21—Build inside public spaces
- Idea 22—Recreational and entertainment businesses
- Idea 23—Zone mixed use areas
- Idea 24—Rezone the commercial areas
- Idea 25—Commercial condominium
- Idea 28—Be innovative
- Idea 29—Less zoning regulation, free-fire zone, enterprise zone
- Idea 34—Small business incubator in an empty business space

Group Two

Current Ideas and Notes

- Idea 1—Expand downtown, redefine downtown
- Idea 2—Every store sells liquor
- Idea 3—Provide loans, financing, tax incentives, grants
- Idea 4—Zoning policies facilitate business coming
- Idea 5—Marketing this area
- Idea 6—Underground parking
- Idea 7—Focus on the access
- Idea 8—Integrate housing with businesses
- Idea 9—Who is the market, target the customers
- Idea 10—Create incentives for coming to this area
- Idea 11—Provide shuttle service
- Idea 12—Provide ease of access
- Idea 13—Aesthetically attractive
- Idea 14—Cohesive design
- Idea 15—Enclose the whole downtown or the corridor
- Idea 16—Change traffic flow
- Idea 17—Eliminate the traffic, put them underground
- Idea 18—Street concerts
- Idea 19—Classical music in downtown area
- Idea 20—Collectism vs. clusters, segregated and yet connected
- Idea 21—Have variety of businesses that open 24 hours
- Idea 22—Go vertical, up and underground
- Idea 23—Barrier-free access, have things that are attractive to wide range of people
- Idea 24—Positive experience, good value, high level of customer service, safety, something unique
- Idea 25—Make downtown a residential area
- Idea 26—Unique combination and business, professional and leisure facilities
- Idea 27—Friendly policies to visitors
- Idea 28—New market programs to attract businesses and people
- Idea 29—A new agency governing how the downtown operates
- Idea 30—Create and association of the interested property/business owners and users
- Idea 31—Good products
- Idea 32—Movable location and products, street vendors

- Idea 33—Multiple means of transportation
- Idea 34—Continuing education in a broad sense
- Idea 35—Integrate learning with retail
- Idea 36—Involve retirees in the process
- Idea 37—Make retirement worthy
- Idea 38—Landscape the whole area
- Idea 39—Athletic events in downtown
- Idea 40—Combine leisure and business
  - ✓ Chess, shuffle board
- Idea 41—Liquor bar in women's store, hardware store
- Idea 42—Combine museum and business, paid and free public events, festival
- Idea 43—Work and study options
  - ✓ at any educational level
- Idea 44—Build and planetary
- Idea 45—New river aquarium
- Idea 46—Snow festival
- Idea 47—Use the Blacksburg tunnel
- Idea 48—Uncover the water to make it a real river/creek
- Idea 49—Build a fountain
- Idea 50—Sell Blacksburg mineral water
- Idea 51—Blacksburg bath
- Idea 52—Involve the people
- Idea 53—Leverage the airport
- Idea 54—Add rail transportation
- Idea 55—Hold a design competition, have citizens to form a jury panel
- Idea 56—Design specific code to address design standard
- Idea 57—Tax incentives
- Idea 58—Lab for experimental architects

Goals

Prioritization

- Idea 5—Marketing (50)
- Idea 8—Housing/business (30)
- Idea 7—Redefine it (27)
- Idea 10—Incentives (7)

Plan

Design

- Idea 3—Provide loans, financing, tax incentives, grants
- Idea 4—Zoning policies facilitate business coming
- Idea 6—Underground parking
- Idea 7—Focus on access
- Idea 9—Who is the market, target the customers
- Idea 13—Aesthetically attractive
- Idea 14—Cohesive design
- Idea 15—Enclose the whole downtown or the corridor
- Idea 16—Change traffic flow
- Idea 17—Eliminate the traffic, put them underground
- Idea 22—Go vertical, up and underground
- Idea 25—Make downtown a residential area
- Idea 29—A new agency governing how the downtown operates
- Idea 30—Create an association of the interested property/business owners and users
- Idea 38—Landscape the whole area
- Idea 42—Combine museum and business, paid and free public events, festival
- Idea 44—Build and planetary
- Idea 45—New river aquarium
- Idea 47—Use the Blacksburg tunnel
- Idea 48—Uncover the water to make it a real river/creek
- Idea 49—Build a fountain

