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The University of Arizona, 1991

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DESIGN AND IMPLEMENTATION OF A NEGOTIATION SUPPORT SYSTEM

by

Bruce Corey Herniter

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A Dissertation Submitted to the Faculty of the
DEPARTMENT OF MANAGEMENT INFORMATION SYSTEMS
In Partial Fulfillment of the Requirements
For the Degree of
DOCTOR OF PHILOSOPHY
In the Graduate College
THE UNIVERSITY OF ARIZONA

1991
As members of the Final Examination Committee, we certify that we have read the dissertation prepared by Bruce Corey Herniter entitled The Design and Implementation of a Negotiation Support System and recommend that it be accepted as fulfilling the dissertation requirement for the Degree of Doctor of Philosophy.

Final approval and acceptance of this dissertation is contingent upon the candidate's submission of the final copy of the dissertation to the Graduate College.

I hereby certify that I have read this dissertation prepared under my direction and recommend that it be accepted as fulfilling the dissertation requirement.

[Signatures]

[Date: 3/18/91]
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ACKNOWLEDGEMENTS

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ABSTRACT

A Negotiation Support System (NSS) is a system consisting of hardware, software, people, and procedures that assists the individual negotiator, mediator, or researcher; and provides a solution or facilitates the process of negotiation. NSS have previously been designed around modeling and simulation, expert systems, and other techniques. However, negotiation can be considered a group process involving two or more teams with communication routed through the group leaders.

Electronic Meeting Systems (EMS) provide a model for the use of computers during group processes. EMS provide a research model and a framework for the development of software tools specify that a computer-based meeting system consists of task, people, is based on MEDIANSS and its successor GroupSystems/Mediation (GS/M) were tested in two contract negotiations totaling almost 90 hours over 23 sessions. The negotiators generally approved of the GS/M tools and used them: the negotiators spent 19% to 24% of their time using computers. Both negotiations concluded successfully. The major accomplishment of GS/M was its assistance in the secretarial function of the talks. The drafts of the contracts were finalized faster than typically expected.
I. INTRODUCTION

A. Background and Motivation

To negotiate is "to treat with another or others in order to come to terms or reach an agreement" (Morris, 1975, p. 879). It occurs all around us and is endemic to our society. Notice that the definition does not define the parties to the negotiation in any way. Essentially, any individual person or organizational entity can enter into negotiation. The parties to a negotiation can be countries, companies and labor unions, or individuals (Fisher and Ury, 1981).

All societies have evolved some method of resolving disputes (Gulliver, 1979). Examples range from the judicial systems evolved by the European nations to the rabbinical tribunals of Jewish law (the "Bet Din") to a tribunal of neighbors known as Rukurato Rw’enzarwa of the Bunyoro people of Uganda.

In the United States of America, negotiation is a major method of resolving disputes. Developers negotiate with neighborhoods, companies negotiate with creditors, and lawyers negotiate on behalf of clients. A textbook on negotiation can offer examples of negotiations between individuals over whether a library window should be open or closed (Fisher and Ury, 1981) or involving a dispute between a hospital and its neighboring residents over delivering affordable medical care (Lewicki and Litterer, 1985).

Negotiation has also been identified as a major task of the manager (Lax and Sebenius, 1986). A manager may negotiate with others who are her superiors, equals, or subordinates in the organization. Managers negotiate in order to obtain resources that are not under their direct control. By doing so, they are able to cooperate and, together, create value for their organizations.
Managers, of course, also negotiate with their workers over union contracts (Walton and McKersie, 1965). Labor negotiations are complex dances determined by past practice and labor law. Teams of negotiators meet to hammer out contracts.

Despite its pervasiveness, perhaps the most famous examples of negotiation involve nations. The Cuban Missile Crisis (Kennedy, 1969), the Egyptian-Israeli Peace Accords of 1979 (Carter, 1985), and the Paris Peace Accords between the United States of America and North Vietnam (Kissinger, 1979; 1982) are just a few of the more recent examples. International negotiations are, perhaps, more interesting because of their impact on peace and war: their failure may mean a resort to warfare.

This research attempts to explore negotiation by designing and then using a system that assists two sides in reaching agreement. The setting is the MIS Group Work Facility at the University of Arizona. The system design is known as MEDIANSS (for MEDIAted Negotiation Session Support) and its implementation using University of Arizona GroupSystems is called GS/M or GroupSystems/Mediation.

B. Research Question

Many of the negotiations cited above require teams. International talks, labor-union bargaining, and others may involve teams that participate in the negotiation. An Electronic Meeting System is a system that uses "information technology to support group work that occurs in meetings" (Dennis et al., 1988, p.593). The group task may be to devise a plan or to create a list of objects to carry to the North Pole for survival, but the operative point is that it is a group activity. Examples of an Electronic Meeting System or EMS include SAMM (Software-Aided Meeting
Management) and University of Arizona GroupSystems (MIS Research Center, 1988; Ventana Corporation, 1990a,b).

Given this work, it is reasonable to expect that a computer-based system operating in the mode of an Electronic Meeting System (also known as a Group Decision Support System or GDSS) should be able to assist negotiators in their task (Dennis et al., 1988). However, only a few researchers have attempted to offer conceptual designs for a Negotiation Support System based on Electronic Meeting Systems (Anson and Jelassi, 1990; Carmel and Herniter; 1989).

The goal of this research is to develop a viable Negotiation Support System in the mode of an Electronic Meeting System. The question this research attempts to answer is:

Can an Electronic Meeting System be devised to support the process of negotiation?

But is there a way to build such a system and conduct valid research?

Indeed there is. System Development Research Methodology (Chen, 1988; Nunamaker and Chen, 1990) is used throughout this research and is described in detail in Chapter 3. The philosophy behind it is that the acts of researching, designing, building, and testing teaches the researcher about a subject. If a system built to aid a process fails, then that failure may signal a flaw in the understanding of that process. Examining the data from the test leads to reformulating the theories or hypotheses on which the system is based. A cycle is started wherein the current knowledge about a process is enshrined in a design, the design is turned into an operational system, the system is rigorously tested to determine its viability, and new knowledge is gained. The cycle can then be repeated.

When using System Development Research Methodology, the first task of the designer is to discover as much as possible about negotiation. Negotiation is a complex task that researchers in the field have broken down into several steps (Kessler, 1978; Sheppard, 1978).
In this research, each negotiation step is examined to determine a software tool that can reasonably be expected to assist it. The combination of steps and tool design is the MEDIANSS framework.

Building the system requires both new and old software. If possible, pre-existing software tools are adapted to negotiation; if not possible, then new tools are designed and implemented. The resulting system is called GroupSystems/Mediation.

The viability of a system can be measured in many ways. In this research, the GS/M system was used in two labor contract negotiations and the case study methodology was employed. Viability is be judged by the actual use of the tools, the attitudes of the participants toward the tools, and the suggestions made by the participants. Success is also judged by outcome: did the final agreement suffer or benefit as a result of using the system? Time spent actually negotiating is also indicative of the value of the system as a negotiation aid.

C. Organization of the Dissertation

Revising the MEDIANSS design, building GroupSystems/Mediation, and testing GroupSystems/Mediation are the focus of this dissertation. The two labor-management case studies represent the end of one complete pass through the steps of research, design, implementation, and testing. However, before we leave this work, another cycle begins: the dissertation ends with a conceptual design for a second generation computer tool specifically for negotiation.

Chapter 2 starts out with a survey of the classification schemes for negotiation and the frameworks offered by researchers. It proceeds to examine previous work in computer-assisted negotiation including modeling and simulation, expert systems, and linear programming solutions.
Electronic Meeting Systems are then examined for their applicability to negotiation. Finally, the framework by Anson and Jelassi (1990) and the MEDIANSS framework by Carmel and Herniter (1988, 1989) in support systems for the negotiation process are reviewed.

Chapter 3 investigates the requirements of the System Development Research Methodology (Nunamaker and Chen, 1990). This methodology formalizes system building as a scientific endeavor. To validate the resulting system, the case study was the methodology of choice. The case study of MEDIANSS and GS/M takes place in the natural setting of the negotiation. The advantage this offers is that the target group for the software are also participants in the case study. Their comments are used to evaluate and further develop the tools. In the two cases described in Chapter 5, the researchers acted as mediators, thus participating in the negotiation process itself as well as observing it.

Chapter 4 details the design of the GroupSystems implementation of the MEDIANSS tools, renamed GroupSystems/Mediation. The software comes in two categories: software specifically written for negotiation and software adapted from GroupSystems for negotiation. In the former category were two tools, Issue Consolidation and Linking. In the latter category were the Electronic Bargaining Book, the Contract Log, and the Article List. The designs of these tools and details of their implementations are discussed in the chapter. These tools were developed for the two labor-management negotiations described in the case studies in Chapter 5.

Chapter 5 describes in detail the contract negotiations held between the management and unions of TransCo and HealthCare. These are the disguised names of a public transportation company and a not-for-profit medical clinic, respectively. The stories of the negotiations are told to set the scene and illustrate the kinds of issues that were discussed. However, the software tools were not frozen in their development during the talks. The story also explains how the
tools evolved during the talks. Data from five sources are used to evaluate the success of the
design: researcher's notes, periodic observations of system use, questionnaire results, post-
negotiation interviews, and the results of a meeting with the case study participants who were
asked to create and rank order a list of suggested improvements to the system.

Finally, Chapter 6 discusses the contributions of the research, its limitations, and future
work. A conceptual design for a second generation software tool is offered. The revised
Electronic Bargaining Book will unite various functions now offered separately by the current
tools.
II. LITERATURE REVIEW

Bargaining has been a part of human behavior for years without the benefit of computers. It is not obvious to the casual observer that a computer can help. However, streams of research in negotiation, Electronic Meeting Systems (EMS, also known as Group Decision Support Systems (GDSS)), and Negotiation Support Systems (NSS) suggest that a synthesis is possible. This synthesis combines the communication and recording capabilities of EMS with the inherent structure of negotiation. The result is a framework for the creation of an NSS that supports the process of negotiation.

A definition of a Negotiation Support System (NSS) has been offered by Foroughi and Jelassi (1990, p. 2). They define an NSS as "a special type of Group Decision Support Systems (GDSS) intended to support negotiation parties (and possibly a human mediator) in reaching an agreement." Offered here is a more specific definition: an NSS is a system consisting of hardware, software, people, and procedures that assists the individual negotiator, mediator, or researcher; and provides a solution or facilitates the process of negotiation. There are several kinds of NSS discussed in the literature: Models, Multiobjective Linear Programming, and Expert System. These systems use the computer to make suggestions. The computer calculates a proposal, indicates an equitable agreement, or suggests negotiation strategies. An entire section is devoted to modeling-type NSS and another section to the linear programming and expert system approaches.

However, this research advocates a new approach — the Negotiation Session System. Session systems support the process of negotiation from planning to bargaining to writing an agreement. The session concept is one that fits in well with Group Decision Support Systems. But there are differences in the environment and communication structures between Session
Systems and current GDSS. GDSS and FMS research is reviewed and then a synthesis of negotiation research and GDSS is presented in the form of MEDIANSS. This section will argue that Session Systems, in the form of MEDIANSS, are both a part of and an important extension to GDSS.

The structure of this second chapter is as follows. This remainder of the second chapter first reviews the various classifications of negotiation and then models of negotiation. It goes on to look at Models, Multiobjective Linear Programming and Expert Systems to see how they have been applied. The fifth section reviews EMS research and the sixth section examines the MEDIANSS design for an NSS.

In summary, this section makes the argument that a Negotiation Session System adapting the software tools of Group Decision Support Systems to the negotiation process is a plausible and fruitful merging of both streams of research.

A. Classification Schemes

Both negotiations and Negotiation Support Systems come in several varieties. Negotiations can be classified according to the parties involved (countries, organizations, or individuals), but authors in the field tend to agree that the process of negotiation is more fundamental (Fisher and Ury, 1981; Raiffa, 1982). There are several approaches to the classification of negotiations (Murray, 1986). Most seem to define negotiation as being of two extremes: an ideal that few negotiations have attained and the evil alternative which the majority of negotiators follow. The articles tend to show how negotiation can be improved by using the better alternative. Figure 1 illustrates some of the more popular classification schemes.
Figure 1. Taxonomies of Negotiation.

A.1. Distributive and Integrative Bargaining

Two taxonomies that describe the tone of the bargaining are offered by Raiffa (1982). One taxonomy divides negotiations into a spectrum ranging from "Distributed Bargaining" to "Integrative Bargaining" (Lewicki and Litterer (1985) renamed this "Cooperative Problem Solving"). Distributed bargaining is most familiar in the form of bargaining for a used car. Any reduction in the price of the car removes money from the pocket of the salesman, any increase in the price paid removes money from the pocket of the buyer. This is also known as a "Win-Lose" situation because there may be no satisfactory way that both parties can be fully content with the result.

An example of integrative bargaining can be found where there is not only something to buy and sell, but also one side is operating under time pressure. Raiffa (1982) illustrates this with a seller who wants a minimum of $60,000 to settle, but needs his money over a thirty month or less period. The buyer is only willing to offer a maximum of $50,000, but she wants to pay it off over at least thirty-four months. Considered separately, there is no zone of agreement on either of these two issues. However, taken together, each side might compromise on one issue to get what it wants on another. The seller might be willing to accept a thirty-six month period...
of payment (better for the buyer) if the buyer is willing to offer $63,000 (better for the seller). In such a compromise, the seller gets better than his rock bottom price, while buyer has longer than her minimum period to pay the bill.

Integrative bargaining may occur in a multi-issue negotiation, but will it? Tradeoffs between several issues can occur. The problem for mediators is that participants in multi-issue negotiations often bargain in a distributed manner. The question is, how can negotiators be encouraged to bargain integratively?

Raiffa (1982) also divides negotiation into single and multi-issue bargaining. These two extremes are closely identified with the Distributive and Integrative Bargaining spectrum, but not exactly. Distributive Bargaining occurs during both single issue negotiations and multi-issue negotiations. However, multi-issue negotiations can be integrative. Many of the prescriptions for successful negotiation center on how to turn a distributed negotiation into an integrative negotiation.

A.2. Positional and Principled Bargaining

Fisher and Ury also offer two taxonomies. The first put forth two bargaining approaches: positional bargaining, which is the traditional approach, and "principled" bargaining, which they offer as an alternative. Principled bargaining is favored by Fisher and Ury (1981).

The second taxonomy is said to occur within positional bargaining. Traditional positional bargaining involves each side arguing over their stated positions. It sees the negotiation process as one where each side states a position and then gives concessions to the other to meet in some middle ground. With traditional bargaining there is yet another taxonomy. There are two extremes of styles: 'hard' and 'soft' (Fisher and Ury, 1981). Soft bargainers
assume that the two sides are friends; that everyone trusts each other; that their mutual goal is an agreement. However, soft bargainers are willing to yield to the other’s demands and change positions easily. Hard bargainers assume that others are their adversaries, that their is mutual distrust; that they must never yield to the other side; and that positions must never change.

Consider the implications of these styles for a two-sided negotiation: if both sides adopt a hard style, it can lead to stalemate; if both sides adopt a soft style, they can easily neglect the true interests of the people they represent; and if one side takes a hard line while the other takes a soft line, the hard side may win the negotiation with an agreement that causes resentment and trouble later (for the constituency of the "soft" team will surely realize they were taken advantage).

The alternative to positional bargaining, the approach championed by Fisher and Ury (1981), is "principled" bargaining. Basically, what they have done is to try to move negotiation to a realm where participants see their true interests, eschewing insults and disregarding personalities. This style involves four axioms. The first is to separate people from the problem. The second is to focus on interests, not positions. The third principle is to generate options. Finally, results should be based on objective standards. For short, these are called designated people, interests, options, and criteria.

In principled bargaining, participants are encouraged to treat negotiation as a problem-solving situation. Instead of splitting the difference between two positions, participants look for underlying causes. An example of focusing on interests is found in Fisher and Ury (1981). They describe a situation where two library patrons argue over an open window; one wants it shut, the other wants it open. No compromise, such as keeping the window partially open, seems possible. The librarian comes over and asks why it should be open. The reason to keep the window open
is for the fresh air. The reason for keeping the window shut is to avoid a draft. The librarian solves the problem by going beyond the positions and addresses the underlying interests by opening a window in the adjacent room, providing fresh air and avoiding a draft.

A.3. Third Party Intervention

Negotiations can also be classified according to the type of assistance the negotiators receive in coming to an agreement: unassisted, mediator-assisted, and arbiter-assisted. Unassisted negotiation means that no third parties are involved. In mediator-assisted negotiation or mediation, a third party is called in to assist the process, but not the outcome of the negotiations. A mediator acts very much like a facilitator. In arbiter-assisted talks, the arbitrator must come up with the solution, the outcome of the negotiation (Kessler, 1978).

B. Structured Negotiation Models

The negotiation literature offers several stage models of negotiation. Stage models of negotiation provide a basis for an agenda and act as a guideline for researchers. Agenda-setting is also one of the benefits of an electronic meeting system (Dennis et al., 1988). Several will be examined here (Figure 2).

B.1. Creative Conflict Resolution

Kessler is a practitioner of mediation. Her model of negotiation is a result of observation, experience and interviews with 30 mediator’s around the United States. There are four steps: setting the stage, defining the issues, processing the issues and resolving the issues (Kessler, 1978). She also advocates use of a mediator. These steps are meant to encourage a satisfactory
Figure 2. Stage theories of negotiation.

and cooperative negotiation. In other words, it is prescriptive, rather than descriptive.

The process model of Kessler is cited by two articles in the field of negotiation support systems. Anson and Jelassi (1990) used Kessler's stage model to design a development framework for a computerized support system for negotiation. Building on their work, Carmel and Herniter (1989) designed structures and fit University of Arizona GroupSystems tools to the model.

The first step is to set the stage. This is a preparatory step defined by Kessler as having four parts: establishing rules, setting the tone, obtaining commitment, and foreshadowing. First, the ground rules are established. In the one of the labor-management negotiations described later (Chapter 6), the two sides decided to restrict information given out regarding the talks to mutually agreed joint statements. They also agreed to provide all the information necessary to support their proposals. These rules can be used to set a tone of cooperation between the sides and to get a commitment to deal with each other openly and fairly. This stage is also used to commit
the sides to actually sitting down with each other. Kessler’s final purpose for this stage is to foreshadow the problems to be discussed later.

The second step is to define the issues. This involves exploring assumptions, gathering facts, and discovering the "real" issues. This is a joint process; both sides are involved. Although it predates their work, this step conforms closely to Fisher and Ury’s (1981) admonition to "focus on issues, not positions."

The third step is to process the issues. The first task is to manage the emotions. Negotiators are encouraged to question each other and avoid nonverbal signals that might enflame the situation and create impasses. Encouraging empathy between the negotiators will help them to understand each others styles, needs, and issues.

Resolving the issues is the fourth and final stage in Kessler’s model. Again, the guidelines here foreshadow Fisher and Ury’s later recommendations. Negotiators are asked to be creative in generating alternatives and to expand the boundaries by exploring different means and ends. The goal is to satisfy everyone (reminiscent of the integrative bargaining). Finally, specific monitoring of results and evaluations should be set.

B.2. Principled Negotiation

As a backdrop to principled bargaining, Fisher and Ury (1981) offer a three-stage framework. In the analysis stage, the negotiators diagnose the situation: they gather information, organize it, and think about the people, interests, options, and criteria. This is done privately.

Planning comes next and is, again, done privately. Ideas are generated on how to handle people, determining the most important interests and objectives. The actual bargaining is relegated to the discussion stage.
B.3. Negotiated Investment Strategy

Negotiated Investment Strategy (NIS) was conceived as a framework for conducting negotiations concerning public policy. It was developed under the auspices of the Kettering Foundation of Ohio and The Conflict Clinic, Inc. (Kettering Foundation, 1984, Laue et al., 1988). Five cases are cited by Laue et al. (1988). The governments who would implement these policies ranged in size from cities to regional groupings of states. Research is currently carried on by the Conflict Clinic.

NIS is based on the several assumptions. First, all parties with a stake in the outcome are represented (business, state government, local government, community groups), so NIS is designed for multiparty negotiations. Second, each party's interests are represented by negotiating teams. Finally, the teams bargain in face-to-face negotiation, assisted by a mediator.

Stages similar to those discussed previously are part of the NIS framework. First comes organizing for negotiation. It is conducted between the time an NIS negotiation is decided upon and the first session. Then comes exchanging information. This step occurs just before and includes the first negotiation. The second step is actually negotiating; it starts with the first session and continues until an agreement is signed. Reviewing and monitoring the agreement immediately following the signing is the final step.

Negotiated Investment Strategy has been actively pursued by the Conflict Clinic. The Kettering Foundation (1984) and Laue et al. (1988) describe use of the technique in a variety of public policy applications: Gary, Indiana (comprehensive urban planning); Connecticut (allocation of federal block grant for social services); Missouri River Basin States water disputes; expansion of Interstate Highway 30 in Texas; and Arapahoe County Development Dispute in Colorado.
Sheppard synthesized several stage models (eight are cited) and problem-solving models (three are cited) to come up with a single, four-step model. The four stages were definition, discussion, alternative selection, and reconciliation. The similarity to Simon's intelligence-design-choice model is striking (Simon, 1960). Definition and discussion map into intelligence; alternative selection maps into design; and reconciliation matches choice.

The definition stage is similar to Fisher and Ury's analysis and planning stages as well as Kessler's stage setting step. The procedure is selected (i.e., a commitment is made to negotiate). The parties decide just what the dispute is about and they look around for alternatives.

The second phase is discussion; it is similar to Kessler's processing and resolution steps and parts of Fisher and Ury's planning and discussion steps. Here, information is exchanged and each side is able to present arguments for their alternatives. Clarifications on proposals are sought and exchanged.

The last two steps describe, in vague terms, the give and take of bargaining. The third step is alternative selection. This, of course, is a very complicated process. In Sheppard's framework, this involves joint decisions on the validity of information and arguments. The goal is to select among alternatives. The fourth step is to reconcile the sides to the solutions they have reached and then to take steps to enforce the agreement.

The stages occur in fixed sequence, but events within stages can be in any order.
B.5. PAST

Our discussion of stage models will end with that of PAST model (Barrett, 1990a,b; U.S. Department of Labor, 1990a,b). Like the Kessler model, it is important because it was developed by a practitioner. Barrett was at the United States Department of Labor Bureau of Labor-Management Relations and Cooperative Programs and wrote several position papers describing Win-Win negotiation. The technique has been taught to the staff of the Federal Mediation and Conciliation Service (Cinquemani, 1990). The framework includes the principled negotiation techniques of Fisher and Ury (1981).

The 'P' of "PAST" stands for the four "principles" of Fisher and Ury (1981): people (separate the people from the problem), interests (focus on interests, not positions), options (invent options for mutual gain), and criteria (insist on using objective criteria).

The 'A' of "PAST" stands for "assumptions" (Barrett, 1990b). These assumptions all justify the Win-Win approach. Bargaining enhances the relationship. Both parties can win in bargaining, and they should help each other win. Open and frank discussion expands the area of mutual interests, and that expands the options available to the parties. While power exists in any bargaining environment, mutually developed standards move decision-making away from reliance on power.

The 'S' stands for "steps" (Barrett, 1990a). This is where the stage theory comes in and it has eight steps. Before the negotiation, the sides start with preparation. After preparations, the first session starts with an opening statement. The sides proceed to agree on a list of issues (issues are the problems to be solved jointly by the two sides).

The next four steps are repeated for each and every issue identified in step three. The first issue is selected and then each group identifies their interests in settling the issue. The
sides go on to develop options to resolve the issue. The sixth step is to create standards (i.e., criteria) so that the seventh step, testing options, can produce unambiguous results. The eighth and last step is achieving Win-Win agreement.

The 'T' stands for techniques. Specific techniques mentioned are brainstorming, consensus building, problem solving, idea charting, prioritizing, and team building (United States Department of Labor, 1990a). None of these techniques are explained.

To implement the PAST scheme, Barrett (1990a) stresses training and closely following the steps. Once the methods are learned, then innovation is encouraged. Barrett suggests that the learning experience concentrate on understanding the assumptions of the technique. The problem is that Win-Win negotiation goes against traditional bargaining behavior, so following the steps rigidly at first is suggested. Later, with more experience, innovation can be safely applied. Two training alternatives are presented and discussed. One option is skills-based training. Win-Win bargaining takes a long time and it is difficult. Third-party based training is the second alternative. Barrett seems to suggest that a third-party, a mediator, is necessary to both train the negotiators and facilitate the talks. So the groups should be chauffeured through the process.

Criticism of the PAST scheme comes from the Federal mediator involved with the cases discussed later (Cinquemani, 1990). In general, only the non-economic issues are taken one at a time. There is no attempt to counter one side's concessions on one non-economic issue with concessions from the other side on another non-economic issue. Economic issues, on the other hand, are approached in an integrative manner. The issues are wages and benefits. In the experience of Cinquemani, extensive training is required. Participants don't get the Win-Win,
joint problem-solving approach unless they have had training. Otherwise, they fall into old habits.

C. Modeling

Modeling as negotiating is the dominant stream in Negotiation Support Systems at the present time. All of the systems discussed in this subsection attempt either to model the judgement of the negotiator or the problem that is at issue in the negotiation. In 1985, Kraemer offered a framework for political modeling which is discussed first. Then several software packages are examined. Many software packages come with a suggested set of steps to be followed.

C.1. Modeling as Negotiating

Kraemer examined the politics in the implementation of fiscal impact models in local governments in the United States (Kraemer, 1985). 121 local governments were field surveyed and four were selected for detailed case studies. The surveys and case studies are the basis of a framework describing four different political perspectives on how models are used by local governments. Those perspectives are: political, technocratic, consensual, and rational.

The first is the political perspective where computer models are "tools of propaganda." The example is given of David Stockman. Stockman altered computer models used by the Office of Management and Budget (OMB) so they would show the benefits of his supply-side economic dogma. The decision making sequence is decision first, then propaganda to sell the decision, followed by conformity to it by the bureaucracy.

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1Fiscal impact models are defined as accounting models that calculate government costs and revenues. In the cases examined by Kraemer, the situations were all used to predict the impact of urban development programs. The models produce "pro forma" balance sheet outputs.
Models are simply the tools of persuasion used by the model experts in the technocratic perspective. They are used to promote the ideas of the model experts and extend them to his or her clients.

Consensual models are for: negotiation, bargaining, and interactive decision making among representatives of conflicting parties. The modeling experts are guided by the sides in their constructions. Once the models are built, the opportunity then exists to reconcile them.

Finally, the rational perspective views models as tools to extract the right answers. Models are scientific aids to policy making and analysis. A rational pattern of decision making is followed when the problem is defined, information is gathered and a decision is made. In this case, the technical staff are given a great deal of leeway to find the right answer.

Kraemer has developed a stage model of computer model implementation. The model is introduced when the need is perceived, the necessary support is gathered, and the model consultant is selected.

Adaptation follows introduction. This is a detailed and complex step. Model assumptions are examined in detail for fit to local conditions and modified as needed. Historical local data are collected and rough estimates of future activity are made. The last part of the adaptation step involves moving the theoretical model to a computer and testing it. Adaptation ends with the evaluation of alternative solutions using the model. The adaptation process is reiterated as many times as necessary. Kraemer lists as participants all the actors of local government, from politicians and bureaucrats to model consultants, in-house analysts and computer experts.

Kraemer's final step is incorporation. Incorporation means integrating the model into the standard operations of government. Provisions are made for the care and feeding of the computer model: data are updated, the model is exercised periodically by running it, people are
trained to operate it, and care is taken to properly interpret it. Less than half of governments surveyed actually incorporated the models they developed.

In conclusion, the benefits of modeling are that it structures the problem, involves the participants in the process and sets an agenda. The survey and case studies indicate that the consensual view dominates. Developing and incorporating models itself suggests a negotiation. Using models helps to resolve conflict, achieve consensus, and facilitate bargaining.

C.2. MIT's Project on Modeling for Negotiation Management

The Massachusetts Institute of Technology's Project on Modeling for Negotiation Management's charter was published by Nyhart and Samarasan in 1989. Much of the article is devoted to describing a series of software tools to explore negotiation. The software provides a road map of the Project's program with the ultimate goal being an integrated negotiation support system.

Much of the Project's agenda is based on Nyhart's experience with the United Nations Law of the Sea Conference in the 1970's. Imbedded within is the idea of using the computer as a neutral third party. Implicit in their formulation is the consensual view of Kraemer (1985).

The primary functions of software in Negotiation Management are also the functions most highly developed in the Project's software (Nyhart and Samarasan, 1989). Included (and, perhaps, the most explored) is simulation of the problem through joint model-building. These have been illustrated in several actual applications (Nyhart, 1988; National Institute for Dispute Resolution, 1988a,c). The advantage is that what-if and sensitivity analyses can be performed. Beyond simulation, primary software functions include risk calculation, selection of decision-making procedures and norms, and optimization of settlements by a third party computer. The last has also been called "post-settlement settlements" by Raiffa (1985; Bazerman et al., 1987).
The secondary functions of software center on those explored in a limited number of cases by project participants or by researchers outside the project. The provision of expert advice by the computer has been researched by Kersten and his colleagues (Kersten et al., 1987; Kersten et al., 1988; Michalowski et al., 1988; Matwin et al., 1989). The analysis of large numbers of cases was illustrated in the settlement of the Dalkon Shield lawsuits where 9500 cases had already been settled and 7000 were pending (National Institute for Dispute Resolution, 1988b). A database was created so that parties, who might differ in their proposals to resolve the class action suit, would have the same data. Statistical justifications of the proposals could then be checked. The final secondary function is the facilitation of the negotiation process. Decision trees have also been mentioned as useful (Nyhart, 1988).

Three Negotiation Management tools are described in the literature. They are briefly described here: SAM, ONDINE, and ISES.

**SAM (Simulated Agreement Mechanics)** is used jointly by the sides (Nyhart and Samaras, 1989). Not much beyond the program's goals are mentioned, other than it is a game-theoretic simulation. The purpose of SAM is to be a simulation of the dynamics of negotiation. It is not intended to be predictive; rather its purpose is to be descriptive. It is intended to help negotiators explore their criteria, framed as investigating the differences in conceptions of fairness between the sides. SAM also helps formulate new procedures for making collective decisions. To aid the researcher it tracks the forming and reforming of coalitions and clusters.

**ONDINE (ONe-DImensional NEgotiation)** comes in versions I and II (Goeltner, 1987; Nyhart and Samaras, 1989). The program makes the computer a medium for the exchange of proposals between the sides. ONDINE I is for a two-party, single-issue negotiation. ONDINE
II is for a two-party, multi-issue situation. Both are set-up for economic bargaining: there must be a buyer and a seller.

**ONDINE** I use starts with *inputing parameters*. Needed are: First Offer (FO), Reservation Price (RP), the Estimated Reservation Price of the other side (RP*), and Fair Price (FP). The first offer is self-explanatory; it is the offer initially made to the other side. The reservation price is the BATNA (Best Alternative To a Negotiated Agreement) price, the lowest the negotiator is willing to go (Fisher and Ury, 1981). In an economic transaction, the reservation price is the maximum price of the buyer and the minimum price of the seller. The computer compares the reservation price’s for overlap: if the buyer’s maximum price is higher than seller’s minimum price then negotiations are worthwhile (assuming the RP’s are accurate). The estimated reservation price of the other side (RP*) represents the perception of the other side’s situation. The fair price (FP) is a side’s idea of what it really should pay.

The second phase of ONDINE I use is *negotiation*. Four different negotiation methods are offered: two methods are independent of the computer (Open Offer, Splitting of the Difference) and two are dependent on the computer (Mild Contract, Fair Price Arbitration). The computer-independent methods are conceptually simple. *Open offer* is where the sides exchange offers until an agreement is reached or arbitration is invoked. *Splitting the difference* involves a simple calculation. The two computer-dependent negotiation methods are more complicated.

*Mild contract* is based on reservation prices. Each side splits a hypothetical bargaining range, based on how much of the hypothetical bargaining range the negotiator is willing to give up. *Fair price arbitration* divides the gap between them proportional to the prospective profit. The greedier party is thus punished. Greed is defined as one side’s fair price being close to the other side’s estimate.
ONDINE II is designed to handle two-party, multi-issue negotiations. It, too, has a set of phases. In pre-negotiation, the parties discuss and agree on the number of issues and the set of possible outcomes for each issue (solution space). Each outcome is assigned a value such that a utility space is defined.

In part one of the process, the utility functions are input to the computer. These are in the form of discrete values, not as formulas. In part two, negotiation as is traditionally known take place. Offers, which address all issues, are simultaneously exchanged and displayed. When an offer is received by the other side, its utility is recalculated by computer in terms of the receiving side's utility functions. Exchanges take place until an intermediate agreement is reached.

In part three, there is an attempt to improve the agreement by computer to reach a solution whose utility is greater for both sides than the intermediate agreement. A set of Pareto efficient outcomes are displayed so that the negotiators can chose among them.

The ONDINE programs were developed on Digital Equipment Corporation VAX II workstations using X-10 window system for the communication environment.

ISES or Integrated Simulation and Evaluation System is supposed to be a simple simulation model, linked to a database, designed to operate in a multi-user computer environment (Nyhart and Samarasan, 1989). The current version is designed for US-USSR arms control negotiation.

Other software under consideration (Nyhart and Samarasan, 1989) includes some standard microcomputer tools such as outliners and spreadsheets. An idea processor is also contemplated.

As stated earlier, the United Nations Law of the Sea Conference from 1976 to 1979 seems to be the origin of the whole concept of simulations to assist negotiation (Nyhart, 1988).
The dispute was over how to regulate mining the ocean floor. A third party, in the form of MIT researchers from the Sloan School of Management, were brought in to construct a model. The two criteria for judging the model were the mining technology required to exploit the ocean resources and its cost. Once the model was in place, interesting behavior was observed. Regulations proposed by various delegations were "tested" using the model. It was found that, as some developed nations suggested, some of the proposals would discourage exploitation. New proposals were explained in terms of its effect on the simulation. Unfortunately, the United States of America never approved the treaty worked out by the conference and no international structure regulating ocean floor mining has been put in place.

Another case, settlement of the Dalkon Shield suits, is worth mentioning because it shows the potential for simply providing accurate information when a third party adjudicates disputes (National Institute for Dispute Resolution, 1988b) In 1986, a federal court was hearing a class action lawsuit against A. H. Robbins Company. 16,000 women were suing Robbins over damage done to them by the Dalkon Shield, a birth control device. 9500 had already settled. The court appointed an expert to estimate the remaining claims to facilitate a final settlement. A database of the settled cases was created. Teams of experts from each party were assembled to collect information: statisticians, physicians, attorneys, economists, and other social scientists. Each team evaluated data in the database and presented its own estimates ranging from 1.6 billion to 7 billion dollars. The judge picked 2.475 billion dollars.
C.3. BestChoice

BestChoice is a software package that implements Policy/Goal Percentaging (P/G%), a form of Multicriteria Dispute Resolution (Nagel and Mills, 1989). This program essentially presents a spreadsheet or matrix. The aim is to evaluate a number of alternative policies by grading them against certain criteria or goals. Policies/Alternatives are in rows, while Goals/Criteria are in columns. Relationships are in cells. The overall scores for alternatives are in the last column on the right. It is implied that the relationships between alternatives and criteria are numeric and scoring might be more than a simple sum of relationship ratings. But there is no description of any scoring. The BestChoice program has not been used in the course of an actual negotiation. Instead, the examples offered are analyses of disputes made after they have been settled.

Nagel and Mills also suggest seven steps in using the tools. First is the preparatory step: determining initial alternatives (options), criteria (values or purposes that the alternatives should meet) and their relationships.

In the second step, each side has the opportunity to convince the other.

The last five steps come under the category of playing what-if games with the alternatives, criteria, and relationships. Assuming that the sides are deadlocked, the third step is to experiment with additional alternatives. The fourth, fifth, sixth, and seventh steps are: change the alternatives (some of the suggested ways are to subtract, consolidate, or subdivide them); change the criteria weights or to average the alternatives; minimize or maximize constraints on criteria and/or alternatives; and to change relationship scores and measurement units.

The latest version, BestChoice3, has been severely criticized by Veit and Robinson (1990). Their major criticism is that BestChoice3 is unable to reproduce a known rank ordering.
They claim that this casts doubt also on the validity of the statistics. Their final criticism is that the results are based on weights that come from the user. The user has no feedback on the validity of the model since there is no way to test the final result.

C.4. Analytic Mediation

Policy PC is a computer program that assists in the implementation of analytic mediation (Executive Decision Services, 1988; Milton and Rohrbaugh, 1988; Mumpower et al., 1988; Darling and Mumpower, 1990). It has been used in actual negotiations, but as a tool for the facilitator.

The basis of Policy PC is Social Judgement Theory (SJT). SJT attempts to construct a judgement function of the form:

\[ Y = \sum b_i X_i + c \]

where:
- \( Y \) = predicted judgement
- \( b_i \) = weight and function for each dimension
- \( X_i \) = cue value
- \( c \) = constant

To understand this, using an example is best (Herniter and Carmel, 1990). Suppose two people wish to become roommates and are looking for an apartment. Together, they decide that there are three dimensions on which to base an apartment selection: rent, distance, and condition. Policy PC allows rent to be defined as a continuous variable, say with a range from 200 to 500.
dollars, in increments of 25 dollars. Distance and condition, on the other hand, have discrete values. Distance is given as either "walk," "bike," or "car;" condition is given as "poor," "fair," or "good." Each roommate (called a "judge" by Policy PC), is presented with a series of possible solutions; different combinations of values (the "cues" or $X_i$ value in the formula) for each of the three dimensions are shown and each judge is asked to input a single number to rate it. These numbers usually have been entered by the facilitator after the judges have entered their ratings on paper sheets and handed them in. After a number of cases are presented (the number determined in advance by the operator of the program), the program then calculates the function forms ($h_i$ in the formula). The function forms and ratings for other settlements can then be calculated. For this example, the function form and weight are shown in Figure 3 for two judges for the distance dimension. The screen uses a character display, so the function form is shown

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Figure 3. Apartment selection function form and weight.

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2This is a student area, so there are no "excellent" apartments.
crudely. Function points labeled as "1" are for judge one and points labeled "2" are for the second judge. The highest weights were assigned to the middle of the distance scale, making it obvious that an apartment within "bike" distance is favored by both roommates.

Analytic mediation uses Policy PC as a tool in the second and third steps of their three step process (Mumpower et al., 1988; Darling and Mumpower, 1990). The first step of the negotiation problem is specified by its nature and boundaries (this is a preparation and issue identification step allowing the participants to build a conceptual model of the problem). A multi-attribute utility model is constructed using Policy PC in Step 2. Finally, quantitative analyses are used to assist negotiators to obtain mutually satisfactory solutions (Darling and Mumpower, 1990).

In the teacher-board of education negotiation presented in Mumpower et al. (1988), the negotiators did not use the program directly. Instead, the cases were presented on 3-by-5 index cards and participants were asked to write their ratings down. Only the mediator used the computer.

Policy PC is a descendent of an earlier system described by Balke et al. in 1973. In that system, paper printouts were used to show issues for ranking, weights attached to each issue, and thicker or thinner lines to show the importance of each issue. As in the later program, the participants did not use the computer directly. Instead, the facilitator acted as the interface between computer and users. Unlike Policy PC, this system was used only for a simulated negotiation. It is interesting to note that the participants were actual negotiators who had just

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3Two other goals are to maximize equity (Mumpower et al, 1988) and giving maximum value or maximized joint utility to all sides (Milter and Rohrbaugh, 1988). As utility is dominated by equity (Rohrbaugh et al, 1980), the differences between the two may be negligible.
completed bargaining with each other. They were asked to renegotiate the agreement in a mock setting using the computer.

C.5. Conflict Analysis

DecisionMaker is a system for analyzing negotiations and positions from the University of Waterloo (Waterloo Engineering Software, 1987a; 1987b; 1989a; 1989b). It is based on a hypergame technique which assumes that single actions only are taken in each round of a conflict (Fraser and Hipel, 1984; 1988a; 1989). The program looks for equilibrium positions in the solution space. These positions are considered stable because no one single action taken by a side can unilaterally improve its position.

Using the program is an involved process. First, all possible options that can be taken by all sides must be identified and labeled. The reason for this is that the "state" of the negotiations is characterized by a vector. Each number in the vector corresponds to an option. A '1' means the option has been exercised, a '0' means it has not. In the version of the program that does not use Microsoft Windows, all vectors are displayed as vertical columns of 1's and 0's on one screen (Waterloo Engineering Software, 1987a; 1987b; 1989a; 1989b). This gives the user a universal view of the negotiation (Herniter and Carmel, 1990). In the Microsoft Windows version, the vectors are displayed individually (Waterloo Engineering Software, 1987a; 1987b; 1989a; 1989b).

In the second step, combinations of options which cannot occur simultaneously are ruled out; i.e., the vectors in which they occur are eliminated.

