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Technical Report PQTR-1046-77-12
Contract MDA903-77-C-0184
ARPA Order No. 3344
December, 1977

AN INTERACTIVE COMPUTER AIDING SYSTEM FOR GROUP DECISION MAKING

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report describes a program centered on the demonstration of an interactive computer aid for group decision making. The report includes: (1) Descriptions and theoretical bases for the system's principal decision analysis algorithms, (2) a report on the system software structure and major components, (3) scenario materials for evaluation studies, and (4) a comparison of the group aiding system to the SRI Decision Aiding Program. The next phase of the program will concentrate on operational testing and comparison of individual and group trees.		

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1. SUMMARY

1.1 Report Period

The third quarter of contract activity involved: (1) refinement of the group machine interactions and displays, (2) development of conflict identification algorithms, (3) implementation of the detailed software design, (4) development of additional scenario materials. The following specific tasks were accomplished during the report period.

- (1) Preliminary operational tests of the group aiding system were used to refine the group/machine interactions and displays described in the first two quarterly reports. Visual cues and display wordings were modified to increase user comprehension.
- (2) Algorithms and procedures were defined for the identification of group utility conflicts. The algorithms identify the basis for utility conflict among individuals and only invoke resolution procedures for significant and resolvable conflicts.
- (3) Implementation of the detailed software design was completed and preliminary operational testing was begun. The software provides for group tree elicitation and large screen color graphics displays of group differences in several display formats.
- (4) Additional scenario materials for group and individual system evaluation were developed. Procedures for conducting the evaluations were defined as were the roles of the intermediary, director and participants.

1.2 Next Period

The contract period during the next quarter will primarily concentrate on evaluating the systems use as a group and individual decision aid. In addition, preliminary design for an individual elicitation and tree merging system will begin. The specific items of work for the next period will include:

- (1) Conduct operational tests with the group aiding system to refine scenario materials and evaluation procedures.
- (2) Perform system evaluations using participants selected from military reserve groups, police units, and other representative user populations.
- (3) Elicit and compare individual decision trees with group developed trees.
- (4) Plan and initiate design on an individual elicitation interface and procedures for merging individual trees.

1.3 Program Milestones

The milestone chart for the contract program is shown in Figure 1-1, with the report period illustrated as the checkered portion.

1.4 Report Organization

Chapter 2 is a program overview containing the problem statement, program rationale, and program objectives. Chapter 3 describes the major decision analysis algorithms and their theoretical basis. Chapter 4 is a

description of the system software. Appendix A and B contains a report by CACI describing the scenario materials that will be used for the evaluation studies. Appendix C is a report comparing the group decision aiding system being developed by Perceptronics with the SRI group aiding program.