Group Three

Current Ideas and Notes

- Idea 1—Create parking space
- Idea 2—Accessible, human
  - ✓ aesthetic attractiveness
  - ✓ advertising
- Idea 3—Zoning by theme
- Idea 4—Architecture collection; layout
  - ✓ such as the food court in shopping mall; the design is attractive
  - ✓ but don't put all the shoe stores together; a flagship store accompanied by other stores
  - ✓ the placement of stores—candy store metaphor
  - ✓ shopping list (weekly, daily. . .) store placement
- Idea 5—Distinct: usefulness and attractiveness to customer/user
- Idea 6—Competition: environment or customer? customer first then the environment; target customer-mix
- Idea 7—Strategies should stop migration: shopping selection, zoning by incentives such as taxation, enterprise zone
- Idea 8—Advertising
- Idea 9—Aesthetic attractiveness
- Idea 10—Business incentives: tax
- Idea 11—A non-commercial facility: library, playground. . .
- Idea 12—Mentor program
- Idea 13—Encourage businesses to sell to each other: business community
- Idea 14—Flexibility to a changing market: the way to operate and the means to foster new ones; to promote
- Idea 15—Offer day-care: female/male consideration; public or private
- Idea 16—Enhance customer satisfaction
- Idea 17—Encourage local ownership

Goals
- Idea 1—Create parking space
- Idea 4—Architecture collection; layout
  - ✓ such as the food court in shopping mall; the design is attractive
  - ✓ but don't put all the shoe stores together; a flagship store accompanied by other stores
  - ✓ the placement of stores—candy store metaphor

      ✓   shopping list (weekly, daily. . .) store placement
- Idea 5—Distinct: usefulness and attractiveness to customer/user
- Idea 6—Competition: environment or customer? customer first then the environment; target customer-mix
- Idea 16—Enhance customer satisfaction

Prioritization

- Idea 8—Advertising (72)
- Idea 7—Strategies should stop migration: shopping selection, zoning by incentives such as taxation, enterprise zone (70)
- Idea 15—Offer day-care: female/male consideration; public or private (42)
- Idea 11—A non-commercial facility: library, playground. . . (36)
- Idea 13—Encourage businesses to sell to each other: business community (28)
- Idea 9—Aesthetic attractiveness (24)
- Idea 14—Flexibility to a changing market: the way to operate and the means to foster new ones; to promote
- Idea 1—Create parking space (16)
- Idea 10—Business incentives: tax (10)
- Idea 17—Encourage local ownership (10)
- Idea 12—Mentor program (9)
- Idea 2—Accessible, human (9)
- Idea 16—Enhance customer satisfaction (9)
- Idea 5—Distinct: usefulness and attractiveness to customer/user (9)
- Idea 3—Zoning by theme (0)
- Idea 4—Architecture collection; layout
  - ✓ such as the food court in shopping mall; the design is attractive
  - ✓ but don't put all the shoe stores together; a flagship store accompanied by other stores
  - ✓ the placement of stores—candy store metaphor
  - ✓ shopping list (weekly, daily. . .) store placement
- Idea 6—Competition: environment or customer? customer first then the Environment; target customer-mix

Plan

Transportation

- Idea 1—Create parking space
- Idea 2—Accessible, human

Design

- Idea 3—Zoning by theme
- Idea 4—Architecture collection; layout
- Idea 5—Distinct: usefulness and attractiveness to customer/user
- Idea 9—Aesthetic attractiveness

Service

- Idea 11—A non-commercial facility: library, playground. . .
- Idea 15—Offer day-care: female/male consideration; public or private
- Idea 16—Enhance customer satisfaction