Then each side rank orders the states by preference.
Finally, in the fourth step, DecisionMaker does a stability analysis. An equilibrium state is defined as a state where any single action by one side results in a worse (i.e., less preferred) state. Equilibria are the same for all sides. Vectors are also rated as R (rational), S (sequentially sanctioned) or U (unstable). These ratings differ by side. If, from the point of view of one side, a state is rational, then that side can take no action or position to improve its position. Sequentially sanctioned means that a side can improve its position, but an action or position by another side negates the gain. An unstable rating means that a side can unilaterally improve its position by exercising some action. A vector/state is considered in equilibrium if it is a rational or sequentially sanctioned state for all sides. A sample screen is shown in Figure 4.

The 1989 Tutorial Manual calls DecisionMaker a tool for making "sense out of the confusing information in complex real-world conflicts" and that "you can model a conflict in terms of its participants, their options, and their individual preferences." DecisionMaker can be
used to advise a decision maker. Therefore it is appropriate to both the negotiator and the mediator.

The technique may also be useful to researchers analyzing conflict situations. The technique was used to analyze the 1984 U.S. Presidential race (Fraser, 1986) and an environmental conflict (Fraser and Hipel, 1988).

D. Multiobjective Linear Programming and Expert System Approaches to NSS

This section reviews the work of Kersten and his colleagues. The first subsection looks at NEGO and GDS1, two programs that implemented a multiobjective linear programming (MOLP) technique. Of all of the systems reviewed here, the MOLP-based programs were the only ones to provide for communication between the two parties. The second subsection involves Negoplan, a prototype expert system that gives advice to a negotiator. Negoplan exists to advise only one side in an negotiation. The knowledge base contains information from an expert negotiator and makes it available to others.

D.1. NEGO and GDS1

NEGO and GDS1 are the first and second generation of tools that use multiobjective linear programming to create the proposals exchanged in a negotiation (Kersten, 1985; Kersten, 1988; Group Decision Support System GDS1: User’s Manual). The system provides for specifying constraints, generating proposals, reviewing proposals, communicating proposals to the other side, and declaring a settlement.
D.1.a. NEGO

NEGO was created to aid Polish companies after the economic reform of 1980-81. It was used in five courses for company executives, trade union representatives, and workers’ self-governments (Kersten, 1985). Using NEGO is a two-stage process. Stage One covers both preparation and the first exchange of proposals. The designated decision maker for each side must choose objectives and then rank them. The program proceeds to calculate the coefficients of the individual utility function. If proposals match, then an agreement has been reached.

If proposals do not match, then it is on to Stage 2. This is an iterative process. The decision maker formulates wants and demands which the program treats as a one-sided goal programming problem. The computer formulates a solution. Demands are reformulated when a compromise is not reached, starting the process over again.

NEGO was originally on a mainframe computer, written in FORTRAN, EXEC 2 and Assembler.

D.1.b. GDSI

GDSI has been used in simulations of labor-management negotiations (Kersten, 1988). Like NEGO, its use is also divided into two stages. In the first stage, each side’s objectives are separately entered as categories on a spreadsheet which constitutes the model. Each side’s decision maker makes a compromise proposal ("an alternative which he/she considers a possible compromise.") Any procedure is useable. Minima and maxima are given for each category.

As with NEGO, stage two is iterative. Various proposals are solved by multiobjective linear programming. When a satisfactory proposal is calculated, it is submitted to the other side. When they match, the program declares that a compromise has been reached.
Implementation of stage one is through the LOTUS 1-2-3 spreadsheet. Both hard and soft constraints are entered into a spreadsheet. The GDS1 program implements Stage Two. It was designed for use on an IBM-compatible microcomputers in a local area network. Three microcomputers are required: two user stations, one for each side, and a server station to pass proposals. Kersten also envisages the use of a mail system to exchange other messages. The system is programmed in Microsoft QuickBasic 2.0. The user interface is both textual and graphical (as seen in Figure 5). Maxima, minima, weights, signs and values (aspiration levels) may be typed in the text mode. In the graphical mode, arrow keys are used to increase or decrease values (aspiration levels). Both are combined into one display. Also, the history of parameters may be viewed.


Negoplan is an ongoing research project to incorporate the knowledge of experts into a rule-based system that can give advice to negotiators (Kersten et al., 1987; Kersten et al., 1988;
Michalowski et al., 1988; Matwin et al., 1989). It has been used to simulate several negotiations. Situations explored have included a police negotiation with a terrorist (Michalowski et al., 1988), the 1978 Israeli-Egyptian Peace talks (Kersten et al., 1988), a labor-management negotiation in a 1987 Canadian Paperworkers Union and CIP, Ltd., a major pulp and paper manufacturer. Negoplan has not yet been used in a real negotiation (Matwin et al., 1989). In the article outlining the hostage application, the authors specifically say that the system might be useful in training negotiators, but that they were not suggesting it be used during the course of an actual terrorist or hostage situation.

The major components of a rule-based expert system are its knowledge base and its inference engine (Rich, 1983; Winston, 1984). As defined by (Kersten et al., 1987), the knowledge base contains meta-rules, and a rule base. Meta-rules are rules about rules. They change the goals, subgoals, and rules of the negotiation. As a negotiation progress, the goals of the bargainers start to change and what will satisfy those goals also changes. The inference engine is forward-chaining; it stops modifying the rule base and goals when there are no more eligible meta-rules left to fire. The goal modifier is invoked if a goal actually does change.

The rule base consists of facts, rules, subgoals, and goals. The goals (goal and subgoals) are related through a logical AND/OR tree also called a goal tree. Some goals require all subgoals to be achieved (AND); in others, some subgoals may substitute for other subgoals (OR). The rules incorporate knowledge about the goal tree.

After goals are modified, goal analysis tools are used to analyze the goal representation (goal developer). The consistency checker tests the rule-base and the tracer tracks down the errors.
Negoplan is implemented in a SUN-3 UNIX workstation and is written in Quitis Prolog.

As with Kersten's other work (NEGO and GDS1), a two part stage model guides the implementation (Kersten et al., 1987; Matwin et al., 1989). The learning stage is the preparatory step. In the interaction stage, players exchange proposals, evaluate other players' proposals, make concessions, and verify their positions.

E. Electronic Meeting Systems (EMS) and Negotiations

Electronic Meeting Systems (EMS) or Group Decision Support Systems (GDSS) are systems that use information technology to support group work that occur in meetings\(^4\). They support both the task and the communication required for the meeting to occur. GDSS' consist of hardware, software, and procedures (also called facilitation), and language components (Huber, 1984). A negotiation support system which supports the process of negotiation should support at least two separate negotiation teams who are working together to find an agreement. In this section, the characteristics of electronic meeting systems are reviewed and the conceptual design of an EMS specifically designed for negotiation is presented.

To understand the place of Negotiation Support Systems in relation to Group Decision Support Systems, the current thinking on GDSS must be surveyed. To come to a more precise understanding of GDSS, this section will examine GDSS from several perspectives. First the themes and rationales for GDSS are surveyed; then, to discover how these ideas are translated into reality, taxonomies of GDSS are surveyed. The role of negotiation in GDSS literature is

\(^4\)This class of software is also known under other acronyms such as CSCW (Computer Systems for Cooperative Work) and GDSS (Group Decision Support Systems).
explored. Finally, the specific GDSS used for this research, University of Arizona GroupSystems, is examined.

E.1. Themes of GDSS

To explore the findings on GDSS, it is best to look at the themes inherent in the taxonomies and systems. Two guiding themes are accepted in the field: structuring the decision process and enhancing communication.

Communication provided the original excuse to separate Group Decision Support Systems from ordinary Decision Support Systems (DSS). Sprague (1980a; 1980b) in his pyramid of DSS, specified communication as a supporting technology to DSS, but did not specifically include it in DSS. Turoff and Hiltz, in an often cited paper (1982), complained that DSS taxonomists had ignored communication and that it was essential for group decisions.

Communication was crowned king by Bui and Jarke (1986) who said it was the core issue for effective decision support systems with many decision makers. Group communication requirements are: information transfer with input and output data in any form, restrictions on information access, and an ability to respond to the dynamics of groups. Under these restrictions, the communication system has two roles: to coordinate information exchange and to monitor it.

DeSanctis and Gallepe (1987) speak of breaking down communication barriers as being characteristic of first level GDSS. In that sense, communication can be considered the defining aspect of GDSS.

The second theme of GDSS is structuring. Groups are shepherded through many tools and techniques to come up with decisions. Sprague (1980b) points out that DSS should support semi-structured and unstructured decisions, but does not mention "structuring" decisions.
Turoff and Hiltz also support the idea of structuring and link it to communication (Turoff and Hiltz, 1982). Communication provides the opportunity for groups to structure their approach to complex problems. In this view, structuring is a function of the communication component. Communication can also be a function of structure. Dennis et al. (1988) contend that structure is one of the ways GDSS enhances communication.

E.2. Rationales for GDSS

Why are meetings inefficient? Specifically, what are the limitations of human beings when it comes to processing information and making a decision as a group? Individual humans are apparently good at fragments of information. We can detect, store and retrieve small chunks of information. Individuals are not good at aggregating information fragments and inferencing (Leal and Pearl, 1977). Groups, however, are superior at decision analysis (Turoff and Hiltz, 1982). Groups can structure ill-structured problems, are more successful in generating options, and are better able to probe the relative advantages and disadvantages of alternatives. Groups are therefore better at the design phase of decision making.

Turoff and Hiltz (1982) also add two other rationales to GDSS. They believe that a Group Decision Support System may aid the "parallel organization," that informal group that comes together to solve a problem. Such a group exists outside the formal structure of the organization. A GDSS may aid the lateral communication needed for the informal organization to operate effectively.
E.3. Environment Taxonomies of GDSS

GDSS can be further understood by looking at its components and its functional taxonomies. Huber (1984) was the first to specify the components of GDSS: hardware, software, language and procedures. This was subsequently modified by later authors. Kraemer and King (1988) substitute "organizationware" (meaning the data, processes and procedures of an organization) for the vaguer "procedures" of Huber. Dennis et al. (1988) add "facilities" to the list.

In their current thinking, DeSanctis and Gallupe (1987) define four types of GDSS settings: (a) decision room (face-to-face, small group), (b) legislative session (face-to-face, large group), (c) local area decision network (dispersed, small group), and (d) computer-mediated conference (dispersed, large group). Existing systems will be examined later in light of these classifications.

Dennis et al. (1988) add to the above by reattaching the time dimension dropped by DeSanctis and Gallupe between their 1985 and 1987 papers. It now refers to whether the participants meet all at once ("All meet at one time" or synchronous) or at separate times ("asynchronous"). They also redefine proximity to refer not to individuals, but to groups and give it three possible values: dispersed individuals, one group (replacing "face-to-face"), and several groups (a new category). The new setting that corresponds to "several groups" is "GDSS teleconference," regardless of the group size.

E.4. GDSS Research Taxonomy

We next turn to taxonomies that concentrate on clarifying research, not just classifying existing systems. McGrath has written on many of the tasks used in group research (McGrath, 1984). The contingency perspective of DeSanctis and Gallupe (DeSanctis and Gallupe, 1987) adds task
type to group size and proximity as variables. The tasks are: planning, creativity, intellective, preference, cognitive conflict, and mixed motive. These categories are of primary interest to researchers.

DeSanctis and Gallupe (1987) provide insight to the direction of GDSS by defining three levels. Level 1 GDSS removes communication barriers. Level 2 GDSS uses decision modeling and group decision techniques. Level 3 GDSS modifies group behavior to introduce machine-induced group communication patterns and uses expert systems.

Exploring "system sophistication" (realized as the degree of customization) is a research goal of DeSanctis and Dickson (1987). While this is not part of contingency perspective, it does introduce an important perspective on existing GDSS. The scale ranges from low to high. On the low side is the generic GDSS shell. It is considered low because it must fit all situations and all types of groups. On the high side are customized GDSS. These are tailored to fit the group.

Dennis and his colleagues also define a taxonomy for decision room meetings based on the "principal communication channel" (electronic or verbal) and the "degree of structure" (low or high) (Dennis et al., 1988). The categories are: (a) synchronous computer conference (electronic, low structure), (b) electronic meeting (electronic, high structure), (c) supported meeting (verbal, low structure), and (d) structured meeting (verbal, high structure). This might be properly classified as an environmental taxonomy; however, by introducing structure, the authors clarify some of the problems with research into GDSS. Recognizing these categories avoids confusing the effects of structured methods from the effects of computerized structured methods (Easton, 1988).
E.5. Taxonomies of Electronic Meeting Systems

Dennis et al. (1988) divide meetings along two axes. On the group proximity axis, participants are either in the same room, face-to-face (a single group site); or in different locations (multiple individual or group sites). Teleconferencing has been one way to handle the latter. On the time dispersion axis, meetings occur either with all people participating at the same time (synchronous) or at different times (asynchronous). An example of an asynchronous meeting is an electronic bulletin board. Participants can sign on to the board, read messages, and respond whenever they wish. As will be detailed later, the system used in this research assumed asynchronous meeting, and a mixture of single (when negotiating) and multiple (when caucusing) group sites.

E.6. The EMS Research Model

The EMS research model (Dennis et al., 1988) offers a guide to classifying variables and their interactions. According to the model, the independent variables can be divided into four categories: group, task, context, and EMS. Group variables include size, history, and cohesiveness. Task variables include the type (negotiation, strategy, and planning are all task types) and complexity. Context variables involve the organizational environment such as the existence of an award system and the organizational culture. The EMS variables concern the tools (i.e., programs) available, the computer hardware, the presence and type of facilitation, and the physical environment. The EMS research model is displayed in Figure 6.

The process variables are transitive or intermediate. How structured are the sessions, the number of sessions, whether the process is anonymous, and the degree of participation are examples of process variables.
Figure 6. EMS Research Model (Dennis et al, 1988).

The dependent variables measure the outcome. User satisfaction, confidence in the result, and the degree of consensus are subjective measures of the outcome. Objective variables include the number and length of meetings (the fewer, the better), the number of alternative solutions considered (higher is considered better), and the number of comments contributed by users.
E.7. Previous Studies with GDSS and GroupSystems

Experiments studying a number of different GDSS's have resulted in a mixture of results, while case studies are more consistent (Dennis et al., 1988). Surveyed were a number of experimental studies comparing GDSS decision rooms versus no computer support. The authors concluded that few generalizations could be reliably made. They found that, at best, use of a GDSS: is associated with better decision quality and enhances a more even level of group participation; at worst, use of a GDSS makes no difference in decision quality or the evenness of group participation. Other dependent variables were considered to have inconsistent findings or are based on an inadequate number of studies.

A total of ten studies measured decision quality. Four reported no effect on decision quality, four found better quality with GDSS, and one found that GDSS was worse than the manual, but better than no procedure at all.

Five studies measured time to decision. Three of them found it took more time to reach a decision using a GDSS. The other two found no effect.

Satisfaction was measured in regard to two aspects of GDSS use. Satisfaction with the group process was examined in seven studies. Only one found that it increased with use of a GDSS and two found that satisfaction was reduced on those circumstances. The remaining four studies found no effect. Satisfaction with the outcome was looked at in four studies: one found no effect, another found satisfaction was reduced with a GDSS, and two found positive effects.

On the other hand, field studies at IBM indicate that University of Arizona GroupSystems (sold as TeamFocus (Ventana Corporation, 1990d)) successfully reduce meeting times, one of the rationales for GDSS cited previously (Nunamaker et al., 1989). The groups used in this case study were engaged in strategic planning and data processing problems. Among the variables
measured were efficiency, effectiveness (comprised of quality of the session process and quality of outcome), and user satisfaction.

The study measured *efficiency* as the percentage of time saved compared to projected:

\[
\text{efficiency} = \frac{\text{actual man-hours}}{\text{projected man-hours}} \times 100
\]

The results indicated that meeting times for projects were reduced by 55.51% over the anticipated duration.

*Quality of process* was measured by the degree to which meeting members took part in the process, as measured by log files and questionnaire responses. The log files recorded the keystrokes made by each participant. The results indicated that GroupSystems equalized participation as compared to the traditional meetings without computer support. In the questionnaire, five statements were made concerning the high quality of GroupSystems; participants were asked to disagree or agree. On a five point scale from "strongly disagree" to "strongly agree," the response means ranged from 4.027 to 4.162.

*Quality of outcome* results were not reported in this study. The authors decided that outcomes were best measured during implementation of the solutions that the IBM groups came up with.

*User satisfaction* was measured by utilization rates of GDSS facilities, a post-session questionnaire, and interviews. Nunamaker *et al.* (1989) report a three week waiting period for use of the facility, which was interpreted as indicating high user satisfaction. On the questionnaire, two statements expressing high satisfaction with GroupSystems were made. On a scale of 1 ("strongly disagree") to 5 ("strongly agree"), the means ranged from 4.023 to 4.109. The interviews also indicated a strong, positive response to the system.
Dennis et al. (1988) speculate that there are three reasons why the experimental results and the field studies differed in their findings. One is that "real world" subjects were simply better able to judge the effectiveness of GroupSystems tools. They had worked on actual problems before and knew what the difficulties were. Another reason offered was that the field study subjects were working on their own problems and had a stake in the outcome, while experimental subjects had only a short-term and limited stake. Finally, "real" tasks are much more complex than experimental tasks which must be accomplished within the short time frame of the experimental treatment.

E.8. Negotiation in GDSS Literature

Three sets of authors recognize negotiation as a GDSS task. Huber describes contract editing as a group task, although he does not address himself to the process leading up to the contract (Huber, 1984).

DeSanctis and Gallupe (1987) view negotiation as a task purpose with tasks being the resolution of conflicting viewpoints and sorting out conflicting motives. They view negotiation as happening between individuals, not groups.

Finally, negotiation is recognized as a GDSS task by Dennis et al. (1988) but no definition of what type of negotiation is provided. No restriction on whether negotiation by individuals or negotiation between groups is indicated.

One aspect of negotiation that is starting to appear in the GDSS literature is conflict management. Poole et al. (1988) suggest that GDSS may promote effective conflict management by focusing on problems, discussing alternatives, and creating a cooperative climate. Voting systems, on the other hand, are artificial reductions of conflict which may hide it, but resolve
nothing. They use the negotiation guidelines of Fisher and Ury (1981) as a guide to conflict management in the GDSS session.

Adams and Kirchof (1982) advance the interesting notion that a manager regularly encounters conflict at a specific phase of the planning cycle. Scheduling can be done as long as resources are under the control of the planner. When the scheduling process encounters resources under another's control, scheduling is suspended. The manager enters a new phase of the planning cycle by negotiating with the owner of the resources. Once the negotiation is over, scheduling resumes.

E.9. University of Arizona GroupSystems

Case studies have consistently shown that "real world" users (as against experimental subjects) are consistently satisfied with GDSS and express the belief that it is effective (Dennis et al., 1988). Interestingly, of the five case studies surveyed, four studied use of University of Arizona GroupSystems (Nunamaker, et al., 1987; Vogel and Nunamaker, 1988; Nunamaker et al., 1989; Dennis et al., 1990;).\(^5\)

GroupSystems was the GDSS used in this study (Dennis et al., 1988; Nunamaker et al., 1989; Dennis et al., 1990). It currently provides support for both a facilitator and participants working sequentially through an agenda. So far, work with real groups has concentrated on groups with all participants meeting at one time (synchronous meetings) at one group site. The groups have either used a decision room or a legislative room for their meetings.

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At the heart of GroupSystems is the so-called EMS toolkit (Dennis et al., 1988). It contains a number of tools (programs) consistently used by groups from International Business Machines (IBM), Burr-Brown, Inc., and over 100 other groups that have used University of Arizona facilities. In strategy and planning meetings, some of the tools are: Electronic Brainstorming, Topic Commenter, and Voting (Dennis et al., 1988; Ventana GroupSystems, 1990a,e).

Electronic Brainstorming is, perhaps, the most extensively studied tool in GroupSystems. It is used for idea generation, allowing users to simultaneously comment on a broad question anonymously. The effects of anonymity, evaluative tone, group size, and the proximity of participants have been explored in experiments (Dennis et al., 1989; Valacich et al., 1989; Connolly et al., 1990; Valacich et al., 1990). The study by Connolly et al. (1990) found that groups working anonymously with a critical confederate produced the greatest number of original solutions and overall comments, but the averages across conditions were not different. Dennis et al. (1989) found that although participation remained the same, overall group performance increased as group size increased (groups of three, six, and eighteen members were used). Valacich et al. (1989) discovered that larger groups generated more total ideas and higher quality ideas as group size increased. They also saw that small, non-anonymous groups felt the most satisfied and most perceptive. Finally, large groups outperformed small groups and distributed groups (several sites) outperformed proximate groups (one site) in a study by Valacich et al. (1990).

Topic Commenter is also an idea generation tool, but it is used when a list of topics of discussion are known (Ventana Corporation, 1990a,e). A stacked set of "cards" are presented on the screen from which the participant can select.
Voting lets a facilitator select among several methods of prioritizing or selecting among options. The facilitator can have participants vote "Yes" or "No," "Agree" or "Disagree" on a five point scale, a scale of one to ten, percentages from 0 to 100 in 10 percent increments, multiple choice for up to seventeen items, and rank order.

F. MEDIANSS: Design for a Negotiation Session System

GDSS and Negotiation Session Systems have much in common, yet the situations to which they apply can be different. This section places Session Systems within the GDSS framework, shows how Session Systems is an extension of GDSS to a negotiation, and describes the development and testing of the MEDIANSS design.

Creating the MEDIANSS design, implementing it as a manual process, and evaluating it constitutes the first pass through the cycle of the System Development Research Methodology (SDRM will be reviewed in Chapter 3).

F.1. Rationales

The rationales for use of a negotiation support system are similar to the rationales for GDSS use. As in GDSS, the aim is to overcome the limitations of human participants.

Negotiators do not follow the rational model (Bazerman and Carroll, 1987), just as decision making in general does not follow the rational model (Kraemer and King, 1988). The reasons include that negotiators: tend to be overconfident and overestimate their chances for success; become conservative when they are gaining and take risks when they are losing; become wedded to their positions and rigid in their thinking; tend to simplify the task at hand (negotiations can be complex and the participants react by simplifying the issues and alternatives);
and, perhaps the most interesting, follow scripts when dealing with each other (Bazerman and Carroll, 1987).

### F.2. Session Systems within the GDSS Idea

Of the three categories of Negotiation Support Systems, Session Systems have several aspects and attributes in common with GDSS. Given that the target situation is a negotiation held between two teams, the group, communication, and structure similarities are apparent. Session Systems, like GDSS, must overcome the problems of group think and cognitive barriers to agreement.

<table>
<thead>
<tr>
<th>Decision Making</th>
<th>GDSS</th>
<th>Negotiation Session Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligence</td>
<td>Problems &amp; Issues</td>
<td>Problems &amp; Issues</td>
</tr>
<tr>
<td>Design</td>
<td>Alternative Policies or Plans</td>
<td>Alternative Proposals</td>
</tr>
<tr>
<td>Choice</td>
<td>Choice</td>
<td>Bargaining</td>
</tr>
</tbody>
</table>

**Figure 7.** Decision making using a Negotiation Session System.

Beyond purpose, there are similarities of activities. Both Session Systems and GDSS try to surface problems and issues. This is the intelligence phase of decision making. In the design phase, GDSS focusses on generating alternative policies or strategic plans, while Session Systems concentrate on generating proposals. The choice phase involves the really hard bargaining, whether in negotiation or group decision making. The phases are shown in Figure 7.
F.3. Session Systems as Extension to GDSS

Where Session Systems extend the GDSS application is in the group interaction. GDSS to date inherently assume that groups are made of individuals, not sides. Accomplishing organizational goals, while not necessarily supreme, are considered to be the rationale for the organization. Anonymity and spontaneity are used to encourage and generate creativity.

The idea of two groups meeting in the same room is not present in GDSS. For example, the framework of Dennis et al. (1988) gives three categories of group proximity: dispersed, one group, several groups. It assumes that when more than one group meets, it will be in separate rooms. An argument can be made that the legislative session concept leaves room for two sides as legislatures in the United States and Canada (the homes of the authors) are divided along party lines. But even in legislatures, members can break with the party, but individuals in a negotiating team cannot.

Communication between individuals is tightly controlled in negotiations. Two well-defined sides, bargaining carefully over a dispute, do not want to inadvertently reveal their cards. While they may break into smaller teams to work on subareas, an individual's freedom to make suggestions is limited to communication within their own group. Innocuous comments might be a well-planned proposal.

As pointed out above, negotiators often follow a set script (Bazerman and Carroll, 1987). One such script involves the chance remark during a break in the negotiations. While the participants are using the rest room, one might say a few words about the negotiation to another. The informal and off-the-record setting allows a proposal to be made without being held responsible for it later. While it may seem spontaneous, the comment can be a carefully planned attempt to offer an alternative proposal or break a deadlock.
A different communication structure will be the key to successful Session Systems. The designers of such a system need to realize the necessary restrictions in negotiation. This flexibility in structuring the communication follows the suggestion by Bui and Jarke (Jarke, 1986) that GDSS must adapt to changing patterns of communication.

The two last major differences between traditional GDSS group decision making and negotiation lie in the lack of common goals of the two sides and the level of naked antagonism that might be present. In response to this, the procedures of a Session System must provide ways to diffuse antagonism and to bring the goals into alignment. The role reversal step suggested by Carmel and Herniter (1989) does that by forcing each side to explain the other's point of view.

F.4. The Development Framework for Computer-Supported Conflict Resolution

The Development Framework for Computer-Supported Conflict Resolution by Anson and Ielassi (1990) directly influenced MEDIANSS, the system design used for the NSS used in the research described in this dissertation (Carmel and Herniter, 1989; Herniter et al.; 1990). It is discussed in this subsection while MEDIANSS is discussed in subsection F.5.

Anson and Ielassi (1990) advocate building on Integrative Bargaining. They identify a number of obstacles to the use of Integrative Bargaining: cognitive biases of negotiators, socio-emotional impediments, and difficulties in analyzing complex sets of solutions. Cognitive biases include the assumption, that negotiation is a win-lose, zero-sum process (the "fixed pie") which leads to distributive bargaining behavior. Socio-emotional impediments include intense distrust among parties, emotional involvement, abstraction of issues, underlying issues, and imbalances of power between negotiators.
Overcoming the aforementioned obstacles in a computer-supported environment is a major thrust of the Development Framework. To eliminate the fixed pie assumption, they suggest training and assistance in Integrative Bargaining, the development of positive frames of thought, and starting from the beginning with cooperation and agreement. To relieve emotional and sociological impediments, a number of steps are advocated. One is a signed rules contract among the parties to foster trust. Another are steps requiring explicit communication of views on problems and issues. They also suggest equal access to the system by all sides. To overcome the complexity of problems, Anson and Jelassi suggest obtaining each negotiator's preferences on issues and explicit identification of alternatives and trade-offs.

Anson and Jelassi explicitly advocate use of a GDSS as the basis for an NSS. They suggest that an NSS needs several features above an ordinary GDSS. A structured negotiation process should be built in to the system; the Development Framework uses the Kessler model (Kessler, 1978). Evaluation and comparison of issues and alternatives is also required to help reduce complexity. Also in keeping with Kessler’s views, an NSS should accommodate a mediator with control over the system. Finally, they suggest that both teams of negotiators and single negotiators be accommodated.

In the climax of their paper, Anson and Jelassi put their ideas into Kessler's four stage model and matched activities to each stage. They then went on to show which activities are supported by the GDSS systems of the University of Arizona (GroupSystems) and the University of Minnesota (SAMM). The steps and activities are shown in Figure 8.
### Process Stages

#### Prosesson:
A. Pre-negotiation strategy formulation
B. Agreement to engage in negotiation

#### Session:

1. **Setting the Stage**
   A. Establishing Rules
   B. Developing Positive Frames

2. **Formulating the Problem**
   A. Defining the Problem
   B. Defining the Issues

3. **Processing the Issues**
   A. Tracking Time Deadlines
   B. Focusing on Specific Issues
   C. Role Reversal
   D. Paraphrasing
   E. Maintaining Equality

4. **Resolving the Issues**
   A. Generating Alternatives
   B. Analyzing Alternatives
   C. Evaluating Issues
   D. Developing Solutions
   E. Completing the Agreement

---

**Figure 8.** The NSS activities suggested by Anson and Jelassi (1990) matched to the process model of Kessler (1978).

**MEDIANSS** is based on Creative Conflict Resolution the stage theory of Kessler (1978), the Development Framework for Computer-Supported Conflict Resolution of Anson and Jelassi (1990), and on GDSS concepts and tools (Carmel and Herniter, 1989; Herniter et al.; 1990).

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1. Rule Setting
2. Role Reversal
3. Issue & Reason Identification
4. Issue Consolidation
5. Ranking
6. Create Package
7. Present Proposal
8. Linking
9. Horse Trading
10. Agreement Wording

**Figure 9.** The MEDIANSS ten-step framework.
MEDIANSS was crafted assuming implementation as part of the University of Arizona GroupSystems software. It consists of a ten-step framework (proceeded by a so-called pre-session) and a suggestion for a GroupSystems tool to implement that step. The framework is shown in Figure 9. It is assumed that a mediator is used throughout the negotiation to (at the very least) operate the software and encourage an agreement.

The facility needed to implement the MEDIANSS scheme is a decision room. A decision room is equipped with networked personal computers arrayed around a table or in a U-shape. A local-area network allows the computers to share information and run the GroupSystems tools. One computer at the front of the room is reserved for the mediator. A video projector is used to show the mediator's display to the whole group.

Before a negotiation begins, each side holds a pre-session. This is a planning meeting to help iron out differences between negotiation team members. Idea generation tools such as Electronic Brainstorming and Topic Commenter are used to expand options and surface alternative strategies. Idea organization tools like idea organizer can be used to sort through the options. Voting can be used to discover differences and to gauge the degree cohesiveness among team members. These tools, such as Electronic Brainstorming (EBS) are not appropriate for negotiation per se because they do not allow for private communication; if there are two teams participating in the brainstorming, each team sees all of the comments entered. So, if members within a team wish to debate a point, they must use the tool privately, with the other team absent.

The actual steps of MEDIANSS are described below.

Rule setting. Ground rules are edited by the facilitator and presented on the front screen for all to see.
Role reversal. Each side is asked to walk a mile in the other side’s shoes by explaining the issues important to the other side. The use of nominal group technique (NGT) is suggested.

Issue and reason identification. Each side has the opportunity to explain its own issues to the other side. The negotiators focus on issues, not demands. A structured version of Electronic Brainstorming can be used to let each side list issues and include reasons through comments as the brainstorming files are passed around each team. The brainstorming files are then consolidated into one for each team and then are displayed on a single screen divided into two panels. Thus, separate list of issues can be compared side-by-side. A new tool would be created to display the two columns.

<table>
<thead>
<tr>
<th>Management</th>
<th>Issues</th>
<th>Union</th>
</tr>
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<tbody>
<tr>
<td>Plant Security</td>
<td>Wages</td>
<td>Job security</td>
</tr>
<tr>
<td>Automation</td>
<td>Benefits</td>
<td>Retraining</td>
</tr>
<tr>
<td>Job Categories</td>
<td>Job Security</td>
<td>Work Rules</td>
</tr>
<tr>
<td>Quality Circles</td>
<td>Modernization</td>
<td>COLA</td>
</tr>
<tr>
<td>Wages</td>
<td>Security</td>
<td>Medical Benefits</td>
</tr>
<tr>
<td>Benefits</td>
<td></td>
<td>Personal Security</td>
</tr>
</tbody>
</table>

Figure 10. Proposed MEDIANSS issue consolidation tool.

Issue consolidation. A single list is created out of the two competing lists created in the previous step. Issues may be grouped, split, or eliminated altogether. A new tool, similar to the one for issue and reason identification, was envisioned to display three columns of text. The outer columns would contain that issues for each side, while the inner would be reserved for the consolidated list. An example is shown in Figure 10.

Ranking. Issues are ranked in importance. Carmel and Herniter (1989) suggested that the ranking be accomplished by each participant allocating 100 points among the consolidated issues using the voting tool. The results would then be combined for each team to give an overall
ranking. Each side could then see what was important to the teams, and tradeoff issues (of issues important to one side, but not the other) could then be identified.

Create package. In private, the teams create a package of proposals. All the information from previous steps are available to them as they work. An editor or word processor is the most appropriate program to use.

<table>
<thead>
<tr>
<th>Management</th>
<th>Issues</th>
<th>Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>3%, no benefits</td>
<td>Wages</td>
<td>5%, add dental, medical.</td>
</tr>
<tr>
<td>Workers freely</td>
<td>Benefits</td>
<td>If job categories</td>
</tr>
<tr>
<td>reassigned</td>
<td>Job Security</td>
<td>reduced, then</td>
</tr>
<tr>
<td>Workers monitored</td>
<td>Modernization</td>
<td>displaced, then</td>
</tr>
<tr>
<td></td>
<td>Security</td>
<td>retrained.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lights, security</td>
</tr>
<tr>
<td></td>
<td></td>
<td>guard in lot.</td>
</tr>
</tbody>
</table>

Figure 11. Proposed MEDIANSS proposal presentation tool.

Present proposals. Each side introduces its proposal in a presentation to the other. If a computer version has been prepared, it is displayed on the front screen using a video projector. If not, the mediator uses an editor and captures the proposal as it is presented. At the end of the process, the two proposals and the issues are presented together on a three window display on the computer, as in Figure 11. This linker tool will also be used in the next step.

Linking issues with proposals. Using the hypothetical tool from the proposal presentation, the proposed three window display of proposals and issues, the mediator draws "links" or lines from each proposal clause to each issue by consulting with the negotiators. A "web" of links is created. The tool can be used to explore tradeoffs in an integrative bargaining session. By highlighting an issue, all the proposals linked to that issue are highlighted.
Horse trading. The actual bargaining. To get things started, the mediator asks a side which proposal from the other is the most acceptable or least objectionable. Such a piecemeal strategy (Beal and Begin, 1982) is used to settle issues one-by-one, without linking separate issues. No software tool was suggested to support this step.

Agreement wording. Agreements are captured by the mediator using an editor or word processor and displaying it on the front screen.

F.6. Initial Testing of MEDIANSS

MEDIANSS was developed using the System Development Research Methodology (Chen, 1988; Nunamaker, 1989; Nunamaker and Chen, 1990). This methodology implies that several versions of a system design must be prototyped and tested. More about the methodology can be found in Chapter 3.

Testing is required to check the validity of the system design and to suggest modifications to the design. As the design was in the early stages, manual versions of all steps were implemented. The emphasis was simply on seeing if a system combining manual techniques and a text editor could function.

Two so-called "walk-throughs" were conducted (Carmel and Herniter, 1988). In each, Ph.D. students and faculty of the Management Information Systems Department of the University of Arizona were asked to participate as "actors," assuming the roles of negotiators. The authors acted as mediator and mediator's assistant, the latter being the person who ran the computer system. The sessions were conducted in the Collaborative Management room at the University of Arizona. The participants were divided into two teams and given written scenarios, created by the authors. Each side then had a private pre-session meeting in which they familiarized
themselves with the scenario and plotted their strategy. The authors did attend these meetings
to guide the actor's through the process. Finally, the teams were guided through the steps of
MEDIANSS.

F.6.a. First Walk-Through
The scenario for the first walk-through involved a negotiation between Graduate Assistant
representatives (teaching assistants) and University Administration representatives regarding pay
and working conditions. Altogether, the description took one typewritten page. The topic was
an active one in the campus newspaper. Since teaching assistants were among the actors, it was
felt that the relevance of the scenario to their own situation would lend an air of realism. The
participants were assigned sides, but not specific roles to play.

A text editor was used to display rules. A whiteboard was used to list issues, reasons,
and to display rating information. For the most part, it was a manual procedure.

The first walk-through was disastrous. Although the issue was salient, the balance of
power was too much great in favor of the University Administration. Management (led by a
graduate student) quickly took the position that they were doing the Graduate Assistants a great
favor simply by sitting down with them; no attempt was made to compromise.

The behavior of the student actors during the negotiation point out the problem with using
business students to simulate negotiation. The Graduate Assistant representatives often had no
argument with the hard line taken by the Administration! In fact, they sympathized with it and
were unable to forcibly and sincerely argue against it.
All participants stepped out of their roles to constantly comment on the process. The MEDIANSS process, in fact, was never successfully completed. No agreement was ever reached.

F.6.b. The Second Walk-Through

The second walk-through was more successful. A new scenario was designed that provided a balance of power and a history of successful past negotiation. Detail was added to provide for differences within negotiation teams. The participants were asked not to step out of their roles until the end, minimizing disruption. The end result was a successful and interesting test.

The scenario again was written by Carmel and Herniter. The Nurse's Association of Souther Arizona (NASA) and an industry group representing local hospitals were negotiating over a new contract. The written materials describing the scenario were divided into three parts. The first part was joint information available to both sides. The second and third parts were private information, meant for one side only. The joint information given to all was a brief summary of past negotiation and a wage history for the past nine years. This was to impress upon the actors that neither side could simply not negotiate; a history of successful past negotiation was built-in.

The private information detailed differences among team members. Nursing team members were asked to assume specific roles and act according to the interests of the character they were playing. The management team members were not asked to act a particular part. It was felt that a management negotiating team would be drawn from the industry group and not the local hospitals themselves.
Actor's guidelines (Figure 12) were introduced to encourage participants to fully assume their roles and to discourage out-of-character behavior. The guidelines also explicitly instructed the actors to come to an agreement.

1. Everyone should fully take on the part assigned.

2. Everyone involved should strive to be creative with their role and not be limited by the written script.

3. For the purposes of this walk-through, the parties will come to and sign an agreement.

4. Critical evaluations of the tools will be welcomed at certain break points in the agenda. Please hold your comments until then.

Figure 12. Actor's Guidelines.

It took four hours for the two teams to come to an agreement. Participants also indicated that they were generally pleased with the process. The length of time indicates that the scenario was complex enough to justify using the MEDIANSS methodology.

The researchers still observed that the students acting as nurses were unable to answer to some of the points raised by management. Other treatments that the authors have heard about have used questionnaires to discover the pro and anti union and management biases of the students, who are then assigned to roles they can empathize with.

G. Conclusion to Literature Review

After a survey of Negotiation Support Systems, it is apparent that most systems implement a particular technique such as linear programming, social judgement theory, and multi-criteria dispute resolution. However, theories of negotiation indicate that a broad range of negotiation styles and problem-solving techniques exist. In fact, the techniques used in the NSS reviewed here seem not to have caught fire: negotiations proceed without the use of computers.
It is possible to argue that a good NSS should support all problem-solving approaches; in other words, the ideal NSS should be inclusive, rather than exclusive of different techniques. But it is better to argue that an NSS should *initially* support negotiation as it is practiced. When we look at a negotiation, it is fundamentally a meeting between two groups of people (at least two). In a labor-management negotiation, they meet to argue over a document, the contract.

Only one class of NSS, the Session Systems, supports both the requirements of a meeting and the requirements of a negotiation. A Session System is both a type of GDSS and a type of NSS. It makes sense to combine the two. The GDSS themes of structure and group communication are already part of negotiation. The setting of both are similar: both negotiations and GDSS take place in decision rooms and legislative settings.

Yet, negotiations offer an exciting new opportunity in broadening the practical application of GDSS. By including Session Systems within the GDSS umbrella, new domains of group conflict, new problem areas, and new tasks will be open to GDSS research and exploration. The use of GDSS procedures and software tools offer a chance to improve the negotiating process and research its activities.
III. METHODOLOGY, EXPECTATIONS, AND PILOT STUDY

There are several kinds of research that are appropriate to Management Information Systems. Vogel and Nunamaker (1990) offer seven types of research: mathematical simulation, software engineering, case study, survey, field study, laboratory experiments, and conceptual or argumentative. Which one is chosen depends on the researcher and the opportunities for research.

Two principles on the selection of a research method have been made by Nunamaker (1989). The first is that "the research method is not more important than the research question." The method chosen cannot overcome a bad or meaningless research question. Systems development is not only a methodology, but as an area of research itself, it can also change the "process and product." The second principle is that "a valid methodology is necessary, but not sufficient for good research." Sound methodology does not automatically lead to results. A researcher must be expert in the area in which they conduct their studies.

It was once argued that methodologies should be sorted according to a hierarchy: experiments for causal research, surveys and histories for descriptive research, and case studies for exploratory research with the experimental method on top (Yin, 1984). The purpose of these two principles is to free the discussion of MIS research methodology from dogmatic discussions of methodological orthodoxy and to move toward the search for meaningful research.

The System Development Research Methodology (SDRM) used in this study is a valid research methodology when it conforms to the following criteria: its purpose is to study phenomenon in the area of information systems using system building; the results are a significant contribution to the field and are testable with the criteria of the objectives and requirements or the system; the system is an advance if it can perform the function better than
other systems; and the knowledge and experience of design are generalizable (Nunamaker and Chen, 1990).

