"NSS SOLUTIONS TO MAJOR NEGOTIATION STUMBLING BLOCKS"

by

Abbas FOROUGHI*
and
Tawfik JELASSI**

N° 90/27/TM

* Doctoral Student in Information Systems, Indiana University School of Business, Tenth and Fee Lane, Bloomington, Indiana 47405 U.S.A.

** Associate Professor of Information Systems, INSEAD, Boulevard de Constance, Fontainebleau 77305 Cedex, France

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Abbas Foroughi

Operations and Systems Management Department
Graduate School of Business
Indiana University
Tenth and Fee Lane
Bloomington, Indiana 47405
U.S.A.

and

M. Tawfik Jelassi

Technology Management Area
European Institute of Business Administration
INSEAD
Boulevard de Constance
77305 Fontainebleau Cedex
France

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ABSTRACT

Negotiation has always been an important means of peaceful resolution to conflict. However, negotiators often encounter several major problems which impede their performance: 1) the cognitive difficulty of analyzing information; 2) cognitive, judgmental biases of negotiators; and 3) socio-emotional aspects of negotiator behavior.

The growing frequency of negotiation situations as well as the increasing complexity of the issues which need to be resolved in a negotiation have fired interest in computer support for negotiation. Negotiation Support Systems (NSS) show potential for alleviating or overcoming major stumbling blocks to successful negotiation.

This paper discusses the three major types of stumbling blocks to negotiation and presents possible solutions to these problems which have been suggested by NSS researchers and designers. It also provides a brief overview of existing negotiation support systems and the results of NSS implementations. Future research directions in the field of NSS are outlined.

KEY WORDS AND EXPRESSIONS:

Negotiation; Computer-Assisted Negotiation; Group Decision Support Systems; Negotiation Support Systems.

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1.0 INTRODUCTION

1.1 Growing Frequency and Complexity of Negotiations

Negotiation and bargaining have always been extremely useful means for achieving peaceful resolution of disputes. It has been suggested that conflict intervention methods are becoming even more important and more frequently employed. For instance, Rubin (1980) describes conflict intervention as of increasing importance as a means of avoiding global war. Harnett and Cummings (1980) argue that negotiation is increasingly important because of the growing scarcity of resources needed and wanted by all nations, the growing interdependence of all human beings and their institutions, and the unfeasibility as well as the tremendous cost involved in solving disputes by alternatives to negotiation such as force or war. At the organizational level, managers are said to spend up to 20% of their working hours in resolving conflicts (Shea, 1983).

The increase in the complexity of problems and decisions in all types of organizations (Huber, 1984) extends also to decision making in non-cooperative settings such as bargaining and negotiation. The number and type of interactions have grown more complex, with more possible coalitions, issues, and potential compromise agreements (Nyhart and Goeltner, 1987). Even the most capable negotiators often find it difficult and risky to rely solely on their own subjective judgments for obtaining feasible resolutions to conflict (Antrim and Lax, 1987). Conflicts can sometimes become so complex that practical resolutions are not reached because of the impossibility of identifying and understanding them (UNISYS, 1987). In many other cases, even if negotiating parties do reach an agreement, they may not have achieved the best possible solution. In addition to the cognitive difficulties involved in conflict resolution, the decision making effectiveness of negotiators is often negatively affected by judgmental or cognitive biases and by dysfunctional socio-emotional aspects of bargaining behavior.

1.2 Computer Support for Negotiations

Recent advances in computer technology and information systems provide the possibility of supporting group decision-making situations in non-cooperative and conflicting situations, thereby contributing to a

"scientific", analytical approach to negotiation. One of the most recent developments is the concept of Negotiation Support Systems (NSS), a special type of Group Decision Support Systems (GDSS) intended to help negotiating parties (and possibly a human mediator) in reaching an agreement (Fraser and Hipel, 1981 and 1986; Jarke et al., 1986; Jarke et al., 1987; Jarke and Jelassi, 1986; Kersten and Szapiro, 1986; and Kersten et al., 1986).

The purpose of this paper is to discuss the major stumbling blocks to successful negotiation and present possible solutions to these problems which have been suggested by NSS researchers and designers. Section 2 discusses cognition and decision making in negotiation as well as the impact of cognitive biases on negotiators' decision making. Section 3 discusses socio-emotional aspects of negotiator behavior which often impede conflict resolution. Section 4 presents a brief overview of existing NSS. Section 5 examines the results of NSS implementations and empirical research, and Section 6 suggests future research directions which may provide empirical evidence of the actual effects of NSS on negotiation processes and outcomes.