Marketing

- Idea 8—Advertising
- Idea 11—A non-commercial facility: library, playground. . .
- Idea 12—Mentor program
- Idea 15—Offer day-care: female/male consideration; public or private
- Idea 16—Enhance customer satisfaction

Finance

- Idea 7—Strategies should stop migration: shopping selection
- Idea 10—Business incentives: tax
- Idea 13—Encourage businesses to sell to each other: business
- Idea 17—Encourage local ownership

Group Four

Current Ideas and Notes

- Idea 1—Encourage new small businesses
- Idea 2—Establish the corridor as the major activity center
- Idea 3—Sense of community at certain points of the corridor
  - ✓ businesses that have outdoor furniture, clustered together, where people can get together
  - ✓ Pedestrian and bicycle hub
- Idea 4—Linear parking
- Idea 5—Downtown pedestrian mall
- Idea 6—Special events, reasons to visit the corridor
- Idea 7—Establish a sense of unity among merchants, merchants association
- Idea 8—Multi-level parking
- Idea 9—Public trans systems
  - ✓ disney world monorail
- Idea 10—Ice skating ring
- Idea 11—Outdoor entertainment during spring and summer
- Idea 12—Economic incentives
- Idea 13—Make it hard to move to Christiansburg
- Idea 14—Keep the commercial rents down
- Idea 15—Limit the junk food places and encourage diversity
- Idea 16—Survey students and residents what they want
- Idea 17—Encourage customer services among existing businesses
- Idea 18—Experimental student businesses in vacant spaces
- Idea 19—Public bath in downtown area
- Idea 20— Public rest rooms
- Idea 21—Change main street to pedestrian mall
- Idea 22—Make the businesses appearing more appealing
- Idea 23—Add trees and benches along south main (gables) of
- Idea 24—Pedestrian cross walk (over path) connection between Gables and Blacksburg Square
- Idea 25—Make old K-Mart a night activity place for students
- Idea 26—Make K-Mart a ballroom dance hall
- Idea 27—Make it pleasant to move around from place to place, divert the traffic along Main Street
- Idea 28—make it easy to park in downtown
- Idea 29—Make parking places on the edge of the town and provide transportation to downtown

- Idea 30—Make transportation schedule continuous
- Idea 31—Public bike system
- Idea 32—More bike paths/parking
- Idea 33—Set a deadline for making decisions
- Idea 34—Free rent, for a while; tax break, favorable tax treatment for new business and expansion of businesses
- Idea 35—Provide start-up monies; businesses incubators
- Idea 36—Provide business workshops
- Idea 37—Advertising, a central business directory
- Idea 38— Uniqueness of downtown business, shop windows
- Idea 39—Word of mouth advertising, old town gossip
- Idea 40—Tell new coming students about downtown
- Idea 41—Second stepping out for students
- Idea 42—The unmall
- Idea 43—Make downtown a "mall"
- Idea 44—Expect the cycle of people's taste
- Idea 45—Capitalize the emerging sense of community
- Idea 46—Create more outdoor open spaces where people can sit down and enjoy
- Idea 47—Create an idea center where business people can look into
- Idea 48—Make College Street a mall, encourage outdoor cafe
- Idea 49—An area of continuous stepping out, "staying out"
- Idea 50—Family oriented activities at night
- Idea 51—Make South Main a family activities
- Idea 52—Make South Main a retirement center
- Idea 53—Emphasize the sense of community
- Idea 54—Accessibility, convenient, unique shopping experience
- Idea 55—Make people the priority over machines
- Idea 56—Ask people involved in the whole project, get people's input
- Idea 57—Create businesses that students want, and businesses for adults and senior citizens, diversity

Goals

Prioritization

- Idea 23—Benches (49)
- Idea 15—Junk food (40)
- Idea 22—Appearing (40)
- Idea 6—Special Events (40)

- Idea 26—Ballroom (24)
- Idea 5—Pedestrian mall (14)
- Idea 41—Second Stepping (14)
- Idea 46—Outdoor space (8)
- Idea 31—Public bike
- Idea 19—Public bath