In this chapter, the research design involving the system development research methodology and case studies will be presented first. This will involve the design, implementation and evaluation of the negotiation support system. Second, the expectations for the system evaluation will be discussed. Finally, the pilot tests will be described.

A. System Development Research Methodology

System development research methodology is derived from four sources (Nunamaker, 1989; Nunamaker and Chen, 1990). The first is the paradigm of research common to engineering: build it, test it experimentally, test it in the field, and report the results. The second is the collective experience of researchers using methods other than experimentation. The MIS research paradigm has evolved to one where the "appropriate methodology" is fit to the situation. The researcher starts with a concept and creates a rough model or a prototype system which is improved through an alternating series of field tests and changes made in response to the results.

The third source of system development research is the research process of social and behavioral science. The first three steps have the investigator chose the research problem, state the hypothesis to be tested, and formulate the research design. The last three steps involve gathering and analyzing data and, finally, interpreting the results.

The fourth source of SDRM are software development methods and Computer-Aided Software Engineering (CASE) tools. CASE tools are based on the system development life cycle (Couger et al., 1982; Chen et al., 1989). The development of case followed the pattern: learn
from the development of previous systems, improve the development process through structured methodologies, create automated tools, and study the use of methods and tools.

**SDRM** enables both the engineering, social/behavioral science traditions, and software development methods to form a new synthesis (Chen, 1988; Nunamaker, 1989; Nunamaker and Chen, 1990). This synthesis allows researchers to explore a field that itself combines both traditions. Building a system can be used to solve the problem of negotiation, but its true impact can only be measured by studying the behavior and opinions of the people who use it. Once a viable system is introduced, the computer can be used to aid the researcher.

The pattern of system development research methodology consists of five phases, which can be iterated at any point (see Figure 13). Each step is examined in turn.

**Construct a conceptual framework.** This starts with stating a meaningful research question, a common approach to focus the research effort. The second step is to investigate the system functionalities and requirements. This is similar to the requirements phase of the system development life cycle (Cougar et al., 1982). The third step is to understand the process and procedures of system building. The fourth is to survey relevant disciplines for new approaches and ideas.

**Develop a system architecture.** Once the survey of relevant fields and techniques of the conceptual step is completed, it is time to organize that knowledge. The system architecture encompasses that knowledge. It is the knowledge base for the researcher. The objective is to develop a unique architecture design for extendibility and modularity. The functionalities of system components and how they interact with each other are defined.

**Analyze and design the system.** To understand tradeoffs and the limitations of the design, alternative solutions to design problems are developed. Finally, one is chosen as a
solution. This is similar to the design step of the system life cycle (Couger et al., 1982).

**Build the system.** The previous phases explored what is formally known about the field. This phase is analogous to the programming step of the system life cycle (Couger et al., 1982). Here, the researcher learns about the concepts, framework, and design through the system building process. As the system development proceeds, the problems of design become apparent. By adapting theoretical concepts to the system, new insights are gained.
Observe and evaluate the system. This is where theory meets reality. The researcher observes the use of the system by case study and field study and formally evaluates it via lab and field experiment. To start the cycle again, new theories and models are developed based on the building and application of the system.

B. Case Study

The case study is advantageous for use with system development research methodology. The evaluation step requires a scientific methodology to test and evaluate the design, and case study was chosen for this research. The case study is a scientific methodology particularly well-suited to exploration (Benbasat et al., 1987).

Writers describing case study methodology offer many areas in which to use the research case study methodology. Yin, in a 1984 book, offers an introduction to the methodology. He argues that case studies can be used for three types of research: exploratory, descriptive, and causal (explanatory). Benbasat et al. (1987) attempted to frame the methodology for the management information systems field. They suggest that case studies are good for exploration, classification of phenomena, and the development of hypotheses. However, their attempt to do so was criticized by Dutton (1988) for implying that the methodology was unscientific and for using Yin (1984) as a source instead of actual papers by practitioners. Dutton suggests that the case study can discover facts equal in validity to survey and experimental research (Dutton, 1988). Lee argues that case studies are appropriate for the deductive testing of theories (Lee, 1989).

---

6 In a later letter, in response to criticism of the article, the authors reemphasize that hypothesis testing is a valid application of the case study method (Benbasat et al., 1988).
B.1. Criteria for Selecting the Case Study Methodology

Criteria abound to guide the researcher in selecting the case study method. Benbasat and his colleagues have two criteria to guide the researcher in choosing the case study methodology (Benbasat et al. 1987). When a natural setting is needed and the emphasis is on contemporary events, then a case study is indicated. Case studies are also selected when the researcher is exploring phenomena not supported by a strong theoretical base. If the phenomena or subjects must be manipulated or a control is called for, then the case study methodology is not appropriate.

Yin divides case studies into single-case and multiple-case studies (Yin, 1984). A situation that fits any one of three categories is eligible for a single-case study. One, the case might be revelatory; that is, it brings to light new facts. Two, a case can be deemed critical, that is it can prove or disprove a theory. Finally, a case can be extreme, rare, or unique. These cases push on the outer limits of theory. A situation similar to one of these three is a candidate for a case study. A single case study is good for exploratory research (Benbasat et al., 1987).

The essence of the multiple-case study is its replicative nature (Yin, 1984). Multiple cases are often considered more persuasive than single cases. However, the three single-case categories (revelatory, critical, and rare) are nearly impossible to find in great numbers. Instead, Yin suggests that multiple cases be chosen for replication of results. Each case is chosen because the outcomes should be the same or they are chosen because the same theory or theories make predictions regarding all the cases. Multiple cases are used if the research is for description, theory building, or theory testing (Benbasat et al., 1987).

Benbasat and his colleagues specify a lot of "not's" to discourage inappropriate use of the methodology (Benbasat et al., 1987). A case study is not an experiment and its techniques
are not cookbook precise. No experimental controls or manipulation are possible. There is no advance specification of independent and dependent variables. Changes in sites and techniques of data collection are allowed as new hypotheses are developed.

B.2. Data Collection

Several methods are available to the case study researcher to collect data. They include using documentation and archival records, conducting interviews, making direct observations, acting as a participant in events as well as an observer, and examining artifacts (Yin, 1984). In fact, one characteristic of case studies are that data collection by multiple methods (Benbasat et al., 1987).

Written records are divided into two categories. Documentation includes correspondence of any sort (letters, memoranda, and communiques), written reports (agendas, announcements, and minutes of meetings), administrative or internal documents (proposals and progress reports), formal studies or evaluations, and any articles appearing in the mass media. Archival information includes any service records (e.g., # of clients served) or organizational records such as organizational charts or budgets. Other sources are maps and charts, lists or names or commodities, survey or census data, and personal information such as diaries, calendars, and telephone listings.

Yin (1984) and McCracken (1988) offer classifications of interviews which overlap somewhat. Yin lists the three interview types as: open-ended, focussed, and survey; McCracken's corresponding types are unstructured, long, and depth. Open-ended or unstructured interviews elicit facts and opinions unrestricted by an agenda on part of the interviewer. The focussed or long interview is about one hour in length and follows a certain set of questions. The
survey is a highly structured interview, one that is essentially a verbal form of a survey questionnaire. The questions do not vary from interviewee to interviewee. The response may be short answer, long answer, or choosing from a list of responses. The depth interview is focussed on the individual and is used by psychological researchers.

Direct observation can either be formalized or casual. The observer watches the process or phenomena and discreetly takes notes.

In a participant-observer case study (also known as action research), the researcher may participate in the phenomena being studied (Yin, 1984; Benbasat et al., 1987). The intent of the research is two-fold: to conduct research while effecting change. For example, a mediator can do research on various methods of third-party intervention. The drawback is that the observations are potentially biased.

Finally, physical artifacts are also evidence. An artifact may be a technological device, a tool or instrument, or a work of art.

B.3. Analyzing Case Studies

Yin (1984) defines the major analysis methods of case studies as pattern-matching, explanation-building, and time-series analysis. In pattern-matching, observed patterns are compared with predicted and rival patterns. To be included in the rivals, patterns can come from one or more theories or cases. Simplifications of theoretical or observed patterns are also eligible.

Explanation-building is the technique of asserting causal links among events. This is often an iterative process, with the researcher subtracting, adding, and modifying the hypothetical links as time and the number of cases grow.
The last major analytic method is *time-series analysis*. A times-series is either a chronology (a series of steps in precise order), simple (a rise or decline in a variable), or complex (e.g., rise then decline).

The minor methods of analysis are analyzing embedded units, making repeated observations, and a case survey (Yin, 1984). Examining a small part of the larger unit is called *analyzing embedded units*. Both longitudinal and cross-sectional studies make use of *repeated observations*. In the longitudinal case, one unit is observed over time. In the cross-sectional study, several sites or units can be observed. The *case survey* requires that several cases be examined, rather than just one.

C. Synthesis of System Development Research and Case Study Methodologies

The main activity of this research will be to develop a software system that implements the MEDIANSS conceptual design. The approach will be system development research methodology (Chen, 1988; Nunamaker, 1989; Nunamaker and Chen, 1990).

**Construct a conceptual framework.** The framework is the MEDIANSS conceptual design as elaborated by Carmel and Herniter (Carmel and Herniter, 1988; 1989; Herniter, Carmel and Nunamaker, 1990). The MEDIANSS framework is described in Chapter 2.

**Develop a system architecture.** The standards of University of Arizona GroupSystems will be used (Ventana Corporation, 1990c,e).

**Analyze and design the system.** Areas in which GroupSystems tools cannot be applied will be identified and specific programs will be designed. GroupSystems tools which do fit the MEDIANSS framework will be applied.
Build the system. The new programs required will be written using Borland Turbo Pascal (Borland International, 1983, 1989). Subroutines that enforce the GroupSystems standards will be freely used to handle input, screen control, and output.

Observe and evaluate the system. The true evaluation of the system will be its use by real groups: in this study, two labor-management contract negotiations. Negotiation team leaders and their members will be introduced to the system for their approval, notes will be taken during the negotiation process, all proposals, and documents will be saved for evidence, regular observations of computer use will be recorded, questionnaires will be distributed, and post-negotiation interviews will be conducted. Finally, all participants from both negotiations will be invited to a meeting where changes in procedures and programs will be suggested, discussed, and ranked.

A case study requires that multiple sources of information be used. Evidence in a labor-management negotiation includes direct observation during the talks, questionnaires, focused interviews and various documents. The current and previous contracts, written proposals, and memoranda of agreement are all information sources.

D. Expectations

There are significant differences between the subjective measures and objective measures of success. Subjective indices examine the perceptions of study subjects. Objective indices measure the physical and temporal effects. It is expected that subjectively, the MEDIANSS system as implemented using GroupSystems will get high marks: users will be highly satisfied and effectiveness will be high. In contrast, the objective measures will reveal no or negative effects. The quality of the settlements reached will be the same or worse than previous negotiations. An
important objective measure is the time required to conclude an agreement. Time can be measured two ways: the number of formal sessions and the total time in face-to-face meetings.

In summary, the feelings of the users toward MEDIANSS is expected to be positive, but the actual impact is either zero or negative.

E. Pilot Study

The pilot study was used to develop and evaluate alternatives for implementing MEDIANSS using the University of Arizona GroupSystems. Three groups of students were asked to read sample negotiation cases and to come prepared to act as negotiators seeking to resolve the dispute. When they arrived at the MIS Group Work Facility, they were instructed on the steps of the negotiation and which software tools were available. After each treatment, the results were evaluated and the implementation was altered for the next group with the hope of developing a more useful system. As a result, each group experiences a different form of Negotiation Support System.

<table>
<thead>
<tr>
<th></th>
<th>Environmental Dispute</th>
<th>Hospital Dispute</th>
</tr>
</thead>
<tbody>
<tr>
<td>group 1a</td>
<td>automated</td>
<td>manual</td>
</tr>
<tr>
<td>group 2</td>
<td>automated</td>
<td>---</td>
</tr>
<tr>
<td>group 1b</td>
<td>manual</td>
<td>automated</td>
</tr>
</tbody>
</table>

*Figure 14. Pilot study design.*
Groups 1a and 1b were drawn from the same negotiation class. The subjects were senior undergraduates and MBA students. Group 2 consisted of students from a senior-level business class. As shown in Figure 14, all groups negotiated in the MIS Group Work Facility (labeled in the figure as "automated.") However, as part of their course work, groups 1a and 1b also negotiated another case without electronic assistance (labeled in Figure 14 as "manual."

The first case came from Lewicki and Litterer (1985) and is called "Twin Lakes Mining Company." It involves a negotiation between a mining company under order from the Environmental Protection Agency to clean up its operations and a city that wishes to keep the operation in town. The goal of the company side is to negotiate a deal which makes the operation profitable; the city wants to keep the company in town without breaking its budget by offering incentives. Group 1a and 2 negotiated this case using computer assistance. Group 1b used this case with the manual treatment.

Groups 1a and 1b also used the same case in their second treatment. This second case also comes from Lewicki and Litterer and is called "Elmwood Hospital Dispute." It involves a negotiation between a non-profit hospital and community activist groups that want it to serve the poor people who live near it. The hospital wishes to continue its high quality care, its affluent clientele, and maintain its operating margin. The goal of the community coalition is to make health care affordable to the nearby residents. Group 1a negotiated this case without computer assistance. Group 1b used this case with the computer.

For purposes of the pilot, the steps of MEDIANSS were divided into four sessions: strategy, issues, proposal creation, and bargaining. The agenda and tools used were different for each treatment. After Group 1a failed to reach agreement after three and one-half hours, it
became obvious that the target goal of two and one-half hour treatments was unrealistic. Thus, the pilot was treated as an opportunity to develop the treatment.

The strategy session was envisioned as a typical planning session using the GroupSystems tools (Dennis et al., 1988; Ventana Corporation, 1990 a,b,c,d,e). Thus Electronic Brainstorming, Topic Commenter, and voting were under consideration. However, each of those tools takes 20 to 40 minutes to run. In the interest of saving time, the strategy session was handled manually in all cases.

Figure 15. Topic tree structure used in topic commenter.
Only one GroupSystems tool was considered for the issues session: Topic Commenter. One idea was to let the two groups present issues, which would then be made separate "topics" under Topic Commenter. Then individuals could enter their ideas regarding the importance (or unimportance) of the issue to the negotiation. Figure 15 illustrates the topic tree (each leaf is a topic) structure under consideration.

*Bargaining session* tools were editors and the Topic Commenter tool. Both of these were used to communicate proposals to the other side. The Topic Commenter tool allows the facilitator to send only a subtree of topics to the users. Thus, the negotiators could suggest proposals to their team leader without the other side seeing it.

Each computer-assisted treatment was different because the goals of the treatments were not realized. One was that the two and one-half hour time limit considered reasonable for an experimental treatment was not being met. In fact, the third treatment, with the least computer support, was quickest.

Another reason each treatment was different was that unreasonable agreements were reached. For group 1a, a town negotiating with a company, the town ended up giving the company a 100%, 25 year tax abatement. There was no "reality check" on the settlements.

The third reason for the different treatments was the general dissatisfaction with the process. In written answers to general questions, all groups felt the computer got in the way.

Data collection involved two steps. A questionnaire given at the end of each automated treatment. Written, essay-type evaluations were collected by the instructors several weeks after groups 1a and 1b finished both manual and automated treatments.

The pilot study made two things about the MEDIANSS implementations and using students clear. The first is that students pretending to be negotiators are inappropriate subjects
on which to test MEDIANSS. The students were extremely eager to proceed with bargaining without preparing strategy or first deciding on the issues. They expressed dissatisfaction with enforced strategy planning steps. The students also expressed annoyance that they could not immediately proceed to bargaining. Of course, the students had no stake in the outcome: they have constituency on behalf of whom they are negotiating and they do not live with the consequences of their actions.

The pilot reinforces the belief that the case study methodology is the appropriate vehicle for testing MEDIANSS. Case studies offer no artificial restrictions on the duration of the talks. The negotiators involved must answer to their constituents for their decisions; the negotiators have a check on their behavior and unrealistic solutions are less likely. Finally, real negotiators are more likely to offer useful hints to aid future negotiations.

F. Conclusion to Methodology, Expectations, and Pilot Study

The goal of this research is to develop a viable Negotiation Support System. To make development and testing of such a system a rigorous endeavor, a scientific methodology coupled with a good research question must be used. A proper methodology carefully followed should produce verifiable results.

A wide variety of methodologies are suitable to Management Information systems, but only one provides a framework to design, implement, and test an information system. System Development Research Methodology unites the development of a system (software engineering) with research in the process it is intended to support. Software engineering and its system development life cycle guide the development of the system. Reviews of the field and the development of a framework all fit into the requirements phase, while design and implementation
fall within their own phases. The analysis step of SDRM calls for the rigorous evaluation of the system and its effects.

The last step of SDRM calls for observation and evaluation of the system. Such an evaluation can be done through an experiment, a field study, a field experiment, or a case study. System Development Research Methodology places only the restriction that it be scientific. The case study approach was selected for the final phase of this research. This is exploratory research: no one has before attempted to support a face-to-face negotiation using an electronic meeting system. Case study is a methodology well-suited to discovery and exploration. By using it with actual negotiators, useful data from actual negotiators will be generated.

It is expected that the system will prove itself only marginally useful at best. Judging from the history of Management Information Systems, we find that many information systems are discarded. Since we do not know how to predict what is useful and what is not, the best preparation and research only postpones the trial and error period. The research described here is in its early stages and experience with actual negotiations is scarce. This initial experience with GroupSystems and the MEDIANSS design should prove to be promising, but the actual results will show that this initial implementation does not have an effect on the outcome.

The pilot study indicates that experimental studies of MEDIANSS using students as subjects are inappropriate for evaluating MEDIANSS. Students do not have a stake in the outcome of a negotiation and they do not view negotiations as seriously as people whose jobs depend on the outcome and who have years of experience dealing with the issues. Other studies of GDSS have suggested that a professional manager with a real task to do has a high satisfaction with GroupSystems (Dennis et al., 1988; Nunamaker et al., 1989, Dennis et al., 1990). A case
study which examines the use of MEDIANSS by actual negotiators is likely to overcome the problems evident when using students in experimental settings.
IV. THE GROUPSYSTEMS/MEDIATION DESIGN

GroupSystems/Mediation (GS/M) is the marriage of GroupSystems and the MEDIANSS conceptual design. It is a revision of the process model and implementation suggested by Carmel and Herniter (1988; 1989). As a redesign, it constitutes the start of another cycle in the System Development Research Methodology (SDRM) cycle.

A new pass through the System Development Research Methodology (SDRM) cycle started with redesigning the implementation of MEDIANSS. The failure of the pilot implementations indicated that the issues and bargaining sessions of MEDIANSS required new tools. These sessions are quite different and two separate sets of tools were developed to deal with them. The way in which each tool base was created also was quite different. Two new tools, issue consolidation (IC) and the linker, were programmed with the use of GroupSystems subroutine modules. Other tools (Electronic Bargaining Book, Contract Log, Article List, and Proposal Editor) were new uses of available software.

The analysis step of the SDRM cycle will be discussed in Chapter 5. This chapter will discuss the design and implementation of six tools. First, the philosophy and general requirements of the GS/M implementation will be presented. Then the IC and linker tools for the issues session will be discussed. Finally, the Electronic Bargaining Book, Contract Log, Article List, and Proposal Editor of the bargaining session will be presented.

A. Process Model

Negotiation tools are designed to fit into the process shown in Figure 16. This model was adapted from Carmel and Herniter (1989), but extends the MEDIANSS framework to include the
"presession" advocated by Anson and Jelassi (1990) and mentioned by Carmel and Herniter (1989). The model is shown in Figure 16 for a two-sided negotiation.

The process is divided into four sessions: strategy, issues, proposal creation, and bargaining. A "session" may entail more than one meeting. Each side holds a strategy session separate from the other (hence the double column of processes in Figure 16). It is a private process in which the team explores its own long-term interests, identifies problems that can be solved by negotiation, and generates possible solutions. These steps are included for the negotiation team to better understand the concerns it can address during the talks. The final step is to formulate a negotiation strategy.

The issues session is held prior to bargaining and the exchange of proposals. In these meetings, the two sides come together for the first time. Since this is the first joint session, the ground rules are set as the first step. Then a role reversal exercise is undertaken to enhance understanding and create a positive atmosphere. The single "role reversal" step of MEDIANSS is shown to include a separate preparation phase done separately by the two groups.

The last three steps of the session deal directly with issues. The sides separate to create their issues lists and come together to meld their lists into a single, consolidated list. They separate again to rank the issues. Rankings are private information and intended for internal use by each team.

Proposals are created privately during the proposal creation session. It is in the bargaining session that proposals are finally presented. The bargaining session is conducted with both teams present. Proposal presentations are followed by linking proposals to issues. After linking, the negotiators get to the actual bargaining steps: horse trading and agreement writing.
Figure 16. A process model for negotiation.
<table>
<thead>
<tr>
<th>Inputs</th>
<th>Processes</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miscellaneous Documents</td>
<td>Identify Interests</td>
<td>Interest List</td>
</tr>
<tr>
<td>Miscellaneous Documents</td>
<td>Identify Problems</td>
<td>Problem List</td>
</tr>
<tr>
<td>Problem List</td>
<td>Generate Solutions</td>
<td>Solution List</td>
</tr>
<tr>
<td>Past Strategies</td>
<td>Formulate Negotiation Strategy</td>
<td>Strategy Statement</td>
</tr>
<tr>
<td>Generic Rules</td>
<td>Rule Setting</td>
<td>Rule Document</td>
</tr>
<tr>
<td>Role Assignments</td>
<td>Role Preparation</td>
<td>Description of Responsibilities &amp; Problems</td>
</tr>
<tr>
<td>Description of Responsibilities &amp; Problems</td>
<td>Role Presentation</td>
<td>Corrected Description</td>
</tr>
<tr>
<td>Problem Lists</td>
<td>Issue &amp; Reason Identification</td>
<td>Issues Lists</td>
</tr>
<tr>
<td>Issues Lists</td>
<td>Issue Consolidation</td>
<td>Consolidated Issues List</td>
</tr>
<tr>
<td>Consolidated Issue List</td>
<td>Ranking</td>
<td>Issues Ranked in Order of Importance</td>
</tr>
<tr>
<td>All Previous Outputs</td>
<td>Proposal Generation</td>
<td>Proposals</td>
</tr>
<tr>
<td>Proposals</td>
<td>Proposal Presentation</td>
<td>Appended Proposals</td>
</tr>
<tr>
<td>Appended Proposals, Consolidated Issues List</td>
<td>Linking</td>
<td>Network of Issues &amp; Proposals</td>
</tr>
<tr>
<td>All Previous Outputs</td>
<td>Horse Trading</td>
<td>Agreements</td>
</tr>
<tr>
<td>Agreements</td>
<td>Agreement Wording</td>
<td>Final Document</td>
</tr>
</tbody>
</table>

Figure 17. Inputs to and outputs from negotiation steps.
Each step in the model is linked by a network of inputs needed and outputs generated. Figure 17 shows the inputs and outputs required for each step in the negotiation process. The task of the designer is to match as many of these processes to electronic tools as possible. The following section will discuss the philosophy behind the design of the tools used in this study.

B. Design philosophy

A simple rule was followed in the design of GS/M tools. If a process could be supported with existing tools, it was; if not, a tool would be designed for use by the mediator. Newly developed tools would operate on only the mediator’s station and the process would be chauffeured by him or her.

The first attempt to computerize a process is to create a single station version. For example, the Stakeholder Identification and Assumption Surfacing module of GroupSystems evolved from a manual tool to a single station version operating only at the facilitator’s workstation; it is now used directly by all participants (Rowe et al., 1986; Easton, 1988; Easton et al., 1989; Ventana Corporation, 1990a,e). Since IC and Linker were new tools without a history of prior computerization, they were single station versions using a chauffeured process.

The bargaining session tools adapted from GroupSystems were another story. These tools involved storing, updating and providing the text of the negotiation (current contract, proposals, results of brainstorming sessions; i.e., anything written and shared among the parties) to all participants during the actual bargaining. Only one document had to be viewed at one time, so the File Reader program of GroupSystems was used for the bargaining book. A commercially available word processor was adequate to create the Contract Log and Article List, both under the mediator’s control. However, a word processor is a complicated system; something simpler
was needed for the negotiators who were not expert in use of a word processor. A simple text editor was provided for the teams to create formal written contract language. It too was commercially available.

C. General Design Requirements

System requirements are imposed by the negotiation process, previous experience in the display of information, and the design standards imposed by GroupSystems. In this section, the general requirements for a negotiation tool are explored.

Several questions arise when writing negotiation software which general guidelines can answer. The first question to ask is "How many sides in the negotiation?" The tools used here assume two sides, appropriate for a labor-management negotiation.

The second question is "Who will run the software?" If the negotiators run the software, then versions of the program run by each side must communicate. If the mediators run the software, then the process is "chauffeured." This latter process is easier since it implies that the mediator's station only need to run the program. To be consistent with the procedure of making a single station version work first, the Issues Tools will be designed for a single station, the mediator's station.

"What color standards should be followed?" The colors of the background, the text, the borders and the titles all need to be consistent with other GroupSystems tools (Ventana Corporation, 1990c,e). In so-called "read-only" windows (where text is viewed, but cannot be altered), white text on a blue background is standard. In "write" windows (where text can be altered), the text is white on a black background.
As noted above, the visual display of text should display or make available all the information required to implement the process the tool is designed to support. Visual display is the critical component. Several authors have offered guidelines which have been compiled by Herniter et al. (1990).

**Color.** Use of color should be limited (DeSanctis, 1984; Benbasat et al., 1986) and color alone should not uniquely distinguish any one piece of data (Christ, 1975).

**Text.** Labels should be self-explanatory. All text should be a mix of uppercase and lowercase letters (Ives, 1982; Tufte, 1983).

**Metaphor.** Computer analog of manual tools offer a good intuitive model to guide the user. A metaphor should be used to guide design (Edwards, 1983; van de Veer and Felt, 1988).

**Legibility.** A legible presentation enhances the perception by users of the professionalism of the presenter (Vogel et al., 1986).

**Graphs versus Tables.** Graphs are for patterning tasks and tables are for referencing data (Jarvenpaa and Dickson, 1988).

**Beginners and Experts.** Accommodate the beginning user. Include features to speed use for the expert.

All except the last two guidelines were used in the GS/M design. In the next two sections, the details of the tools are presented.
D. Original Tools

A total of six tools were developed for this study (Figure 18). Two of the tools are original, built from scratch for the issue consolidation and linking steps of the negotiation process. These are discussed in this section. The remaining tools were adapted from pre-existing software and are discussed in section E.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue Consolidation</td>
<td>Issue Consolidation</td>
</tr>
<tr>
<td>Linker</td>
<td>Linking</td>
</tr>
<tr>
<td>Electronic Bargaining</td>
<td>Horse Trading</td>
</tr>
<tr>
<td>Book</td>
<td></td>
</tr>
<tr>
<td>Contract Log</td>
<td>Preposal Demonstration, Horse Trading, Agreement Wording</td>
</tr>
<tr>
<td>Article List</td>
<td>Horse Trading</td>
</tr>
<tr>
<td>Proposal Editor</td>
<td>Proposal Generation, Horse Trading</td>
</tr>
</tbody>
</table>

Figure 18. Tools designed for negotiation.

*Issue consolidation* (IC) was specifically written for the issues sessions and *linker* was written for the bargaining sessions. The development environment used was Borland Turbo Pascal 5.5 (Borland International, 1983,1989). Turbo Pascal is used throughout version 3 of GroupSystems. The Turbo programming environment can compile computer code, execute the program under development and provides debugging facilities. The software libraries used are those standard for GroupSystems. Canned subroutine packages called "units" are used to provide edit functions, string manipulations, menus, file management functions, video manipulations, and DOS file functions.
Figure 19. First page of IC/Linker source code.
Figure 19 shows a page from the linker source code. The linker and IC share the same source file. IC was developed first and linker second. The two programs share many of the same characteristics and functions, so it was logical that they share most of the code. A series of compiler switches are used to control which program is produced when compiling. If "LINKER" is defined, then the linker tool code is compiled. If "CONSOLIDATION" is defined, then the issue consolidation program is produced.

The careful reader will note that there exist three other definitions built into the code. Each was also used to determine how the source compiled. The "CHECK" and "NOCHECK" definitions were used to change the way the link information was stored. With "CHECK," the links were stored as strings that are easily readable. In development, the "CHECK" option was used each time the links had to be debugged. Normally, the linking information is stored purely as numbers, unreadable to the developer. The "NOCHECK" option provides for this normal mode, the advantages of which are that it is faster for the computer and it takes less storage space in the computer's active memory.

The "MASTER" or "SLAVE" definitions follow from the two screen nature of the tools. Each has the option of using a second networked computer as a slave machine. As described later, only two text windows appear on the user's screen at any one time. Using a slave computer and two screens, that number is increased to three.

Defining either "COLOR" or "MONOCHROME" was originally intended as a convenience to the developer. Part of the development took place on a laptop computer which used only a monochrome liquid crystal display (LCD). Ordinary colors blend into similar shades of gray on an LCD. The "MONOCHROME" option let special gray scales be used. A lasting advantage to this is ready adoption of the final product to monochrome displays.
The last part of Figure 19 lists the subroutine libraries, known as units, referenced by the programs. Units contain compiled Turbo Pascal code that can be incorporated by other programs. Libraries "Dos," "Crt" and "Util" are standard Turbo Pascal units. "CEdit," "Listmgmt," "Fileio," "screen," "strings," "ffile," "Menu," "Pull," and "Group" are units tailored for GroupSystems and implements its standards (Ventana, 1990e). For example, "CEdit" contains all the editing functions and "Group" contains subroutines that handle several user stations at once.

D.1. Issue Consolidation

When designing the computer display of text, its placement and formatting should not hinder the task the program is supposed to assist. The display of the Issue Consolidation (IC) tool is an attempt to make all the information available that is needed to complete the task of issue consolidation.

The creation of a list is the metaphor for IC. The issue consolidation step of MEDIANSS requires that two lists of issues be folded into one (Carmel and Herniter, 1989). This is handled in IC by displaying only one side's issues at a time in the bottom window of the display. Only one key stroke is needed to replace one side with another. At all times, the consolidated list of issues is displayed, so that the focus remains on the consolidated list. Figure 20a shows the IC display with a consolidated issues list on the top window and the issues list for "Management" on the bottom window; Figure 20b shows the same consolidated issues list in the top window, but the bottom window shows the issues list for "Union." Notice that all labels are combinations of upper- and lowercase character styles.
Figure 20 a,b. The Issue Consolidation screens for Management (a) and Union (b), single screen version.

Another viewing option is available. A second terminal can be slaved to the mediator's terminal and made to show the side unavailable on the main screen. A master and slave screen combination are shown in Figure 21a and Figure 21b.

When designing a display using an IBM-compatible personal computer, two display modes are usually possible. The first is character mode. Only a fixed set of characters can be
### Issue Consolidation

**Consolidated**

1. Security  
2. Job Security  
3. Modernization  
4. Wages & Benefits

#### Management

1. Plant Security  
2. Automation  
3. Job Categories  
4. Quality Circles

#### Labor

1. Job Security  
2. Retraining  
3. Work Rules  
4. Wages  
5. COLA  
6. Medical Benefits

---

**Figure 21 a,b.** The Issue Consolidation screens for Management master (a) and Union slave (b), two screen version.

displayed. They include uppercase letters, lowercase letters, punctuation characters, graphics characters (single and double versions of vertical, horizontal, and right angle lines), and some miscellaneous characters. The size of the letters are fixed; screens are usually restricted to displaying 25 lines of 80 characters each. This is the normal display mode, used in spreadsheets, word processors and other tools. The second is *graphics mode*. This mode allows a finer
display. Characters can be shown, but in any size. Graphics is not limited to straight horizontal and vertical lines and corners, but also includes lines in any direction and curves. This is the mode used by word processors to view a page and spreadsheets to display graphs and charts. Character mode was selected because of its legibility; the characters are larger and thicker. Also, there was no need to produce curves or draw lines.

Consolidated Issues
    Union
    Management

Figure 22. TITLE.IC file from HealthCare negotiations.

Two files serve as input. ISSUEA.IC and ISSUEB.IC files provide the issues text files. The TITLE.IC file (Figure 22) provides the names of the sides used on the display screen. The output file is CONSOLID.IC, another text file. Any of these files can be brought in from any source; however, once imported into the tool, they are saved under these names.

When a mediator sits down at the terminal, the IC program starts by asking for titles, but gives the chance to use default titles. If the title file already exists, the defaults are the titles from that file; otherwise the default titles are "Consolidated Issues," "Side A," and "Side B".

The second set of information required by IC are the names of the issues files. If files CONSOLID.IC, ISSUEA.IC, and ISSUEB.IC do not exist, the mediator is asked for the names of the files that contain the issues.

The issues files ISSUEA.IC and ISSUEB.IC come from the Strategy Session. The consolidated list file is displayed in a write window: black background with white lettering. The first issue file, ISSUEA.IC, is displayed in a read-only menu: blue background with white lettering. At this point, the preliminaries are over; the mediator may now start the process. The

7Text files are sometimes referred to as DOS Text or ASCII files.
mediator may switch between the upper and lower windows (F6) and between the issues files (F8).

Issue consolidation is a chauffeured process. While the IC tool is designed to run only at the mediator's station, the results are displayed through the front video projector to the entire group. The mediator starts the process by randomly selecting the side whose issue starts the list. An issue is first considered from one side, then the other. The rule is that if one side thinks something is an issue, then it is. Neither team has a veto over issues, however, changes to the consolidated list must be by mutual consent. As each issue is added, it is discussed. Issues can be dropped, split, or combined. A cut and paste function lets text be copied from one side's window to the consolidated list window.

The selected side is asked by the mediator to pick an issue from its own list. By hitting the F6 key, the mediator switches to the bottom issue screen, which then appears with a black background. The current place in the issue text is shown only through a blinking cursor. Once the proper issue has been located, a team spokesman explains why it is an issue for negotiation. The other side gets to ask questions for the purposes of clarification, to which the selecting side must respond.

Once an issue is selected, the mediator copies the text to the consolidation window through a cut and paste procedure (F2 key). He or she scans the consolidated list to see if the current issue might be combined with others. Any merging, splitting, or deleting of issues is done with the consent of both sides.

If more issues exist for the next side, then the mediator asks the other side to select an issue and the process repeats. The sides alternate for as long as each has issues to add. If no more issues exist for the next side, then the current side is asked to select another issue.
D.2. Linker

The linker tool is used in the linking step of the bargaining sessions. The purpose of the tool is to visually display the connections between proposals and issues so that tradeoffs can be explored by negotiators. The two sets of proposals are viewed as a solution space, whereas the issues are a problem space. The linker connects the issues to the proposals.

The linker was written as an extension to the issue consolidation tool. The two window format is the same, with the consolidated issues appearing in the top window. The bottom window, however, displays proposals rather than issues. The color conventions are the same: the text being manipulated appears in a window with a black background and white text; the other window is blue with white text. Combinations of upper- and lowercase letters are displayed using character mode.

The procedure asking for titles and file names is the same in the linker as it is in IC.

Consolidated Issues
Union Proposals
Management Proposals

Figure 23. TITLE.LK for HealthCare negotiations.

The input files, as in the issue consolidation tool, are text. Three files initially serve as input. Two are the proposal files (PROPOSEA.LK, PROPOSEB.LK) containing the text of the proposals finalized in the proposal creation session. Proposals appear in the bottom window, one file at a time. The third file is CONSOLID.LK, the consolidated list of issues created in the issue consolidation step of the issues session. When the mediator starts the program, these files can be taken from files of any name, however, once imported into the tool, they are saved under these names. TITLE.LK (Figure 23) provides the text for the labels used in the window borders.
All labels are a mix of lowercase and uppercase letters, as recommended by Ives (1982) and Tufte (1983).

The mediator starts the process by selecting an issue (like IC, this is a chauffeured process). When in the issues window, the window has a black background and white text. Using the up and down arrow keys, a blinking cursor marks the current position in the text file. By hitting a function key (F5), a range of issues text can be marked for linking. The linked issues text is shown in a green background and black letters.

```
Linking
Consolidated
4. Wages & Benefits

Management
1. 3%, no benefits
2. Workers freely reassigned
3. Workers monitored
```

```
Linking
Consolidated
4. Wages & Benefits

Union
1. 5%, add dental, medical
2. If job categories reduced, then retraining program
3. Lights, security guard in parking lot
```

Figure 24. The Linker screens for Management (a) and Union (b), single screen version.
The second step is to link the proposals. Through the use of another function key (F6), the user is put into the proposal window. The issues window now has a blue background and white lettering to signal that it is now read-only. Meanwhile, the proposal text can now be changed, so it has a black background with white lettering. Linking the proposals follows the same procedure as linking the issues. The linked proposal text is shown with a green background and white lettering. Figure 24a shows a sample linking screen for Management and Figure 24b shows a sample linking screen for Union.

To link the other side’s proposals, function key F8 is hit and the bottom window shows the proposals from the other side. The linker tool, like the IC tool, is also a two screen tool. When the proposals from the other side are put in the lower window, the other proposals appear on the screen of a slave terminal.

Another viewing option is available. As for IC, a second terminal can be slaved to the mediator’s terminal and made to show the side unavailable on the main screen. A master and slave screen combination are shown in Figure 25a and Figure 25b.

Files containing the linking information are output. These too are text files. Each line corresponds to a line of text in the consolidated issues file. A line contains a series of numbers. Each pair of numbers indicates a range of lines in the proposal files. ISSLINKA.LK contains the links from Issues to Side A’s proposals; ISSLINKB.LK contains the links from Issues to Side B’s proposals.

Alt-F9 exits the linker, following GroupSystems 3.2 standards (Ventana Corporation, 1990c,e). Upon exit, the report text file REPORT.LK is produced.

E. Adapted Tools
Figure 25 a,b. The Linker screens for Management master (a) and Union slave (b), two screen version.

General GroupSystems software was adapted to the steps of the bargaining session for four tools (Figure 18). These tools were not specifically programmed for bargaining. Instead, a word processing program, an editor, and a file reading program were adapted. These tools were flexible enough to provide the secretarial and administrative support required for the session.

All tools complied with GroupSystems color standards. Text was displayed in character mode, as with the issues sessions tools, and was quite legible. A mixture of upper- and lowercase letters were used.
Metaphors were used extensively. One tool emulated the bargaining book many negotiators maintain to keep their notes, proposals, and reference materials together. Another emulated the note sheets used by negotiators. A third "tool" summarized the progress of negotiations; it was simply a text file checklist listing by article and section number whether a part of the contract had been agreed to. Finally, a text editor was made available to both sides during caucus - providing an electronic typewriter to draft proposals.

The processes were run by the negotiators. Presenting proposals, bargaining, and agreement writing were all directed by the team leaders. Bargainers had direct access to the Electronic Bargaining Book and the Proposal Editor. During agreement writing, only the mediators had access to the word processor and the Contract Log file. If it had been available, the Group Editor tool would have allowed a secretary from each side to alter the contract, but it was not available at the Group Work Facility.

A description of each tool and how they are used follows.

E.1. Electronic Bargaining Book

The File Reader program of GroupSystems was used to create the Electronic Bargaining Book (EBB). This program was available to all negotiators. It was used to view all written information shared by the sides.

The EBB presents a menu of text files from which the negotiator may chose. An example is shown in Figure 26 from the HealthCare negotiations. The background of the menu window is black, while the text is yellow. The current selected file is shown highlighted with a light gray background and black text shows which file is used to indicate the current selected file. Hitting the enter key displays the file (shown in a blue background with white text). The display starts
Figure 26. The menu of the Electronic Bargaining Book used during the HealthCare talks.

The EBB was meant to be analogous to the notebook some negotiators use as reference. Thus, all sorts of information can be included. In this electronic incarnation, the same EBB is available to both sides, so no confidential information is posted. In the HealthCare example, the negotiation ground rules are available, as are report files from brainstorming sessions on costs and wages. Package proposals from Union and Management are also listed. Finally, the contract text is divided into separate files for each article (Article V, being quite long, is split into two). Each article entry contains the current contract, written proposals, and any agreed language. The article files are text versions of the Contract Log document discussed in the next subsection.
E.2. Contract Log

The *Contract Log* is essentially a long document file. At the beginning of the bargaining process, before proposals are presented, the log document is prepared. First, the current contract is loaded in. The articles and sections of the current contract form the structure of the log. Proposals are divided up according to their article and section and pasted into the document at the specific point where the proposal modifies the current contract. As written proposals are submitted and agreements made during the bargaining, they too are added to the document. All entries are labeled according to which side submitted it and when.

---

**05/31/90 AGREED**

Section 1. e. (NEW SUBSECTION)
Salaries of class I employees currently on staff shall be adjusted to be made consistent with the above formula, on June 1, 1990. Those employees whose salary requires adjustment will have a new anniversary date of June 1, 1990.