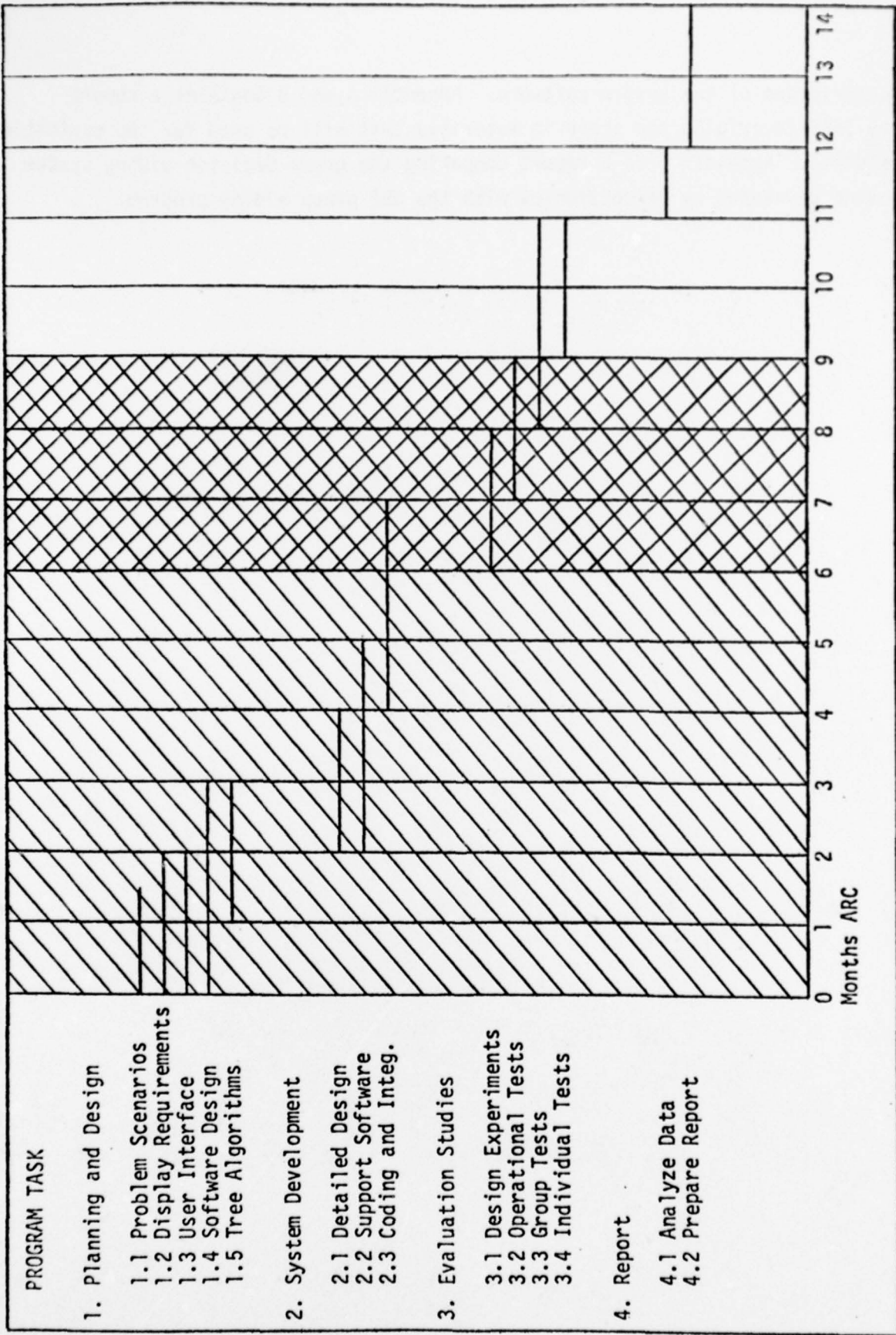


FIGURE 1-1. PROGRAM MILESTONES

2. PROGRAM OVERVIEW

2.1 Statement of Problem

Constant escalation in weapons cost and effectiveness, as well as the increasing complexity of international relations, makes military decision making more critical today than ever before. In today's military environment, most upper-level decisions are made by committees and staff groups. Typically, such groups contain experts from several speciality areas, who bring to the decision environment disparate sets of values. Decision time is usually limited, the decision making procedure is relatively unstructured, and intragroup conflicts arise on a broad variety of issues. Consequently the group is unable to consider the maximum set of alternatives, conflicts are not resolved in an optimum manner, and the resultant decision is rarely up to the aggregate potential of the group membership.

2.2 Rationale

Decision analysis offers a promising approach to solving these problems. The analytical procedure of building a decision tree formalizes the decision process, and permits incorporation of individual values (utilities) into the selection of alternative courses of action (Hays, O'Connor, Peterson, 1975). However, decision analysis as it is usually practiced is a highly personal and time-consuming process. Decision analysts are often called upon to assist in the solution of problems ranging over a large variety of domains. In most cases the decision analysts know far less about the problem domain than do their clients. Thus their contributions are confined primarily to the phases of formalization and optimization. While optimization is usually computer assisted, the formalization phase invariably has been accomplished

manually, using lengthy interviews of persons more familiar with the problem area. This approach is generally incompatible with the conditions of command group decision making.

Accordingly, it would be highly worthwhile to automate the formalization phase, using an interactive computer system to interrogate the group members and to construct a decision tree based on their responses. The purpose of the research undertaken here is to develop and evaluate the means by which such an interactive aid could be used to improve group decision making.

2.3 Objectives

The goal of the research program addressed in this progress report is to develop an automated decision tree elicitation system using on-line sensitivity analysis with direct real-time group feedback and evaluate its effectiveness in aiding group decision making.