Idea Packages

Pedestrian

- Idea 4—Linear park
- Idea 5—Downtown pedestrian mall
- Idea 6—Special events, reasons to visit the corridor
- Idea 7—Establish a sense of unity among merchants, merchants association
- Idea 8—Multi-level parking
- Idea 11—Outdoor entertainment during spring and summer
- Idea 20—Public rest rooms
- Idea 21—Change main street to pedestrian mall
- Idea 22—Make the businesses appearing more appealing
- Idea 23—Add trees and benches along south main (gables)
- Idea 24—Pedestrian cross walk (over path) connection between Gables and Blacksburg Square
- Idea 27—Make it pleasant to move around from place to place, divert the traffic along Main Street
- Idea 28—Make it easy to park in downtown
- Idea 29—Make parking places on the edge of the town and provide transportation to downtown
- Idea 30—Make transportation schedule continuous
- Idea 31— Public bike system
- Idea 32—More bike paths/parking
- Idea 38—Uniqueness of downtown businesses, shop windows
- Idea 41—Second stepping out for students
- Idea 42—The unmall
- Idea 43—Make downtown a "mall"
- Idea 46—Create more outdoor open spaces where people can sit down and enjoy
- Idea 49—An area of continuous stepping out, "staying out"
- Idea 51—Make South Main a family activities
- Idea 52—Make South Main a retirement center

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Group Five

Current Ideas and Notes

- Idea 1—Have mini-parks or something to promote attractiveness
- Idea 2—Keep Architecture attractive
- Idea 3—Incentives to get specialty shops such as framing shop
- Idea 4—Industrial park strategy at Gables and Blacksburg Square; shell buildings developed
- Idea 5—Change concept from strip mall landscape to more of a village concept
- Idea 6—Needs identification process to determine what is needed where (e.g. Hubbard Street out vs. Hubbard Street in)
- Idea 7—Entice professional clientele
- Idea 8—Get empty buildings filled
- Idea 9—Good and adequate signage without being intrusive; Easily seen, so as to know what is in the "mall"
- Idea 10—Design competition to develop overall theme or character, keep distinct or coordinate all three areas of town
- Idea 11—Encourage pedestrian traffic by having a park or something
- Idea 12—Make Hubbard to Country Club more attractive via landscaping, signage, etc.
- Idea 13—Town buy property
- Idea 14—Contact owners of Gables, etc. to encourage them to fill them by lowering rents
- Idea 15—Encourage local ownership
- Idea 16—Marketing strategies
- Idea 17—Distinct shops so that items can only be gotten there
- Idea 18—Town offer incentives such as lower rent, taxes, etc.
- Idea 19—Encourage mixed occupancy—residential over shops, etc., encourage pedestrian traffic
- Idea 20—Good transportation accessibility, buses come into shopping areas, frequency of buses, etc.
- Idea 21—Change Blacksburg council's perceived anti-business image
- Idea 22—Streamline red tape
- Idea 23—Open market at Gables—was there several summers ago, but not allowed back
- Idea 24—Explore seasonal uses of area
- Idea 25—Develop into office suites complex
- Idea 26—Monetary incentives from town to redesign shell buildings

- Idea 27—Corporate research center—town draw on that traffic along Main
  - Idea 28—Open businesses such as restaurant to serve people working in research park
- Idea 29—Some of larger buildings used as start-up companies—incubators
- Idea 30—Encourage Virginia Tech to rent/buy some of the buildings—better partnership
- Idea 31—Special events at these areas such as summerfest downtown, fairs, etc.
- Idea 32—Try and get back carnival
- Idea 33—Greek housing
- Idea 34—Change lighting to make it distinctive
- Idea 35—Develop complex such as Pulaski's Antiques complex
- Idea 36—Tie in with Electronic Village—electronic businesses go together in some areas
- Idea 37—Try to re-establish what was there (e.g. drug stores left, maybe encourage some to come back; fabric stores, etc.)
- Idea 38—Novelty shops—five and dimes
- Idea 39—Figure out what motivates owner to leave shopping centers
- Idea 40—Exit interviews: "Why did you leave?"
- Idea 41—Initial interviews: "What are new business expectations?"
- Idea 42—Parking accessibility
- Idea 43—Pier One type store—national retail stores that might not be able to afford downtown rents.
- Idea 44—Foreign investment to draw in international students—international bazaar
- Idea 45—Determine needs of students/faculty that may not be being met with current mall shops; tie in with needs assessment
- Idea 46—More consideration by town council of better needs assessment
- Idea 47—Creative partnership between city council and private business
- Idea 48—Blacksburg marketing itself; tie in with distinctiveness