2.0 COGNITION AND DECISION MAKING IN NEGOTIATION

2.1 Negotiation as a Decision Making Process

Recent negotiation research has begun focusing on the cognitive decision making processes which take place during negotiation (Bazerman and Carroll, 1987; Pinkley, 1988; Pennington and Hastie, 1985; Kruglanski, 1987; Sheppard et al., 1987; Carroll et al., 1986; Samuelson and Bazerman, 1985). According to this decision making approach, each party in a negotiation is a decision maker, whose behavior is a result of choices based on judgments he/she makes about the negotiation situation. The outcome of the negotiation is determined by the interplay of the negotiators' behavior and the contingencies of the negotiation situation (Bazerman and Carroll, 1987).

2.2 Cognitive Processes in Negotiation

The cognitive processes involved in decision making in negotiation have been characterized as highly complex and often difficult to understand (Bazerman and Carroll, 1987). Watson and Buede (1987) write that of the three types of decision modes (choosing a single alternative from among many, allocating scarce resources, and negotiating an agreement), decisions

involving negotiating are the most difficult to analyze.

In an effort to make the concept of cognition in negotiation more comprehensible, decision making in negotiations has been broken down into a set of five steps (Huber, 1980; Hogarth, 1980; March and Simon, 1958):

1. Recognizing the problem which needs to be negotiated;
2. Structuring or formulating the problem;
3. Collecting information about the conflict;
4. Information evaluation;
5. Strategy formulation and evaluation.

The five-step model is useful in terms of elaborating the concept of negotiation decision making behavior. Unfortunately, this model suffers from the same limitations of most prescriptive approaches to negotiation, which assume that decision makers always engage in purely rational thinking and behavior as they proceed through the various negotiation decision making steps (Bazerman and Neale, 1983). For instance, such approaches assume that 1) negotiators are aware of all alternatives, 2) negotiators are aware of all consequences and probabilities of each alternative, and 3) negotiators have a complete utility function for all possible sets of consequences (Bazerman, 1983). According to such a rational view of negotiation, negotiators will follow each of the decision making five steps in an optimal manner, identifying all alternatives and outcomes, gathering all relevant information, and evaluating it optimally (Bazerman and Carroll, 1987).

In such an ideal, rational scenario, decision making in negotiation would be a relatively simple, routine task. But, in reality it is very rare for negotiating parties to arrive at solutions which are considered mathematically ideal or pareto optimal (UNISYS, 1987). According to behavioral researchers, negotiator behavior is "selective, abbreviated, and even biased ...", with each stage in the decision process affected by negotiators' oversimplifications and errors (Bazerman and Carroll, 1987, p. 252).

2.3 Cognitive Biases

The less than optimal decision making typical of negotiators is the result of what March and Simon (1958) call "bounded rationality" or cognitive limitation, which causes them to "subjectively optimize" or

satisfice instead of seeking optimal solutions. For instance, negotiators tend to select a satisfactory alternative instead of seeking an optimal solution which has a set of criteria that permits all alternatives to be compared and preferred to all other alternatives (Bazerman, 1983).

In an effort to compensate for their cognitive limitations, negotiators typically use decisional heuristics or simplifying rules called knowledge structures which are based on their particular set of past experiences. An individual's knowledge structure includes stereotypes, categories, norms, roles, implicit theories, schemas, prototypes, scripts, heuristics, and attributions (Fiske and Taylor, 1984). These knowledge structures help negotiators organize and simplify the vast amount of information they need to process in order to make good decisions and guide their behavior during negotiation.

Unfortunately, knowledge structures can also lead to cognitive, judgmental biases which have adverse effects on the quality of decision making and negotiators' ability to achieve an optimal resolution of their conflict (Einhorn and Hogarth, 1978; Kahneman et al., 1982; Bazerman and Neale, 1983). Cognitive biases such as the consideration of issues one at-a-time, negative framing of the negotiation, the fixed-pie, win-lose mentality, premature closure, and preference for more available solutions are examples of cognitive biases which often negatively affect negotiator decision making behavior.

A. Consideration of issues in isolation

Negotiators tend to consider issues one at-a-time, because it is cognitively difficult for them to integrate multiple issues into a single package. As a result, potential tradeoffs remain unrecognized (Erickson et al., 1974; Kelley, 1966; Froman and Cohen, 1970).

B. Negative framing of the negotiation

Negotiators often "frame" the negotiation negatively by evaluating their potential losses instead of considering their potential gains. Negative framing can lead to risk-seeking behavior instead of the risk-avoiding behavior which is conducive to finding a cooperative agreement (Bazerman and Lewicki, 1983; Kahneman and Tversky, 1979; Kahneman and Tversky, 1982; Tversky and Kahneman, 1981; Neale and Bazerman, 1983).