**MANAGEMENT - 05/30/90 SUPERSEDED 05/31/90**

(NEW SUBSECTION)
Salaries of class I employees currently on staff shall be adjusted to be made consistent with the above formula, on their anniversary.

**UNION - 05/22/90 SUPERSEDED 05/31/90**

Incorporate language from 1989 Memorandum of Understanding.

**MANAGEMENT - 05/31/90 AGREED**

Categories 12, 13 and 14 currently employed at the Center will be advanced to grade 15 to the step which most closely corresponds to their current salary plus 1%.

**UNION - 05/10/90 BLANKET WITHDRAWAL 05/31/90**

Clarify mileage reimbursement procedures to include compensation when employees utilize personal vehicle and allows compensation for additional insurance costs.

Figure 27. Excerpt from the Contract Log for the HealthCare talks.
The current contract, all written proposals, and any agreed contract language is entered as text. During breaks, the Electronic Bargaining Book was updated using the text files extracted from the log document. An example is shown in Figure 27.

The *Contract Log* was created using WordPerfect, a popular word processing program (WordPerfect, 1982, 1989). The program provided for formatting, word-wrap, search, cut and paste, and spell-checking functions.

The log is operated only at the mediator's station and only by the mediator or mediator's assistant. By prior agreement, proposals are entered with the permission of the side submitting it. Sections are marked as "AGREED" if both sides agree to the language.

The log is available to negotiators through the EBB. Modifying the Contract Log does not automatically update the EBB. Instead, articles from the log document are copied and made into text files. These text files are then saved in a file directory accessible to the File Reader program. Once copied to that directory, the articles are available to the users.

E.3. Article List

The *Article List* was another file which simply kept track of progress. It was a checklist of articles based on whether the article is economic or not and the settlement date. This tool was not conceived until the second session of the TransCo talks. It is an example of how responding to the immediate needs of an actual negotiation can lead to a useful tool.

Figure 28 shows an example from the HealthCare talks. In addition to simply noting the dates each section was settled, it also divides the contract into economic and non-economic portions.
### Figure 28. Excerpt from the Article List used during the HealthCare talks.

The List is maintained as a document file on the mediator’s workstation. When changes were made, a text copy is created and posted to the EBB.

#### E.4. Proposal Editor

The *Proposal Editor* enables negotiators to draft formal proposals to the other side. It is meant to be used during caucus, when a team meets in one of the breakout rooms. It is started by the mediator, but the tool is meant to be used by the negotiators themselves.

At first, a text editor was created using the editing functions of GroupSystems. But that incarnation proved too unreliable. Ultimately, the text editing function of Turbo Pascal 3.0 was used. This enabled the participants to enter text and do some simple functions. It does not have the capability of a full word processor to format output, spell check, or provide for different fonts.

A text editor creates a text file as output. Word processors create a document file that contains codes for underlines, boldface text, margins, and other formatting capabilities. As a text editor, Turbo Pascal produces text files that can be used directly by the Electronic Bargaining Book. A union proposal from the HealthCare talks is shown in Figure 29.

<table>
<thead>
<tr>
<th>Article</th>
<th>Title</th>
<th>Economic</th>
<th>Non-Economic</th>
<th>No Change</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>X.</td>
<td>Holidays</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XI.</td>
<td>Sick Leave</td>
<td>X</td>
<td></td>
<td></td>
<td>05/17/90</td>
</tr>
<tr>
<td>XII.</td>
<td>Vacation Leave</td>
<td>X</td>
<td></td>
<td>X</td>
<td>05/10/90</td>
</tr>
<tr>
<td>XIII.</td>
<td>Leaves with Pay</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XIV.</td>
<td>Leaves without Pay</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>XV.</td>
<td>Promotions, Layoffs &amp; Workforce Changes</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
UNION PROPOSAL MAY 30 9:00PM

Article V., Section 1.a.

Base Pay
Hospital Duties
Telephone Duties
Training, 1-3 years
Training, 4-5 years
Previous Experience
Board
One-Time Sign Up Bonus

36000
13500
2500
2000
1000
1000
3000
5000 if no previous experience
2000 if 1-3 years previous experience
1000 if 4 years previous experience

(New Subsection) Malpractice Savings Redistribution

All group II employees between and including step 4 through step 9 on the current (1988 contract) pay scale shall receive an equal amount of savings realized by the implementation of the changes in malpractice coverage, through a one-time-only payment of $500. Payment will be in the month of July, 1990.

Figure 29. A proposal created using the Proposal Editor.

F. Conclusion to System Design

The design for GroupSystems/Mediation combined creative use of current software with the creation of specialized software to fill gaps in the computer support. For the most part, the display and retrieval of text was all that was thought required for the bargaining sessions. On the other hand, the issues sessions required some special support.

The tools described here (except for the Contract Log) create or reference text files. The same basic text editing functions are required. What is different is the method of display. The issues software allows for three text files to be manipulated at once. The issue consolidation tools provides for combining two issues lists into one. The linker lets the mediator display the connections between issues and proposals.

The design assumed that there would be two sides plus a third party: the mediators and the computer. The mediator would chauffeur the issue consolidation and linker tools. The Contract Log and Article List were meant to be under the control of the mediator while the two
sides bargain. The Electronic Bargaining Book and the Proposal Editor are to be used directly by the negotiators.

It is important to realize that GroupSystems/Mediation is designed to support the negotiation process as it is practiced. The issues session is inserted into the process to adapt to current theories of Win-Win negotiation which many people are attempting to use. The bargaining session is traditional negotiation. With the tools presented here, both forms of negotiation can be assisted with the use of computers.
V. CASE STUDIES

Procuring negotiations and mediating them are not trivial tasks. This chapter describes the entire process of procuring, observing, and mediating contract talks. In addition, the actual procedures and use of each tool were constantly evaluated and revised during the talks.

A word should be said here about the responsibilities of the two researchers in these case studies. Reference will be made throughout to the "mediators" or the "researchers." These are Erran Carmel and Bruce C. Herniter, the latter being the author of this dissertation. Herniter assumed a role that was essentially technical and oriented to the design, implementation, and execution of all GroupSystems tools; he also worked out the initial procedures for the use of some of the tools. During the negotiations sessions, Herniter manned the mediator’s terminal. He also took responsibility for setting up the decision room before the negotiators arrived; the written procedures and mediator’s checklists were his. He also designed the computer use tracking form described later.

Carmel took responsibility for the agenda and evaluating the tool design, and acted as primary mediator and master of ceremonies.

Both Carmel and Herniter shared in the design of the questionnaires. They also shared the design of the EBB, the Proposal Editor and the Contract Log, which were implemented using existing GroupSystems tools and evolved throughout the case studies.

The design and implementation of the Issue Consolidation and Linker tools were accomplished by Herniter. Data collection and evaluation, as well as convening a meeting of negotiators from both case studies to discuss the system was Herniter’s responsibility. Creating the documents containing the questionnaires, agendas, checklists, procedures, and final contracts were also done by Herniter.
Testing the GS/M design is in the nature of exploratory research. Put very simply, there was no precedent for supporting a negotiation from being to end in an electronic meeting. The tools were all untried under these circumstances. Just getting them to work was a major accomplishment. In this situation, an experiment was not possible: there is no way to predict how a new software concept will fare in actual application. The case study method casts a wide net, catching as much data from as many sources as possible. The case study methodology was used because of its flexibility and its emphasis on studying phenomena in their natural setting.

Ultimately, two case studies were conducted. The TransCo negotiation came first. It was used to not only test the design, but to develop and refine the bargaining session tools. The EBB, Contract Log, and Article List evolved quickly in response to the needs of the TransCo negotiators. The development of those tools are documented in this chapter.

The HealthCare negotiation served a different role. These negotiators experienced the full brunt of the GS/M design. As a result, the entire Win-Win approach was subjected to a grueling test. The strategy, issues, and bargaining session tools were all used. The software changed very little in response to HealthCare's needs. However, the usefulness of Issue Consolidation and Linker were tested for the first time. This story is also documented in this chapter.

The entire process of snagging, conducting and evaluating the negotiations is detailed here. We start first with an overview of the "sales pitch" designed to convince negotiators to use the MIS Group Work facility as the site of their negotiations. Second, the site itself is detailed. Third, the concepts, measures, and methods used in the research are explained. Fourth and fifth, the stories of each negotiation are told with reference to data collected during each. The emphasis will be on an evaluation of the GS/M tools. Sixth, the data pertinent to the GS/M
design is presented and discussed. Finally, the results of a meeting among negotiators from both cases, called to evaluate the negotiation process they had just undergone, will be presented.

A. The "Sales Pitch"

Approximately 14 presentations were made to organizations and individuals in the local area before two consented to using the University of Arizona facilities and GroupSystems/Mediation. The talks were given in either the MIS Group Work Facility or the Collaborative Management room. The slides used in the presentations are shown in Appendix A. Each presentation was a pitch designed to sell potential negotiators on three points. The first was our capability to act as mediators. As will be discussed further, this was not of much concern to TransCo negotiators, but was a significant factor in the HealthCare negotiator's consent. The second and third points were to sell them on the framework and software tools of GroupSystems/Mediation. The Win-Win approach was crucial to the decision of HealthCare management and union to use the system.

The presentation started with an introduction to electronic meeting systems. The setting and purpose of the software were explained. So was the leading role of the University of Arizona in research. It then proceeded to discuss the Win-Win approach. Principles of Win-Win, drawn mostly from Fisher and Ury (1981), were presented.

The meat of the talk was the agenda of GroupSystems/Mediation; this covered the steps through which the negotiators would be guided by the mediators. The strategy, issues, proposal writing, and bargaining sessions of GS/M were explained. Finally, the benefits of using GS/M were enumerated.

The final point was the price. The MIS Group Work Facility was normally rented out at a high fee. To induce the organizations to use it, the fee was dropped so that use charges per
day were comparable to a hotel room. The normal charge for the facility was one thousand dollars per day; instead a fee of fifty dollars was assessed for each day the MIS Group Work Facility was used for negotiations.

As Swanson and Beath note, introductory meetings accomplish a broad range of tasks (Swanson and Beath, 1988). The primary task is to get an agreement to participate. Among the secondary tasks discussed by Swanson and Beath is the decision on the scope of the study and the clarification of issues.

The TransCo and HealthCare labor and management negotiators viewed the meeting rooms and the presentations privately. These meetings were very important in nailing down the agreement to use the facility as well as the parameters of the study. The process is described in the two sections detailing the cases.

B. Site

The site of both negotiations was the MIS Group Work Facility. The facility is a computerized meeting room and laboratory. It is equipped for both research and electronic meetings of all sorts. The physical layout of the rooms is shown in Figure 30.

The large room in the center is the decision room where 16 user workstations and 1 mediator's station are located. As noted in Figure 30, the user workstations are arranged in a U-shape. In both negotiations, labor sat at the right leg of the U, while management sat on the bottom, sometimes using one station on the left leg. This is a face-to-face arrangement, but a U is not traditional for negotiation (DeSanctis and Gallupe, 1987). During the first TransCo session, labor used the right leg, while management used the left. At subsequent meetings, management moved to the bottom of the U. This arrangement was used immediately by
HealthCare, at the suggestion of the mediators. Thus the teams changed the U to an L.

The decision room also contained a video projector (mounted on the ceiling), a screen (at the top, center of the U) and two white boards (at the top left and right of the U). The video projector was used to display the sales pitch and whatever was showing on the mediator's screen at the time. When the Contract Log was in use, it was constantly displayed to the front screen. The white boards were used in the HealthCare talks to display salary proposals.

Two "breakout" rooms on the right were available for caucusing; each of those had a phone, workstation, white board, table, and chairs. The rooms were used for private discussions
among team members and to telephone back to the union and management offices.\footnote{Once, during the TransCo talks, a phone in one breakout room was used jointly by union and management to handle a personnel problem during a break.} The breakout room workstations were used to craft counter-proposals. At first, the mediators were used for secretarial services, but the groups eventually typed material on their own (except for the TransCo union, which always requested help with the Proposal Editor).

Each workstation was an AT&T 6312, an AT-class computer based on the Intel 80286 microprocessor chip. The workstations are linked by a local area network (LAN). The network hardware and software were also AT&T products: StarLAN. The hardware transmitted information at a relatively slow rate of 1 megahertz. The software was StarLAN 2.0 during the TransCo talks and version 3.2 for HealthCare. StarLAN 3.2 was much more reliable, a must during the HealthCare talks because of its more extensive use of group software.

Network services were required for two reasons. First, GS/M controls the software run on the participant workstations through the network. Messages passed between the mediator and negotiator stations control the software run by the negotiators. For example, the mediator runs a program at his or her station which orders the other computers to start the brainstorming tool (EBS). Second, the machine that bosses the network (located in the control room) acts as a file server. What that means is that files located on the file server's disk may be open and read by any other computer on the network. To use our previous example, each workstation running EBS reads and writes separate files. Those files are located on the file server. The bargaining book files, for another instance, are all located on the file server. When a negotiator selects the entry for "Article VI," that file is opened on the file server and read by the negotiator's computer into its memory and displayed on its screen.
The control room contained machines which provided the rest of the services needed by the room. The LAN was managed by two server workstations located in the control room. These two were also AT-class computers. One server machine ran GS/M and managed the machines in the decision caucus rooms. The other server machine managed the laser printer, also located in the control room. Only the mediator's station was able to use the laser printer.

Software came from four sources. University of Arizona GroupSystems 3.2 was the EMS software used in the HealthCare strategy and issues sessions. The bargaining session also used GroupSystems, but required two outside systems. The Contract Log used WordPerfect 5.0, a popular commercial word processing package. The Proposal Editor used the editing function of Turbo Pascal version 3.0. The fourth source was software written specifically for this research. The issue consolidation and linker tools were written for the negotiations described here.

C. TransCo - Public Transportation

TransCo marked the first time the bargaining tools and methods of GS/M were used. The actual issues of the negotiation will be dealt with only in broad and general terms. The investigator's agreement with the parties was that the issues, proposals and discussion would be kept confidential. What will be dealt with in detail will be the structure of the negotiation, the agenda used in the talks, the details of computer use, and the negotiator's reactions and suggestions regarding GS/M.

The TransCo negotiation was a tremendous learning experience, but it involved only the bargaining session steps in the process model offered in Chapter 4 (Figure 16). The TransCo talks did not involve strategy, issues or proposal creation sessions. The participants did not want
Figure 31. Bargaining session processes and tools for TransCo talks. Other sessions not conducted.

them and came prepared with proposals and ready to bargain. After a proposal presentation meeting, the rest of the meetings involved horse trading and agreement writing. Only those three steps were actually supported using GS/M (Figure 31).

This negotiation was the first time the investigators were able to witness a labor-management negotiation. As will be seen, all aspects of the GS/M design bargaining tools were changed through its encounter with real life. The format of the EBB and the Article List were changed specifically to meet the needs and criticisms of the TransCo negotiators. After some background on TransCo and the process of convincing the negotiators to use GS/M, the development of the bargaining tools will be related.

C.1. Background Information on TransCo

TransCo is a city-owned company that has operated since the 1940's. The city council determines fares, provides a subsidy to the company, and makes helpful suggestions. Other than that, TransCo is insulated from city politics. A professional management company operates the business, appointing the general manager and others.
The state also regulates the company. One issue in the talks was how to cope with proposed state legislation that would restrict municipal and county owned transportation companies from competing for new routes.

The TransCo union represented a bargaining unit which encompassed half the workers at the company. All drivers, maintenance, and refueling personnel are in the unit. The union performed various functions. First and foremost its job was to represent its members during contract negotiations. The contract specified wage scales, medical benefits, work rules, and procedures for evaluating, disciplining and dismissing workers. The contract also specifies an extensive list of labor-management committees which handle complaints, investigate accidents, and oversees the pension and medical plans. The union was well-established at the company, having represented the bargaining unit for several decades.

At the time of the contract talks, there had been no strike for ten years. The contract, a 55 article document, was well-established and provided the starting point for the negotiation. Relations between labor and management were good. The union president, business agent, and stewards meet on a regular basis with management. In addition, a number of labor-management committees were in operation that included rank and file workers and managers.

TransCo was financially healthy at the time of the talks, but financial constraints did exist. One was a privatization threat: a bill in the state legislature would have forced 10% of existing TransCo routes to be let out to competitive bidding. What was worse was that all new routes would also be out to bid, with the public companies barred from bidding.

Even if the privatization bill did not become law, TransCo still had two economic strikes against it. First, its wages were higher than private companies, by as much as 50%. Second was a general economic slowdown in the municipal economy. A number of workers for a major
manufacturer had been laid off and vacancy rates were high. TransCo employees were making good money for blue collar work. Just before the talks opened, TransCo placed an advertisement announcing job openings 300 people submitted applications. When management mentioned this during the talks, it was perceived by the union negotiators as a warning to them that management was prepared to take a hard position during bargaining.

During the talks, frequent mention was made of the demographics of the TransCo work force. General comments were made throughout the talks, but exact figures were neither given nor made available to researchers. The work force is stable and experienced. Turnover is considered low. The consequence is that the work force is aging and the pension and healthcare liability for the company will increase; both are a drain on income and restrict the money available for wages.

C.2. Selling to TransCo

TransCo management was the first to hear the researcher's sales pitch. A team consisting of the general manager, the assistant general manager, and the personnel manager viewed the presentation in the Collaborative Management Room. It was explained that the MIS Group Work Facility would be used instead. They were interested, but they needed to discuss it among themselves and with the union before a decision could be made.

The second TransCo meeting occurred with the second-in-command of the union bargaining team (the union business agent) and the assistant general manager, this time at the MIS Group Work Facility. The assistant general manager was very enthusiastic and was assisting the mediators in their attempt to sell the system to the union business agent. Indeed, the business agent was sold on the system, but not for the reasons anticipated by the mediators.
The mediators assumed that the Win-Win approach and the spiffy hardware would sell the system. To their surprise, it was the secretarial services provided by GS/M. The union business agent immediately seized on the idea that a final contract could be prepared quickly. As it turned out, his expectation of a two day preparation time was a little optimistic.

The next step was to convince the union president, who would be the chief spokesman for the union team. Another meeting was arranged. The president, the business agent, the general manager, and the two mediators met in the president’s office. The union president had insisted that any meeting with him also include the general manager. The president felt he had an excellent relationship with the company and did not want it jeopardized by any misunderstanding. At this point, the first ground rule was agreed to: the computers would be turned off any time the negotiators requested it. There was no requirement that the negotiators use the computers and GS/M; their use was completely voluntary. In return, the negotiators agreed that they would hold all their negotiation sessions within the MIS Group Work Facility, regardless of their use (or non-use) of computers.

It was at this last planning meeting that the proposals were delivered to the mediators. The union proposals were typed in the margins of the current contract. The contract was printed on small pages; after photocopying on to 8.5 inch by 11 inch paper, there was plenty of room in the margins for their proposals. In contrast, management proposals were already available in a word processing document.

Neither side had seen the other’s proposals at the time they were delivered to the researchers and neither would until the opening session. Both agreed that the mediators could receive them for the purpose of constructing the Contract Log, but that they were not to be
transmitted to the other side before the first negotiation session. It took approximately four days for the Contract Log to be readied.

C.3. Opening Bargaining Session

The opening session was convened in the main room of the MIS Group Work Facility. Six union negotiators and three management negotiators were present. As negotiators walked into the room, the Electronic Bargaining Book was on display at each workstation and the Contract Log was showing on the front video projection screen.

The mediators encouraged the negotiators to examine the then-current contract and the proposals using the EBB. This was their introduction to the GS/M tools used throughout the negotiations; it was also the first time they could examine the other side's proposals. The union president was the only one to express dissatisfaction; he said that the EBB was awkward.

Present was the entire union team consisting of the local president, the business agent, the chief and assistant stewards for operations (drivers), and the chief and assistant stewards for maintenance workers (mechanics). The management team included the general manager, the assistant general manager, and the director of maintenance. Also present, but not on either team were the two researchers/mediators (Erran Carmel and Bruce Hemitier), a faculty member of the University of Arizona, and a mediator from the Federal Mediation and Conciliation Service. The faculty member was known to both sides through his work as an arbitrator and researcher on labor-management issues. The mediator was also known to the negotiators through his work in labor negotiation. Their presence at this opening session was well-received. They did not attend later sessions.
The seating arrangement used in this session was altered for later sessions. During the opening meeting, the management team sat on the left leg of the U and the union on the right. Afterward, the teams expressed displeasure at being so far apart.

The session started with an exchange of written proposals, welcoming remarks by the Arizona faculty and a short explanation of the EBB and Contract Log by the mediators. All spoke about the facility and the research.

The two sides then agreed on ground rules. First, the talks were divided in two. Non-economic issues, such as work rules and committees, would be negotiated in the first two weeks. Economic issues, such as wages, would be discussed in the last two weeks. The assistant team leaders (business agent and general manager) would be the team spokesman during the non-economic talks, while the team leaders would be spokesmen for the economic issues. The dates of the sessions were confirmed. Finally, it was resolved that the sessions would be closed. No information would be given to rank and file union members or managers outside of the bargaining teams; no one would talk to the press.

The team leaders then made opening comments. These opening comments were their issues sessions. Throughout the talks, issues and problems would be discussed in light of the proposals already made. Individual instances of problems would be used to bolster each side's arguments. Apparently, all issues were well-known to both sides.

The union president started off. He spoke at length about the issues in the negotiation: wages, pensions, and work rules. He said the negotiations would be difficult and that management should not underestimate the importance of these issues to the workers.

The general manager responded by noting the low employee turnover rate and the bill in the state legislature restricting TransCo's ability to bid for new routes and requiring it to give
10% of existing routes out to bid. He noted that the organization needed to reduce costs to be competitive against private, non-unionized transportation companies.

The tone of the remarks was combative and tough. It was clear that both sides wanted to be taken seriously.

After the opening remarks, the union caucused in breakout room Number 1 for about 30 minutes; management stayed in the main room. Each side was examining the other's proposals. After a half hour, they met again and recessed the session. The entire process took approximately two hours. During the actual session, the EBB was not used, although some additions were made to the Contract Log.

C.4. Non-Economic Issues

Two weeks after the opening session, the first bargaining over non-economic issues began. Altogether, there were five face-to-face meetings over two weeks on non-economic issues. The first session established precedents followed during the rest of the talks. In this subsection, the story of the first session will be used to describe the use of the GS/M system. The story of the first session will be told first, then the response to the GS/M tools, and finally, a summary of the results of the non-economic negotiations.
C.4.a. The Opening Non-Economic Bargaining Session

Setting a positive tone in this phase of the negotiations was important to both sides. In the post-talk interviews, the business agent said that all progress on non-economic issues had to be made before the economic phase. If no progress were made, unsettled non-economic issues would be lost. Meanwhile, management wanted to show its friendly face before the much tougher talks on wages.

The union bargaining team was fixed for these sessions. The union business agent acted as the team spokesman; most of the bargaining positions were articulated by him. He was joined by the two stewards and their assistants.

The management team fluctuated during the non-economic talks. The assistant general manager remained the spokesman during this phase. For the most part, the team consisted of the assistant general manager, the personnel manager, and the director of operations. At one time the director of maintenance joined the team and on another the general manager took over when the assistant general manager was tied up.

Opening remarks started this phase of the talks. The investigators confirmed the schedule of talks and reintroduced the EBB. The negotiation started when the assistant general manager began by mentioning the privatization bill. He also mentioned another legislative matter, an amendment to the federal Clean Air Act, that would let public transportation companies use diesel vehicles. He wanted to emphasize the need for cooperation between union and management to see that the former is made more favorable and the latter is passed.

The business agent did not really respond to management's remarks; the union had its own agenda. Both sides agreed that every agreement they would make was to be considered tentative. He then suggested that the two sides agree that any contract articles which had no
proposals was considered to be tentatively settled. Management agreed. The business agent also proposed that group should review all proposals and classify them as either "economic" or "non-economic," with the latter being the subject of discussion during the current phase of talks. This was all accepted and the two sides proceeded with the task.

C.4.b. Physical Layout

At the first non-economic session, the management team decided to move from the left leg of the U to sit at workstations 7 and 8 at the bottom of the U shape (see Figure 30).

During the entire negotiation, the room had to be kept dark so that the images from the video projector could be seen. This meant that all the doors were shut and fluorescent lighting, though available, was not used. The room was instead lit with variable-intensity incandescent lights set at mid-level.

Later, the federal mediator informed the investigators that the participants complained that the computer workstations got in the way. Some found the terminals difficult to see over (some of the participants were just over five feet in height). Complaints about the lack of desk space occurred from time to time. In response, before each session, the mediators moved some of the computer keyboards from immediately in front of the users, to a foot farther away, next to the video screens, freeing up the first foot or so of desk space for the users. This was done for those people who did not want to use the EBB, but instead had the Contract Log transmitted to their screen. When they wanted to use the computers, they simply move the keyboards back into position.
C.4.c. Response to the Electronic Bargaining Book and Contract Log

A modification in procedure prevented the two team spokesmen from using the EBB. It turned out that it was difficult for some negotiators to read the text of the Contract Log displayed on the front projection screen. To make it easier, the EBB was first disabled at the assistant general manager's and several empty workstations. In its stead, the GroupSystems tool *screen switcher* was used to transmit the image of the Contract Log to those stations. As different parts of the contract were discussed, the mediator would bring that text up on the screen. It was then displayed on the front screen and on the receiving stations.

The assistant manager jumped at the opportunity to have the Contract Log displayed on his screen at the very first non-economic session. The union business agent was more reticent. In this first session, he steadfastly refused all offers to send Contract Log images to his terminal; yet he did not use the EBB available at his workstation. He spent that first session leafing through the written copies of the contract and proposals. In fact, he continually referred to page numbers, making use of the EBB very difficult because page numbers are not displayed on it.

However, the second session was different. The mediators again offered the Contract Log image and the bargaining agent again refused. But one of the stewards insisted that he use it and he finally accepted.

At this point, the negotiators started adapting themselves to the technology. No data were kept on this, but references to page numbers all but disappeared and references to article numbers, section letters, and subsection numbers were used. These are easier to follow on the EBB, where a menu allowed selection of text by article number, and the text itself was subdivided into sections and subsections.
The business agent and the assistant general manager did not miss the EBB. They were too busy stating positions, responding to the other side, and consulting their team members to manipulate the tool. It was much more convenient to let the mediators manipulate the screen for them.

The negotiators never entirely abandoned their written copies of the contract and proposals. One union team member remarked that "old habits are hard to break."

Often during the talks, the team leaders would ask their members to look up information. Management would often create a *multi-display information system*: its team members would use the EBB to display the contract clauses and proposals relevant to the current discussion, while the Contract Log was shown on the leader’s terminal. The union also took advantage of the multiple workstations. One of the union stewards permanently kept the Article List on his screen and looked at his neighbor’s screen for other information.

The procedure for updating the Contract Log originated in the first non-economic session. It was apparent during the talk that copying an article from the Contract Log to a text file to update the EBB would be disruptive. Remember, the Contract Log is essentially a document file maintained on a word processor operated by the mediator. To make it accessible to the negotiators, the image on the mediator’s display is transmitted to selected workstations and the video projector. The EBB, on the other hand, is a collection of individual text files accessible directly by the user through a menu. There is *no* automatic link between the EBB and the Contract Log. Instead, the mediator must use word processing commands to create a new text file with the latest wording. Unfortunately, the problem was that those manipulations caused the display to change drastically and were disruptive to the negotiators viewing it. The solution was to update the EBB during breaks in the talks. The talks would take a break every
2 hours and during the lunch hour. At those times, the mediators would update the EBB. When the talks reconvened, the mediators would announce that certain articles and sections had been updated. They also requested the negotiators to double-check the entries. The personnel manager (for management) and the maintenance steward and assistant stewards (for the union) verified the new articles.

C.4.d. Inception and Evolution of the Article List

In response to classifying the proposals as economic or non-economic, a separate file showing

04/03/90

Agreed
1
2
3
5
9
12
14
17
28
25
36
44
45
47

Figure 32. First version of the TransCo Article List, from the first non-economic session. The divisions was created. This file became the Article List.

The Article List evolved through several versions. The first version was a simple list of unchanged articles, shown in Figure 32.

By the second non-economic session, it had become more sophisticated with separate columns for unchanged and non-economic articles and the dates that they were tentatively agreed to (Figure 33).
#### Article List

<table>
<thead>
<tr>
<th>No Change</th>
<th>Agreed Date</th>
<th>Non-Economic</th>
<th>Agreed Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>04/03/90</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>04/03/90</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>04/03/90</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>04/03/90</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>04/03/90</td>
<td>11</td>
<td></td>
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<tr>
<td>12</td>
<td>04/03/90</td>
<td>13</td>
<td></td>
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<td>14</td>
<td>04/03/90</td>
<td>15</td>
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<td>17</td>
<td>04/03/90</td>
<td>20</td>
<td></td>
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<td>18</td>
<td>04/03/90</td>
<td>22</td>
<td></td>
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<tr>
<td>25</td>
<td>04/03/90</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>04/03/90</td>
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<td>44</td>
<td>04/03/90</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>04/03/90</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>04/03/90</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>

Figure 33. The Article List from the second TransCo non-economic session.

By the time of the economic sessions, more columns of information, to list the economic articles and when they were agreed to, were added (Figure 34). This last list was much longer: as the talks progressed, the focus on agreements went down to the section level.

C.4.e. Proposal Editor

The Proposal Editor was actually used only twice during the non-economic phase. The editor was not as useful as it was thought to be.

Theoretically, the Proposal Editor was available on any workstation. In practice it was used only in the caucus rooms. The union team was the only one to meet regularly in the caucus room; management tended to stay in the decision room to talk.
The sides tended to talk through proposals before committing them to paper. A written proposal was considered to be close to a formal agreement. Proposals created during the talks were put to writing only when both sides had worked on the language and they were close to agreement. In these cases, the two sides dictated wording to the mediator, who typed it in directly to the Contract Log.

The first case in which the Proposal Editor was used for non-economical proposals occurred in the second session. The union team called a caucus and asked one of the mediators to come in and type while they fashioned a proposal. The caucus broke when the proposal was finalized and the union team rejoined the talks. The union proposal was not immediately presented to management. By prior arrangement, the union proposal was to be displayed on the front screen only when the business agent signaled he was ready. When the negotiation resumed, the agent started to talk. In the mean time, while the video projector was off, one of the

**Figure 34. Partial Article List from the economic TransCo talks.**

<table>
<thead>
<tr>
<th>No</th>
<th>Change</th>
<th>Agreed</th>
<th>Non-Economic</th>
<th>Agreed</th>
<th>Economic</th>
<th>Agreed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>04/03/90</td>
<td>4</td>
<td>04/05/90</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>04/03/90</td>
<td>6</td>
<td>04/05/90</td>
<td>8(5)y</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>04/03/90</td>
<td>7</td>
<td>04/05/90</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>04/03/90</td>
<td>7(Intro)</td>
<td>04/05/90</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>04/03/90</td>
<td>7(Step 1)</td>
<td>04/05/90</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>04/03/90</td>
<td>8</td>
<td>04/05/90</td>
<td>16(5)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>04/03/90</td>
<td>8(3)</td>
<td>04/05/90</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
<td>04/03/90</td>
<td>11</td>
<td>04/04/90</td>
<td>19(1)</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>04/03/90</td>
<td>13</td>
<td>04/04/90</td>
<td>19(3)</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td>04/03/90</td>
<td>15</td>
<td>04/04/90</td>
<td>19(4)</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td></td>
<td>04/03/90</td>
<td>15(1)</td>
<td>04/17/90</td>
<td>19(5)</td>
<td></td>
</tr>
<tr>
<td>44</td>
<td></td>
<td>04/03/90</td>
<td>15(2)</td>
<td>04/17/90</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td></td>
<td>04/03/90</td>
<td>15(3)</td>
<td>04/17/90</td>
<td>21(4)</td>
<td></td>
</tr>
<tr>
<td>47</td>
<td></td>
<td>04/03/90</td>
<td>15(4)</td>
<td>04/17/90</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15(5)</td>
<td>04/17/90</td>
<td>22(2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15(6)</td>
<td>04/17/90</td>
<td>22(3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20</td>
<td>04/05/90</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20(3)</td>
<td>04/17/90</td>
<td>23(2, para 1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20(4)</td>
<td>04/17/90</td>
<td>23(2, para 2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>22</td>
<td>04/17/90</td>
<td>23(6)</td>
<td></td>
</tr>
</tbody>
</table>
mediator’s used the word processor to bring in the union proposal as a second document (the Contract Log being the first). The word processor had the ability to switch between two documents. Once the proposal was imported, the word processor was switched back to the Contract Log and the video projector was activated. At business agent’s signal, the mediator switched to the proposal document.

The Proposal Editor was used again in the third session, this time by management. Instead of being chauffeured by a mediator, the personnel director typed their proposal directly into the computer. This too was later presented to the union via the video projector.

C.4.f. Unexpected Glitches
One technological wildcard was the overhead video projector. It was discovered during the first non-economic session that it shut down when overheated. This first happened approximately 1.5 hours into the talks. It was a reoccurring problem. Luckily, there were long periods of time when no entries were made to the Contract Log. The Contract Log and the video projector which displayed it, were needed only when new language was submitted. Taking advantage of these long lapses, the investigators made a habit of turning off the video projector when it wasn’t needed, thus preventing unexpected (and inconvenient) shutdowns when it was needed.

Periodic loss of the video projector was also compensated for by using the screen switcher to broadcast the Contract Log image from the mediator’s stations to selected user stations. Unfortunately, the screen switcher behaved erratically, too. During the second session, it “seized-up” immediately: the mediator’s station froze (keystrokes were ignored). The only solution was to reboot the computer. Happily, the negotiators’ workstations were unaffected;
participants were able to access the EBB and the last image of the Contract Log remained on the selected receiving stations. This problem remained through both negotiations. 9

C.4.g. Note-Taking and the Contract Log

The GroupSystems/Mediation design made no provision for note-taking. This was asked for periodically by the negotiators, who were disappointed to learn that it was unavailable.

![DO NOT DESTROY]

**NEGOTIATION NOTES**

<table>
<thead>
<tr>
<th>Proposal Number</th>
<th>Agreement</th>
<th>SUMMARY OF DISCUSSIONS</th>
<th>Hold</th>
<th>Agreed</th>
<th>Withdrawn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company</td>
<td>Union</td>
<td>Article</td>
<td>Section</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 35. Schematic of note form used by TransCo union.

Notes were taken using a variety of written media. Notes were made on blank sheets of paper, on the proposal sheets themselves, and (in the case of the union) on a special form. Shown in Figure 35 is a schematic of the form. It cross-references the notes with the proposal number and with reference to the article and section of the current contract. It also indicates the status of the proposal as "hold," "agreed," or "withdrawn."

The terminology used by the form worked its way into the negotiators' jargon and the labels used in the Contract Log. The negotiators themselves referenced the contract in much the

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9. It was fixed the following summer when the problem was traced to a conflict between network and keystroke interrupts in the computer hardware.
same way as the union form did. The proposals were discussed in association with the article and section of the contract to which they applied, but the proposals themselves were not numbered. The status of each proposal was also referred to as "hold," "agreed," and "withdrawn." The same status labels were used in the Contract Log.

C.4.h. Message Passing

Message passing occurred among members of the same team (intra-team communication) and between the opposing teams (inter-team communication). Inter-team communication between labor and management was through conversation and exchanges of written proposals on paper or the computer. Intra-team communication was more complex.

Team members took great care in guaranteeing that intra-team communications were confidential. Before and after negotiating sessions, team members were always able to talk face to face as long as they waited until members of the other side were out of earshot. But during sessions, this was more difficult.

It was always very obvious when team members were talking about something urgent or bringing a point up to their team leader. Messages were written on paper or people would whisper into each others' ears. Unfortunately, the GS/M system offered no alternative computer channel.

Twice members of the management bargaining team requested a message passing utility. Such a system would offer perhaps a less obvious way to exchange information.
C.4.i. Conclusion to Non-Economic Sessions

The five sessions ended with all the non-economic issues discussed. At the last session, the team leaders changed, apparently for reasons of protocol. The union business agent was unable to arrive when the session started, so the union president took over the leadership role. That, in turn, forced the management team to use the general manager as its leader. Apparently, having the union president present without the general manager was considered improper protocol. However, the general manager spent most of his time on a phone in a breakout room. Two hours into the talks, the business agent joined the talks and the assistant general manager took the leadership of the management team. The union president and general manager left the meeting.

C.4.j. Negotiators' Perceptions on the Fit of the Bargaining Tools

At the end of the fifth session, a questionnaire was distributed. The questionnaire can be found in Appendix C. The first person finished in 7 minutes, the last in 17. One respondent asked about the tool fit question; he thought the illustration was the question. We will discuss here the responses to questions seeking to measure how well the tools during the negotiation.

The ratings on the fit of the bargaining tools to various tasks was quite high (Figure 36 and Appendix F.3). A scale of 1 ("clearly does not work") to 3 ("not elegant, but can get the job done") to 5 ("the perfect tool") was used. The union respondents consistently chose higher fit ratings than management respondents.

The two highest tool-to-task fits were for using the Contract Log to record agreements in Question 16c ("Recording agreements with Bruce Herniter's Editor") and for using the Contract log to edit the contract in Question 16d ("Editing contract with Bruce Herniter's Editor). The results for both fits were the same. The union rated the two tool-to-task fits as "the perfect
16. ...how well do the Group-Systems tools assist the various negotiation tasks?

<table>
<thead>
<tr>
<th>Question</th>
<th>Overall</th>
<th>Management</th>
<th>Union</th>
<th>Average</th>
<th>Std.Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Referencing past proposals, agreements, and contracts with the Electronic Bargaining Book.</td>
<td>4.0</td>
<td>3.8</td>
<td>4.2</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>b. Preparing proposals with the Proposal Editor.</td>
<td>4.4</td>
<td>4.3</td>
<td>4.6</td>
<td>0.7</td>
<td>0.4</td>
</tr>
<tr>
<td>c. Recording agreements with Bruce Herniter’s Editor.</td>
<td>4.7</td>
<td>4.3</td>
<td>5.0</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>d. Editing contract with Bruce Herniter’s Editor</td>
<td>4.7</td>
<td>4.3</td>
<td>5.0</td>
<td>0.5</td>
<td>0.4</td>
</tr>
</tbody>
</table>

1 = Clearly does not work
3 = Not elegant, but can get the job done
5 = Perfect Tool

Figure 36. Questionnaire Results from TransCo Talks for Tools Fit.

...tool," a 5.0. Management was slightly less enthusiastic over the Contract Log, responding with an average of 4.3.

Slightly less perfect was the fit of the Proposal Editor (Question 16b). Management ranked it as 4.3 on average while the union ranked it 4.6.

The worst fit involved the EBB (Question 16a). "Referencing past proposals, agreements, and contracts with the Electronic Bargaining Book" was given a 3.8 (halfway between the "perfect tool" and "can get the job done") by management and 4.2 by the union.
C.5. Economic Issues

A total of four face-to-face meetings were held over seven days’ time on the economic issues. The teams were led by the union president and the general manager. Also, a consultant to the company joined the management team. These meetings were more tense, louder, and the sides more belligerent than in the non-economic talks. The economic sessions were also marked by different uses of the tools.

First, use of the Proposal Editor ended. The pace of the talks was faster and the groups did not wish to write down their proposals. Package proposals on wages, insurance, and pensions flew back and forth. In fact, at the end of the session, proposals on wages were exchanged so rapidly that the mediators gave up requesting that the proposals be entered into the Contract Log. The non-economic sessions were almost leisurely compared to these.

Second, the general manager (unlike the assistant general manager) wanted to use the EBB, even though he was team leader. Observations indicated that he looked at his screen or typed at his terminal about 10% of the time, the same as his team’s average. The assistant general manager stayed on the team and had the Contract Log image transmitted to him via screen switcher. The union president opted to have the Contract Log on his screen as well. He seemed glad not to battle with the computer; he had appeared awkward and uncertain in earlier encounters with it. His assistant was not present during this second phase.

Third, the jamming caused by the screen switcher became worse. As the talks became more complicated, the need to move around in the Contract Log increased. Moving the current position requires use of the arrow keys. It was later discovered that the more keystrokes used at the mediator’s terminal, the more likely that the screen switcher would jam it. At least one jam caused a delay in the talks, and it may have contributed to the negotiators later ignoring
mediators' pleas to enter their proposals into the Contract Log. By the last day of negotiation, the screen switcher was turned off.

C.6. Post-Settlement Settlements

The union ratification meeting took place two days after the last bargaining session. The vote was close. Apparently the workers were upset at the lack of a wage increase, despite the threats to the financial health of TransCo. Union members were asked to ratify the contract based on a verbal explanation of it offered by their bargaining team members. The draft was not ready for several days; even then it needed review and further negotiation.

It took several days to produce a draft of the contract. The process was one of editing the Contract Log by incorporating the agreed proposals, eliminating status headings, and removing obsolete contract language. The immediate problem was the exact nature of the final wage, pension, and insurance package. The mediators consulted with both sides to come up with the appropriate language. Everyone consulted their notes.