Group Six

Current Goals and Ideas

Goals

- Find anything in BB
- Center for constituent groups
  - ✓ Teens
  - ✓ Families
  - ✓ Retirement
  - ✓ Students
  - ✓ Children
  - ✓ "Townies"
- Unique identity
- Zero vacancy
- Good diversity
- Parking
- Recreational opportunities
- Positive economic impact
- Provide youth activities
- Enhance BB as a retirement center

Ideas

- Idea 1—Convert armory to a senior center
- Idea 2—Town based economic incentives (incubator for small businesses)
- Idea 3—Convert K-Mart into a mixed use center with common area (mini-squires)
- Idea 4—Get federal grant
- Idea 5—Convert Gables building into arts/crafts center with craft/hobby shops
- Idea 6—Establish unique and popular restaurant in Gables area
- Idea 7—Downtown parking lots
- Idea 8—Implement "greenway"
- Idea 9—Complete Hubbard connection
- Idea 10—Recruit large vendor
- Idea 11—Develop town center
- Idea 12—Flea/Farmers market at Gables (covered, all weather)
- Idea 13—Use middle school after hours as a youth center

- Idea 14—Improve transportation system to include activities
- Idea 15—"Cable cars"
- Idea 16—After school tutoring/recreation activities
- Idea 17—Promote senior activities
- Idea 18—Intergenerational center—theater, restaurant, activities, special shops
- Idea 19—Limit commercial zoning

- Idea 20—Reserve center
- Idea 21—Used book/exchange
- Idea 22—Middle car racing
- Idea 23—"Go cart" track
- Idea 24—Recycling center (business!)
- Idea 25—Small business (retail) incubator

Prioritization

Priority No. 1

- Idea 14—Improve transportation system to include activities
- Idea 24—Recycling Center

Priority No. 2

- Idea 4—Get federal grant
- Idea 6—Establish unique and popular restaurant in Gables area
- Idea 11— Develop town center
- Idea 16—After school tutoring/recreation activities

Priority No. 3

- Idea 8—Implement "greenway"

Priority No. 4

- Idea 1—Convert armory to a senior center
- Idea 10—Recruit large vendor
- Idea 12—Flea/Farmers market at Gables (covered, all weather)

- Idea 18—Intergenerational center—theater, restaurant, activities, special shops
- Idea 19—Limit commercial zoning

Priority No. 5

- Idea 7—Downtown parking lots

Priority No. 6

- Idea 3—Convert K-Mart into a mixed use center with common area (mini-squires)

Priority No. 7

- Idea 5—Convert Gables building into arts/crafts center with craft/hobby shops

Priority No. 8

- Idea 2—Town based economic incentives (incubator for small businesses)

Plan

- Economic incentives including small business incubator
- Establish intergenerational center to include theater, restaurant, special shops and activities in Gables/Lowes space
- Use Gables space for art, crafts and hobbies including studios, workshops and galleries
- Convert K-Mart into mini-squires/community center (teens, senior, etc.)
- Recruit unique and popular restaurant (e.g. Red Lobster for Gables area)
- Establish covered, all weather flea/farmers market in Gables area
- Convert armory into senior center

Group Seven

Current Ideas and Notes

- Idea 1—Consider service items i.e. dime store, clothing store, card shop, copy
  area, restaurant, discount store

  NOTE: Town has little control over whether or not these entities are established. They come about as a result of other things.