C. The fixed-pie, win-lose mentality

Negotiators often assume that their interests are in direct conflict with those of the other party, that they are in competition for a fixed-pie of resources, and that one side will win at the expense of the other. This assumption may cause negotiators to ignore the need to cooperate and use creative problem solving to find an integrative solution (Bazerman, 1983; Winkelgren, 1974; Pruitt, 1983a and 1983b).

D. Premature closure or finalizing of positions

Because of their limited ability to recognize all possible alternative solutions, negotiators tend to prematurely finalize their positions, often failing to consider other potentially feasible solutions to their dispute (Kelley, 1966).

E. Preference for available, salient information or solutions

Negotiators tend to recall and value most those bits of information which are most salient or familiar to them (Tversky and Kahneman, 1981). This may cause them to select either familiar or very unusual alternative solutions because they "stand out", while rejecting or neglecting to consider other alternatives.

2.4 The Impact of Cognitive Biases on the Negotiation Process

Bazerman and Carroll (1987) describe the impact cognitive biases can have on decision making at each of the five steps of decision making in negotiation. Problem recognition can be affected when a conflict is either not recognized, ignored, or considered unfeasible. Problem structuring can be negatively affected if a negotiator has a negative frame of the negotiation which causes him to structure and evaluate the problem solely in terms of what he stands to lose. He may also assume that he is negotiating over a fixed-pie of resources, failing to consider how an integrative approach could benefit both him and his opponent. Preference for more available, salient solutions may cause him to overlook other important aspects and opportunities for compromise. At the information gathering stage, the negotiator must identify and gather additional information about his opponent, his environment, and the preferences of the interested parties. Knowledge structures help negotiators organize and simplify the vast amount of information they need during the negotiation. But, unlike a rational negotiator who has access to all relevant information, the real-

life negotiator gathers information which is most salient or available to him, and which reinforces his particular frame of the negotiation and his assumptions about the negotiation being either a zero-sum situation or one where joint benefits are possible. Similarly, information evaluation is undertaken with the same biases that affected the gathering of information.

A rational negotiator would identify a negotiation strategy that maximizes his or her expected utility. However, the real-life negotiator may be attracted to more familiar, salient maneuvers and may be significantly affected by the way he frames the negotiation. A negative framing of a negotiation may cause the negotiator to engage in risk-seeking behavior rather than the risk-avoiding behavior which might lead him to compromise. If he sees the negotiation as a fixed-pie situation, he will only concentrate on "winning" and may overlook opportunities for cooperation and the use of creative problem solving to find a mutually beneficial agreement. A negotiator may also fractionate multi-issue settlements, dealing with individual issues instead of treating them as a package which would allow trade-offs between issues.

3.0 SOCIO-EMOTIONAL PROBLEMS ENCOUNTERED BY NEGOTIATORS

In addition to the cognitive biases discussed above, certain socio-emotional aspects of negotiator behavior also impede the successful resolution of conflict in negotiation. For instance, face-saving behavior, ineffective communication between or among negotiators, negotiator overconfidence, and the tendency toward nonrational escalation of the conflict contribute to inhibit optimal decision making behavior in negotiation.

A. "Face-Saving" behavior

Negotiators tend to avoid agreements in which they feel they are "giving in". Often, the major determinant of their behavior during a negotiation may be the avoidance of "losing face" in front of the opposing party or in front of their own constituents. This face-saving behavior may take precedence over reaching a viable agreement with the opposing side (Podell and Knapp, 1969; Pruitt and Johnson, 1970; Pruitt and Rubin, 1986; Brown, 1977; Hiltrop and Rubin, 1981; Bazerman, 1983).

B. Ineffective communication

Communication has been described as being "at the heart" of the negotiating process (Lewicki and Litterer, 1985). For this reason, barriers to effective communication such as distraction caused by attention to physical appearance of opposing parties, semantic differences, the absence of feedback, and status and power differences can seriously hinder effective negotiation (Jelassi and Foroughi, 1989; Lewicki and Litterer, 1985).

Recent research on cognition in negotiation stresses the importance of the fact that two different individuals can evaluate the same information very differently (Jervis, 1976), depending on their perception of the situation. Most people mistakenly assume that both friends and opponents share their perceptions of a situation as well as the goals they have. As a result, two people may be playing the same game, but by entirely different rules (Pinkley, 1988). If negotiators do not effectively communicate to each other their perceptions of the situation as well as the motives for their actions, they may grossly misinterpret each others' statements.