Once a draft was completed, typed copies of the new contract were given to the union president and the personnel manager for their approval. Each sent the contract off to other members of the bargaining team to review. This process took approximately a month. Final corrections were sent to the mediators who spent about a day correcting the word processor document. The mediators then hand delivered the finished documents in written form and on computer disk to the two sides six weeks after the last session. The contract was then sent to the printers. Approximately two months after the formal conclusion of talks, the contract was distributed to union members.
Even then, problems occurred. A misprint caused members to think that new drivers would be on probation for only six months, when both sides agreed to twelve months.

C.7. New Ideas
The investigators were always seeking new ideas for tools. Negotiators were encouraged to voice their opinions and suggestions, although some were quite helpful and offered suggestions without prompting.

Early on, two members of the management team suggested a message passing capability for their workstations. The concept was that notes would be passed among members of a single team; a small window at the bottom of each screen where messages would appear or be sent from. During the TransCo talks, messages were passed orally or in the form of written notes. It was obvious that activity was going on and the opposing team spent time speculating on what was said.

Another idea was to cross-reference or provide a search capability to the EBB. This came up during a discussion of how the company handles rider complaints in the second non-economic session. It turned out that the topic was addressed in several different articles of the contract. The negotiators were required to search manually through the EBB for references to complaints.

In fact, getting around the EBB was a problem. Two of the union team members suggested that a mediator be able to order the EBBs to bring up a certain article and section, so everyone would be synchronized. These folks were having a hard time finding the parts of the contract under discussion.
The format of the EBB screen was not satisfactory. The format used was linear: old contract language followed by the union proposal followed by the management proposal. New ideas from the management team suggested a parallel display. The first proposal was for two windows: one for the current contract language, the other for proposals. The second idea was for a three column display: one column for the current contract, another for proposals, and the third for the status of the proposal ("hold," "agreed," and "withdrawn").

Finally, wrapping up the negotiation involves proofing the contract. One of the union stewards suggested using the GroupSystems tools to proof the contract. With the negotiators present in the MIS Group Work Facility and following along on their own workstations using the screen switcher, the mediators would use the Contract Log to edit the contract. That was shot down by the union president, who brought up the cost of using the Group Work Facility.10

C.8. Summary

TransCo used only part of the process model introduced in Chapter 4 (Figure 16). Only the proposal presentation, horse trading, and agreement wording steps were followed. The talks led to improvements in the EBB, Article List, and Contract Log as the tools were adapted to the needs and requests of the participants. As described in Section D, the HealthCare talks involved almost all the steps of negotiation process model.

D. HealthCare - Neighborhood Health Clinic

HealthCare afforded the opportunity to test almost all steps of the process model. The steps to generate solutions and formulate a negotiation strategy were not followed due to a lack of time

10However, the idea made sense and was used during the HealthCare negotiations.
<table>
<thead>
<tr>
<th>Processes</th>
<th>Tool Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify Interests</td>
<td>Electronic Brainstorming</td>
</tr>
<tr>
<td>Identify Problems</td>
<td>Electronic Brainstorming</td>
</tr>
<tr>
<td>Generate Solutions</td>
<td>Process Not Used</td>
</tr>
<tr>
<td>Formulate Negotiation Strategy</td>
<td>Process Not Used</td>
</tr>
<tr>
<td>Rule Setting</td>
<td>Word Processor</td>
</tr>
<tr>
<td>Role Preparation</td>
<td>Editor</td>
</tr>
<tr>
<td>Role Presentation</td>
<td>Word Processor</td>
</tr>
<tr>
<td>Issue &amp; Reason Identification</td>
<td>Editor</td>
</tr>
<tr>
<td>Issue Consolidation</td>
<td>Issue Consolidation</td>
</tr>
<tr>
<td>Ranking</td>
<td>Voting</td>
</tr>
<tr>
<td>Proposal Generation</td>
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</tr>
<tr>
<td>Proposal Presentation</td>
<td>Contract Log</td>
</tr>
<tr>
<td></td>
<td>Electronic Bargaining Book</td>
</tr>
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<td></td>
<td>Word Processor</td>
</tr>
<tr>
<td>Linking</td>
<td>Process Not Used</td>
</tr>
<tr>
<td>Horse Trading</td>
<td>Contract Log</td>
</tr>
<tr>
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<td>Electronic Bargaining Book</td>
</tr>
<tr>
<td>Agreement Wording</td>
<td>Contract Log</td>
</tr>
<tr>
<td></td>
<td>Article List</td>
</tr>
<tr>
<td></td>
<td>Proposal Editor</td>
</tr>
</tbody>
</table>

Figure 37. Process and tools for HealthCare talks.

and linking issues and proposals was rejected as unnecessary by the negotiators (Figure 37). Proposal creation was done outside the MIS Group Work Facility and was, therefore, unobserved.

First, the scene will be set on HealthCare by relating the background of the organization and describing the process used to secure the negotiators consent. Then separate subsections will review the strategy, issues, and bargaining sessions.
D.1. Background Information on HealthCare

The HealthCare bargaining unit consisted of all medical personnel. In practice, the unit included: the drivers of vans that transport patients and make medical deliveries, all medical assistants, technicians, nurses, doctors of dentistry, and medical doctors. Almost everyone in the clinic was included. The salaries ranged from $11,000 per year to $60,000 per year under the current contract. In his talk welcoming the two sides to the MIS Group Work Facility, the same University of Arizona faculty member who was present during the TransCo opening session called the bargaining unit unique and highly unusual in its range of employees.

At the time of the contract talks, the union had reached a new high in membership by enrolling two-thirds of eligible personnel. The union was not well-entrenched among the higher paid members of the bargaining unit. Few of the medical doctors and none of the dentists were members. However, the doctors were influential members of the labor negotiating team.

Labor was led by the union field representative and the chairperson of the HealthCare chapter of the union; those two were present at all sessions. The chairperson was a registered nurse (RN) who managed a satellite clinic. Other members of the team included three medical doctors, two other nurses, and the senior van driver.

The management team was led by the executive director, the personnel manager and the medical director. The former two had MBA degrees while the medical director was an MD.

The history of HealthCare is interesting. HealthCare started out as an anti-poverty program begun in the 1960's. It is now a large neighborhood clinic offering medical, dental, and eye care. In 1989, 19,787 patients were seen for a total of 108,900 visits.

The HealthCare board of directors was originally elected by the community in a general meeting. However, bankruptcy hit in the mid-1980's and the structure changed. It is now a self-
perpetuating group, electing new members itself as old members resign. One manager claimed that the old structure insured that the employees (also members of the community) would control the board.

Historically, HealthCare’s medical personnel accepted lower wages as the price paid for the satisfaction of helping an underprivileged community. Different interpretations of this legacy were a major source of conflict between management and labor.

The clinic remains non-profit and dedicated to serving the community. It is located in the midst of a lower-income ethnic neighborhood. Its activities include operating a clinic for a local Native American tribal government and operating an outreach program for homeless patients.

D.2. Selling to HealthCare

The HealthCare negotiations were quite different from the TransCo negotiations. HealthCare negotiators had been frustrated by tension in their relations for several years. The first to approach the negotiators was the union field representative for the HealthCare workers. He heard from another union field representative that the mediators were actively seeking a negotiation and contacted them on his own.\textsuperscript{11}

The first meeting to sell the system to the HealthCare negotiators occurred between one of the researchers and the union field representative in the Collaborative Management Room. The purpose of the meeting was to get the field representative interested in using GroupSystems/Mediation for his next negotiation. Again, the researcher presented the sales talk.

\textsuperscript{11}The union for HealthCare workers was an organization separate from the TransCo worker's union.
The field representative expressed the belief that "something" had to be done to change the course of previous negotiations. He mentioned that he was thinking of bringing in a federal mediator. Several weeks later, a meeting was held with the executive director and personnel manager of HealthCare. These managers also expressed the opinion that relations were bad and that a new procedure was required. Management approved the idea.

At this point, all that remained was final approval from the union negotiation team. The agent is an employee of the union and only speaks when given authority. He recommended to the team that GS/M be used for their negotiation. The team had a total of ten members. On a Saturday, the employees' day off, seven of the eleven team members appeared for another presentation.

One of the more interesting points the union members brought up concerned possible manipulation of the computer system by management. The members knew that management was more experienced in the use of computers. This fact was born out later in the post-negotiation survey. To counter the union concerns, the mediators offered verbal assurances that management would not be able to manipulate the computer system. The condition offered to TransCo negotiators, that the computer could be turned off any time, was also offered to the HealthCare union. In addition, a sample brainstorming session was started. The group saw how the software worked and the mediators felt their concerns had been eased.

One week later the union field representative transmitted the team's approval. The complete package of strategy, issues, proposal writing, and bargaining sessions was agreed to. Arrangements were made for separate strategy sessions two weeks before the starting issues session. Because the groups agreed to the Win-Win framework, the Contract Log and proposals were not ready until the bargaining session several weeks later. Preparing them earlier would
have risked locking the sides into their specific proposals. Postponing proposal preparation gave
the sides the opportunity to change their proposals in light of their own strategy considerations
and the issues surfaced during the issues session. As we will see later, this theory was not
entirely born out.

D.3. Strategy Sessions

One strategy session was held for each side. The purpose of the session was to focus the groups
on their issues and interests in the negotiations. Often each negotiator will have a different view
of these. These sessions are designed to share these views among members of the same team,
to exchange pertinent information any one team member might have, and to give the team leaders
an overview of his team's concerns. The agenda was simple: the participants were asked to
brainstorm first on their long-term interests and then on issues important to them. Then, the
major issues were listed on the Topic Commenter tool, chauffeured by the mediator. Each
person was requested to comment on the issues of importance to them. Finally, the vote tool was
used to rank the issues by importance. The issue list was then used for the issues session.

Preparations for the strategy sessions were fairly simple. Discussions were held with
each side to set a date and approve an agenda. In the case of management, setting a date was
easy; the executive director arranged it as part of their preparations for the negotiation. An
afternoon session in mid-week was selected. The union had more difficulty. Negotiating was
not part of their job description, so preparation had to be scheduled after hours. A Saturday
morning was chosen.

Updating the network software and double-checking the GroupSystems software were the
main preparatory activities of the mediators. The network was using version 2.0 of the StarLAN
network software. It was slow and unreliable. During the TransCo negotiations, this was not a problem because the use of network services was actually small, but that would not be true during the HealthCare strategy sessions. The EBS, Topic Commenter, and Vote tools (especially the EBS tool) make heavy use of the network to pass files and store results. The mediators hoped that a more recent version of the StarLAN would be faster and more reliable. As a result, version 3.2 was installed and tested with GroupSystems prior to the sessions.

D.3.a. Union Strategy Session

The union strategy session was held on a Saturday, when the members were free to participate. Unfortunately, not all the union negotiators were present. Only six of eleven were present.

A 10-point agenda, shown in Figure 38, called for the use of Electronic Brainstorming (EBS) twice, File Reader to look at the EBS results, Topic Commenter twice, and ranking issues via the Vote tool. It was predicted that the entire process would consume three hours and forty minutes.

The session started with a presentation by the mediators. First, the negotiation sales presentation was repeated because many on the union team had not seen it. Second, the EBS tool was introduced so they could immediately start to brainstorm. The introductory presentations took fifteen minutes.

One purpose of the first EBS session was to elicit the long-term interests of the union as seen by each member. Figure 39 shows the question and the responses. The other purpose was to familiarize the members with the decision room, its software, and its hardware.

The seven union members were very hesitant at first. The physicians were the most hesitant and seemed to type the least. Eventually, a total of 50 comments were recorded by EBS.
The long-term interests suggested included: job security, safety, a wage large enough to make each employee self-sufficient, an adequate pension, and educational benefits. The entire session lasted 40 minutes.

A computer network error appeared on the mediator's screen at the end of the session. The only effect of the network error was the loss of access to the laser printer through the network. This was not noticed by the participants and led to only a slight inconvenience to the
What are the fundamental, long-term interests of the employees?

1.1 Upgrading the standard of living for all employees of the center
1.2 uphold the highest standard of medical care for our patients.
1.3 RE 1.2: Sure, upholding standards is important. How does one do that?
1.4 RE 1.2: Upholding standards means that workloads need to be reasonable. If a provider has to see too many patients in too short a period of time or the nurse or other support staff have to do too many tasks, standards are going to slip.

Figure 39. Long-term interest brainstorming session for HealthCare union.

mediators who had to copy files to a floppy disk and walk them over to the control room for printing. An investigation after the session revealed that the network server which managed the printer was running an out-of-date version of the StarLAN software. Once the software was updated, the problem disappeared.

The purpose of the second EBS session was to generate and discuss the issues of concern to the union. However, the union field representative raised objections to repeating the process. The union already had a list of proposals, each addressing a problem. Why go through it all again?

The mediators' response was that underlying problems were often not clear to the participants or that each participant had a different idea on exactly what the problems were. The purpose of this session was to bring out everyone's pre-conceptions. The union field representative appeared mollified, so the second EBS session started.

Figure 40 shows the brainstorming question and a sample of the responses. The issues were framed as "problems" to be discussed with management.

The union members seemed much more comfortable with EBS with this second use. This time, the pace of the contributions was faster, with 76 comments submitted in 45 minutes. The
What are the problems we wish to discuss during the negotiation?

1.1 Staff is too inconsiderate of the providers, knocking on the door, interrupting sessions with patients for example. I CAN'T GET MY WORK DONE!

1.2 It is not possible to adequately see a patient, deal with all the problems they have, formulate a care plan and document all of this up to standards which will meet QA criteria if we only have 15 min to see the patient and get interrupted during the visit and/or not have the patient's chart, labs, etc. in hand.

Figure 40. Issues brainstorming transcript for HealthCare union.

comments revealed a number of dissatisfactions with management, planning, procedures, and each other.

A 30 minute break was taken to give the union members a chance to talk about what they had just done. Meanwhile, the mediators posted the EBS results to File Reader, the same tool used to implement the EBB. When the negotiators returned from their break, they were encouraged to look through the results, which took 35 to 40 minutes.

The next step was to create a list of issues. One of the mediators sat at the mediator's station, running the Topic Commenter (TC) tool. The initial screen in TC allows a list of topics to be entered. The topics would be the issues, which were entered at the suggestion and prompting of the mediators. The mediators also urged the team to pare the list as much as possible so it would fit in the Vote tool, which can handle a maximum of 18 issues. The resulting list contained 17 items. After the list was solidified, the team members used TC to enter their specific comments on each issue. Use of TC lasted 50 minutes.

Although the agenda called for a discussion of the issues, it was decided to go directly to ranking (Topic Commenter was only used once). The session was already an hour past the predicted ending time. After a ten minute break, Vote was used to rank the issues. The consolidated list of seventeen issues and their relative rank will not be displayed. The
confidentiality agreement and other oral agreements with the union pledged that the information generated in the strategy session would be kept secret. While innocuous samples from the EBS sessions can be shown, the issues list represents a summary of information that is very sensitive.

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Kendall Coefficient of Concordance, (1.0 = most agreement) --> 0.32

Figure 41. Union ranking of issues.

What can be reported is that the union team ranked the issues and numerous differences emerged. Figure 41 shows how the various issues (appearing in disguise) were ranked. The issues appear in the column on the left. The position from 1 to 17 is listed along the top. The numbers represent the number of people who ranked that issue in the position signified by the column. The "MN" column shows the mean ranking of each issue and the "STD" column the standard deviation of the rankings. One indication of the spread of opinion is that only one issue had all of its ratings as number 10 or below. The level of agreement, as measured by Kendall's coefficient of concordance, was 0.32. If agreement had been total, the number "6" would appear
diagonally from upper left to lower right, the means would correspond exactly to the ranking, and the standard deviation would have been zero. Ranking took ten minutes.

The entire process lasted five hours and ten minutes, 90 minutes longer than anticipated. Reports from the two EBS, one TC, and one Vote tool uses were edited with the word processor and given to the union field representative. The agent felt that the ranking was particularly helpful because it gave him a sense of how strongly his team felt about certain issues.

D.3.b. Management Strategy Session

Six members of the management team met one afternoon, several days following the union meeting. The goals and agenda for the meeting were the same as the union’s.

The network performed well during the entire meeting; no unexpected bugs occurred. The laser printer was available the entire time as the network software on the server had been updated.

What are the fundamental, long-term interests of the organization?

1.1 Developing a motivated and productive staff; reducing turnover and dissatisfaction
1.2 Availability to perform more extensive testing at the center rather than having to refer out
1.3 I also feel expansion is critical to HealthCare’s long term viability.
1.4 Develop continuing education classes for all departments.
1.5 Availability of time to attend continuing education conferences and lectures

Figure 42. Transcript of brainstorming by HealthCare management on long-term interests.
Use of EBS went very smoothly. The team seemed comfortable with the tool and computer use in general. The first EBS session concerned the long-term interests of HealthCare (Figure 42). A total of 64 comments were made in 30 minutes, a rate 70% higher than the union. In addition, they were familiar with the concept of a long-term interest. The comments dealt with financial stability, competitiveness, public service, and affordability of medical services.

What are the problems we wish to discuss during the negotiation?

4.1 Need to improve the overall productivity of our staff to assure a high quality AND cost effective program

4.2 Need to find agreement on the long term interests of healthcare and develop more cooperation to reach those goals

4.3

4.4 Salaries for physicians are not competitive in the marketplace

4.5 Getting back to the question at hand.....the Problem is how to provide adequate compensation (to recruit and retain competent staff), provide good services and facilities, keep staff motivated and in synch with organizational direction, and maintain financial viability

Figure 43. Issues brainstorming by HealthCare management.

The second EBS session dealt with issues (Figure 43). 65 comments were entered in 33 minutes, only 17% more than the union.

The results of the two EBS sessions were posted to File Reader. After a ten minute break, the team spent about 16 minutes examining what they had written. It took another 24 minutes to list issues using Topic Commenter. Like the union, management produced a list of 17 issues at the urging of the mediators who wanted the list to be as short as possible to fit under the 18 issue limit of the Vote tool. The Topic Comment session itself lasted 50 minutes.

The management team exhibited a higher degree of agreement on issues than their union counterparts (Figure 44). The Kendall Coefficient of Concordance was 0.40 (1.00 being absolute
The entire process took 4 hours and 10 minutes, an hour shorter than the union.

D.3.c. Questionnaire Results for Strategy Sessions

Questions were asked in post-session questionnaire (Appendix C) regarding how successful the strategy session was and how well the GroupSystems tools fit the various tasks performed in the issues sessions (the results can be found in Appendix G.3). Three of the four objectives were apparently accomplished. On a scale of 1 for "agree" to 5 for "disagree," people tended to mildly agree that the strategy session helped to define long-term interests (1.9), problems to be solved (1.8), and the negotiation issues (1.9). Where the strategy session apparently had no effect was on the bargaining tactics used (3.1). This last is not surprising as tactics were not
addressed in the strategy session, but it was hoped that the results of the strategy session would have an effect.

The fit of the GroupSystems tools EBS, Topic Commenter, and Vote for ranking ranged from 3.8 to 4.2 (Appendix G3). Thus all the tools were rated halfway between adequate and perfect.

D.4. Issues Sessions

Further development of the Win-Win attitude requires that the two sides exchange information on the problems that confront them. Three times sessions were held to discuss rules, role-play, and develop a list of issues.

A post-negotiation questionnaire (Appendix D) asked several questions regarding the issues sessions and the fit of the tools. The questionnaire results concerning the session and the fit of the tools are shown in Appendix H.6.

Three meetings were scheduled for issues. The agenda for the first meeting assumed that the entire issue session process of rules, role reversal, issue consolidation, and ranking would take place in one day (Appendix H.1).

The first issues session started 20 minutes late. This was a pattern that was to continue throughout the talks. Usually, individual union members would be anywhere from an hour early to an hour late. The sessions tended to start 20 to 30 minutes late.

The mediators, a University of Arizona faculty member and a federal mediator were present at the first issues session. As in the TransCo negotiation, both the faculty member and the federal mediator were known to both sides. This session was treated as the opening session for the negotiation since it is the first time the two sides met face-to-face.
Opening comments were offered by the mediators and the Arizona faculty member familiar to both sides as a consultant and arbitrator. In Appendix H.2, the notes for the remarks are outlined. The investigators reintroduced the facility, pointing out the location of rest rooms, the kitchen, and the breakout rooms. They also told the negotiators that they were breaking new ground in negotiation by using GS/M.

The faculty member emphasized the uniqueness of the bargaining unit at HealthCare. It was the only one that he knew of that contained all medical workers from lab technicians to nurses to physicians and dentists. He wished them luck.

Then the mediators introduced the agenda and the Tuesday/Thursday schedule of meetings. The next item on the agenda was the development of ground rules. The introduction lasted ten minutes.

D.4.a. Ground Rules

The very first session immediately ran into a snag with its very first step, the adoption of ground rules (Figure 45). The difficulty was with two rules. The rule on limiting the number of team members present at any one time was difficult to settle. The union wanted the right to have all of its members present at all times. Management believed that having large numbers of union members present during the talks was a tactic to intimidate them. They wanted the teams limited to five present at any one time.

The ultimate resolution was to have a limit of six people on Tuesdays and five people on Thursdays. This compromise was possible because the union team members were assigned to different negotiating days based on their schedule. Before the session, management agreed to change the schedules of only 4 people for each day (the fifth was the union field representative).
The parties agree to work toward a mutually beneficial solution.

The parties agree to deal with the issues in a fair manner unbiased by anger or other emotional response.

The parties agree to make honest and open evaluations of the proposals.

The parties agree to exchange all information pertinent to the negotiation.

The parties agree to follow the procedures explained to them by the mediator.

The parties agree to limit the bargaining team members present to not more than five (5) on Thursdays and six (6) on Tuesdays.

The parties agree that to the best of their ability they will abide by the attached schedule for representation.

The parties agree to keep all circumstances of the mediation confidential.

The parties agree to abide by the final agreements as the agreements are jointly consented to and signed.

__________________________  ___________________________
Senior Field Representative  Executive Director
Union Council 97  HealthCare Health Center

__________________________  ___________________________
Erran Carmel  Bruce C. Herniter
Department of  Department of
Management Information Systems  Management Information Systems
The University of Arizona  The University of Arizona

Date

Figure 45. Final ground rules for HealthCare talks.
Only by coming in on their day off could extra union people attend. Due to scheduling conflicts and vacations, only one extra person would be available to attend and then only on Tuesdays. A compromise was hatched.

The rules controversy marked the first time the investigators actively mediated an issue. It was they who suggested the compromise on the member limit rule. The federal mediator present for the opening issue session privately said later that strikes had occurred in other talks simply over the ground rules.

The negotiators themselves rated the fit of using the word processor at the mediator’s stations to the task of developing ground rules in Question 23e of the post-negotiation questionnaire (Appendix H.6). On a scale of 1 ("clearly does not work") to 5 ("perfect tool"), the fit was rated an average of 3.3, only slightly better than "not elegant, but can get the job done."

A break was taken to print out three copies of the ground rules. Each copy was signed by the executive director, the union field representative, and both mediators. A total of 45 minutes was spent working out the ground rules.

D.4.b. Role Reversal

The purpose of the role reversal step is to clear up any misconceptions each side may have about the other. It was also designed to make the negotiators see the other side as people, not as stereotypes. The procedure is outlined in Appendix H.3.

Each person was assigned a specific person "to be" from the other side. Each negotiator was given standard-size sheet of paper, folded lengthwise, written with the name of a member of the opposite side. The paper was to serve as a name plate, identifying their role to the rest
of the group. Quite a bit of laughter and joking followed the announcement of each assignment.

Eight minutes passed before all the roles were announced.

The teams were then asked to develop, in private, a document that explained the job, responsibilities, and problems encountered by the people whose roles they had taken on. Each was assigned a breakout room (#1 for union, #3 for management, repeating the TransCo pattern) and was accompanied by a mediator.

The mediators chauffeured the process. The differences in their approaches were later to cause irritation and concern among the negotiators.

The management team was led to create a structured document. As shown in Figure 41, the name of the character and the character's title were given on the first line, with the person assigned to that role in parentheses. Their duties are listed followed by the problems they meet in carrying them out. In Figure 46, the character was not only an RN, but also chairperson of the HealthCare union chapter. Management spent 60 minutes devising the document.

****

Live up to the union contract without seeming soft to his management. Ultimate person responsible for the financial well-being: wages and salaries take up a big part of the budget. decrease turnover rate and increase compensation, but not too much so as not to jeopardize the financial well-being of the center. I need to cultivate good relations with labor because if I don't they haul me into court. I have to balance the demands of interest groups, contractor, patients, labor, board, government, staff, community, creditors. In this clinic: the buck stops here!

Figure 47. Excerpt from role reversal document created by HealthCare union.
***************, RN (*********)

---------------------------
Staff Nurse: Nursing duties at satellite Pascua Clinic.
Follow-thru on Doctor's orders
Runs clinic nursing assistants
Calls in prescriptions
Phones answered
Adequate Supply at Clinic
Arranges referrals
Nursing treatments
Draws blood
Patient Education
Nursing Assessment

Problems:
Referral authorization
Paperwork
Rotating Staff
Reconciling needs of physicians with nursing director
Obtaining Medical Records
Time off for Educational Leave
Adequate response from cli
Adequate response from clinic support services
Isolation
Lack of support from tribal health authorities
Patient Transportation to specialists
Long commute to work
Transportation to main clinic
Lack of equipment

Chairperson:
Organizing union meetings
Planning union strategy
Communicating with members
Representing members at state and local levels
Developing Union solidarity
Attending every every meeting with management and Board

Problems:
Balancing nursing duties with union duties
Adequate time for Union duties
Motivating Membership
Anticipating management
Inflexibility of management

Figure 46. Excerpt from role reversal document created by HealthCare management.

The union team created an unstructured document. Figure 47 shows an excerpt with just
the characters name on top and a few general statements. The union spent 45 minutes creating
their document.

These differences arose because the two mediators had not agreed in detail to the
chauffeuring procedures in writing the role reversal documents. Only the general content of the

document had been agreed upon. The result was that the union team did not delve into the roles and responsibilities of the management team members as deeply as management examined the union. The management members later privately expressed dissatisfaction with the process to the mediators. They felt they were misunderstood and therefore made less sympathetic to the union members. Both sides seem to think the caucus room editor was an adequate fit to the role reversal process (Appendix H.6.).

The two sides reconvened after lunch to publicly recite their analysis of each other (after a brief caucus). Management won the coin toss to present their characters first. The procedure was for each team member to present the job concerns and problems their assigned character faced. At the same time, the written document was shown on the front video screen as a visual aid. Afterward, the person so described (being present in the room) had a chance to correct any mistakes.

The presentations proceeded quickly, with the participants listening and correcting the descriptions they heard of themselves in good humor. A number of negotiators complemented the presenters on how close their descriptions came to reality. The presentation process lasted 1 hours and 40 minutes to hear and correct 11 job and problem descriptions.

On the other hand, the executive director, member of board of directors, and personnel manager thought their descriptions showed a complete misunderstanding of their responsibilities. The executive director was seen as more of a coalition balancer, while he saw himself as an advocate and initiator of change. The board of directors was seen as an arbitrator between labor and management, when in reality management is the agent of the board. The personnel manager was seen by the union as dealing strictly with personnel. However, he also acted as an assistant to the executive director, performing a variety of tasks.
The post-negotiation questionnaire (Appendix H.6) revealed that the process of role reversal using the editor in the breakout room was rated 3.7 (on a scale of 1 to 5), with the union members rating it slightly higher (4.0) and management slightly lower (3.5).

D.4.c. Issue Consolidation

The initial step of issue and reason identification was already accomplished during the strategy sessions. Each side created a list of issues with a set of rationales behind them. The task for the second and third issues sessions was to combine the two lists into one unified list.

The procedure guidelines followed by the mediators to consolidate issues are shown in Appendix H.4. The teams first caucused to consider changes to their issues lists created in the strategy sessions. These were available as text files to be edited at the workstations in the caucus rooms. The editor used here was specially-created to conform to GroupSystems standards.

It was the intention of the mediators to let the teams edit their issues lists without help. Unfortunately, the GroupSystems editor had many bugs: lines of text would disappear when they were still present in the file or fail to disappear after deletion. The result was the mediators were called in to edit the issues and reasons lists.

The teams caucused for 2 hours and 15 minutes. They then broke for a ten minute recess. Management had pared its list to 7 issues and the union to 16 issues, both down from the 17 items each had settled on in their strategy sessions. The fit of the caucus room editor to the task of listing the issues (Appendix H.6) was rated 3.6 (on a scale of 1 to 5), slightly better than "not elegant, but can get the job done."

During the break, the mediators loaded the File Reader program with the two issues lists and activated the program at the negotiator's workstations. The participants were told that they
could read each other's lists while the group consolidated the two lists. The mediators' procedure guidelines are found in Appendix H.4.

After a brief introduction to the File Reader and Issue Consolidation (IC) tools and the consolidation process, another coin was tossed to determine which team would submit an issue to the consolidated list first. The toss was won by the union.

More than one person acted as spokesperson for their teams. People who were especially concerned with certain issues would present those issues. Several people participated from each side.

An issue would be first offered by one side, and then explained by a team member. The mediator meanwhile would show the issue in the bottom window of the IC screen (the top contained the consolidated list). The other side then had a chance to question the reasons behind the issue. A general discussion would ensue.

The mediators had two functions during the discussion. First was the secretarial function: the mediator would copy the issue text to the end of the consolidated list or merge it with some other issue and its reasons. The second function was to guide the discussion: to prevent talk of actual proposals, to prevent criticism of issues from the opposing side, and to search for issues that could be combined, thus encouraging common ground.

Discussion times ranged from 3 minutes to 29 minutes with an average of 13 minutes (Figure 48). In a post-negotiation questionnaire, the negotiators indicated that the consolidated issues list was good, but that the IC tool was not a perfect fit (Appendix H.6). They were asked to agree (1) or disagree (5) with the statement "the combined list of issues that we came up with does a good job of representing the issues of these talks". 4 of 13 did not respond or indicated that they did not know. The average for all participants responding to the questionnaire was 2,
halfway between "neutral" and "agree." The negotiators were also asked about the fit of the IC tool (Appendix H.6). On a scale from 1 ("clearly does not work") to 5 ("perfect tool"), they averaged 3.3. 3 of 13 indicated they did not know.

The tools worked well during this period in that they functioned without apparent error. The negotiators examined the issues on File Reader without a problem and all the editing functions used in the Issue Consolidation tool also performed. However, two design changes would have made the tool better. First, constantly switching the background color to indicate a read-only window (blue background) and an edit window (black background) was annoying to the mediator. Second, only one screen and two windows were visible at any one time, meaning that one side's issue list was invisible. The constant switching between the two sides' issues lists was also annoying.
The issue consolidation process was completed during the second issues session. The actual time spent in issue consolidation was 4 hours and 10 minutes (excluding a lunch break).

At this session, HealthCare decided to consider economic issues first and non-economic issues later. This was against the mediators' advice; they felt that the fundamental problem was a lack of trust. They hoped that a series of agreements on non-economic issues would include a labor-management committee. Use of such a committee would start the process of cooperation between labor and management.

D.4.d. The Third Issues Session: Ranking, Brainstorming and Article Classification

The third session was a short afternoon session and the last of the issues sessions. The mediators wanted to wrap-up consideration of issues and prepare for the bargaining. They also used it to introduce some cooperative measures, namely two joint brainstorming exercises.

It was at this session that the mediators first noted continuity problems on the union team. The union could only bring 6 (on Tuesdays) or 5 (on Thursdays) of its 11 members. Some members present at earlier sessions were not at the third session. The procedures of EBS and ranking had to be explained again. In fact, the entire idea of a consolidated list had to be reiterated to new team members. The problem reoccurred throughout the sessions with past compromises and positions subject to new, private discussions and with tactics changing from session to session. Only the union field representative and the chairperson were present during all the talks.

D.4.d.(1). Ranking
### Number of votes in each position

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Kendall Coefficient of Concordance, \((1.0 = \text{most agreement}) \) --> 0.64

Figure 49. Union ranking of consolidated issues.

### Number of votes in each position

|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | MN | STD |
|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| E | 3 | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1.75 | 0.75 |
| K | 1 | 1 | - | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2.25 | 0.85 |
| B,C | - | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.25 | 1.03 |
| D | - | 1 | - | 2 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 3.75 | 1.03 |
| I,M | - | - | 1 | 1 | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | 4.25 | 0.85 |
| H,R | - | - | - | 1 | 3 | - | - | - | - | - | - | - | - | - | - | - | - | - | 5.75 | 0.48 |
| J | - | - | - | - | - | 1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 7.75 | 0.48 |
| G | - | - | - | - | - | - | - | 2 | - | 2 | - | - | - | - | - | - | - | - | 8.00 | 1.00 |
| Q | - | - | - | - | - | - | 1 | 1 | 1 | - | - | - | - | - | - | - | - | - | 9.50 | 1.71 |
| L | - | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - | - | - | - | - | - | 10.75 | 1.11 |
| N | - | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - | 1 | - | - | - | - | 11.75 | 0.63 |
| O | - | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - | 1 | - | - | - | - | 11.75 | 1.11 |
| A | - | - | - | - | - | - | - | - | - | 1 | - | 1 | 1 | - | - | - | - | 12.50 | 1.50 |
| F | - | - | - | - | - | - | - | - | - | 1 | - | 1 | 1 | 1 | - | - | - | - | 13.00 | 1.83 |
| P | - | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - | - | - | 4 | - | 16.00 | 0.00 |
| S | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 4 | 17.00 | 0.00 |

Kendall Coefficient of Concordance, \((1.0 = \text{most agreement}) \) --> 0.93

Figure 50. Management ranking of consolidated issues.
Ranking the issues in the consolidated list came first. Both sides used the Vote tool at the same time, but the results were kept confidential from each other. There was some discussion of sharing the results, but the ultimate decision was not to share them. Union ranking of issues is shown in Figure 49; management’s in Figure 50.

The lack of continuity on the union team surfaced when a union team member announced he was unaware a consolidated list of issues had even been created, let alone the need to rank them. He requested a general discussion, but the consensus of the group (with the mediators’ urging) was to continue with the ranking.

The most striking result was how far apart the two sides were. Each side ranked its issues as most important and the others as less important. Management seemed to be the main beneficiary of the issues sessions; their concordance was a very high 0.93 as measured by Kendall’s Coefficient of Concordance. In ranking their own issues in the strategy session, they achieved a concordance of 0.40. The high agreement level can also be seen by how their rankings are grouped along the diagonal in Figure 50. The executive director was quite pleased. The union was less harmonious; their Kendall’s coefficient measured only 0.64, up from 0.32 (Figure 49). The process required 20 minutes to complete.

D.4.d.(2). Brainstorming

The GS/M design does not include brainstorming in the issues session. The argument was that brainstorming with both teams would require that they reveal confidential information. It was assumed that such a process would be unacceptable.

However, throughout the previous sessions, it was obvious that the two sides not only did not trust each other, but were talking past each other. The union was talking about the need
for trust, employee empowerment, and financial disclosure; management was interested in competitiveness, employee accountability, and a lean operation. In private sessions, they both alluded to poor leadership and ulterior motives. Of course, this was also seen in how differently they ranked the issues.

The third issues session was only a half-day session. Following the old GS/M design, the only task left would have been ranking. The mediators decided to add two EBS sessions to the agenda (Appendix H.5). Brainstorming was done ahead of classifying the articles because it was later thought that the classification would take less time and therefore could be done just before the session adjourned.

What process can this contract put in place that will, during the life of the agreement, identify ways to reduce medical costs without compromising medical care?

1.1 Reconfigure the flow of patients, records, ancillary information, paperwork, etc. in a way which is more conducive to efficient processing of our services. (Maybe get an efficiency expert to look over how we do things in the suites)

1.2 Efficiency experts cost a lot of money. Money that could be spent on paying another person to get the job done.

1.3 If you knew how to best get the job done, it would save even more money... and on an ongoing basis indefinitely.

1.4

1.5 Assure continued monitoring of quality care and patient satisfaction

1.6 How?

Figure 51. Costs brainstorming comments.

Each brainstorming question addressed a concern of one side or the other. The first question was for management: "what process can this contract put in place that will, during the life of the agreement, identify ways to reduce medical costs without compromising medical care?" The purpose here was to come up with suggestions that might be used as the bases for
compromise. A page from the comments are shown in Figure 51. The first brainstorming session lasted 34 minutes.

How can we measure the fairness of the wage and benefit package at HealthCare?

1.1 Could HealthCare employees go elsewhere and get a better deal—salary, vacation, sick time, insurance?

1.2 HealthCare should consider developing some special benefits that would not be costly to provide if it is not able to pay competitively. Day care might be considered, or maybe some sort of commodity bank.

1.3 Maybe the employees could get a better deal at other places but there seems to be a great amount of loyalty to the center and to the patients, despite all the problems.

1.4 I'm not so sure it is loyalty in all cases. Particularly with so many people at the top end of the pay scale (and who would most likely not be able to match their salaries elsewhere).

1.5 I think 1.3 is right, but HealthCare should not bank on this indefinitely. "You only get what you pay for" is unfortunately true. Also, all the wages in the world will not make up for poor working conditions, if that is a problem.

Figure 52. Wages and benefits brainstorming comments.

The second brainstorming question was directed toward a union concern: "how can we measure the fairness of the wage and benefit package at HealthCare?" This was a direct attempt to devise objective criteria by which to measure the wage and benefit proposals suggested by various sides. Perhaps as a result, the medical director later produced some data on physician compensation and malpractice insurance. A page from this question is displayed in Figure 52. This brainstorming session endured 25 minutes.

In a conversation the following day, the union field representative said that the brainstorming sessions were useful, but they were too limited. He suggested that more brainstorming was needed to get into the issues in depth.

D.4.d.(3). Economic and Non-Economic Classifications
The Article List and economic/non-economic article classification was an easy task. After 10 minutes, the list was finalized (Figure 53). The two sides agreed to start the bargaining off with the economic issues first, the opposite to the procedure used by TransCo.

D.4.e. Overall Evaluation

Several questions were asked to determine the impact of the issues sessions on the negotiations. In the questionnaire (Appendix D), items 16a, 16b, 17a, 17b, and 18 made statements about the
issues session (Figure 54, Appendix H.6). The respondents were asked if they agreed (1) or disagreed (5) with each statement (3 was neutral).

Two statements were made regarding how the issues sessions assisted the respondent's team. To the statement "the issues sessions helped my side to understand the other side better," the ratings averaged 1.9, between agree and neutral. When asked to respond to the statement

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<th>Overall</th>
<th>Management</th>
<th>Union</th>
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<td>a. understand the other side better.</td>
<td>1.9</td>
<td>2.0</td>
<td>1.8</td>
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<td>b. understand the concerns of the other side better.</td>
<td>1.8</td>
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<th>Management</th>
<th>Union</th>
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<td>a. understand us better</td>
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<td>b. understand our concerns better</td>
<td>2.3</td>
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<th>18. The combined list of issues that we came up with does a good job of representing the issues of these talks.</th>
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<th>Union</th>
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1 = Agree  3 = Neutral  5 = Disagree

Figure 54. HealthCare questionnaire results on the Issues Sessions.

"the Issues Session helped my side to understand the concerns of the other side better," negotiators averaged 1.8.

Two statements were made to gauge what the negotiators thought about the effect of the issues sessions on the other side. The difference between the union and management was startling. The statement "the Issues Sessions helped the other side to understand us better" was
rated as a 2 by the union and a 3 by management. Meanwhile, the statement "the Issues Sessions helped the other side to understand our concerns better" had a similar split: the union averaged 1.8 and management averaged 3. The responses to both questions reflect management's objections regarding the process. From role reversal on, management expressed the belief that the process was making them more understanding of the union, but that the union was not more understanding of the role of management.

D.5. Bargaining Sessions

A total of eight bargaining sessions were held over a three week period. On the surface, the sessions were comparable to those of TransCo: the participants used the EBB to examine the contract and proposals, and the Proposal Editor to create proposals in the caucus rooms; the mediators used the Contract Log to capture language as dictated. However, the tone of the talks was rougher, more adversarial and the progress was very slow. Several disputes flared into the open during the bargaining session.

This subsection will first give the story of the bargaining sessions, and then proceed to discuss some of the data directly relating to the sessions.

D.5.a. Opening Bargaining Session

The first session did start off well. The two sides were to formally present their proposals to each other. The union was ready with all their proposals, economic and non-economic. The field representative distributed them to management and awaited management's proposals.

Management distributed their proposals, but only some of them: their economic proposals only. The misunderstanding was probably due to the mediators neglecting to be specific in
requesting all proposals to be ready to go; the executive director and personnel manager (who was charged with preparing the proposals) had assumed that only economic proposals were to be presented because they were to be discussed first. The mediators had compounded the problem when they received the computer document files containing each side's proposals. Only management's economic proposals were received, while the union submitted all of theirs. The mediators did not catch this ahead of time.