The specific objectives of the current program include the following:

- (1) Develop computer programs for efficient, comprehensive, elicitation of decision trees from a decision making group.
- (2) Develop computer programs for identifying structural and numerical differences among the contributions of individual group members, for merging these contributions and for resolving the points of conflict.
- (3) Develop effective means for displaying to the group the results of the elicitation procedures and conflict analyses.

- (4) Integrate the various programs and techniques into a complete aiding system which can be readily transferred to other test environments.
- (5) Experimentally test the group decision aid, using a variety of representative military decision problems, to demonstrate its advantages under realistic conditions of use.
- (6) On the basis of the developmental effort and the experimental results, establish guidelines and recommendations for future military applications of the group decision aiding methodology.

3. ALGORITHMS

3.1 Introduction

The descriptions and justifications of the following algorithms are given in this section: (1) conflict detection, (2) conflict resolution, (3) probability aggregation, and (4) utility aggregation. Attributes have unit weights in all calculations.

3.2 Conflict Detection

The algorithm assesses conflict on a "localized" set of values, e.g., a vector of estimated utilities elicited from the group members for each alternative decision action or probable event. During the decision making session the sensitivity differential¹ calculated for each node changes dynamically as the tree expands. These changes can be decomposed into two generating sources: (1) the sensitivity value calculated after expanding the node or any node in its sub-tree, and (2) the sensitivity value calculated after expanding any other node in the tree. Analysis of data collected during demonstrations of the "group decision aiding system" shows that the greatest change to a node's sensitivity measurement comes from source 2. Computing the impact of a node's value on the entire decision tree relative to the current sensitivity measurements would be accurate only if there were no further expansion. Therefore, conflict assessment is done on individual sets of "localized" values to expose conflicts and conflict resolution identifies the ones requiring the more comprehensive MAUM procedure for resolution.

By a previous sensitivity calculation node n3 in Figure 3-1 has the sensitivity differential $S_3 = 16$, i.e., node n3's value has to change by 16 in order to effect a change in the current best decision path. Node n3 has just been expanded and has nodes A and B as its successors. The value

¹See June 1977 Technical Report for definition of sensitivity calculations.