C. Negotiator overconfidence

Negotiators tend to be overly optimistic about the probability of their own judgments being correct (Einhorn and Hogarth, 1978; Fischhoff, 1981; Lichtenstein et al., 1977) as well as the probability that a neutral party will judge in their favor (Farber, 1981). The more difficult the task, the more overconfident they become (Clark, 1960; Pitz, 1974). They are also overconfident of winning if they do not give in, which reduces the incentive to bargain and compromise (Neale and Bazerman, 1983; Bazerman and Neale, 1983).

D. Nonrational escalation of conflict

Negotiators tend to escalate the level of conflict irrationally and unnecessarily (Jelassi and Foroughi, 1989; Lewicki and Litterer, 1985; Bazerman, 1983), often "locking in" on opening moves and attitudes, which may be hostile, and continuing them through the negotiation process (Pilisuk and Skolnick, 1978).

4.0 NEGOTIATION SUPPORT SYSTEMS

4.1 A Brief Overview of Existing Systems

Taken in the broad sense, the idea of computerized support for negotiation, or "negotiation support systems", is not a new phenomenon. Since the 1960s, computer models have been employed for negotiation support (Nyhart and Goeltner, 1987). This was long before the term "NSS" or the field of NSS was formalized. In the past few years, the name NSS has been given to a type of Group Decision Support Systems (GDSS) which is designed especially to support decision makers in non-cooperative, mixed motive tasks.

NSS differ widely in the type and amount of support they give as well as the negotiation stage for which they are to be used. (For reviews of existing NSSs, see Jelassi and Foroughi, 1989; Nyhart and Goeltner, 1987). There is a wide spectrum in terms of the degree of computer intervention in a negotiation. At one end of the spectrum, NSS can consist of a computer model used for performing calculations or quantitative analysis during part of the negotiation process. Such systems serving as "backroom processors" play a relatively passive role in the negotiation process (Anson and Jelassi, 1990). Toward the middle of the spectrum are interactive systems such as MEDIATOR (Jarke et al., 1987), NEGO (Kersten, 1985), and GDS1 (Kersten, 1987) which include computerized multicriteria decision making techniques, a DSS for eliciting preferences, and GDSS components such as electronic communication. Proceeding along the spectrum, two recently proposed systems, the KAJ NSS (Anson and Jelassi, 1990) and MEDIANSS (Carmel and Herniter, 1989) provide interactive support for the entire negotiation process, including electronic communication, group process structuring techniques, and quantitative analysis of preferences and alternatives.

At the extreme end of the spectrum are rule-based NSS which use expert systems techniques to play an active role in the negotiation process. The NSS RUNE (Kersten et al., 1986) employs an artificial intelligence approach to problem representation and solution by evaluating bargaining positions and modelling negotiating strategies. However, RUNE supports only one stage of the process, pre-negotiation planning. DeSanctis and Gallupe (1987) as well as Anson and Jelassi (1990) suggested that rule-based intervention in negotiations could potentially include: 1) analysis of conflict

contingencies, 2) suggestion of appropriate process structuring formats or analytical models, 3) monitoring of the semantic content of electronic communications in order to enforce pre-programmed, mutually agreeable interaction norms, 4) suggestion of settlements with high joint benefits, 5) automatic mediation, and 6) automated parliamentary procedure. The common element in all NSS is their universal use of the computer as a modelling mechanism, either for producing an optimal settlement or for predicting the outcome of a particular solution (Carmel and Herniter, 1989). NSS models have been categorized according to the negotiation function they serve into six types: 1) pattern-seeking models, 2) simulation models, 3) assessment models, 4) solution-seeking models, 5) teaching models, 6) and integrative models which combine two or more of the above functions and/or knowledge from other fields (Nyhart and Goeltner, 1989).

4.2 Some Limitations of NSS Technology

NSS technology presents potential for alleviating or overcoming major stumbling blocks to negotiation. NSS researchers have suggested possible ways in which NSS can address the problems of negotiator cognitive limitations and biases as well as the socio-emotional aspects (see summary in Table 1). However, NSS is still a relatively new field, and existing NSS have certain limitations which need to be overcome before the potential benefits of these systems can be realized. The majority of existing NSS are computer models which fall into the category of "backroom processors" mentioned above. According to Nunamaker (1989), most NSS are "single workstations with limited capability to support electronic information exchange and parallel processing. Most have concentrated on providing a DSS to support the mediator or one side, rather than providing a face-to-face GDSS" (p. 117).

Only AUTOMATED DECISION CONFERENCING (Quinn et al., 1985), KAJ NSS (Anson and Jelassi, 1990) and MEDIANSS (Carmel and Herniter, 1989) support group processing structuring techniques such as the Nominal Group Technique (Delbecq et al., 1975), Delphi technique, brainstorming, etc. This is another indication that the potential benefits of computerized group decision making have not yet been incorporated into the design of most computer systems for negotiation support.