Once the field representative caught the error, he insisted on retrieving all the copies of his proposals. A few words about breach of trust were exchanged. Luckily, management's non-economic proposals were available in a draft form. The executive director agreed to photocopy and distribute them with the rest. The matter was settled in 10 minutes and the two sides proceeded to proposal presentation.

The presentations took approximately 2 hours and 16 minutes, excluding a 24 minute break. From the presentations, two things were apparent. First, the union had made no changes to their proposals; they were the same ones the mediators had seen previous to the start of the negotiations. Second, management had changed their proposals substantially in response to what they learned in the strategy and issues sessions.

Immediately after finishing the presentations, a second dispute surfaced. This one was raised by the executive director. He contended that the confidentiality rule had been broken by the union. The eighth ground rule states "the parties agree to keep all circumstances of the mediation confidential" (Figure 45). The alleged violation occurred when the bargaining team briefed the chapter membership on the talks sometime during or after the Issues Sessions.

The union field representative disputed the interpretation of the rule as applying to the union membership. It was his understanding that it covered contacts with the press. The
executive director countered that he had adhered to the rule by not briefing any management people outside his team or members of the board of directors.

To further complicate matters, a key member of the union bargaining stated that she had never heard of any ground rules.

The two sides caucused. At this time, the mediators decided to set a precedent: they simply entered the caucus rooms with the teams and remained during the discussions. There were no objections.

The apparent difficulty was that confidential bargaining was not the norm at HealthCare and not part of national union procedures. After the caucus, the two sides agreed to abide by the confidentiality agreement until the next session and then discuss it. At the third bargaining session, they agreed to keep the confidentiality rule and make announcements only by mutual agreement. Discussion of the confidentiality rule lasted 40 minutes.

D.5.b. Shadow Boxing - Sessions 2 through 6

Progress was very slow in these sessions. The two sides exchanged a number of proposals regarding wages, benefits, and malpractice insurance. However, almost no progress was made.

For four sessions (2 through 5), only one mediator (Herniter) was present. He operated all the tools and maintained the system. Immediately, one shortcoming was painfully obvious: one person cannot simultaneously handle operating the system and mediate. Herniter spent all of his time updating the bargaining book and responding to requests. There was no time to observe caucuses or suggest solutions.

During this time, Herniter requested that the federal mediator attend one of the bargaining sessions. Progress was slow and he worried that the bargaining would not result in an
agreement. Bringing in the federal mediator was agreeable to both sides, who were also disturbed at the lack of progress.

The federal mediator observed the second bargaining session for approximately an hour. He also spoke with both sides. His conclusion was that the sides were simply not prepared to settle early. He offered this observation to the mediator: "you have your hands full."

The impact of negotiating economic issues first was now felt. Compensation and malpractice insurance issues were causing a logjam. Two fact-finding committees were suggested by the mediator, but were never implemented. No other issues were under consideration and no agreements were made. It was obvious that many important "non-economic" issues would be settled at the last minute.

Herniter did attempt to convince the two sides to concentrate on non-economic issues for at least a session and offer use of the linker tool to link proposals issue by issue. It was rejected out of hand by the union field representative as taking too much time. The Linker was thus never used in either the TransCo nor the HealthCare negotiations.

As can be seen in the Article List from the sixth bargaining session (Figure 55), only a few sections of the benefits contract Article VI had agreements. The rest of the agreed articles and sections were in the introductory and concluding parts of the contract. These tend to be formulaic. For example, the "No Strike" article (number XXIII) simply states that no strike action will be taken for the duration of the contract. All in all, little progress had been made.

The second mediator (Carmel) returned in time for the sixth session. At the conclusion of the session, it was obvious to both investigators that time was running out. They decided to strongly intervene and actively mediate.
D.S.c. Rush to Agreement

The pattern of mediation followed in the last two sessions was familiar: one mediator (Carmel) would take the lead and actively talk to both sides during breaks and caucuses; the other (Herniter) also participated in pushing the sides to agreement, but still tended to the GS/M tools.

The seventh session was crucial. The two sides were still far apart on the basic issues of compensation and malpractice insurance. Each was still finding fundamental flaws in the other’s proposal. Several caucuses were held to examine the proposals.
As proposals were flying back and forth, the mediators suggested the use of a spreadsheet to record and experiment with physician pay scales. This was done and several proposals were illustrated side-by-side. The spreadsheet was used mostly for illustrative purposes. The spreadsheet screen was projected onto the front screen for all to see, like the Contract Log. However, neither side requested use of the spreadsheet to develop further proposals.

In mid-evening, the two sides were still apart, but the mediators saw a chance for possible compromise. They brought their suggestion to the executive director; the union had just made a proposal and it was management’s turn to respond. The mediators made clear that the idea was their own and not the union’s; further, that the union did not know of it. The management team considered the proposal, estimated its cost, and decided to make it their own.

When the two sides reconvened, management made the offer, but the union had questions and probed for other concessions. The executive manager decided to read a newspaper while the union field representative asked his questions. This incensed the field representative, who decided to call a halt to the session.

In a discussion in the parking lot, the executive director admitted that he had lost an opportunity to reach agreement.

Was agreement an impossibility? The eighth session started the next afternoon with the union proposing a final fix to management’s compensation package. At this point, the sides started talking about contract wording; the fix was accepted in principle. Interestingly, they resisted including their draft language into the Contract Log. The mediators insisted on it however and Article V was soon settled. The logjam was broken!

Other agreements occurred in relatively quick succession. As the pace quickened, the mediators found themselves struggling to keep up with the negotiators; precisely the same
predicament as they faced in the TransCo negotiations. A final agreement was hastily sketched out by the negotiators and saved in a "final points" file at 2:40 am. Everyone was tired and wanted to go home. The negotiation adjourned at 2:45 am.

D.5.d. Post-Settlement Settlements

Only one dispute occurred after the negotiation was concluded. It concerned one of the final points that were only briefly sketched in the final minutes of the negotiation.

The personnel manager and the field representative did meet once more in the MIS Group Work Facility to go over the final contract.

A ratification vote by the union was held eight days after the conclusion of the talks. The contract was approved by a large majority.

The contract was reviewed and the final draft approved 11 days after the negotiation ended. A pamphlet version was available several weeks later.

D.5.e. Use of tools

The HealthCare pattern of software tool use was both similar to and different from that of TransCo.

Both negotiations witnessed the use of multiple EBB screens by both teams. Again, management was more organized in its use, but the union also gravitated toward this.

Both negotiations had the team leaders view the Contract Log at their own workstations through the Screen Switcher tool, while the rest of the negotiators tended to use the EBB. Like TransCo's general manager, the HealthCare union field representative first asked for the EBB,
but then switched to the Contract Log and used his team member's EBB's for reference when needed. The personnel manager also requested the Contract Log.

Another similarity was the jamming caused by the screen switcher program. The upgrade to StarLAN 3.2 neither prevented nor reduced the frequency of the crashes the mediator's station experienced. It was only later that the bug was traced to a clash between one set of interrupts required to process keystrokes and another required to actually send the screen images across the network.

There were differences between the two negotiations as well. HealthCare made more extensive use of the Proposal Editor. A total of 10 proposals were exchanged by labor and management via the Proposal Editor, as compared to 2 for TransCo.

Another difference was eyestrain. Two HealthCare negotiators experienced discomfort with the display equipment. One union team member had headaches because of the brightness of her video screen. The mediators did not know about her problem until she started wearing sunglasses; thus alerted, they reduced the brightness of her video screen and the headaches disappeared (so did the sunglasses).

The personnel manager had continual problems seeing the front projection screen. Eventually, he had his terminal receive the Contract Log images. But he insisted that the mediators change the text and background colors on the Contract Log in an attempt to make it sharper. The video projection image is indeed fuzzy and inferior to the video display screens.

One new bug did appear with the File Reader program during use of the EBB. Article V on wages became too big to be loaded entirely within the computer's memory. Error codes appeared on the screen of any participant who attempted to view the article. When the source
of the error was discovered, the solution was simple: Article V was split into two files, each as a separate selection on the menu.

D.5.e. Bargaining Session Questionnaire Data

Questionnaire data regarding the bargaining sessions can be found in Appendix I.7. The data will be used throughout the discussion on the bargaining sessions. Seven union members and six management members returned questionnaires.

Five statements regarding the bargaining sessions appeared in the questionnaire. Respondents were asked to rate the statements on a scale of "agree" (1) to neutral (3) to disagree (5). By and large, the negotiators were in mild agreement with the statements, which were positive in tone. When asked whether "our Bargaining Sessions were more effective than our last talks with the other side," answers averaged to 2.3. To the statement "our Bargaining Sessions made extensive use of the computer," the responses averaged out as neutral: 2.9. Upon seeing "our Bargaining Sessions were easier because of the computer," the respondents averaged 2.4, just slightly more agreed than disagreed. When asked "our Bargaining Sessions were faster because of the computer," again slightly more people agreed than disagreed, averaging 2.3. Finally, when confronted with the statement "our Bargaining Sessions were better because of mediation," the response was halfway between "agree" and "neutral." The answers averaged 2.1 on a scale from 1 to 5.

One union negotiator said the advantage of the computer is that it puts things on paper that would ordinarily be the property of only one note-taker. Everyone can now see it.

The HealthCare respondents were less enthusiastic about the tools than their TransCo counterparts (Figure 56, Appendices F.3 and I.7). Negotiators were asked to rate four tools and
...how well do the Group-Systems tools assist the various negotiation tasks?

<table>
<thead>
<tr>
<th>Task Description</th>
<th>TransCo</th>
<th>HealthCare</th>
<th>Average</th>
<th>Std.Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Referencing past proposals, agreements, and contracts with the Electronic Bargaining Book.</td>
<td>4.0</td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Preparing proposals with the Proposal Editor.</td>
<td>4.4</td>
<td>3.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.7</td>
<td>0.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Recording agreements with Bruce Herniter’s Editor.</td>
<td>4.7</td>
<td>4.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>0.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Editing contract with Bruce Herniter’s Editor.</td>
<td>4.7</td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 = Clearly does not work
3 = Not elegant, but can get the job done
5 = Perfect Tool

Figure 56. Comparison of TransCo and HealthCare responses on the fit of bargaining session tools.

tasks on scale of 1 ("clearly does not work") to 5 ("perfect tool"). The EBB was rated a 4 by the HealthCare negotiators. The union rated the EBB slightly higher (4.3) and management rated it slightly lower (3.6). The HealthCare negotiators were less happy with the Proposal Editor. Here, union and management matched, rating it 3.8, almost halfway between "not elegant, but can get the job done" and "perfect." The mediator’s editor (the word processor used with the Contract Log) was rated for fit with two tasks. For recording agreements, it was rated 4.1; while for editing the contract it was rated a 4. The closeness of these two values suggests that the task were perceived as equivalent. TransCo had rated the mediators editor slightly higher, assessing its fit as 4.7.
E. Data Analysis

Before the data are presented in detail, this section describes the methods and means of collecting information. First the general concept is described and then the method of collecting the information. Then the data are presented. Data regarding computer use, session duration, and further questionnaire results can be found in Appendix J.

The data collected were both objective and subjective. The objective information was collected via direct observation by the researchers. Researchers recorded information in a "computer use tracking form" and via note taking during negotiation sessions. The subjective category attempted to measure various concepts such as user satisfaction and perceived ease of use via questionnaires. Post-settlement interviews were used to probe for suggestions and opinions regarding the GS/M process.

The two case studies were treated as exploratory research. As a result, the questionnaires and questions were changed to take advantage of what was learned along the way. The TransCo questionnaire was not finished until the day it was handed to the participants. Items were included to specifically take into account the unique negotiation process that the negotiators actually used. In that spirit, the questionnaire had to be altered to fit the HealthCare talks. The researchers, who also doubled as mediators, took advantage of what they learned in observing TransCo to alter the process used by HealthCare. The tools were used differently or altered to fit HealthCare's negotiation process.

The effect on the questionnaire was that the wording of items was changed, new items were added and some were deleted. For example: questions regarding the "fit" of the tools to the task were altered because HealthCare used more tools (in fact they went through the entire Win-Win process while TransCo did not); a user satisfaction item was added to include the
breakout rooms used for caucusing; and open questions designed to examine specific tools in the TransCo case were replaced with questions on how to improve the sessions and the drawback and advantages to using computers in the HealthCare case.

However, some questions remained the same and their results are presented side-by-side. A t-test on the mean of the differences were performed on 24 questionnaire items using the SAS statistical package (SAS Institute, 1985). Not a single item recieved a p-value less than 5%, although one recieved a p-value of 5.72%. However, in a random sample of 24 questionnaire items, it is expected that at least one should recieve a low p-value. The results indicate that the differences between the TransCo responses and the HealthCare were insignificant. Appendix J.11 lists the p-values.

During the sessions, two mediators were assisted by several undergraduate business students. The students' primary duty was to record computer use and take notes of the sessions. They also served as "gofers" running errands as needed. One student served as an assistant throughout the TransCo talks, while two helped with the HealthCare talks.

E.1. Computer Use

The actual use of the computer is a major objective measure of success. Subjective questions asking what is wrong or right with a tool can point the way to improvement, but if the computer is not used, the software is not a success. Computer use may be the most important measure in the point of view of the negotiator. The users here are actual negotiators conducting talks in which they have a real stake. Success here points the way to use by other negotiators.

The computer use form was not employed until the fifth negotiation session (the fourth session on non-economic issues) held by TransCo. It was created in response to the need to
measure computer use. Initially, it was thought that log files recording computer use were generated by the File Reader tool (which supported the EBB), but this was not the case. Without an automated way to collect this information, the computer use form was necessary to record data manually.

Computer use was recorded only during the bargaining sessions. For the TransCo talks, this meant use was tracked every session. For HealthCare, data were not collected in the strategy and issues sessions. Those sessions involved essentially required use of the computers; in a sense, computer use was involuntary. Electronic Brainstorming, a tool used in both types of sessions, requires all users to be entering data. If a person does not use the workstation, there is nothing else for him/her to do. During bargaining, computer use was voluntary. Each negotiator could use written copies of the current contract and proposals. Use of the computers during bargaining indicates that the computer was a useful alternative.

The computer use form is found in Appendix B. The first page lets the observer record the date, start and stop times, and the positions and names of the participants. The second page is used to record each person's computer use at regular intervals.

Looking at the video screen, typing on the computer keyboard, and observing the front video projection screen are all considered computer use. A negotiator looking at his or her own screen implies use of the Electronic Bargaining Book; typing also implies use as the user must use various keys to navigate throughout the text. Looking at the front screen implies that the most recent text in the Contract Log is being read. In the statistics quoted later, all these categories are summed to produce overall proportion of time devoted to computer use. This measurement of time differs from other use measures which often counted the number of times a record, file or program was used (Melone, 1990).
Recording the use information is quite easy. At the start of a day’s session, the observer (sometimes one of the mediators, sometimes a student assistant) first records the names and positions of the negotiators around the decision room. Then at ten minute intervals, the computer use is recorded. There are four categories of computer use: an 'L' means that a participant is seen just looking at the video screen; a 'T' indicates that the negotiator is typing on the workstation keyboard (presumably while looking at the screen - this category supersedes 'L'); an 'F' means that the user is looking at the front video screen where the mediator’s Contract Log is displayed. If none of these occur, then an 'N' for 'No use' is entered.

Computer use was tracked during all negotiation sessions. During the first TransCo session, were collected every fifteen minutes. However, there was so little for the mediators to do that the frequency was increased to ten minute intervals.

The results indicate that the bulk of the negotiators’ time was not spent using the system. TransCo and HealthCare negotiators spent comparable amounts of time using the computer: 19% and 24% respectively. This is actually good. The negotiators used the computers as they saw fit. Although they had complete veto over the system, the participants never requested the computers to be shut off.

Basically, people spent the bulk of their time negotiating: talking about issues, explaining proposals. GroupSystems/Mediation did not overwhelm the negotiators; instead of them spending their time wrestling with the system, they spent it negotiating.

Computer use by the unions were similar: 22% for TransCo, 24% for HealthCare.
E.2. Duration Statistics

A great deal of time was spent in face to face negotiating sessions by the all four teams (Appendices J.2 and J.3). The total time spent by TransCo was 32.22 hours. The much higher time of 57.05 hours spent by HealthCare reflects the greater number of sessions. More comparable is the amount of time spent in direct face-to-face bargaining (Figure 57): TransCo spent 32.22 hours in 10 bargaining sessions; HealthCare spent 35.00 hours in 8 face-to-face bargaining sessions. The average time per bargaining session was 5.75 hours for TransCo, 4.375 hours for HealthCare. This time excludes lunch breaks, coffee breaks, caucuses and private conferences.

<table>
<thead>
<tr>
<th>Negotiation</th>
<th>Sessions</th>
<th>Duration (hours)</th>
<th>Average (hours/session)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TransCo</td>
<td>9</td>
<td>51.75</td>
<td>5.750</td>
</tr>
<tr>
<td>HealthCare</td>
<td>8</td>
<td>35.00</td>
<td>4.375</td>
</tr>
</tbody>
</table>

Figure 57. Comparison of Bargaining Session durations.

E.3. Computer literacy

Prior familiarity with computers was only measured in the HealthCare questionnaire (Questions 4a through 4e, found in Appendix D). A series of yes or no questions were asked to determine their experience.

Two yes/no questions asked about the location of the computer. Respondents were asked if they had used computers "at work" (4a) or "at home" (4b).

The remaining three questions asked whether a computer had been used for popular applications. Question 4c asked about word processing ("have you ever used a computer to type
a letter"). Question 4d asked "have you ever used a computer to figure your taxes?" Finally, Question 4e asked about recreational use: "have you ever used a computer to play a game?"

<table>
<thead>
<tr>
<th>Location Activity</th>
<th>Management</th>
<th>Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR Work Home</td>
<td>1 2 3 2</td>
<td>2 3 2</td>
</tr>
<tr>
<td>NR Type Letter</td>
<td>1 0 3 2</td>
<td>2 0</td>
</tr>
<tr>
<td>NR Figure Play</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NR Taxes Game</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NR = No Response</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 58.** Computer literacy response distribution for HealthCare.

Together, these five questions sought to gauge computer literacy simply through the use of computers and software. The result? Management clearly had the advantage in experience with computer use. 2 members union had never used a computer at work or at home, while only 1 manager had so little experience. As seen in Figure 58, 5 of 6 management respondents had 2 to 3 "yes" responses, whereas 5 of 7 union respondents had 0 to 1 "yes" responses.

**E.4. User satisfaction**

High user satisfaction is, perhaps, the most sort after and elusive goal of system designers. It is a highly subjective measure of the user's attitude toward a computer system (Melone, 1990). This subsection reviews some recent work and describes the measures used in this study.

Ives, Olson, and Baroudi surveyed the measurement of what they dubbed "user information satisfaction" or UIS (Ives et al., 1983). UIS was defined as the "extent to which users believe the information system available to them meets their information requirements."

UIS is a subjective measure of the success of a system and often substitutes for other measures. For example, it is used in place of objective standards. Objective measures are most
likely economic, so there must be a determination of the value of information from which the development and operating costs are subtracted (Ives et al., 1983; Melone, 1990). These are often lacking or are difficult to determine, so UIS is substituted.

Melone (1990) also points out that user satisfaction is often used as a measure of system effectiveness. She argues that user satisfaction is a concept with many definitions and facets and is in need of reworking. "User attitude" (defined as "a predisposition to respond favorably or unfavorably to a computer system, application, system staff member, or a process related to the use of that system or application") is offered as a substitute that can draw on psychological research.

Development of a generally accepted instrument for the measurement of UIS would benefit MIS practitioners and researchers (Baroudi and Orlikowski, 1988). A validated instruments saves time, relieving investigators of the necessity to develop their own. Also, it would allow comparison of results across many classes of users and situations. Several recent instruments are reviewed below.

Ives et al. reviewed several multi-item UIS rating scales with an eye toward developing their own (Ives et al., 1983). Multi-item scales are considered to be more reliable than single-item scales. They then developed and validated a "short form" instrument with four questions focussing on the "data processing group" presumably in charge of a computer system. In the first two questions, users are asked how the group met its responsibilities and the needs of the users. After a brief written explanation, the last two questions asked about the efficiency and effectiveness of the data processing group.

Other measures of user satisfaction require lengthier questionnaires. Bailey and Pearson first reviewed 22 studies and developed a list of 36 factors that go into the user satisfaction
construct (Bailey and Pearson, 1983). After review by three data processing professionals, the list was increased to 38 factors. The list was then compared to interview responses from 32 middle managers. One more factor was mentioned by four of them, so the final list contained 39 factors. The authors then developed and validated a questionnaire using the interviewees' positive and negative reactions to the 39 factors. Briefly, the factors can be grouped under many headings, including: organizational factors (top management involvement, priorities determination), the electronic data processing staff (communication with EDP staff, technical competence, staff attitude), development and maintenance (time for new development, processing of change requests), the quality of the system (accuracy, timeliness, precision, reliability) and the users' feelings (expectations, confidence, feeling of participation). The authors' experience suggests that responding to the questionnaire takes between 15 and 25 minutes.

Another version of the Ives et al. UIS short form instrument (Ives et al., 1983) was tested by Baroudi and Orlikowski (1988). This was a thirteen scale instrument with two items for each scale. Each item had seven blanks, with qualifiers (such as "bad" and "good") at each end. It measures three major factors: information product, data processing staff and services, and knowledge and involvement.

Baroudi and Orlikowski also discuss the relative merits of the short questionnaire and a single item, all-encompassing question. The short form is useful when looking at different facets of UIS. The items can be modified to fit the particular organizational situation under study. Citing work in measuring job satisfaction, they suggest a single item might be more valid as a global measure and suggest further research.

The basis for the user satisfaction items used in this study was the questionnaire used in a series of Electronic Brainstorming studies using University of Arizona GroupSystems (Valacich
et al., 1989a; 1989b; Dennis et al., 1989; Connolly et al., 1990). This research stream studied anonymity, evaluative tone, group size, and group member proximity during use of Electronic Brainstorming. User satisfaction was one of the constructs measured. Since this work was specific to GroupSystems, those questions formed the basis of the user satisfaction questions used here.

How do you feel about:

a. the computer system your group used to discuss this problem?
   Very dissatisfied 1 2 3 4 5 6 7
   Very satisfied

b. the process by which your group generated and evaluated ideas?
   Very dissatisfied 1 2 3 4 5 6 7
   Very satisfied

c. the ideas your group proposed?
   Very dissatisfied 1 2 3 4 5 6 7
   Very satisfied

All in all, how did you feel about being a member of this group?
Very dissatisfied 1 2 3 4 5 6 7
Very satisfied

Figure 59. User satisfaction items used in EBS studies.

User satisfaction was measured by Valacich et al. (1990a) in four questionnaire items used in brainstorming studies (shown in Figure 59). They examine three aspects of satisfaction with the system, the process, and ideas generated by brainstorming. The fourth question asks about satisfaction with being a member of the group. How these questions were constructed or their basis was not explained in the papers. The discussion that follows is wholly this author’s.

The four satisfaction items correspond to four of the six components of the EMS research model (Dennis et al., 1988). The question about the system measures the EMS or ITGW (Information Technology for Group Work) facet of satisfaction; the question about the process relates to satisfaction with that; the question about the ideas generated is an attempt to gauge the satisfaction with the outcome; and the membership item looks at the group facet of satisfaction.
Two parts of the EMS research model are not addressed by these satisfaction measures: the task of idea generation itself and the organizational context.

The brainstorming process is not the same as the bargaining process, so the satisfaction items must be changed to make sense in the context of a negotiation. Appendix C (Question 8), Appendix D (Question 6), and Appendix J.5 show the satisfaction items used for TransCo and HealthCare. Both asked questions regarding the process used (A), and about the system (C). Instead of asking generic questions about process and the system, the questions referenced GroupSystems directly.

The question about the outcome was dropped in favor of two questions regarding the contract, shown in Appendix C (Question 15), Appendix D (Question 13) and Appendix J.6. The two questions were designed to measure the joint utility of the new contract. In this study, it is also interpreted as the qualitative aspect of effectiveness. Joint utility is further described and the results presented in the next subsection.

The remaining questions were designed to address the facilitation and setting aspects of satisfaction. These both come under the EMS part of the research model which includes hardware, software, and facilitation. Item B asked a question regarding the performance of the staff (B) and was intended to measure satisfaction with facilitation. Items D and E were to measure satisfaction with the setting. TransCo negotiators were asked only about the meeting room, while HealthCare negotiators were asked about both the meeting room and the caucus rooms. HealthCare negotiators spent a substantial part of their time in caucus, using the Proposal Editor, so adding the question was justified.

Aggregate satisfaction results are shown in Appendix J.5. Satisfaction with the negotiation process, staff performance, and use of GroupSystems were close for TransCo and
HealthCare respondents. Satisfaction with the process and use of GroupSystems averaged to 3.8 out of 5, with 5 being "very satisfied." Higher levels of satisfaction were reported for the staff (i.e., the mediators and their assistants), averaging to 4.4 by TransCo and 4.7 by HealthCare. TransCo union was very satisfied (5.0) and so was HealthCare's management (4.8).

Differences occurred between union and management in the two negotiations, but the differences occurred in opposite ways. In general, the HealthCare union was less satisfied than management; the TransCo union was more satisfied than its management. In particular, the TransCo union was very satisfied with the staff.

Satisfaction with the meeting and caucus rooms was neutral. Overall, TransCo rated the meeting room 1.1 point less satisfactory (3.1) than HealthCare (4.2). The federal mediator told the investigators that the TransCo union felt there was not enough desk space. The caucus rooms were rated as 3.8 by HealthCare negotiators.
E.5. Effectiveness

Effectiveness has a quantity component and a quality component (Diehl and Stroebe, 1987). In their study of anonymity and evaluative tone on idea generation in Electronic Brainstorming, Connolly and his colleagues defined effectiveness entirely as the number of ideas generated, in concert with the work of Diehl and Stroebe, and quote other studies which measure the quality of the ideas (Connolly et al., 1990).

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Management</th>
<th>Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>TransCo</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>HealthCare</td>
<td>10</td>
<td>3</td>
<td>7</td>
</tr>
</tbody>
</table>

Figure 60. Number of formal proposals.

In the negotiation context, the direct analogy is to the number of proposals generated. In this study, the number of formal written proposals is taken as the quantitative measure of effectiveness (Figure 60). The TransCo negotiators exchanged few formal proposals: 1 each was submitted by TransCo management and union. HealthCare exchanged more: 3 by management and 7 by union.

Joint utility is the qualitative side of the effectiveness of the system. Instead of asking a panel of experts to rate the proposals, the opinions of the negotiators themselves are used. The negotiators are the experts.

The first questions ask the respondent to rate the contract on a five point scale (Appendix C, Question 15 and Appendix D, Question 13). The second question asks the respondent to rate the contract from the point of view of the other side. By reversing the ratings (subtracting the ratings from 6) and then adding them together, the researcher has a measure of the joint utility of the contract. Joint utility is the sum of the utility of the contract for both sides. It is used by
many researchers as a guide to the best solution acceptable to all sides (Raiffa, 1982; Darling and Mumpower, 1989).

The calculation done here for joint utility transforms the raw sum of the settlement quality questions (ranging from 10 for no utility to 2 for high utility) to a 100 point scale. The calculated joint utilities are found in Appendix J.6. In the aggregate, TransCo was less satisfied (56) than HealthCare (75). TransCo’s union found less utility in the contract than management; their utility numbers was 63 and 50, respectively. HealthCare’s two sides were closer in their assessment. Management found a utility of 72, while union found 77.

E.6. Perceived Ease of Use

The ease of use questions used in this study were based on those of Davis (1989). As defined by Davis, perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort."
Learning to operate CHART-MASTER would be easy for me.
likely | extremely | quite | slightly | neither | slightly | quite | extremely |
I would find it easy to get CHART-MASTER to do what I want it to do.
likely | extremely | quite | slightly | neither | slightly | quite | extremely |
My interaction with CHART-MASTER would be clear and understandable.
likely | extremely | quite | slightly | neither | slightly | quite | extremely |
I would find CHART-MASTER to be flexible to interact with.
likely | extremely | quite | slightly | neither | slightly | quite | extremely |
It would be easy for me to become skillful using CHART-MASTER.
likely | extremely | quite | slightly | neither | slightly | quite | extremely |
I would find CHART-MASTER easy to use.
likely | extremely | quite | slightly | neither | slightly | quite | extremely |

Figure 61. Perceived Ease of Use questions from Davis (1989).

Notice the use of the word "would." Davis' definition of the concept is based on prospective use, not on actual use. The test subjects were asked to evaluate a program based on how well they thought it would work. All of the questionnaire items also used the word "would" (Figure 61).

Only three of the Davis questions were used. The first two questions dealing with ease of use and the item on flexibility were included in the questionnaire. The question concerning a "clear and understandable" interaction and the question on becoming "skillful" were dropped because they were deemed inapplicable. GroupSystems/Mediation tools were either run by the mediators (Contract Log, Article List, and sometimes the Proposal Editor) or used very few commands (the Electronic Bargaining Book used only six keys). The broad question on ease of use was dropped because of time constraints. Experience using real groups suggests that they are impatient with long surveys. A redundant question on ease of use ran the risk of being
perceived as a waste of time. To preserve the good feeling between the negotiators and the researchers, the last question was dropped.

<table>
<thead>
<tr>
<th>TransCo</th>
<th>Agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Learning to operate GroupSystems was easy for me.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>12. I did not find it easy to get GroupSystems to do what I wanted it to do.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>13. I found GroupSystems to be flexible.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HealthCare</th>
<th>Agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Learning to operate GroupSystems has been easy for me.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>9. I found it easy to get GroupSystems to do what I wanted it to do.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>10. I found GroupSystems to be flexible.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 62.** Perceived Ease of Use questions for TransCo (top) and HealthCare (bottom).

Once selected, the item wording had to be changed. The original wording asked respondents to judge future use of the software. This study surveyed participants concerning use in the immediate past and present. The word "would" was replaced by "was," "did," or simply dropped (Figure 62).

Changing the wording necessitated altering the anchors for the response. The original anchors were "likely" and "unlikely," consistent with the conditional future tense of the items. The new anchors were "agree" and "disagree." Replacing "would" with "was" and "did" resulted in a forceful, emphatic statements; "agree" and "disagree" were the most natural anchors.
The seven rating boxes in the original questions were replaced with a five point scale for consistency with the other items in the questionnaire.

The Davis questions, as presented, dealt with a specific tool called "CHART-MASTER." The items were pretested with another system simply by replacing the software named in the questions. Following this logic, "CHART-MASTER" was replaced with "GroupSystems."

The second ease of use question for TransCo (# 12) was phrased negatively while it was phrased positively for HealthCare (# 9). Originally, the question was randomly chosen for negative phrasing in order to vary from the positive tone of the surrounding questions and for increased validity. However, it was changed to the positive tone for the HealthCare questionnaire to take advantage of Davis' suggestion that positively phrased questions are more reliable.

Another concept related to "perceived ease of use" was not included in the questionnaires. As defined by Davis, "perceived usefulness" is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989). For the negotiators, negotiation was not part of their regular jobs; relating usefulness to job performance would produce a confusing question. Attempts to produce alternative phrasing produced odd sounding questions, so the attempt to include usefulness was dropped.

Questionnaire results are found in Appendix J.7. Learning GroupSystems was particularly easy. TransCo averaged 1.6 while HealthCare averaged 1.5 on a scale from 1 for "agree" and 5 for "disagree."

On flexibility, TransCo and HealthCare had similar aggregate ratings, 2.3 (TransCo) and 2.5 (HealthCare), mildly agreeing with the statement that GroupSystems was flexible. TransCo's union and management had a wide gulf on this question. The union agreed more (1.6) and management slightly disagreed (3.3) with the statement.
TransCo mildly disagreed with the statement that it was not easy to get GroupSystems to do what they wanted (3.9). HealthCare mildly agreed that it was easy to get GroupSystems to do what they wanted it to do (2.0). Since the questions are opposites, these answers are roughly in agreement with each other. The reason may be due to some of the functions that were requested, but not provided: message passing, side-by-side display of current contract and proposals, and sending an electric shock to a member of the other team (humorously suggested by the TransCo union president).

E.7. Information exchange

A fundamental premise of Win-Win negotiation is that exchange of information will lead to problem-solving and integrative solutions. Five questions were asked to measure different aspects of information exchange (Appendix C, Question 14; Appendix D, Question 11; Appendix J.8). Questions a and c ask about understanding, while b and d ask about "information" and "knowledge." The first two questions ask about the respondent's view of his or her understanding of information at his or her proposal. The last two questions ask about the respondent's perception of the other side.

Information exchange was rated as about the same on four questions only by the TransCo's management (Appendix J.8). Its union, however, rated the information exchange as slightly better (3 of 4 questions averaged to 2.5 on a scale of 1 for "much better" to 3 for "about the same" and 5 for "much worse").

To the question of the information at their own disposal, the TransCo union rated it as 1.8, about halfway between "much better" and "about the same," and 1.1 more points better than the management. It is interesting to note that the business agent for TransCo's union suggested
that no terminals be provided for the team members (only for the team leader and a team secretary). He wanted them to spend more time listening to the other side.

A similar dichotomy on the same question existed among the HealthCare sides. Only in that case, as noted on other questions, the direction of the differences was reversed. It was HealthCare's management that thought their information was "much better."

In general, all sides rate their information in a range from "about the same" to "much better."

E.8. Efficiency

The efficiency of negotiating with GroupSystems rather than manually was examined five ways. Appendix J.7 shows the questions and the results. Respondents were asked to rate the effect of GroupSystems, from "Decreased Greatly" to "Increased Greatly" (1 to 5), on the total time in contract talks, wording errors, time spent looking up agreements made in previous sessions, referencing proposals made earlier and the effort to negotiate.

The two sets of negotiators agreed that the effort to negotiate had increased slightly; both averaged 3.3 on this rating, slightly above "no difference." They also agreed on referencing proposals made earlier as decreasing slightly (2.4)

The biggest difference between the two sets of talks occurred in the estimated effect GroupSystems had on the total time spent in contract talks. The TransCo negotiators felt that the time increased slightly (3.4). This is consistent with comments made throughout the TransCo talks that they were actually spending more time in face-to-face sessions to nail down the contract language. HealthCare negotiators estimated a slight decrease in the total time spent in talks (2.8).
This may reflect the fact that most of the negotiation involved wages and salaries which were recorded in tables in the contract. Much of the HealthCare’s time was spent negotiating numbers.

TransCo respondents indicated that there was a slight decrease in errors and time spent looking up previous agreements (2.5 and 2.6, respectively); HealthCare estimated increases (1.8 and 2.0).

Of the teams, HealthCare’s management team estimated the greatest savings of all teams in two areas: time spent looking up previous agreements (1.5) and referencing proposals made earlier (1.5).

E.9. Fit

An effort was made to measure the “fit” of the software tools. Fit is a word often used to describe software, but is not defined. Here it is taken to be the appropriateness of the tool to the task. Fit not only depends on the features of the tool, but also the characteristics of the task.

To answer this next question, keep in mind the following analogy: suppose you need to pound a one-inch nail into a wood beam. To do this you have to choose from several tools. You would like to choose the best tool.

1 - a piece of cardboard; it clearly doesn’t work
2 - a hard cover book; it’s awkward, very slow and breaks down
3 - a frying pan; not elegant, but can get the job done.
4 - a small, one-pound hammer; the right tool, but not the right size
5 - a larger, three-pound hammer; the perfect tool

Figure 63. Fit definition by analogy used in questionnaire.

For respondents, fit is defined through an analogy devised by Carmel (Figure 63). In the analogy, the task is to pound a one-inch nail into a wooden beam and various tools are used given as examples of fit. The examples range from a piece of cardboard, which clearly doesn’t work, to a three-pound hammer, which is the perfect tool. This long introduction is consistent
with Converse and Presser's suggestion that a long introduction to a question may be necessary to explain the rating task to the respondent (Converse and Presser, 1986).

The questions about fit are divided into tools for the strategy, issues, and bargaining sessions. These items ask the participants to rate the fit of specific tools to specific tasks. Appendix D, Question 23a through 23d shows the strategy session fit items. The fit of the EBS program to defining long-term interests and discovering issues is rated, as well as the use of Topic Commenter to discuss issues and the use of Vote to rate issues.

The fit items regarding issues tools are shown in Appendix D, Questions 23e through 23h. The use of an editor to display ground rules, the role reversal step using the editor in the caucus rooms, listing issues using the editor in the caucus room, and the issue consolidation tool are all rated for their fit.

The fit items regarding bargaining tools are shown in Appendix C, Question 16 and Appendix D, Questions 23i through 23j. The same questions were used in the questionnaires for both TransCo (which only had bargaining sessions) and HealthCare (which had strategy, issues, and bargaining sessions). The participants are asked to rate the Electronic Bargaining Book, the Proposal Editor, and the Contract Log (referred to as "Bruce Herniter’s Editor").

Fit results and a discussion are found in the two previous sections describing the cases.

E.10. Interviews
Post-settlement interviews were used to further explore the cases. Team leaders were interviewed and asked to comment and speculate about how the negotiation went. The interviews complemented the questionnaires as the mediation, use of the tools, and suggestions for improvement were explored.
The type of interview employed here is the "long interview." As defined by McCracken (1988), the long interview is conducted between the investigator and a single respondent. It is intended to be an open-ended process, flexible enough to "maximize the value of time spent" (p. 7). The interviewer is the scientific instrument, "rummaging" through his own experience to look for patterns and to explore interesting responses when they are offered.

A set of standard questions guided the interviews. Appendix E lists the questions and their categories. Using the EMS research model as a guide, questions were asked in five categories: Group, Facilitation (actually, mediation - part of the EMS variables), Task, Process, and Outcome. The interviewer was free to pick and chose among the questions. The method was to select a question, ask it, get a response, and explore the response more with follow-up questions. Finally, another question would be selected from the standard list. All interviews were no more than an hour in length.

A total of six interviews were conducted. Five of the interviews were conducted with single respondents, in accordance with McCracken's definition. A sixth, however, was conducted with two respondents due to reasons of convenience: the assistant general manager of TransCo and the Personnel Director of TransCo. All the single interviews were conducted with team leaders or assistant team leaders. The interviews were conducted after the contracts had been finalized in written form, anywhere from 1 week to 6 weeks after the respective negotiations were concluded. The people interviewed were: TransCo union president, TransCo business agent, TransCo assistant general manager, TransCo personnel manager, HealthCare union chairperson, HealthCare executive director, and the HealthCare personnel manager.

One very ego-deflating result (at least for the system designer) emerged from the interviews almost at once. The GS/M system had no effect on the outcome of the talks.
TransCo interviewees felt they got the contract they expected. HealthCare interviewees credited the intervention by the mediators, not the system itself, with producing a satisfactory agreement (a rating of 75 in calculated utility; Appendix J.6).

In one area, the computer system actually changed the procedures of bargaining. Many agreed that more time was spent in face-to-face talks writing language; one interviewee called it "cumbersome and time-consuming," but they expressed happiness that they had done it and found it useful.

Time savings was mentioned by one interviewee, the TransCo union president. He thought that use of GS/M and the services of the mediators during the talks saved approximately 20 hours in negotiating time. He translated that 20 hours to mean 2 to 3 bargaining sessions.

Several interesting comments on the tools emerged from the interviews with the TransCo folks. The union team leaders in particular had given much thought to how the room should be set-up. They wanted access to terminals restricted to a team secretary, someone designated to take notes and write down language and, perhaps, the team leader. The union team leaders felt their people were distracted by the computers. The union team members' function in a negotiation is to listen carefully to what management is saying, to give to the team leader information he may find useful against the other side, and to warn the team leader when management is twisting facts to suit its own purposes.

The TransCo union team interviewees also suggested more desk space. They felt it was difficult to find space for all their notes and paper copies of contract and proposals. They also complained that the video monitors obstructed their view of the other side. That may be one other reason why they didn't think the team leaders should have a terminal.
Another aspect, brought up by only one the HealthCare union chairperson, was the difficulty of reading the computer screens. One of the nurses apparently had headaches from looking at the video monitor. This was apparently the same person who wore sunglasses to the negotiation. Both chairperson and the personnel manager said the front video projector screen was difficult to read.

The union leaders also emphasized note-taking as one function lacking in the GS/M system. Notes are very important to a negotiation; they often serve as the only evidence of the "intent" behind a contract clause. The union president suggested somehow recording or noting the conversations between opposing team leaders.

Two important criticisms of the Electronic Bargaining Book emerged. First, searching it is slow and difficult. The information was all there, but retrieval was clumsy. Second, it was challenging to the user to tell the difference between union proposals and management proposals, old contract from new contract, and proposals from the contract. HealthCare's personnel manager suggested color-coding the text to make it easier to identify.

The cost of using GS/M must be kept low to be attractive to the unions. The union president felt computers could have a real impact, but only if it was financially attractive to the unions. Fifty dollars per day was mentioned as a reasonable figure.