- Idea 2—Library in old Leggetts
- Idea 3—Remove some of the restrictions
- Idea 4—Study root of economic decline. Need incentives at tax level, zoning level
- Idea 5—Need to know benefits of growth—does it pay?
- Idea 6—Plow it down and let grass grow
- Idea 7—If they have income for empty building, do they want to
change   • Idea 8—Home Depot—unique store that might be willing to locate here
- Idea 9—Grocer "wholesale" store
- Idea 10—Medical complex
- Idea 11—City buy property
- Idea 12—School by satellite
- Idea 13—Investigate grants
- Idea 14—Make into parks, low income housing, etc.
- Idea 15—Educational uses by NRCC and UPI as satellites or administration
- Idea 16—Municipal and county government complex
- Idea 17—Improve physical appearances, add trees, uniform signage
- Idea 18—Look at part of downtown that works
- Idea 19—Develop definition of space
- Idea 20—Make having a "wonderful place" pre-eminent over the "almighty
  dollar
- Idea 21—Admit that competing with Wal-Mart and K-Mart is hopeless
- Idea 22—Narrow South Main to slow speed, make more of city street vs. highway. Reinstate idea of main street—small town image
- Idea 23—Encourage more housing development
- Idea 24—Try to forbid retail development in other parts of town

- Idea 25—Recruit stores that don't aim head-on to compete with major retailers
- Idea 26—Play up tie with Virginia Tech and intellectual community—arts, festivals, cultural events, etc.
- Idea 27—Park at retirement community
- Idea 28—Students who decide to stay; why?
- Idea 29—Determine who we are; what is real problem?
- Idea 30—Does growth necessarily help us?
- Idea 31—Any solution should not damage downtown development
- Idea 32—University use these empty buildings
- Idea 33—If you get people and traffic, you will get demand for services/retail
- Idea 34—Provide retraining services for community, i.e. increase skill level
  of population, aptitude testing, retraining, "reminding" people, job placement
- Idea 35—Marketing research—what would go?
- Idea 36—Needs assessment
- Idea 37—Provide more transportation, free trolley idea
- Idea 38—Parking accessibility and cost; e.g. meters with possibilities of tickets, etc. vs. free parking area
- Idea 39—Capitalize on buying power of students
- Idea 40—Look at zoning—relax? tighter? require landscaping? economic view
  must also incorporate aesthetic concern
- Idea 41—Urban design issues—stores next to street; parking in back
- Idea 42—Promote open space—trees/park with limited retail
- Idea 43—Safety, security issues; business traffic at all hours of day
- Idea 44—Look at it as issue of nodes—within nodes pedestrian traffic—need
  transportation between nodes
- Idea 45—Take advantage of what we have; electronic village—fiber optics; compete with corporate research—get electronic businesses

Group Eight

Current Goals/Criteria and Ideas

Goals

- Environmental impact
- Cost
- Aesthetics
- Economic sufficiency
- Flexibility
- Feasibility
- Public safety
- Accessibility
- Social impact

Ideas

- Idea 1—Encourage family oriented retail mix
- Idea 2—Increase number of bus stops along South Main
- Idea 3—More diverse restaurants
- Idea 4—Encourage mixture of professional and retail spaces
- Idea 5—Free shuttle busses
- Idea 6—Tie downtown retail and government services
- Idea 7—More downtown events
- Idea 8—Utilize empty spaces, special reference to Gables
- Idea 9—Movie theater, farmers market, museum
- Idea 10—Lots of walkways (pedestrian walks)
- Idea 11— Physical focus for downtown
- Idea 12—Advertise to new residents
- Idea 13—Avoid "hamburger" alley
- Idea 14—Clean, safe, public restrooms/drinking fountains
- Idea 15—Lots of "tasteful" landscaping
- Idea 16—Promote town-wise perspective of merchants
- Idea 17—More free parking
- Idea 18—Bike parking
- Idea 19—Benches/pedestrian amenities
- Idea 20—Food vendor carts
- Idea 21—Encourage responsive investment and ownership