Anson and Jelassi (1990) point out that in general all NSS suffer from the failure to support several important aspects of negotiation which are considered to be essential for success (Bazerman, 1983; Kessler, 1978). First, the major emphasis has been on designing systems to support the analytical processing of information during a negotiation. For example, Winter (1985) used Decision Tree Analysis to analyze subjective estimates of gains, risks and probabilities to support pre-negotiation strategy formulation. Expert Choice (Decision Support Software, 1986) uses an Analytical Hierarchy Process to evaluate alternatives based on subjective preferences of the negotiators. Other systems support analytical processing with metagame analysis methods (Fraser and Hipel, 1986), game theory (Mumpower et al., 1988), multicriteria decision models (Jarke et al., 1987), and regression analysis (Executive Decision Service, 1986).

Second, since most NSS support only one stage of negotiation, they do not provide structure to the negotiation process. ANALYTICAL MEDIATION (Ulvila and Snider, 1980) uses a structured negotiation process, but computer support is given only at one stage (alternative evaluation) of this process. Kessler (1978) stresses the importance of providing guidance to negotiators to help them achieve mutually beneficial outcomes. She argues that the greater the intensity of conflict which exists, the more essential and beneficial negotiation structure and support become.

Third, the majority of NSS are for single users and therefore do not provide for direct interactions between the parties. The benefits of electronic communication minimizes the social content of input, focuses the attention of decision makers and helps them to engage in more thorough consideration of ideas and alternatives, and reduces the effect of power asymmetries between participants (DeSanctis and Gallupe, 1987; Kiesler et al., 1984; Nunamaker et al., 1989; Vogel et al., 1987).

Finally, because of the major focus which NSS has had on analytical processing of information during negotiation, most NSS do not deal with the cognitive biases and socio-emotional aspects of conflict situations such as those mentioned earlier.

-- Insert Table 1 about here --

4.3 New Directions in NSS Design

To address the above shortcomings of many existing NSS, efforts are being made toward the design of session-oriented NSS which provide computer support and electronic communication throughout the negotiation process rather than just at one stage. For example, Anson and Jelassi (1990) have proposed an NSS (the KAJ NSS) based on an integrative bargaining process suggested by Kessler (1978). This process attempts to address socio-emotional factors which inhibit successful achievement of mutually beneficial outcomes. The KAJ NSS provides several types of support for a mediator: 1) negotiation process structuring (pre-sequenced software modules), 2) computerized group process structuring techniques such as the Process Centered Leadership (PCL) approach (Miner, 1979) and Nominal Group technique (Delbecq et al., 1975), 3) electronic communication channels with interactive input by the negotiators and public display of input, 4) subjective preference elicitation and analysis, and 5) documentation of the agreement. Interest in session-oriented NSS is growing, as evidenced by the work of Carmel and Herniter (1989), who have proposed another NSS based on the KAJ NSS, and by the on-going research at Indiana University which is examining the effects of another session-oriented NSS on negotiation outcomes and negotiator post-bargaining attitudes (Foroughi and Perkins, 1989).

5.0 RESULTS OF NSS IMPLEMENTATIONS AND EMPIRICAL RESEARCH

Although the potential of NSS has been recognized, there is still very little empirical evidence about how and under what circumstances computer-based tools can best assist bargainers. In many cases, the use of computerized negotiation support has "occurred almost by chance when the developer of a computer model came into contact with someone involved in a conflict to which the model applied" (UNISYS, 1987, p.2). Empirical evidence of the effects of NSS on decision making in negotiations consists of 1) often brief documentation of NSS implementations in real settings, and 2) a few more completely documented experimental studies.

Computer support for negotiation has been employed in many fields such as international affairs, labor law, and environmental and safety disputes during the past decade (Ulvila and Snider, 1980; Mumpower et al., 1986; Nyhart and Triantafyllou, 1984; McGovern, 1986; Stearns and Roberts, 1976;

Senge, 1985; Cooper, 1980; CLC, 1984; Andrews, 1981; Raker, 1986; Winter, 1985). Those reporting the use of computer support for real-life negotiating have been enthusiastic, presenting generally positive results, both in negotiation outcomes and post-negotiator attitudes. For instance, after using Policy-PC in a school board-teacher's union contract mediation, Mumpower et al. (1988) commented that the computer support was impersonal, enabled the possibility of simultaneous evaluation of proposals, facilitated inter-personal communication and equal consideration of all proposals, and showed less flexibility than traditional, non-computer supported mediation techniques. These results and those obtained from other implementations generally substantiate NSS' potential for making negotiation problems more manageable and comprehensible for negotiators (Nyhart and Goeltner, 1987). However, many of these implementations of NSS have not been critically analyzed by the reporters or described in sufficient detail to allow other researchers to benefit from them. Single systems have been implemented, using different tasks and group structures, so that no real comparison across implementations is possible.