On the subject of ground rules, the HealthCare union probably would not use the "confidentiality" rule again. The union team received much criticism from its members who were surprised at the final package. The rule goes against the union culture. Wide-open negotiating sessions and large teams are their norm.

Opinions differed on the impact of the issues sessions on the HealthCare talks. The clinic's union chapter chairperson said she thought the issues sessions did a lot of good; she
called them a "catharsis" where all the venom came out. She also thought it helped the management team understand the union side more. On this subject, the two management interviewees agreed. The executive director and personnel manager felt that management had gone to great lengths to understand the union side; that it had, in fact, helped them. But they were upset that the union had not made similar gains in understanding management.

Everyone said they would use the system again.

F. Follow-Up Critique: Bruce's Brunch

Bruce's Brunch was designed as a follow-up meeting, where all the participants from both negotiations could meet and exchange views. Invitations went out to all participants via mail. They were asked to respond via a self-addressed and postage-paid postcard. Ten negotiators out of a possible 28 participated in a 3 hour and 30 minute electronic and verbal discussion of GroupSystems/Mediation. Herniter acted as facilitator.

The session started with an introduction of the negotiators and a thank you for attending from the facilitator.

A brief talk by Dr. Douglas R. Vogel, of the University of Arizona Department of Management Information Systems, followed. He discussed the research and development of GroupSystems. He stressed how grateful the department was for their use of the MIS Group Work Facility and how their opinions would be used for further development and refinement of the tools.

A short slide show was presented. It explained more about the University of Arizona research in electronic meeting systems, presented the agenda (Figure 64), and reminded them of the highlights of their negotiations: the strategy, issues and bargaining sessions and the tools...
The first tool used was Topic Commenter. The topics were determined by the facilitator prior to the session (Figure 65). The TC session was intended to spur discussion of the GS/M framework and specific tools. The negotiators were asked to enter comments under topics they thought they were familiar with.

The negotiators seemed hesitant to use the tool. Only a few remarks were actually entered. Most people would add a comment and then sit back and watch.

The spirit of the remarks were similar to those expressed during the negotiations, in the questionnaire responses, and during interviews. Remarks expressed satisfaction with the Win-Win approach to negotiation, that the strategy sessions needed to be longer, and that the front
screen was hard to read. However, the front screen was praised for its usefulness during the negotiation.

The EBB and Contract Log were considered useful for keeping track of agreements, but they were considered somewhat confusing. The idea of color-coding the text was repeated. Brainstorming and issue ranking were highly praised.

The topic commenter session lasted 42 minutes and was followed by a short break. Upon their return, the negotiators were given a brief introduction to electronic brainstorming. The TransCo negotiators had never used the tool and the HealthCare negotiators were given a refresher.

The EBS question was: "What should the computer do or do better in future negotiations?"

Again, the participants were hesitant, not quite sure what was expected of them. Herniter, Carmel, and Vogel participated in the EBS session by adding remarks to act as a stimulus. The few remarks that did come in offered two suggestions. One was to improve the Article List to turn it into a private "scorecard" that each side could have to keep track of agreements. The second was a discussion of revealing information. Some participants thought that most companies would not want to put sensitive information on the computer; proprietary information could easily be copied and fall into the hands of competitors.

The EBS session lasted 35 minutes. A half hour lunch break was declared for the participants. Meanwhile, the facilitator prepared the output from TC and EBS. The two reports were then posted to File Reader. The File Reader program was activated at the users stations, while ranking was activated at the facilitator's station.
When the negotiators returned, an hour-long discussion took place. Negotiators were asked to come up with suggestions on improving the GS/M design and tools. Only now did comments flow freely. One participant said after the meeting that he did not understand what more the computer could possibly do until he was able to discuss it with the others. The end result was 16 suggestions that represented a potpourri of ideas.

- Color proposals, current language.
- Introduce financial and operating information - spreadsheets, charts
- Highlight proposals by issue.
- Index proposals by issues that link them.
- Score card of proposals and status for each group.
- Begin process prior to formulating proposals.
- Automatically calculate cost of proposals.
- Color code article list according to status.
- Layering of information - less -> greater detail; audit trail.
- Highlighting differences and similarities.
- Messages.
- Identify and evaluate alternatives using computer.
- Summarize and manage information.
- Write tablet.
- Humor.
- Argue out proposals.

Figure 66. Suggestions in rank-order.

The suggestions were ranked with a very low concordance. Kendall’s coefficient of concordance was 0.28 out of a possible 1.0. The highest ranking was given to coloring proposals and current language to make the different parts of the contract log easy to identify (Figure 66). Another coloring proposal, for the Article List, came in as number 8.

The second highest was a request for integrating charts, spreadsheets, and financial information into the system. While a spreadsheet was used in one TransCo bargaining session, it was only to work on the wage scale. HealthCare did use a spreadsheet once. In neither case was information regarding the financial state of the organizations made available.
The third was to highlight proposals by issue and the fifth was to index proposals by issue. This was analogous to the Linker, rejected for use by TransCo because it would take too much time. But it does show a need for cross-referencing proposals.

The fourth-ranked suggestion was a score card of proposals and their status; a more sophisticated version of the Article List. This was also mentioned during the negotiation by TransCo management. They created a paper version of such a scorecard for their own use during the negotiation.

Of the other suggestions, the one most feasible is "messages." The inability to send messages was the subject of comments during both negotiations. Although it does not seem to have a high priority, it would seem to be a logical tool to add to GroupSystems and would be useful in a negotiation context.

G. Conclusion to Case Studies

One goal of this study was to further the development of electronic meeting systems for negotiation. That has been done. A wealth of information and ideas for improvement were generated from the case studies.

The case study methodology has shown itself to be particularly useful when the investigators were also mediators. The investigators were able to build trust with their subjects by working with them in close proximity. This trust has helped unearth data that will be used to guide the GS/M design.
VI. CONCLUSION

The entire process of design, test, redesign, and case studies described here, although a contribution, is only the beginning. The research has limitations in its applications and the GS/M tools need improvement. This chapter will discuss the contribution of this research, its limitations, and future directions.

A. Contribution

The contribution of this research is that it has demonstrated that computers can be used to support the process of negotiation. Previous experience using computers in negotiation involved assisting a simulated negotiation, modeling economic processes, storing and retrieving information using databases, and using computers to model negotiator judgement (Chapter 5). The case studies presented here mark the first time the process of negotiation itself was supported using computers.

The research has contributed knowledge about how an EMS-based negotiation support system is useful to negotiators. The major contribution GS/M made to the negotiation process was assisting the secretarial function. Future research will concentrate on building upon that foundation.

The case studies demonstrated that negotiators unfamiliar with GroupSystems electronic meeting software would actually use it. The computer technology did not obstruct the process. The negotiators spent 76% to 81% of their time negotiating, not fiddling with computers. They were able to ignore the technology when they needed to.
B. Limitations

Limitations of this research are that its conclusions are difficult to generalize, which restricts the conclusions which can be drawn, and its expense, which limits the market for its use. There are several reasons for the limitations.

B.1. Validity

As a class, individual case studies are the most limited in terms of their validity (Campbell and Stanley, 1963; Yin, 1984). Single case studies examine only one application and there are no scientific controls to sort out the effects of different variables. In fact, the researcher is advised to approach the case study with an open mind on the role of the variables: no distinction can be made between dependent and independent variables (Benbasat et al., 1987).

The limits on the case study as a scientific methodology are examined in Chapter 3 and are readily acknowledged. This research makes no claim to have discovered processes fundamental to negotiation. The goal, instead, is to design and apply an EMS-based Negotiation Support System with the aim of assisting negotiators in their task. In terms of this goal, there are indeed limitations to the study's validity. These limitations are due to the circumstances of the TransCo and HealthCare negotiations and the evolving form of the tools.

There are several categories in which the validity of a study can be examined (Campbell and Stanley, 1963; Cook and Campbell, 1979). Internal validity concerns whether the treatment under study (here, the use of GS/M) actually made a difference. External validity refers to the generalizability of the effect across different populations, settings, and times. In other words, can the conclusions drawn by this research be applied to other negotiators, negotiations settings (other than an electronic meeting room), and other times? Construct validity refers to
generalizations that can be made from what is actually measured in a study to the complex variables (i.e., constructs) we wish to study.

B.1.a. Internal Validity

There are three threats to the internal validity of this research. First, there is a selection bias in the groups studied. HealthCare and TransCo were very different. The HealthCare management and union had a bad relationship, whereas the TransCo management and union had a good relationship, without much of the tension. So on the level of labor-relations, the two case studies differed widely. Second, there were changes in the instrumentation between the two case studies. As discussed in Chapter 5, some questions were revised and new questions were added between the TransCo and HealthCare cases. Third, dissimilar treatments also threaten any comparison between and during the case studies. As noted in the cases, GS/M evolved considerably during the TransCo talks. HealthCare used a different version of GS/M refined in the heat of the TransCo bargaining.

B.1.b. Construct Validity

There are also two threats to the construct validity of this research. Cook and Campbell (1979) mention that experimenter expectancies can bias data. One important source of data for this study are notes of the negotiation sessions and notes taken during interviews. Both could be biased by the expectation of success. In fact, the entire thrust of this research is to develop a negotiation support system that works.

Throughout the two cases, the researchers sought to adapt the GS/M tools to the requirements and wishes of the negotiators. As a result, any hint that a tool was not useful
encouraged the researchers to change it. The researchers did everything they could to assist the negotiators. It can be argued that an unsuccessful result was the least likely outcome of the study.

B.1.c. External Validity

Threats to the external validity of this study involve the interactions between the use of GS/M, the MIS Group Facility setting, and the selected groups. Both of these restrict generalizing the conclusions drawn here to other groups, types of negotiations, or settings.

B.1.c.(1) Interaction of Selection with Treatment

First, there is the effect of interaction between the selection of subjects and the use of GS/M. Cook and Campbell (1979) call this interaction of selection and treatment. This has three aspects: the two groups wanted to succeed, they both wanted to produce a written agreement, and they were both labor contract negotiations. As to the former, it can be argued that the two groups were more or less programmed to succeed. Both TransCo and HealthCare had a history of successful negotiation going back many years. In addition, HealthCare and TransCo were self-selected cases. Using them was completely opportunistic. Both negotiations were found after a "sales" campaign that invited any group interested in computer-assisted negotiations to use GS/M.

In a sense, the negotiators had a stake in seeing that GS/M was used successfully. Both contracts were set to expire within 30 days after the negotiations convened, yet neither the TransCo union nor the HealthCare union were seriously considering strikes, and neither the TransCo management nor the HealthCare management were interested in pressing their unions
to the point of strikes. All parties seem to concur that negotiations had to be successful. This lack of a strike threat and the deadlines makes it difficult to trace successful results back to any one source. One cannot claim that the use of GS/M was the deciding factor that led to a successful negotiation and a satisfactory contract. It is possible that the wish of the subjects to successfully use GS/M overcame any negative aspects of the system. One counterpoint to this argument is that the negotiators always had the opportunity to turn off the computer, but chose not to.

The other aspect of the interaction between selection and treatment is that both cases involved production of a written agreement. A major contribution of GS/M is the secretarial help. Would a negotiation that does not involve a text benefit from GS/M? Obviously, the Bargaining Session tools (EBB, Contract Log, and Article List) are useless if a written end-product is not the objective of the talks and written proposals are not exchanged. Will the electronic tools used during the Strategy and Issues Sessions be enough to justify holding an entire negotiation using GS/M? These questions have not been answered by this study.

Finally, labor-management talks are only one kind of bargaining, so it is difficult to argue that the conclusions drawn are valid for all varieties of negotiation. The critical part of the talks studied here centered around economic issues, yet non-economic issues are often at stake in negotiations. For example, issues of historical preservation and neighborhood character are sometimes at stake in community disputes. Would a Negotiation Support System based on Electronic Meeting Systems be successful in other settings? The argument can be made that GS/M is a text-based system and so is particularly suited to issues best expressed in written form, but it cannot be proven by the TransCo and HealthCare cases.
B.1.c.(2) Interaction of Selection with Treatment

The second threat to external validity is the interaction of setting and treatment. As noted in Chapter 5, neither TransCo nor HealthCare had used an electronic meeting facility before. TransCo had always negotiated in the union hall and HealthCare held previous negotiations in a large, open meeting room in the clinic building. There can be no doubt that the MIS Group Facility impressed the negotiators and was a factor in their agreeing to participate in the case studies.

What does the interaction of setting and treatment say about validity? After all, GS/M has certain hardware requirements. It requires personal computers, a video projection system, and a local area network. Given these requirements, the MIS Group Work Facility is a prototypical setting for future GS/M negotiations. On the other hand, portable personal computers might also be used. In such a setting, the coaxial cables for the local area network and the video projector would be out in the open (in the MIS Group Work Facility, all these are well hidden). If the negotiators saw this raw technology, would they be as impressed? Would they react the same way to GS/M?

B.1.d. Conclusion to Validity

Because of the limitations of the cases, it is impossible to isolate the factors that led to a successful application of GS/M. More applications of the system to different negotiations are needed so a theory of its use can be developed and tested in a more controlled setting. Indeed, a few failed cases would be of use in learning the limitations of GS/M.
B.2. The Cost Factor

To use GS/M, one needs the computer hardware, the GroupSystems software, a meeting room designed to accommodate it, and the presence of mediators to operate the system. In the case studies presented in this dissertation, all four were supplied by the University of Arizona. Yet, the expense of providing those services were not recouped by the fees.

The standard charge to use the MIS Group Work Facility was $1000 per day at the time of the case studies. That was the cost to groups who conducted an all-day meeting using the facility. The fee covered the expense of the entire package: the room, facilitation, procedures, hardware, and software.

The package of services offered by GS/M all have low-cost traditional alternatives. First, the facility: GS/M requires a room equipped with computers in order to operate. The MIS Group Work Facility also provides three breakout rooms plus a room with a conference table. The low-cost alternative is simply a meeting room in a union or company building. The out-of-pocket costs of such facilities are essentially zero. For the TransCo talks, negotiations are normally held in a union hall or, at most, three rooms in a hotel. For the HealthCare talks, previous contract talks were held in the large meeting room of the HealthCare building; the cost was zero.

Second, the facilitation has low-cost alternatives as well. The alternatives are two-fold: mediation and secretarial services. Mediation is available through the Federal Mediation and Conciliation Service (FMCS). Use of an FMCS mediator is free. The researchers also provided secretarial services to TransCo and HealthCare by typing and printing proposals and agreements. Comments during the talks indicated that the usual method was for both sides to ask the company's secretarial staff to type proposals and agreements. Using the company's secretarial staff has the drawback that the turnaround time (the time between submitting the text to be typed
and the delivery of the typed manuscript) is one day. Still, it is likely to cost less than $1000 per day.

Third, the procedures imposed by the mediators during the HealthCare talks are derived from sources such as principled negotiation (Fisher and Ury, 1981) that do not require computers. The procedures exist independent of the medium used to implement them.

Fourth, the computer hardware provided the means for storing and retrieving contract information during the case studies. Communal viewing of the Contract Log was available through the video projector. The low-cost alternative was, in fact, present during both case studies. Printed copies of the opening proposals and current contract were given to each member of all teams. As related in Chapter 5, the negotiators would often refer to the written material. Thus paper, typewriters, and copy machines can substitute for the negotiators’ workstations and the video projector.

Finally, the software is simply the means to fashion appropriate tools using computer hardware. The software gives the hardware the ability to support brainstorming (through EBS), store information (through the Contract Log), and retrieve it (through the EBB).

Interviews with the TransCo union president and business agent suggest that the $1000 cost is excessive compared to their normal way of negotiating. A source of financial support other than user fees is required before computerized mediation can be commonly used. One possible model is the Federal Mediation and Conciliation Service. Supported by federal tax dollars, the FMCS offers its services without charge. To apply the FMCS model to electronic negotiations will require convincing evidence that GS/M is both effective and cost-efficient.
C. Future Research

The apparent success of GS/M points the way to future versions of text-based support for negotiation. Future research will center on further developing the Electronic Bargaining Book and introducing modeling to GS/M.

C.1. Revised Design and Implementation

Improvements to GroupSystems/Mediation are planned to come in the form of a revised Electronic Bargaining Book. The EBB is planned to include many of the suggestions suggested by negotiators.

The great strength of the tools provided to negotiators was the automation of secretarial services. During the entire negotiation, the Contract Log served as the input device for the current contract, all written proposals, and the final agreement. Two tools shared the output function: the EBB and the Contract Log. The EBB made the log file and the Article List available to negotiators at their own workstations. However, the EBB was static and did not directly allow for input. The Contract Log display was projected via video projector onto the front screen and served as a focus for the talks.

These different uses of the tools reflect two different views of the negotiation data. The mediator view was one where data was directly manipulated. During the negotiations, the mediators were able to enter the current contract, the proposals and the final language. They were able to edit all that was in the Contract Log. The negotiator view was one where data was accessible through a menu, but only for reading.

Described throughout this section is a new conceptual design for the EBB which, if implemented, will combine the input functions of the Contract Log with the output functions of
the EBB. The function of summarizing the state of the negotiations will also be absorbed into
the design. It will also allow for less rigid assignment of different views to the mediator and
negotiator. There is a three-fold aim here. The first is to improve the mechanical performance
of GS/M by having all participants view the same file. The second is to improve the usability
of the tool. For example, text will be color-coded to indicate current contract, proposals, and
final language. The third aim is to reduce dependence on and the burden of the mediator (or
mediators) to enter proposals and final language. During the cases, it was obvious that two
mediators were necessary to operate the GS/M system. When only one mediator was present
during the HealthCare negotiation for a two week period, it was impossible for that mediator to
make suggestions or manage the process. Instead, he spent his time managing the computer
system. In the new design, designated negotiators will be given authority to enter proposals
themselves.

Described next are the various parts of the revised EBB, divided into set-up, input,
processing and output phases. Each subsection will describe the functions required by each and
illustrated in Figure 67.

C.1.a. Set-Up

The set-up phase lets the mediators tailor the EBB to an individual negotiation. Before any text
is entered by the mediators, labels, colors and document division names must be made known
and available to the EBB. When talks start, the mediator should be able to assign the workstations
that will have special privileges: team leader, team secretary and team member terminals will
have separate privileges. These parameters will be stored in an initialization file that the EBB
will read every time it is run.
During the TransCo and HealthCare talks, the two sides were labeled "MANAGEMENT" and "UNION." However, not all negotiations involve just two sides. A multilateral negotiation might involve literally dozens of different sides. During the set-up phase, the number and name of each side would be entered. The names would then be used to headline different parts of the EBB. For example, a proposal from the Johnson Neighborhood Association might be titled with "JNA Proposal - 02/09/91." If names are not specified, then defaults can be provided. For example, during the setup phase, the mediator could select among several standard names (such as "Labor" and "Management") and a user-specified name.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Function</th>
<th>File</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Set-up</strong></td>
<td>- Establish labels and colors for the categorization of text</td>
<td>Parameters</td>
</tr>
<tr>
<td></td>
<td>- Establish the columns and column headings for the Status List</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Assign terminals to negotiation teams</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Designate team leader and secretary terminals</td>
<td></td>
</tr>
<tr>
<td><strong>Input</strong></td>
<td>- Editing</td>
<td>Privileges</td>
</tr>
<tr>
<td></td>
<td>- Importation of</td>
<td>Log</td>
</tr>
<tr>
<td></td>
<td>- text</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- documents</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Logically dividing and subdividing text</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Labeling and coloring text</td>
<td></td>
</tr>
<tr>
<td><strong>Process</strong></td>
<td>- Privileged processes</td>
<td>Log</td>
</tr>
<tr>
<td></td>
<td>- Team Secretary: submission written proposals</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Team Leader: approval final language</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Automatic time and date stamping of proposals and approved final language</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Generation of the progress list</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Navigation of text through menu selection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Message-passing</td>
<td></td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>- Extraction of all approved language into a word processing document</td>
<td>Draft</td>
</tr>
<tr>
<td></td>
<td>- Printing</td>
<td></td>
</tr>
</tbody>
</table>

Figure 67. EBB functions and files divided according the phase of use.
The sides might also refer to the status of certain parts of the contract differently than TransCo. If the jargon of a negotiation does not include the "AGREED," "WITHDRAWN," and "HOLD" terminology, the set-up phase should allow alternative terms to be specified.

One common complaint during the contract talks was that it is difficult distinguishing among a proposal, a passage from the current contract, and agreed final language. Color-coding the proposals and contract is the highest ranking suggestion to come out of Bruce's Brunch (see Chapter 5); color-coding to indicate status ("AGREED," "WITHDRAWN," and "HOLD") ranked eighth. Color-coding the text, as well as labeling it, would make color a redundant attribute of the text. According to Christ (1975), using color as a redundant attribute is better than relying on color alone to distinguish objects. Both the label and the color would indicate the nature of the text being viewed.

To implement color-coding, the mediator would establish the colors used for each side after their names are entered. Also, a color for "AGREED" text would be specified at the same time that the term for agreement was entered. Then, during the negotiation, text under each of the labeled categories would also be distinguished by the selected color. If colors are not decided upon in advance, the EBB can impose defaults.

The Article List is a tool that evolved greatly during the talks. For this new tool, the list would be renamed the "Status List," as a more general name. In negotiations other than union-management talks, more categories (other than "Economic" and "Non-Economic") are likely to be needed. Thus, the set-up phase should allow the number and titles of the columns used to be entered at the set-up phase. The columns listing the different articles (or whatever the divisions are) and the date that they have been agreed to will be fixed.
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C.1.b. Input

The revised EBB will contain the same raw data as the Contract Log. The current contract, plan, or other current object document will be submitted to the mediators. Any written proposals any side is prepared to offer will also be submitted. Proposals will be inserted into the articles (or other document division) they are meant to modify. It is envisioned that the text of the EBB will still serve as the record of the negotiation and will be referred to as the "log" or "negotiation log."

The EBB will need the editing capabilities now supplied to the Contract Log through a word processor. The ability to enter and delete text, to cut blocks of text and paste them somewhere else in the log, to copy text from one part of the document to another, are all standard functions.

Importation of text files is absolutely necessary. These text files, which contain only recognizable characters, can be generated by standard word processing packages. They contain no special processing codes, such as codes indicating the underlining of text or the left and right margins. Importation of text would let pre-existing computerized versions of contracts and proposals be easily included in the EBB and save the expense of typing them in by hand. An improvement would be the ability to directly use a document produced by one of the common word processors. If the EBB were to use exactly the same codes and conventions of a major word processor, then a document written using that word processor could be used directly by the EBB. As a result, proposals and contracts in nicely formatted documents could be used with minimal change. Negotiation documents, such as contracts, tend to be divided and subdivided into articles, sections, and subsections. During the TransCo and HealthCare talks, each contract division was made into a separate file and made available via a menu. The revised
EBB should have the same capability. The EBB should allow divisions to be marked in the text, and then make those divisions accessible through a menu.

Before or after text is input to the EBB, the tool should be able to label and color code it according to the parameters specified in the set-up phase. With a simple command, a block of text should receive a predetermined label, a time and date stamp, and be displayed in a unique color to indicate the origin of the text. For example, a proposal from the TransCo union would be labeled as "UNION - 02/09/91" and colored blue. TransCo management proposals might be labeled as "MANAGEMENT - 02/09/91" and colored red. Current contract language might be labeled as "CONTRACT - 06/01/91" and colored light gray.

C.1.c. Process

To fundamentally shift the secretarial burden from mediator to negotiator, a redesigned EBB must allow negotiators themselves to enter proposals during talks. The EBB must also allow negotiators themselves to indicate if a proposal has been accepted.

As discussed in Chapter 5, communication during negotiations is highly structured. Only one person at a time is designated to discuss an issue. For TransCo, it was the team leader or his deputy. For HealthCare, individuals who were particularly interested in an issue or proposal acted as spokesperson. Restricted patterns of negotiation should be reflected in the EBB design as well.

It is the prerogative of the team leader or spokesperson to offer proposals. However, they themselves do not type the proposals they offer. During the TransCo and HealthCare negotiations it was observed that team leaders tend to spend their time talking, listening, and approving or disapproving proposals.
The GS/M implementation used in the cases requires two mediators to be present. When only one was present, most of his effort was spent managing the tools, not actually mediating. To reduce the secretarial responsibilities of the mediators, negotiators should enter their own proposals into the system.

The revised EBB will accommodate the two functions of typing and approving proposals by two privileged workstations on each side. The privileges will be granted by the mediator. One workstation will be a team secretary's workstation. The person using that computer will have the authority to submit proposals to the EBB. When proposals are submitted, they will be stamped with the name of the side that submits it, as well as the time and date of submission.

A team leader's workstation will be also be designated by the mediator. Whoever uses that station will be able to approve contract language. When two sides approve a section of text, it will be marked "AGREED" and the text color will change.

Another process is the generation of the Status List. The EBB should be able to survey the negotiation log and update which articles (or whatever division name is chosen) have been agreed to. Such a "scorecard" was ranked number four in the suggestions from Bruce's Brunch.

Navigation through the EBB via menu selection worked well during the case studies. It should be maintained for the revised EBB. The divisions designated in the set-up phase should be the menu selections used by negotiators to display parts of the contract. Once the proper division is discovered, the movement can be provided by standard edit functions: cursor movement through the up and down arrow keys. Movement can also come through a string search function.
The final process is message-passing. This was suggested by negotiators during the case studies and was ranked eleventh out of 16 suggestions. Each member of a team should have the ability to write and send a message to other team members.

C.1.d. Output

The final product of the labor-management negotiation process is a final, written contract. To produce the final contract, one of the mediators had to extract all the approved language from the Contract Log.

The ability to extract approved or agreed language and save it in a computer file should be an automatic function. The file can then be edited on a word processor for the final document.

C.2. Incorporate Models

One of the drawbacks of GS/M is that it offers no theoretical analysis of proposals or their likely reception. Incorporating the modeling process into the GS/M procedures and making available the actual models themselves are likely to help the mediators and the negotiators. Two types of models are available: Analytic Mediation and simulations of specific processes that are the subject of negotiation.
C.2.a. Analytic Mediation

Analytic Mediation offers specific techniques for modeling the judgement of negotiators (Chapter 2; Mumpower, 1988; Mumpower, Schuman, and Zumbolo, 1988; Darling and Mumpower, 1990). The mediator now relies on knowledge of the people, spoken indications from the negotiators, and intuition when suggesting compromises. Tools to analyze the choices made by negotiators would be of great help to mediators.

The route of directly suggesting to negotiators the compromises calculated by the tools of Analytic Mediation has already been tried; unfortunately, the participants chose not to follow the mediator's advice (Mumpower, Schuman, and Zumbolo, 1988). However, another route is available and should be tried.

A mediator could simply use the information provided by Analytic Mediation to indirectly help the mediation effort. Instead of suggesting the compromises directly, a mediator could simply keep them in mind as a goal. How far away the negotiators are from the calculated compromise would be a measure of how much more work the mediator has to do. In this scenario, Analytic Mediation would be strictly a mediator's tool.
C.2.b. Modeling the Problem

Models or simulations of the problem undergoing negotiation would be a valuable tool. As discussed in Chapter 2, the very act of modeling itself becomes a forum for negotiation. But once completed, the model can be used to evaluate proposals, acting as the objective criteria (Fisher and Ury, 1981; Goeltner, 1987; Nyhart and Goeltner, 1987; Samarasan, 1987; Nyhart, 1988; Nyhart and Samarasan, 1989). The MIT Project on Modeling for Negotiation Management is working on a variety of modeling tools. Actively seeking to use these tools in the Issues and Bargaining Sessions might assist more complicated negotiations.

The drawback, however, is the length of time needed to create the models. The several months taken to develop an economic model of mining the ocean floor would be impossible to copy in the labor-management negotiations which take place over several weeks. The funding necessary is probably unavailable to companies and unions accustomed to conducting negotiations in union halls or hotel rooms. Inexpensive modeling tools would be necessary to combine GS/M with economic and other problem models.

D. Conclusions

The design and implementation of the GroupSystems/Mediation was a successful application of an electronic meeting system to a heretofore untouched process: negotiation. This study demonstrates that GS/M was able to store and retrieve contract and proposal information useful to the negotiators, while still allowing those negotiators to bargain with each other.

This study has obvious limitations to generalizing from its cases. It focuses on two labor-management negotiations in which the participants wanted to come to an agreement. In addition, GS/M is an expensive process which limits its potential market. More experience is
needed to explore the factors which lead to a successful application of GS/M. Only from understanding those factors can researchers predict which negotiation will benefit from using GS/M and which negotiation will not.

Future work will concentrate on further developing the GS/M software. The most obvious improvement is to combine the functions of the EBB, Contract Log, and Article List into a single new program, the revised EBB. The aim is to further automate the storage, display, and secretarial functions that were distributed among the three tools. The second improvement will concentrate on giving GS/M modeling capabilities advocated by other researchers. Modeling the decision making processes of the negotiator may lead to a valuable aid for the mediator. Using economic and other process models may provide aids to evaluate proposals.

The entire process of designing, developing and actually using a negotiation support system has been a rewarding and fascinating experience. Applying information technology to the negotiation field is far from fully explored and promises more developments.
APPENDIX A

"SALES PITCH" SLIDES
University of Arizona
GroupSystems

Electronic Meeting Systems
for Group Support

Management Information Systems Department
Karl Eller Graduate School of Management
University of Arizona, Tucson, AZ 85721

Group Support for

• Collaboration
• Communication
• Deliberation
• Negotiation
• Consensus Building
• Decision Making
• Planning
Selected Sessions

- ACM Curriculum Task Force
- Army Information Systems Command
- Arthur Andersen & Company
- Burr-Brown Corporation
- Carondelet Health Services
- Electric League of Arizona
- Greyhound Financial Corporation
- House Minority Democrats
- IBM Boulder
- IBM Federal Systems Division
- Phelps Dodge
- Southwest Gas
- Tucson Tomorrow Political Action Group

University of Arizona GroupSystems Installations
Field Studies

To gain insight into group work process, identify factors to test experimentally, and test various software designs.

- CMI and PlexCenter
  Over 100 public and private sector groups have been studied
- IBM
  Over 100 groups have been studied

GroupSystems/Mediation
Mediated Negotiation Session Support

- A subsystem of
  University of Arizona GroupSystems specifically for negotiations.
Mediator

A neutral third party brought in by mutual agreement to control the process of negotiation.

Types of Settlements

WIN-LOSE  WIN-WIN
Bargaining Modes

Hard ← Adversarial Victory Distrust Threats Position → Soft Friendly Agreement Trust Offers Agreement

Negotiation on the Merits

• Separate people from the problem
• Focus on interests, not positions
• Invent options for mutual gain
• Insist on using objective criteria
GroupSystems/Mediation
Benefits

- Creativity
- Agenda Organization
- Communication Channels
- Session Memory & Organization
- Universal View
Benefits
Agenda Organization

Benefits
Communication Channels
Benefits
Session Memory & Organization

Benefits
Universal View
Schedule

1. Strategy Session
2. Issues Session
3. Bargaining Session

GroupSystems/Mediation
Strategy Session

- Separate & Private
- Topics:
  - Issues
  - Positions
  - Proposals

Electronic Brainstorming (EBS)
GroupSystems/Mediation
Issues Session

- Face-to-face

Steps
- Rules
- Role Reversal
- Issue and Reason Identification
- Issue Consolidation
- Ranking

Editor, Topic Commenter (TC) and Vote

GroupSystems/Mediation
Intersession

- Separate & Private

- Step
  - Create Package
GroupSystems/Mediation
Bargaining Session

• Face-to-face

• Steps
  Present Proposal
  Linking
  Horse Trading
  Agreement Wording

Editor and Topic Commenter (TC)
APPENDIX B

COMPUTER USE TRACKING FORM
Computer Use Tracking Form

Use this form to track the use of the computer by negotiators. It has two pages. The first page is used to record the date, start time and stop time of the negotiation session.

<table>
<thead>
<tr>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<tbody>
<tr>
<td>6</td>
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<td>16</td>
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Date __________________ Recorder _______________________
Start Time _________________ Stop Time ________________

1. _________________________ 11. _______________________
2. _________________________ 12. _______________________
3. _________________________ 13. _______________________
4. _________________________ 14. _______________________
5. _________________________ 15. _______________________
6. _________________________ 16. _______________________
7. _________________________ 17. _______________________
8. _________________________ 18. _______________________
9. _________________________ 19. _______________________
10. _________________________ 20. _____________________
This page is to follow how each participant is using the computer. Every 10 minutes, please write a letter indicating how that negotiator is using the computer.

N = No use       L = Looking at the screen, no typing     T = Typing
F = (Looking at) Front screen

Date __________ Recorder _______________________

<table>
<thead>
<tr>
<th>Time</th>
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<th>Comments</th>
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</tbody>
</table>
APPENDIX C

TRANS CO QUESTIONNAIRE
University of Arizona
GroupSystems/Mediation
Questionnaire

Your opinions on GroupSystems are very important to us. The purpose of this questionnaire is to gather information about both your individual experience and team experience, as well as some information on the people using the system. Your answers to this questionnaire will be kept confidential.

Part A: Background Information

1. Which negotiating team are you a member of?
   (circle your answer) Company Union

2. What is your age?
   (circle your answer) 25-29 30-34 35-39 40-44 45-49 50-54 55-59 60-64 65-69

3. How do you type? (circle one)
   a. Slowly (hunt and peck)
   b. Rough or casual typing
   c. Good typing (30 words per minute, error free)
   d. Excellent typing

4. What language are you most comfortable with? __________________

5. Were you involved in the previous contract negotiations with the other side?
   (circle your answer) Yes No
Part B: The Negotiation Process

6. As compared to previous talks with the other side, have your bargaining tactics changed?
   (circle your answer)  Yes  No  Don't Know

7. If your answer to question 6 was "Yes":
   Please rank, in order of importance, the reasons for the tactical changes (1 being most important, 2 being second-most important, etc):
   ___ outside people present (ie, Bruce, Erran, and Adam)
   ___ new location for talks
   ___ GroupSystems
   ___ other: ________________________________
   ___ other: ________________________________

For questions 8 through 16 we present several statements. Please indicate how each statement applies to you or your group by circling the appropriate number. There are no right or wrong answers. Many of the statements are similar to other statements. Do not be concerned about this. Work quickly; just circle your first impression.

8. How do you feel about:  
<table>
<thead>
<tr>
<th>Very dissatisfied</th>
<th>Very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  2  3  4  5</td>
<td>1  2  3  4  5</td>
</tr>
</tbody>
</table>
   a. the process of negotiating using GroupSystems?
   b. the performance of the GroupSystems staff?
   c. using GroupSystems during the negotiation?
   d. the meeting room?
9. Compared to last year's talks, these talks were:

<table>
<thead>
<tr>
<th></th>
<th>Agree</th>
<th>Disagree</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. smoother</td>
<td>1 2 3</td>
<td>4 5</td>
<td>DK</td>
</tr>
<tr>
<td>b. friendlier</td>
<td>1 2 3</td>
<td>4 5</td>
<td>DK</td>
</tr>
<tr>
<td>c. worse for long-term labor peace</td>
<td>1 2 3</td>
<td>4 5</td>
<td>DK</td>
</tr>
<tr>
<td>d. more successful</td>
<td>1 2 3</td>
<td>4 5</td>
<td>DK</td>
</tr>
<tr>
<td>e. worse for attaining my team's goals</td>
<td>1 2 3</td>
<td>4 5</td>
<td>DK</td>
</tr>
</tbody>
</table>

10. What effect has GroupSystems had on:

<table>
<thead>
<tr>
<th></th>
<th>Decreased greatly</th>
<th>Increased greatly</th>
<th>Don't Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. total time spent in contract talks</td>
<td>1 2 3</td>
<td>4 5</td>
<td>DK</td>
</tr>
<tr>
<td>b. errors in wording/language</td>
<td>1 2 3</td>
<td>4 5</td>
<td>DK</td>
</tr>
<tr>
<td>c. time spent looking up agreements from previous sessions</td>
<td>1 2 3</td>
<td>4 5</td>
<td>DK</td>
</tr>
<tr>
<td>d. referencing proposals made earlier</td>
<td>1 2 3</td>
<td>4 5</td>
<td>DK</td>
</tr>
<tr>
<td>e. effort to negotiate</td>
<td>1 2 3</td>
<td>4 5</td>
<td>DK</td>
</tr>
</tbody>
</table>

11. Learning to operate GroupSystems was easy for me.

   Agree | Disagree
---|---
1 2 3 | 4 5

12. I did not find it easy to get GroupSystems to do what I wanted it to do.

   Agree | Disagree
---|---
1 2 3 | 4 5

13. I found GroupSystems to be flexible.

   Agree | Disagree
---|---
1 2 3 | 4 5
14. As compared to our last contract talks with the other side:

<table>
<thead>
<tr>
<th></th>
<th>Better</th>
<th>Worse</th>
<th>Don’t</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. my understanding of the other side is . . .</td>
<td>1 2 3 4 5 DK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. the information at our disposal is . . .</td>
<td>1 2 3 4 5 DK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. the other side understands us . . .</td>
<td>1 2 3 4 5 DK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. our knowledge about the other side is . . .</td>
<td>1 2 3 4 5 DK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. So far, what is your view of the new contract?

<table>
<thead>
<tr>
<th></th>
<th>Great</th>
<th>Awful</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. for your side</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>b. for the other side:</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

16. To answer this next question, keep in mind the following analogy: suppose you need to pound a one-inch nail into a wood beam. To do this you have to choose from several tools. You would like to choose the best tool.

<table>
<thead>
<tr>
<th></th>
<th>it clearly doesn’t work</th>
<th>it’s awkward, very slow and breaks down</th>
<th>not elegant, but can get the job done.</th>
<th>the right tool, but not the right size</th>
<th>the perfect tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - a piece of cardboard;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 - a hard cover book;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 - a frying pan;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 - a small, one-pound hammer;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 - a larger, three-pound hammer;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Using the above analogy, how is the fit of the GroupSystems tools to the various negotiation tasks?

<table>
<thead>
<tr>
<th></th>
<th>Clearly does not work</th>
<th>Perfect tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Referencing past proposals, agreements, and contracts with the Electronic Bargaining Book</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>b. Preparing proposals with the Proposal Editor</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>c. Recording agreements with Bruce Herniter's Editor</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>d. Editing contract with Bruce Herniter's Editor</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
Part C: Improving the Tools

Your ideas on how to make better use of the computer are important to us. This part has several questions to help us *improve* GroupSystems/Mediation. Please write your suggestions in the space provided. If you need more room, feel free to use the back of the page.

17. How would you improve the Electronic Bargaining Book?

18. How would you improve the Proposal Editor?

19. If you could suggest the perfect computer system for bargaining, what would it include?
20. Ideally, how should we present the old contract and the proposals from both sides on the screen? Please use the "screen" provided below.

Thank you! Any more comments? Feel free to write them down.
APPENDIX D

HEALTHCARE QUESTIONNAIRE
University of Arizona GroupSystems/Mediation
Questionnaire

Your opinions on GroupSystems are very important to us. The purpose of this questionnaire is to gather information about both your individual experience and team experience, as well as some information on the people using the system. Your answers to this questionnaire will be kept confidential.

Part A: Background Information

1. Which negotiating team are you a member of?
   (circle your answer) Management Union

2. What is your age?
   (circle your answer) 25-29 30-34 35-39 40-44 45-49 50-54 55-59 60-64 65-69

3. How do you type? (circle your answer)
   a. Slowly (hunt and peck)
   b. Rough or casual typing
   c. Good typing (30 words per minute, error free)
   d. Excellent typing

4. Have you ever used a computer
   a. at work? (circle your answer) Yes No
   b. at home? (circle your answer) Yes No
   c. to type a letter? (circle your answer) Yes No
   d. to figure your taxes? (circle your answer) Yes No
   e. to play a game? (circle your answer) Yes No

5. Were you involved in the previous contract negotiations with the other side?
   (circle your answer) Yes No
Part B: The Negotiation Process

For questions 6 through 24 we present several statements. Please indicate how each statement applies to you or your group by circling the appropriate number. There are no right or wrong answers. Many of the statements are similar to other statements. Do not be concerned about this. Work quickly; just circle your first impression.