Prioritization

Priority No. 1

- Idea 14—Clean, safe, public restrooms/drinking fountains

Priority No. 2

- Idea 5—Free shuttle buses

Priority No. 3

- Idea 4—Encourage mixture of professional and retail spaces
- Idea 7—More downtown events
- Idea 9—Movie theater, farmers market, museum
- Idea 10—Lots of walkways (pedestrian walks)

Priority No. 4

- Idea 1—Encourage family oriented retail mix
- Idea 8—Utilize empty spaces, special reference to Gables
- Idea 11— Physical focus for downtown
- Idea 13—Avoid "hamburger" alley

Priority No. 5

- Idea 2—Increase number of bus stops along South Main
- Idea 3—More diverse restaurants
- Idea 6—Tie downtown retail and government services
- Idea 12—Advertise to new residents
- Idea 15—Lots of "tasteful" landscaping
- Idea 16—Promote town-wise perspective of merchants
- Idea 17—More free parking
- Idea 18—Bike parking
- Idea 19—Benches/pedestrian amenities
- Idea 20—Food vendor carts
- Idea 21—Encourage responsive investment and ownership

VITA

Milton E. Lopes

CURRENT POSITION

Public Service Assistant, Institute of Community and Area Development, the University of Georgia.

BACKGROUND

More than twenty-five years of academic, government, and corporate experience. Has taught in colleges and universities in Texas, Maryland and Virginia ... been involved in regional and multi-state community/economic development and small business management training and development/assistance. Has been a senior marketing manager with large blue chip firm, a Commercial Lending and Trust Officer with major Southwest bank, extensive sales, investment and financial planning experience with major Wall Street firm, New York based life insurance company and financial advisory firm located in Dallas. As consultant has worked with a number of closely-held businesses, federal and municipal agencies, non-profit organizations and other entities in the areas of organizational development, strategy planning, finance, marketing, and productivity improvement.

EXPERIENCE

Founder and Principal of STRATEGIC MANAGEMENT ASSOCIATES, consultants and advisors to industry and government. Has been associated with the human resource consulting firm, Karen Johnson Associates as Vice President; Westinghouse Electric Corporation's Furniture Systems Division as a Marketing Zone Manager responsible for Dealer Development and Relations throughout that portion of the United States west of the Mississippi River; Strategic Planning Associates of Houston, Texas as President; Radford University in Virginia as a Marketing Instructor; Morgan State University as a Marketing Lecturer; Texas Southern University as Assistant Professor of Finance and Marketing. Has also been Director of that University's Economic Development Center and Risk Management Center. Recommended by Governor of Texas and appointed by the Carter Administration to represent the State of Texas on the Ozarks Regional Commission, an economic development entity of the U.S. Commerce Department. Has been a portfolio manager with Financial Strategies Corporation, a trust officer of InterFirst Bank, and Executive Director of the Interracial Council for Business Opportunity - all in Dallas, Texas. In New York City was involved in investment banking with the then Shearson Hammill, Inc. and in life insurance with New York Life Insurance Company.

EDUCATION

PHD, Center for Public Administration and Policy, Virginia Polytechnic Institute and State University, Blacksburg VA. Commonwealth Fellow. Concentration: Public Policy. Dissertation title: *DECISION INTERACTION PROCESSES AND DECISION PRODUCT QUALITY: A Comparative Study of A Group Support System, CyberQuest and the Nominal Group Technique*, 1994

MBA, University of Dallas, Texas; Concentration: Marketing; 1978.

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TEACHING INTERESTS

Strategic Management, Public Policy, Organization Theory, Normative Foundations

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Group decision Processes, Citizenship and Governance, Regional and Community Economic Development, Ethics.

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Strategic Management, Marketing Management, Small Business Management, Financial Management, Risk Management, Organizational Theory and Design, Business Ethics

PROFESSIONAL AFFILIATION

American Society for Public Administration (Past President, Southwest Virginia Chapter)

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MILITARY

U.S. Army (Information Specialist), Feb. 1960 - Dec. 1962, Active Duty; Honorable Discharge, 1966