Very little rigorous experimental work has actually been done in the NSS area and in many cases, only a brief mention has been made of run-throughs and experimental trials of NSS. The American Academy of Arts and Sciences project (UNISYS, 1987) represents a start toward a systematic research program to determine the most effective roles which various negotiation support tools can play in supporting negotiations. However, although the project resulted in the development of a system called SPN, only a brief mention is made of experimentation with this system. Kersten's (1985) experimentation with NEGO, although poorly documented, led to refinements and improvements and to the development of an improved NEGO, called GDS1, which incorporates network capabilities (Kersten, 1988). Carmel and Herniter (1989) conducted walk-throughs of a manual version of their proposed MEDIANSS which provided valuable insights about the problems and limitations of laboratory implementations of NSS.

Studies by Jones (1988), Samfort et al. (1987) and Poole et al. (1988) are among the few examples of formal, documented experimental investigation of computer-supported negotiations. Jones' (1988) research provided valuable information about the role of conflict level in negotiation and the effectiveness of computer contract suggestions in situations of distributive and integrative bargaining. She found that such

suggestions enhanced the achievement of high joint outcomes for subjects in the integrative conditions, but not in the distributive conditions, where negotiators tended to ignore the computer suggestions and split the issues down the middle (for more details, see Jones and Jelassi, 1990).

Sainfort et al. (1987) investigated the effectiveness of an interactive DSS which took pairs of subjects with real-life problems through a six-stage process of conflict resolution. The DSS was compared to a videotape that subjects saw prior to starting the negotiation. Results showed that the DSS was significantly more effective for all outcome variables for high importance problems as compared to low importance ones and was perceived as more useful, especially for high importance problems. In almost all cases, subjects using the DSS reached consensus, while those viewing the videotape had only 50% success in reaching consensus.

Poole et al. (1988) investigated how a non-specialized, multi-purpose GDSS would influence conflict management in group decision making. Their laboratory study contrasted GDSS groups, manual groups, and baseline, unsupported groups performing a budget allocation task designed to produce conflict. The results of the experimentation showed that, in computer-supported groups, there was more focus on written materials, more depersonalization, greater expression of positive effect, and less consideration of alternatives.

In general, Poole et al. found that the computer-supported groups did not manage conflict as well as the manual groups and that the GDSS did not help them shift toward integrative behavior. Poole et al. attribute the relatively negative results obtained by the GDSS groups to the fact that the subjects did not seem to be comfortable or confident in their use of the GDSS, and that the system seemed to get in the way of successful conflict management. They conclude that more thorough training, including orientation about constructive conflict resolution, needs to be given, and that "specialized management programs" should be incorporated into GDSS training or software to assist with conflict management. The implications of these results is that decision makers facing a conflict-laden group decision need guidance and structure to help them reach integrative solutions as well as adequate training so that they can use a computer support system confidently and effectively.

Research currently underway at Indiana University (Foroughi and Perkins, 1989) builds on these NSS experimental studies. Jones' (1988) research task and conflict operationalization are used, but instead of just providing modelling capabilities, computer support will consist of a structured, interactive NSS. As in Stainfort et al.'s (1987) study, computer support will be given during the entire negotiation process and analytical data processing will be performed by a DSS, but this time the subjects will use electronic communication in addition to being able to communicate verbally. As in Poole et al.'s (1988) study, electronic communication will be used, but this study will also provide a structured, mediated integrative bargaining process and DSS support for analytical processing. Comparison will be possible with Jones', Stainfort et al.'s and Poole et al.'s research results, thus representing an effort toward a cumulative research base in the NSS field.

6.0 CONCLUDING REMARKS AND FUTURE RESEARCH DIRECTIONS

Support for negotiators is a topic of growing importance, given the increasing frequency of negotiation scenarios and the growing complexity of the problems to be resolved by negotiations (Rubin, 1980; Harnett and Cummings, 1980; Ewing, 1977; Adams, 1976; Sheppard, 1984; Huber, 1984). The importance of research in this area is captured in a quotation from Bazerman and Carroll (1987, p. 248):

> **"Despite the obvious prevalence and importance of negotiation, substantial evidence exists that negotiators frequently fail to attain readily available and mutually beneficial outcomes, and that these inefficiencies in the negotiation process reduce society's available resources, productivity, and creative opportunities, and increase society's conflict and self-destructiveness (Pruitt and Rubin, 1986; Raiffa, 1982). For example, in the labor-management domain, failures of negotiation lead to costly strikes, decreased harmony in the workplace, and threats to the survival of the organization and the jobs of organizational members (Walton and McKersie, 1965; Kochan, 1980). The dangers of negotiation failures in the international sphere include inefficient economic trade, war, and threats to our survival."**

The idea of computer support for negotiations is very exciting and appealing. Many organizations have begun using GDSS and have established

decision room settings such as those used for the NSS in this research. The physical setting for NSS is often in place, therefore, and the NSS software is not prohibitively expensive.