6. How do you feel about:

<table>
<thead>
<tr>
<th>Option</th>
<th>Very dissatisfied</th>
<th>Neutral</th>
<th>Very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. the process of negotiating using GroupSystems?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>b. the performance of the GroupSystems staff?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>c. using GroupSystems during the negotiation?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>d. the meeting room?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>e. the caucus room?</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

7. Compared to last year’s talks, these talks have been:

<table>
<thead>
<tr>
<th>Option</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. smoother</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b. friendlier</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c. better for long-term labor peace</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d. more successful</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>e. better for attaining my team’s goals</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

DK = Don’t Know
8. Learning to operate GroupSystems has been easy for me.
   Agree: 1  Neutral: 2  Disagree: 3 4 5

9. I found it easy to get GroupSystems to do what I wanted it to do.
   Agree: 1  Neutral: 2  Disagree: 3 4 5

10. I found GroupSystems to be flexible.
    Agree: 1  Neutral: 2  Disagree: 3 4 5

11. As compared to our last contract talks with the other side:
    Much Better: 1  About the Same: 2  Much Worse: 3  Disagree: 4 5
    a. my understanding of the other side is . . .
       Agree: 1  Neutral: 2  Disagree: 3 4 5 DK
    b. the information at our disposal is . . .
       Agree: 1  Neutral: 2  Disagree: 3 4 5 DK
    c. the other side understands us . . .
       Agree: 1  Neutral: 2  Disagree: 3 4 5 DK
    d. our knowledge about the other side is . . .
       Agree: 1  Neutral: 2  Disagree: 3 4 5 DK

12. What effect has GroupSystems had on:
    Decreased Greatly: 1  No Difference: 2  Increased Greatly: 3  Disagree: 4 5 DK
    a. total time spent in contract talks
       Agree: 1  Neutral: 2  Disagree: 3 4 5 DK
    b. errors in wording/language
       Agree: 1  Neutral: 2  Disagree: 3 4 5 DK
    c. time spent looking up agreements from previous sessions
       Agree: 1  Neutral: 2  Disagree: 3 4 5 DK
    d. referencing proposals made earlier
       Agree: 1  Neutral: 2  Disagree: 3 4 5 DK
    e. the effort to negotiate
       Agree: 1  Neutral: 2  Disagree: 3 4 5 DK

13. So far, what is your view of the new contract?
    Great: 1  Neutral: 2  Awful: 3
    a. for your side
       Agree: 1  Neutral: 2  Disagree: 3 4 5
    b. for the other side:
       Agree: 1  Neutral: 2  Disagree: 3 4 5
Strategy Session

The *Strategy Session* was the session where each side came in separately. The next two (2) questions are about the *Strategy Session*.

14. The *Strategy Session* helped my side to define:

   a. our long-term interests  
      | Agree | Neutral | Disagree | Don't Know |
      | 1     | 2       | 3        | 4         | 5         | DK        |

   b. the problems we wanted to solve  
      | Agree | Neutral | Disagree | Don't Know |
      | 1     | 2       | 3        | 4         | 5         | DK        |

   c. the issues of these negotiations  
      | Agree | Neutral | Disagree | Don't Know |
      | 1     | 2       | 3        | 4         | 5         | DK        |

   d. the tactics we were to use  
      | Agree | Neutral | Disagree | Don't Know |
      | 1     | 2       | 3        | 4         | 5         | DK        |

15. How would you improve the *Strategy Session*?
Issues Sessions

The Issues Sessions were done in early May. Role Reversal, Issue Identification and Discussion, Issue Consolidation, and Brainstorming on costs and wages were the activities in these sessions. The next four (4) questions concern the Issues Sessions.

16. The Issues Sessions helped my side to:

<table>
<thead>
<tr>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

a. understand the *other side* better

b. understand the *concerns* of the other side better

17. The Issues Sessions helped the other side to:

<table>
<thead>
<tr>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

a. understand *us* better

b. understand our *concerns* better

18. The combined list of issues that we came up with does a good job of representing the issues of these talks

<table>
<thead>
<tr>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

19. How would you improve the Issues Sessions?
Bargaining Sessions

The Bargaining Sessions are the sessions started when the two sides presented their proposal packages on XXX XX, 19XX. The next three (3) questions ask about the Bargaining Sessions.

20. Our Bargaining Sessions

<table>
<thead>
<tr>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

   a. were more effective than our last talks with the other side

   b. made extensive use of the computer

   c. were easier because of the computer

   d. faster because of the computer

   e. better because of mediation

21. How would you improve the Bargaining Session?

22. If your bargaining tactics in this negotiation have changed, what are the reasons for the change?
23. To answer this next question, keep in mind the following analogy: suppose you need to pound a one-inch nail into a wood beam. To do this you have to choose from several tools. You would like to choose the best tool:

1 - a piece of cardboard; it clearly doesn’t work
2 - a hard cover book; it’s awkward, very slow and breaks down
3 - a frying pan; not elegant, but can get the job done.
4 - a small, one-pound hammer; the right tool, but not the right size
5 - a larger, three-pound hammer; the perfect tool

Using the above analogy, how well do the GroupSystems tools assist the various negotiation tasks?

<table>
<thead>
<tr>
<th>Clearly does not work</th>
<th>Perfect tool</th>
<th>Don't Know</th>
</tr>
</thead>
</table>

I. Strategy Session

a. Defining the long-term interests of the bargaining team using Electronic Brainstorming
   1  2  3  4  5  DK

b. Discovering the issues important to the bargaining team with Electronic Brainstorming.
   1  2  3  4  5  DK

c. Discussing the issues important to the bargaining team with Topic Commenter.
   1  2  3  4  5  DK

d. Discovering the value of issues by ranking them with the Vote program.
   1  2  3  4  5  DK

II. Issues Sessions

e. Displaying and developing ground rules by editing them on the front screen.
   1  2  3  4  5  DK

f. Going through the Role Reversal process using the editor in the caucus room.
   1  2  3  4  5  DK

g. Listing your issues using the editor in the caucus room.
   1  2  3  4  5  DK

h. Displaying and consolidating issues with the Issue Consolidation program.
   1  2  3  4  5  DK
III. Bargaining Sessions

Again, using the above analogy, how well do the GroupSystems tools assist the various negotiation tasks?

<table>
<thead>
<tr>
<th>Clearly does not work</th>
<th>Perfect tool</th>
<th>Don't know</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Referencing past proposals, agreements, and contracts with the Electronic Bargaining Book</td>
<td>1 2 3 4 5</td>
<td>DK</td>
</tr>
<tr>
<td>j. Preparing proposals with the Proposal Editor</td>
<td>1 2 3 4 5</td>
<td>DK</td>
</tr>
<tr>
<td>k. Recording agreements with Bruce Herniter's Editor</td>
<td>1 2 3 4 5</td>
<td>DK</td>
</tr>
<tr>
<td>l. Editing contract with Bruce Herniter's Editor</td>
<td>1 2 3 4 5</td>
<td>DK</td>
</tr>
</tbody>
</table>

24. a. Would you use the computer again for negotiations? (circle your answer)
   
   Yes  No

b. Why would you use or not use the computer again for negotiations?
Part C: Improving the Tools

Your ideas on how to make better use of the computer are important to us. This part has several questions to help us improve GroupSystems/Mediation. Please write your suggestions in the space provided. If you need more room, feel free to use the back of the page.

25. What were the benefits of using the computer during your negotiation?

26. What were the drawbacks of using the computer during your negotiation?
27. If you were to design the perfect computer tool for negotiation, what would it be?

28. How would you improve the process in general?

Thank you! Any more comments? Feel free to write them down.

Bruce & Erran
APPENDIX E

INTERVIEW QUESTIONS
Questions  
for  
TransCo & HealthCare  
Negotiators  

XX XXXX 19XX  

Group  
1. How large are the typical bargaining teams at  
a. Opening session  
b. Non-economic issues bargaining session  
c. Economic issues bargaining session  

Facilitation (ITGW)  
2. Have you ever considered issues first, then written the language?  
3. Have you ever broken into working groups to discuss individual problems?  
4. Have you ever tried using a neutral facilitator or mediator at the start of you negotiation?  
5. Have you ever brought in a mediator before? If so, at what phase did he/she come in?  
6. What do you think of the Electronic Bargaining Book?  
7. What would you like the computer system to do? What additional functions do you want?  
8. Knowing that we cannot change the layout of our Group Work Facility for this negotiation, what suggestions would you make if we were to build a negotiating room?  

Task  
9. What are the signs of a "tough" negotiation?  
10. What are the signs of a "good" negotiation?  
   - hard bargaining?  
   - last minute agreement?  
   - getting everything you wanted?  
   - concessions from the other side?  

11. Are there any activities besides "negotiating" that you engage in? What would you call those activities?
Process

12. How did the requirement that proposals be submitted through the computer effect the process?

13. How many times do you swap written proposals?

14. Please describe the process of past negotiations. Is it as we saw in your first session? If not, how was it different?

15. Have you ever used Win-Win bargaining? Have you ever considered issues separate from proposals?

16. How satisfied have you been with the process of negotiating?

Outcome

17. Did the computer make any difference in the outcome of the talks?

18. Are negotiations which conclude early better than negotiations which go up to the deadline?

19. How satisfied have you been with the results of past negotiations?

20. Do you consider past contracts to have dealt with both sides equally?

21. Do you consider past contracts to have been the best for both sides?
APPENDIX F

PREPARATORY MATERIALS FOR TRANSCO BARGAINING SESSIONS
F.1. TransCo Pre-session Checklist

Check List
for
TransCo Negotiations
XX/XX/XX

Start-up
1. Turn on air conditioning
2. Turn on machines.
3. Make sure logo screen is displayed.
4. Erase previous session files.
5. COPY C:\TransCo\*.TXT F:\UAZ\PUBLIC\LIBRARY\*. *
6. Reserve one terminal on each side for editing
7. Reserve leader terminal on each side to view front screen
8. Start File Reader at each station.
9. Ready PROPOSALS (Beta Test Tools)
   a. facilitator brings up Word Perfect
   b. two user stations and two breakout stations Proposal Editor
10. Print out a short file to see that laser printer is working.

Wrap-up
11. Make sure F:\UAZ\PUBLIC\LIBRARY = C:\TransCo
12. COPY C:\TransCo\*.TXT A:\*. * for facilitator’s records
13. COPY C:\TransCo\*.TXT A:\*. * for lab manager’s records
14. BACKUP
15. COPY C:\TransCo\CONTRACT.WP C04??90B.wp
Instructions on Computer Use

How to Use

the

Computer

Electronic Bargaining Book

The Bargaining Book is on the computer as you come in. The articles are listed on the screen. The Bargaining Book can be used by itself or with any other program.

\[\text{^} \quad \text{or} \quad \text{V} \text{ keys are used to point to the article you wish to see.}\]

'Enter' key is used to view the article.

'Esc' key is to return to the Article List. 'Esc' while viewing the Article List returns you to whatever program you were using. If no program, you then see our opening University of Arizona screen.

Each article contains first the old contract language and proposals. Second, the proposals are listed with the most recent proposals first.

Holding down 'Shift' and then pressing 'F8' when you are using any of the other programs brings back the Bargaining Book.

Proposal Editor

The Proposal Editor is started by the mediator. It will be used on one machine on each side. When started, the Proposal Editor will bring up one article on the computer. Shown will be the old contract language plus all of the proposals - the same as on the Bargaining Book.

The purpose is to let you type in a new proposal. You can start typing anywhere.

\[\text{^} \quad \text{or} \quad \text{V, >, < keys are used to point to a place in the article.}\]

'<<Backspace' erases the character to the left.

'Delete' erases the character you are on.

Holding down 'Alt' and pressing 'F9' lets you send the proposal to the mediator.
This program lets you send messages to each other.

'Enter' key is used to bring up your sending screen.

'F8' lets you see what others have sent.

'Esc' key is to return to the Article List. 'Esc' while
F.3. Questionnaire Results for Bargaining Tools Fit.

<table>
<thead>
<tr>
<th>16. ...how well do the Group-Systems tools assist the various negotiation tasks?</th>
<th>Overall</th>
<th>Management</th>
<th>Union</th>
<th>Average</th>
<th>Std.Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Referencing past proposals, agreements, and contracts with the Electronic Bargaining Book.</td>
<td>4.0</td>
<td>3.8</td>
<td>4.2</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
<tr>
<td>b. Preparing proposals with the Proposal Editor.</td>
<td>4.4</td>
<td>4.3</td>
<td>4.6</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
<tr>
<td>c. Recording agreements with Bruce Herniter's Editor.</td>
<td>4.7</td>
<td>4.3</td>
<td>5.0</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
<tr>
<td>d. Editing contract with Bruce Herniter's Editor</td>
<td>4.7</td>
<td>4.3</td>
<td>5.0</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
</tbody>
</table>

1 = Clearly does not work  
3 = Not elegant, but can get the job done  
5 = Perfect Tool
APPENDIX G

PREPARATORY MATERIALS FOR HEALTHCARE STRATEGY SESSIONS
I. Introduction. 10:00-10:15

II. Long-term interests of the Union? 10:15-10:45
   A. Electronic Brainstorming.

III. Break. 10:45-10:50

IV. What are the problems we wish to discuss during the negotiation? 10:50-11:20
   A. Electronic Brainstorming.

V. Lunch Break. 11:20-11:50

VI. Listing possible issues to be raised at the talks. 11:50-12:35
   A. File Reader.
   B. Topic Commenter.

VII. Break 12:35-12:40

VIII. Discussion of the issues. 12:40-1:10
      A. Topic Commenter

IX. Ranking and selecting the issues. 1:10-1:40

X. Adjourn. 1:40

G.1. HealthCare Union Strategy Agenda

AGENDA

UNION STRATEGY SESSION

XX XXXXX 19XX
HealthCare Management Strategy Agenda

AGENDA

MANAGEMENT STRATEGY SESSION

XX XXXXX 19XX

I. Introduction. 1:00-1:30

II. Long-term interests of the organization? 1:30-2:00
   A. Electronic Brainstorming.

III. Break. 2:00-2:05

IV. What are the problems we wish to discuss during the negotiation? 2:05-2:50
   A. Electronic Brainstorming.

V. Break 2:50-3:00

VI. Listing possible issues to be raised at the talks. 3:00-3:25
   A. File Reader.
   B. Topic Commenter.

VII. Discussion of the issues. 3:25-4:10
   A. Topic Commenter

VIII. Break 4:10-4:15

IX. Ranking and selecting the issues. 4:15-5:00

X. Adjourn. 1:40
### Questionnaire Results for Strategy Sessions

14. The Strategy Session helped my side to define:

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Management</th>
<th>Union</th>
<th>Average</th>
<th>Std.Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a. our long-term interests</strong></td>
<td>1.9</td>
<td>1.6</td>
<td>2.2</td>
<td>0.5</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>b. the problems we wanted to solve</strong></td>
<td>1.8</td>
<td>1.8</td>
<td>1.8</td>
<td>0.8</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>c. the issues of these negotiations</strong></td>
<td>1.9</td>
<td>2.0</td>
<td>1.8</td>
<td>0.8</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>d. the tactics we were to use</strong></td>
<td>3.1</td>
<td>3.5</td>
<td>2.8</td>
<td>1.1</td>
<td>1.3</td>
</tr>
</tbody>
</table>

1 = Agree 3 = Neutral 5 = Disagree

23. ...how well do the Group-Systems tools assist the various negotiation tasks?

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Management</th>
<th>Union</th>
<th>Average</th>
<th>Std.Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a. Defining the long-term interests of the team using Electronic Brainstorming</strong></td>
<td>3.8</td>
<td>4.0</td>
<td>3.6</td>
<td>0.9</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>b. Discovering the issues important to the bargaining team with Topic Commenter.</strong></td>
<td>4.2</td>
<td>4.4</td>
<td>4.0</td>
<td>0.9</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>c. Discussing the issues important to the bargaining team with Topic Commenter.</strong></td>
<td>3.8</td>
<td>4.2</td>
<td>3.4</td>
<td>1.2</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>d. Discovering the value of issues by ranking them with the Vote program.</strong></td>
<td>3.9</td>
<td>4.0</td>
<td>3.8</td>
<td>0.9</td>
<td>1.2</td>
</tr>
</tbody>
</table>

1 = Clearly does not work 3 = Not elegant, but can get the job done 5 = Perfect Tool
APPENDIX H

PREPARATORY MATERIALS FOR HEALTHCARE ISSUES SESSIONS
I. Introductory Remarks (8:00-9:00)
II. Rules (9:00-9:30)
III. Role Reversal (9:00-10:30)
   A. Roles (9:00-9:05)
   B. Caucus (9:05-9:30)
   C. Break (9:30-9:35)
   D. Presentations (9:35-10:30)
IV. Issue Consolidation (1:00 - 5:00)
   A. Caucus (1:00-2:00)
   B. Break (2:00-2:05)
   C. Joint List (2:05-??)
   D. Break (3:30-3:35)
   E. Consolidation(??-??)
V. Ranking
Introductory Remarks

Introductory Talk

I. Erran
   A. Introduce Bruce and Erran
   B. Bathrooms & Kitchen & refrigerator
   C. Win-Win philosophy
   D. Strategy - Issues Sessions link
   E. Philosophy of discussing issues separate from contract language
   F. Leading edge of negotiation frontier

II. McBeary
   A. Introduce McBeary
      1. Mediator
      2. Consultant for both unions and management
      3. Chair of annual U of A labor-management conference
      4. Teaches labor-management in Dept of Economics
      5. Involved in the birth of the HealthCare bargaining unit

III. Bruce
    A. The Agenda (Pump them up!!!-avoid monotone-avoid details)
       1. Review steps - high level
       2. Very brief justification for each step
       3. Warn long process
    B. Tuesday Thursday meetings
    C. Ideas behind rules
H.3. Procedure for Role Reversal

Procedures for Role Reversal

I. Roles
   A. Assign each person a reversed role.
      1. Mmmmmmm <-> Ggggg
      2. Kkkk <-> Sssssss
      3. Cccc (finance?)
      4. Lllll (Bbbbbb lady - records?) <-> Mmmmm (LPN?)
      5. Mmmmmm (homeless)
      6. Cccc (medical director) <-> physician
      7. <-> transportation
   B. Give each person a name plate.

II. Caucus
   A. Each side to a breakout room
   B. Each person explains according their character:
      1. the job, responsibilities and the important problems
   C. Mediators record issues onto editor
      1. The format on the editor will be Name-o-role then Name-o-person
         and don’t forget page breaks.
   D. Other team members review and input

III. 5 minute break. Bruce merges files. and puts on screens.

IV. Presentation
   A. Chose at random the starting side. coin toss.
   B. Chose the leader as first talker.
   C. Presentation minimum 2 minutes.
   D. the F presents the page on the front screen
   E. Criticism:
      1. the real person
      2. others
   F. Scribe takes notes
   G. Alternate sides, going person by person
H.4. Procedures for Issue Consolidation

Issue Consolidation

I. Caucus
   A. GS Editor to create issues list.
   B. Facilitator's not present in breakout rooms

II. Joint List
   A. We check for ALT-F9 at breakout terminals
   B. Flip coin
   C. Start Issue Consolidation tool
      1. Keep video projector off
      2. Call up winning side's issues
      3. Turn on video projector
      4. Show issues list
   D. Winner spokesperson or other designated individual asked to choose issue
   E. We paste issue to Consolidated Issues window
   F. Winner explains why it is an issue.
   G. Take questions from other side
   H. We consolidate when possible
   I. Repeat D-H, alternating sides

III. 5 minute break
   A. Put F:\UAZ\FACILTOR\CONSOLID.IC list into Word Perfect

IV. Consolidation
   A. Bring up Word Perfect
   B. 18 issues max
   C. Facilitator
      1. Cajoles
      2. Eliminates
      3. Groups
      4. Searches for new words
H.5. HealthCare Issues Agenda (Third Session)

Agenda
HealthCare Issues Session #3
X XXX 19XX

I. Preparation
A. File Reader:
   1. Management Issues
   2. Union Issues
   3. Current Contract

II. Consolidate Issues
A. Introduction
   1. Tell both sides to review notes.
   2. We read the issues to participants.
B. Use Word Perfect to consolidate or IC?
C. Go through the issues one by one, suggesting consolidations.

III. Ranking
A. Introduction
   1. This is a new set of issues.
   2. We will be using this issues to group proposals together.
   3. You need information again on how your side has ranked
B. Vote tool
   1. Turn off video projector
   2. Load issues from CONSOLID.IC
C. Reports
   1. Two separate groups
   2. One report each

IV. Economic and Non-Economic Sections of the Contract
A. Introduction
   1. Economic issues through 5/17
   2. Non-Economic issues through 5/31
B. Word Perfect / Front Screen
   1. Turn on video projector
   2. Load list from LIST.WP
C. Report
   1. Create LIST.TXT
   2. Post to File Reader
V. **Problem Solving**

A. **Reducing the cost per visit**.

1. **Introduction**
   a. **Constraints:**
      (1) A community with
      (a) a limited income
      (b) great health needs
      (2) Maintained high level of health care
      (3) Feds pressing to reduce costs
   b. **Problem:** can costs be reduced without sacrificing quality or squeezing the employees?
   c. **Benefits of a solution:**
      (1) Management
      (a) Show lower costs
      (b) Show an efficiently managed clinic
      (2) Union
      (a) More money to supplement wages and benefits.

2. **Electronic Brainstorming (EBS)**
   a. **Question:** What process can this contract put in place that will, during the life of agreement, identify ways to reduce cost without compromising medical care?

3. **Report**
   a. Create COST.EBS
   b. Post to File Reader

B. **Fairness of wages and benefits**.

1. **Introduction**
   a. **Constraints:**
      (1) Local competition for staff/ Tucson wages
      (2) Community service mission of the clinic
      (3) Reliance on state and federal funding
   b. **Problem:** Can we devise a solution which satisfies the needs of the staff, allows HealthCare to compete for staff, and satisfies state and federal standards for funding.
   c. **Benefits of a solution:**
      (1) Proposals can be measured.
      (2) Each side can sell the package to its respective constituents.

2. **Electronic Brainstorming (EBS)**
   (1) **Question:** How do we measure the fairness of the wage and benefit package at HealthCare?

3. **Report**
   a. Create WAGE.EBS
   b. Post to File Reader
**Questionnaire Results for Issues Sessions**

### 16. The Issues Sessions helped my side to:

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Management</th>
<th>Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. understand the other side better.</td>
<td>1.9</td>
<td>2.0</td>
<td>1.8 Average</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
<td>0.0</td>
<td>1.5 Std.Dev.</td>
</tr>
<tr>
<td>b. understand the concerns of the other side better.</td>
<td>1.8</td>
<td>2.0</td>
<td>1.7 Average</td>
</tr>
<tr>
<td></td>
<td>0.9</td>
<td>0.0</td>
<td>1.1 Std.Dev.</td>
</tr>
</tbody>
</table>

### 17. The Issues Sessions helped the other side to:

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Management</th>
<th>Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. understand us better</td>
<td>2.4</td>
<td>3.0</td>
<td>2.0 Average</td>
</tr>
<tr>
<td></td>
<td>1.4</td>
<td>0.8</td>
<td>1.5 Std.Dev.</td>
</tr>
<tr>
<td>b. understand our concerns better</td>
<td>2.3</td>
<td>3.0</td>
<td>1.8 Average</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
<td>0.8</td>
<td>1.2 Std.Dev.</td>
</tr>
</tbody>
</table>

### 18. The combined list of issues that we came up with does a good job of representing the issues of these talks.

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Management</th>
<th>Union</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.0</td>
<td>1.7</td>
<td>2.2 Average</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
<td>0.5</td>
<td>0.4 Std.Dev.</td>
</tr>
</tbody>
</table>

1 = Agree  3 = Neutral  5 = Disagree

### 23. ...how well do the Group-Systems tools assist the various negotiation tasks?

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Management</th>
<th>Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>e. Displaying and developing ground rules by editing them on the front screen.</td>
<td>3.4</td>
<td>3.3</td>
<td>3.5 Average</td>
</tr>
<tr>
<td></td>
<td>1.3</td>
<td>0.8</td>
<td>1.5 Std.Dev.</td>
</tr>
<tr>
<td>f. Going through the Role Reversal process using editor in the caucus room.</td>
<td>3.7</td>
<td>3.5</td>
<td>4.0 Average</td>
</tr>
<tr>
<td></td>
<td>1.0</td>
<td>0.5</td>
<td>1.4 Std.Dev.</td>
</tr>
<tr>
<td>g. Listing your issues using the editor in the caucus room.</td>
<td>3.6</td>
<td>3.6</td>
<td>3.6 Average</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>0.4</td>
<td>1.0 Std.Dev.</td>
</tr>
<tr>
<td>h. Displaying and consolidating issues with the Issue Consolidation program.</td>
<td>3.4</td>
<td>3.3</td>
<td>3.4 Average</td>
</tr>
<tr>
<td></td>
<td>0.8</td>
<td>0.8</td>
<td>0.8 Std.Dev.</td>
</tr>
</tbody>
</table>

1 = Clearly does not work  3 = Not elegant, but can get the job done  5 = Perfect Tool
APPENDIX I

PREPARATORY MATERIALS FOR HEALTHCARE BARGAINING SESSIONS
I.1. HealthCare Bargaining Agenda (First Session)

Agenda

Union - HealthCare Bargaining Session #1

XX XXX 19XX

I. Protocol
   A. Use of Computer with proposals
   B. Agreements dictated immediately
      1. Public Screen
      2. Dated

II. Proposals
   A. Each side introduces its proposals

III. Caucus to review proposals?

IV. No Change Articles
   A. Go thru contract - public screen
   B. Date and mark no change

V. Linking - (Probably not possible)
   A. Present pre-prepared links
   B. Economic proposals only

VI. Horsetrade!
   A. Have both sides comment on the others proposals? Maybe a bad
      idea??
HealthCare Bargaining Agenda (Second Session)

Agenda

HealthCare Bargaining Session #2

XX XXX 19XX

I. Housekeeping
   A. Introduce Pete Cinquemati
   B. Proposals
      1. Contract log & file reader
      2. Mistakes
         a. Reviewed by David Kohn and David Mendoza
         b. Let me know
   C. No Change Articles
      1. See Article list for my suggestions
      2. Any changes?
   D. Confidentiality rule

II. Exchange statements on Economic proposals

III. Bargain
   A. Bring up WP LOG.WP
   B. Let them talk.
   C. Suggest that there were two articles maybe in agreement
HealthCare Bargaining Pre-session Check List (Fifth Session)

Pre-session Check List
HealthCare Negotiations
XX/XX/XX

MEDIANSS

____ Update ALT-D macro to current date.
____ Update negotiation log file.
____ Update article files. Copy to C:\EL-RIO\TXT and F:\UAZ\PUBLIC\LIBRARY.
____ Computer use forms for student helper
____ Note paper for student helper.
____ Set temperature to 73 F; fan to AUTO

Printer

____ Print sample file to check on printer status.
____ Fill paper tray of printer.

UAGS

____ Facilitator, Machines 1 thru 11, 16, 17, & 19 on.
____ CLEAR files.
____ ERASE user.txt
____ Update READLIST
____ Copy READLIST to F:\UAZ\PUBLIC\LIBRARY\*.*
____ Turn off logo screens.
____ Clear all user screens.
____ Start Machines 17 & 19 with TXED from D:
____ Start Machines 1 thru 11 with FILEREADER (shift-f8)
I.4. HealthCare Bargaining Pre-session Check List (Sixth Session)

Pre-session Check List

HealthCare Negotiations

Date: ________________

MEDIANSS

_____ Update ALT-D macro to current date.
_____ Update negotiation log file.
_____ Update article files.
   Copy to C:\EL-RIO\TXT and F:\UAZ\PUBLIC\LIBRARY.
_____ Computer use forms for student helper
_____ Note paper for student helper.
_____ Set temperature to 73 F; fan to AUTO

Printer

_____ Print sample file to check on printer status.
_____ Fill paper tray of printer.

UAGS

_____ Facilitator, Machines 1 thru 11, 16, 17, & 19 on.
_____ CLEAR files.
_____ ERASE user.txt
_____ Update READLIST
_____ Copy READLIST to F:\UAZ\PUBLIC\LIBRARY\*.*
_____ Turn off logo screens.
_____ Clear all user screens.
_____ Start Machines 17 & 19 with TXED from D:
_____ Start Machines 1 thru 11 with FILEREADER (shift-f8)
I.5. Pre-session Checklist (Final Form)

Pre-Session Check List
HealthCare Negotiations

Date: ___________

MEDIANSS

___ Update ALT-D macro to current date.
___ Update negotiation log file.
___ Update article files. Copy to C:\EL-RO\TXT and F:\UAZ\PUBLIC\LIBRARY.
___ Computer use forms for student helper
___ Note paper for student helper.
___ Set temperature to 73 F; fan to AUTO.

Printer

___ Print sample file to check on printer status.
___ Fill paper tray of printer.

UAGS

___ Facilitator, Machines 1 thru 11, 16, 17, & 19 on.
___ CLEAR files.
___ ERASE user.txt.
___ Update READLIST.
___ Copy READLIST to F:\UAZ\PUBLIC\LIBRARY\*. *
___ Turn off logo screens.
___ Clear all user screens.
___ Start Machines 17 & 19 with TURBO, editing D:USER.TXT.
___ Start Machines 1 thru 11 with FILEREADER (shift-f8).
___ Florescent lights off, incandescent lights on.
Post-Session Check List
HealthCare Negotiations

Date: ___________

MEDIANSS/UAGS

__ Get diskette, create subdirectory for today.
__ Save negotiation log file.
__ Save any proposal files.
__ Save article files. Copy to TXT diskette.
__ Collect computer use forms from student helper.
__ Collect note paper from student helper.

Printer

__ Collect any output remaining from printer.

Room

__ User and Facilitator machines off.
__ Lights off.
### Questionnaire Results for Bargaining Sessions

#### 20. Our Bargaining Sessions

<table>
<thead>
<tr>
<th>Question</th>
<th>Overall</th>
<th>Management</th>
<th>Union</th>
<th>Average</th>
<th>Std.Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. were more effective than our last talks with the other side</td>
<td>2.3</td>
<td>2.0</td>
<td>2.4</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
<tr>
<td>b. made extensive use of computer</td>
<td>2.9</td>
<td>2.6</td>
<td>3.1</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
<tr>
<td>c. were easier because of the computer</td>
<td>2.4</td>
<td>2.0</td>
<td>2.6</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
<tr>
<td>d. faster because of the computer</td>
<td>2.3</td>
<td>2.0</td>
<td>2.5</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
<tr>
<td>e. better because of the mediation</td>
<td>2.1</td>
<td>1.8</td>
<td>2.3</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
</tbody>
</table>

1 = Agree 3 = Neutral 5 = Disagree

#### 23. ...how well do the Group-Systems tools assist the various negotiation tasks?

<table>
<thead>
<tr>
<th>Tool</th>
<th>Overall</th>
<th>Management</th>
<th>Union</th>
<th>Average</th>
<th>Std.Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Referencing past proposals, agreements, and with the Electronic Bargaining Book</td>
<td>4.0</td>
<td>3.6</td>
<td>4.3</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
<tr>
<td>j. Preparing agreements with the Proposal Editor</td>
<td>3.8</td>
<td>3.8</td>
<td>3.8</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
<tr>
<td>k. Recording agreements with Bruce Herniter’s Editor.</td>
<td>4.1</td>
<td>4.0</td>
<td>4.3</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
<tr>
<td>l. Editing contract with Bruce Herniter’s Editor</td>
<td>4.0</td>
<td>4.0</td>
<td>4.0</td>
<td>Average</td>
<td>Std.Dev.</td>
</tr>
</tbody>
</table>

1 = Clearly does not work 3 = Not elegant, but can get the job done 5 = Perfect Tool
APPENDIX J

GENERAL DATA
### User Computer Use Statistics

<table>
<thead>
<tr>
<th>Observations</th>
<th>Overall</th>
<th>TransCo Management</th>
<th>Union</th>
<th>Overall</th>
<th>HealthCare Management</th>
<th>Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not present</td>
<td>253</td>
<td>155</td>
<td>98</td>
<td>891</td>
<td>362</td>
<td>529</td>
</tr>
<tr>
<td>No use</td>
<td>458</td>
<td>216</td>
<td>242</td>
<td>860</td>
<td>399</td>
<td>461</td>
</tr>
<tr>
<td>Looking at own screen</td>
<td>63</td>
<td>21</td>
<td>42</td>
<td>132</td>
<td>55</td>
<td>77</td>
</tr>
<tr>
<td>Typing</td>
<td>14</td>
<td>5</td>
<td>9</td>
<td>52</td>
<td>25</td>
<td>27</td>
</tr>
<tr>
<td>looking at Front screen</td>
<td>28</td>
<td>11</td>
<td>17</td>
<td>81</td>
<td>41</td>
<td>40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Frequencies</th>
<th>Overall</th>
<th>TransCo Management</th>
<th>Union</th>
<th>Overall</th>
<th>HealthCare Management</th>
<th>Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>No use</td>
<td>81%</td>
<td>85%</td>
<td>78%</td>
<td>76%</td>
<td>77%</td>
<td>76%</td>
</tr>
<tr>
<td>Looking at own screen</td>
<td>11%</td>
<td>8%</td>
<td>14%</td>
<td>12%</td>
<td>11%</td>
<td>13%</td>
</tr>
<tr>
<td>Typing</td>
<td>2%</td>
<td>2%</td>
<td>3%</td>
<td>5%</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>looking at Front screen</td>
<td>5%</td>
<td>4%</td>
<td>5%</td>
<td>7%</td>
<td>8%</td>
<td>7%</td>
</tr>
</tbody>
</table>
J.2. TransCo Session Duration

<table>
<thead>
<tr>
<th>Phase</th>
<th>Session</th>
<th>Start</th>
<th>Stop</th>
<th>Duration (hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening</td>
<td>1</td>
<td>10:26 AM</td>
<td>12:17 PM</td>
<td>1.85</td>
</tr>
<tr>
<td>Non-econ</td>
<td>1</td>
<td>10:00 AM</td>
<td>12:55 PM</td>
<td>2.92</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>11:40 AM</td>
<td>02:20 PM</td>
<td>2.67</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>10:00 AM</td>
<td>12:45 PM</td>
<td>2.75</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>07:06 AM</td>
<td>10:55 AM</td>
<td>3.82</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>10:15 AM</td>
<td>12:47 PM</td>
<td>2.53</td>
</tr>
<tr>
<td>Subtotal (Non-econ)</td>
<td>5</td>
<td></td>
<td></td>
<td>19.53</td>
</tr>
<tr>
<td>Economic</td>
<td>1</td>
<td>10:10 AM</td>
<td>12:20 PM</td>
<td>2.17</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>10:02 AM</td>
<td>10:58 AM</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>08:00 AM</td>
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### J.3. HealthCare Session Duration

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J.4. Computer Literacy (Health Care)

4. Have you ever used a computer

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<td>5</td>
<td>3</td>
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<tr>
<td>b. at home?</td>
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<td>3</td>
<td>4</td>
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<tr>
<td>c. to type a letter?</td>
<td>9</td>
<td>5</td>
<td>4</td>
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<tr>
<td>d. to figure your taxes?</td>
<td>3</td>
<td>3</td>
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<tr>
<td>e. play a game?</td>
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<td>3</td>
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Questionnaire Responses

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<tr>
<td>U1</td>
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<td>Y</td>
</tr>
<tr>
<td>U2</td>
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<td>Y</td>
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<tr>
<td>U3</td>
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<td>Y</td>
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<td>U4</td>
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<tr>
<td>U5</td>
<td>Y</td>
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<td>M1</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>M2</td>
<td>Y</td>
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<tr>
<td>M6</td>
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J.5. **User Satisfaction**

TransCo question 8 / HealthCare question 6

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<th>Union</th>
<th>Overall</th>
<th>HealthCare Management</th>
<th>Union</th>
<th>Average</th>
<th>Std.Dev.</th>
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<td>a. the process of negotiating using GroupSystems?</td>
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<td>3.3</td>
<td>4.2</td>
<td>3.8</td>
<td>4.0</td>
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<td>0.6</td>
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<tr>
<td>b. the performance of the GroupSystems staff?</td>
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<td>3.8</td>
<td>5.0</td>
<td>4.7</td>
<td>4.8</td>
<td>4.6</td>
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<td>0.0</td>
<td>0.5</td>
<td>0.4</td>
<td>0.5</td>
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<tr>
<td>c. using GroupSystems during the negotiation?</td>
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<td>3.3</td>
<td>4.2</td>
<td>3.8</td>
<td>4.0</td>
<td>3.6</td>
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<td>0.8</td>
<td>0.7</td>
<td>1.2</td>
<td>0.6</td>
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<td>d. the meeting room?</td>
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<td>3.0</td>
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<td>4.2</td>
<td>4.3</td>
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<td>0.4</td>
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<td>0.9</td>
<td>0.7</td>
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<td>e. the caucus room? mediation</td>
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<td>-</td>
<td>-</td>
<td>3.8</td>
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<td>3.7</td>
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<td>1.2</td>
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1 = Very dissatisfied  3 = Neutral  5 = Very Satisfied
J.6. Settlement Quality and Joint Utility (Effectiveness)

TransCo question 15 / HealthCare question 13

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<th>So far, what is your view of the new contract?</th>
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<th>TransCo</th>
<th>HealthCare</th>
<th>Union</th>
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<tbody>
<tr>
<td>a. for your side</td>
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<td>2.5</td>
<td>2.0</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>0.6</td>
<td>0.5</td>
<td>0.7</td>
<td>0.7</td>
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<tr>
<td>b. for the other side</td>
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<td>2.5</td>
<td>2.0</td>
<td>2.0</td>
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<td>0.6</td>
<td>0.5</td>
<td>0.6</td>
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</table>

1 = Great 3 = Neutral 5 = Awful

Calculated Joint Utility

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<th>HealthCare</th>
<th>Union</th>
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<tbody>
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<td>Average</td>
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<td>63</td>
<td>75</td>
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<tr>
<td>Std.Dev.</td>
<td>16</td>
<td>13</td>
<td>16</td>
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</table>

Joint Utility = 100 * (10 - E(settlement quality)) / 8
J.7. Perceived Ease of Use

TransCo questions 11, 12, and 13 / HealthCare questions 8, 9, and 10

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<tr>
<th></th>
<th>Overall</th>
<th>TransCo</th>
<th>HealthCare</th>
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<th></th>
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<th></th>
<th></th>
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<td>Management</td>
<td>Union</td>
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<td>Union</td>
<td>Management</td>
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<td>Management</td>
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<td>Learning to operate GroupSystems has been easy for me.</td>
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<td>1.8</td>
<td>1.4</td>
<td>1.5</td>
<td>1.5</td>
<td>1.4</td>
<td>Average</td>
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<td>Std.Dev.</td>
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<tr>
<td>I did not find it easy to get GroupSystems to do what I wanted it to do.</td>
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<td>4.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td></td>
<td>Std.Dev.</td>
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<tr>
<td>I found it easy to get GroupSystems to do what I wanted it to do.</td>
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<td>-</td>
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<td>Std.Dev.</td>
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<td>I found GroupSystems to be flexible</td>
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<td>2.5</td>
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<td>Std.Dev.</td>
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1 = Agree  3 = Neutral  5 = Disagree
J.8. Information Exchange

TransCo question 14 / HealthCare question 11

As compared to our last contract talks with the other side:

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<th>TransCo</th>
<th>Union</th>
<th>Overall</th>
<th>HealthCare</th>
<th>Union</th>
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<td>a. my understanding of the other side is...</td>
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<td>0.8</td>
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<td>b. the information at our disposal is...</td>
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<td>1.0</td>
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<td>0.4</td>
<td>0.9</td>
<td>0.0</td>
<td>0.7</td>
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<td>c. the other side understands us...</td>
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<td>0.5</td>
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<td>d. our knowledge about the other side is...</td>
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1 = Much Better 3 = About the Same 5 = Much Worse
J.9. Efficiency

TransCo question 10 / HealthCare question 12

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<th>Union</th>
<th>Overall</th>
<th>HealthCare Management</th>
<th>Union</th>
<th>Average</th>
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<td>1.2</td>
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<td>0.5</td>
<td>0.7</td>
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</tr>
<tr>
<td>b. errors in wording/language</td>
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<td>1.7</td>
<td>1.8</td>
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<td>c. time spent looking up agreements from previous sessions</td>
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<td>e. the effort to negotiate</td>
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1 = Decreased Greatly  3 = No Difference  5 = Increased Greatly
J.10. Tone

TransCo question 9 / HealthCare question 7

Compared to last year’s talks, these talks were:

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1 = Agree 3 = Neutral 5 = Disagree
J.11. T-Tests on the Means of the Differences

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APPENDIX K

BRUCE'S BRUNCH SLIDES
Welcome to

Bruce’s Brunch

Coffee supplied by Carmel’s Catering
Tea from Chudoba Natural Foods

World-Wide Installations
Brunch Menu
(Agenda)

1. Introduction 9:15-9:30
2. Comments on the Negotiations 9:30-10:05
3. Break 10:05-10:10
4. New Computer Functions
   a. Brainstorming 10:10-10:55
   b. Break 10:55-11:00
   c. Discussion 11:00-11:25
5. Ranking 11:25-11:50
6. Lunch 11:45
Sessions

Strategy:  Issues:  Bargaining:
- Interests  - Rules  - Linking
- Problems  - Role Reversal  - Horsetrading
- Issues  - Issue & Reason ID  - Agreement
  - Issue  writing
  - Consolidation
  - Ranking

Tools

Strategy:  Issues:  Bargaining:
- Brainstorming  - Editor  - Bargaining
- Topic  - Brainstorming  Book
- Comment  - Voting  - Proposal
- Voting  - Editor
REFERENCES