However, so far there is very little empirical evidence available about the impact of computer support on negotiation, and only one reported study of the effects of such support on distributive and integrative bargaining (Jones, 1988). Many pioneers in NSS research have expressed the need for more rigorous empirical research in the area (Kersten, 1987, 1988; Carmel and Herniter, 1989; Jelassi and Foroughi, 1989; Jelassi and Jones, 1988; Jones, 1988; Jones and Jelassi, 1990; Srikanth and Jarke, 1987; Nyhart and Goeltner, 1987; UNISYS, 1987; Poole and DeSanctis, 1987). There is a definite need for "the development of a framework for understanding the potential roles of computers in conflicts and disputes, for identifying the factors that have led to successful applications of computers in the past and developing computer tools that make the strengths of the computer more accessible to people who are faced with dispute" (UNISYS, 1987, p. 3).

There are many unanswered questions about NSS. For instance, what are the advantages of the support given by an NSS as compared to that provided by a similarly structured, non computerized negotiation process? What particular advantages does the technology give for enhancing the negotiation process? Is NSS as effective in situations involving high conflict as well as those involving low conflict?

A vast amount of research needs to be conducted before we have definite answers about the effectiveness of NSS in different negotiation situations. For instance, studies need to be conducted on the effects of NSS on 1) bargaining between negotiating teams, 2) in different mixed-motive task environments, and 3) in remote settings.

Also needed are experiments using different NSS to solve the same problem with similar types of users so that comparisons can be made between systems. The user interface for NSS also needs to be studied, as well as the role that NSS can play in the negotiation process. More complete knowledge of the exact role different systems can play in negotiation settings as well as an awareness of any assumptions built into various systems which might restrict their behavior will enable decision makers to make more rational choices of negotiation support tools (Kersten, 1987).

Most important, researchers need to study the use of NSS in real, "live" negotiation situations. This will entail intensive analysis of the actual process of negotiation, using a content communication analysis mechanism such as Morley and Stephenson's (1977) Conference Process Analysis, which was adapted from Bales' (1950) interaction process analysis to assess negotiation deliberations. Using such an analysis mechanism would greatly enhance the evaluation of the effects of NSS on the negotiation process and help determine the actual potential benefits of this emerging technology.

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TABLE 1

NSS SOLUTIONS TO MAJOR STUMBLING BLOCKS

MAJOR STUMBLING BLOCKS TO SUCCESSFUL NEGOTIATIONS	POSSIBLE NSS SOLUTIONS
COGNITIVE DIFFICULTY OF DETERMINING OPTIMAL SOLUTIONS The cognitive difficulty of evaluating the utility of alternative settlements for each party and determining tradeoffs often impedes successful conflict resolution (Lewicki and Litterer, 1985).	NSS can assist with analytical processing of subjective preference and/or external objective data and can provide techniques based on regression analysis, multiple-criteria decision making, and game theory to identify high joint benefit solutions or viable negotiating strategies (Anson and Jelassi, 1990; Jelassi and Foroughi, 1989; UNISYS, 1987).
CONSIDERATION OF ISSUES IN ISOLATION Negotiators tend to consider issues one at a time, in a stepwise fashion, instead of integrating multiple issues into a single package so that potential tradeoffs can be recognized (Erickson et al. 1974; Froman and Cohen, 1970; Kelley, 1966).	NSS can display an entire contract for discussion so that participants can "logroll" among issues, focusing on tradeoffs among them instead of arguing about single issues (Jelassi and Jones, 1988).
NEGATIVE FRAMING OF THE NEGOTIATION Negotiators often "frame" the negotiation negatively by evaluating their potential losses instead of considering their potential gains. Negative framing can lead to risk-seeking behavior instead of the risk-avoiding behavior which is conducive to finding a cooperative agreement (Kahneman and Tversky, 1982; Kahneman and Tversky, 1979; Neale and Bazerman, 1983; Tversky and Kahneman, 1981).	Group process structuring techniques such as the Process Centered Leadership Approach (Miner, 1979) can be used to establish rules to govern interaction and to create a sense of agreement, trust and fairness. Pre-negotiation modules can require parties to identify their interests in undertaking negotiation, thereby emphasizing the mutual benefits of negotiation (Anson and Jelassi, 1990).
"FIXED-PIE" MENTALITY Negotiators often assume that their interests are in direct conflict with the other party's interests, that they are in competition for a fixed-pie of resources, and that one side will win at the expense of the other. Negotiators may ignore the need to cooperate and use creative problem solving to find an integrative solution (Bazerman and Lewicki, 1983; Pruitt, 1983a; Pruitt, 1983b; Winkelgren, 1974).	NSS can integrate conflicting views by publicly displaying them as separate columnar lists. Related items in the list can be paired and publicly merged by the mediator into single items (Anson and Jelassi, 1990). Analytical methods such as regression analysis, multiple criteria decision making, and game theory techniques will help identify more alternative solutions beneficial to all parties (Anson and Jelassi, 1990).
PREMATURE CLOSURE OR FINALIZING OF POSITIONS Negotiators tend to prematurely finalize their positions, often before all possible solution alternatives have been recognized and considered (Kelley, 1966).	A single negotiation text (SNT) (Fisher, 1978) consisting of an agreement which is not pareto optimal but is of equal value to both sides can be presented as a starting point (Jelassi and Jones, 1988). Rules can be established that require consideration of all issues before reaching a final agreement.
PREFERENCE FOR AVAILABLE, SALIENT INFORMATION OR SOLUTIONS Negotiators tend to recall and value most those bits of information which are most salient or familiar to them (Tversky and Kahneman, 1981). This may cause them to select either familiar or very unusual alternative solutions because they are more salient, while rejecting or neglecting to consider other alternatives.	The establishment of rules requiring consideration of all issues before reaching a final agreement will help prevent negotiators from considering only salient information (Jelassi and Jones, 1988). Also, NSS suggestions of possible concessions and/or solutions and tradeoffs can help ensure more thorough consideration of all pertinent information and alternatives (Jelassi and Foroughi, 1989).
"FACE-SAVING" BEHAVIOR Negotiators tend to avoid agreements in which they feel they are "giving in". This face-saving behavior may take precedence over reaching a viable agreement with the opposing side (Bazerman, 1983; Brown, 1977; Hiltrop and Rubin, 1981; Pruitt and Rubin, 1986).	NSS can be used to suggest possible concessions each side should make to achieve optimal joint outcomes, which would permit negotiators to compromise while still saving face (Brown, 1977; Brown, 1970; Podell and Knapp, 1969; Pruitt and Johnson, 1970; Rubin, 1980; Wall, 1984).
INEFFECTIVE COMMUNICATION Barriers to effective communication such as distraction caused by attention to physical appearance of opposing parties, semantic differences, absence of feedback, and status and power differences can seriously hinder effective negotiation (Jelassi and Foroughi, 1989; Lewicki and Litterer, 1985).	Semantic differences can be detected and resolved with techniques such as "view integration" (Jarke and Jelassi, 1986). Time limits can be set on communications and rules set for participation to prevent domination by one side, and organized feedback can be displayed (Jarke and Jelassi, 1986). Computerized communication between parties encourages equality of participation and reduces the inhibiting effects of asymmetry of power and influence (DeSanctis and Gallupe, 1987).
NEGOTIATOR OVERCONFIDENCE Negotiators tend to be overly optimistic about the probability of their own judgments being correct (Einhorn and Hogarth, 1978; Fischhoff, 1981; Lichtenstein et al. 1977) as well as the probability that a neutral party will judge in their favor (Farber, 1981). Overconfidence increases with task difficulty (Clark, 1960; Pitz, 1974) and reduces the incentive to bargain and compromise (Bazerman and Neale, 1983; Neale and Bazerman, 1983).	NSS support such as analytical processing of subjective preference and/or external objective data as well as the determination of possible solutions will bring a sense of "rationality" to the negotiation and will help the negotiators make more objective, realistic judgments (DeSanctis and Gallupe, 1987).
NONRATIONAL ESCALATION OF CONFLICT Negotiators tend to escalate the level of conflict irrationally and unnecessarily (Bazerman, 1983; Jelassi and Foroughi, 1989; Lewicki and Litterer, 1985), often "locking in" on opening moves and attitudes, which may be hostile, and continuing them through the negotiation process (Pilisuk and Skolnick, 1978).	Electronic communication focuses attention away from personalities and on issues (DeSanctis and Gallupe, 1987; Vogel et al. 1987), thus "separating the people from the problem" as suggested by Fisher and Ury (1981). Individual idea generation can be separated from group evaluation by using structured group processes which encourage equal, active participation (Anson and Jelassi, 1990).

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