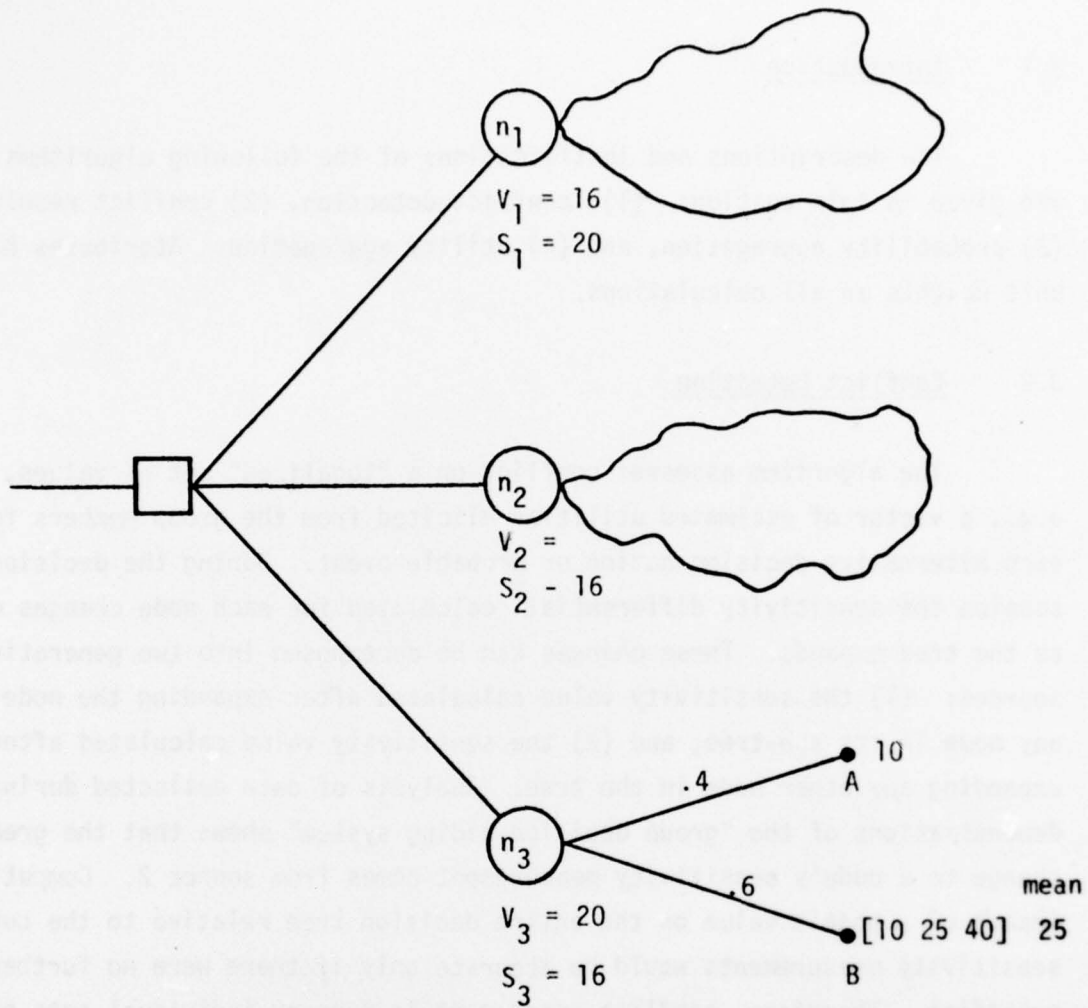


FIGURE 3-1. DYNAMICS OF SENSITIVITY DIFFERENTIALS

estimates of node B by three people are 10, 25 and 40. If they all agreed on a value of 40 for node B the new value of n3 would be $.4 \times 10 + .6 \times 40 = 28$, an increase of 8 over its present value of 20. This increase is one-half of the requirement (S3) to make a change in the current best path. Superficially then, it appears that the discrepancies in the estimation of node B's value are not worth resolving, and that the mean value should be assigned to node B resulting in the following calculation of node n3's value; $.4 \times 10 + .6 \times 25 = 19$. However, consider the case where some node in n2's sub-tree is next expanded and, following rollback calculations and subsequent sensitivity measurement, V2 becomes 15 and S2 and S3 become 5. If conflict resolution had previously been invoked for node n3 and it had been assigned the value of 40, a new best decision path would now exist in the tree!

Description - Conflict Detection Algorithm

The conflict detection algorithm identifies conflict over a vector of values elicited from the group members. The values may be utilities on alternative actions or events, attribute levels, or aggregated utilities. This multi-use capability of the algorithm is made possible by the consistent method of obtaining value assessments from the group members. Only numerical values in the range 0 to 100 are allowed where 0 represents the worst possible value of a situation and 100 represents the best possible value (as if the crisis situation had never occurred²). The vector of values must meet certain criteria in order to be in agreement, in which case the mean value is used.

Two threshold measures are used to create a specific conflict domain. These are:

ADMTH - average deviation from the mean (adm) threshold

²An accurate description of value estimation in the initial stages of the aiding system is vitally important. Group members must be reminded that the scale is representative of estimated loss. For example, a value of 60 represents substantial loss when compared to 100, i.e., the "normal situation", as if the crisis had never occurred. Hopefully this will eliminate the clustering of value estimations for non-desirable but necessary actions and least wanted event outcomes around the low end anchor. A more uniform distribution of utility estimations will provide an equalization effect of each node upon the decision structure.

PRBTH - event probability threshold

The initial values chosen for the thresholds are:

ADMTH - 10

PRBTH - .5

Let \vec{x} be a vector of values elicited from the participants (utilities on an alternative, attribute levels, or computed aggregated utilities).

Let m be the number of participants.

$$\text{mean} = (\sum_{i=1}^m x_i)/m$$

$$\text{adm} = \sum_{i=1}^m |\text{mean} - x_i|/m$$

The following expression determines conflict

if $(\text{adm} \geq \text{ADMTH})$ "there is conflict".

This conflict domain is shown by Figure 3-2. Additionally, probabilities for alternative events are checked in order to filter out conflict recognition on low probability events. Since probabilities on a list of events must sum to 100, the probability threshold is made a function of the number of alternatives to adjust for the probability distribution over a varying number of events.

The following expressions compute the probability threshold:

Let n be the number of alternative events

Let p be the probability threshold

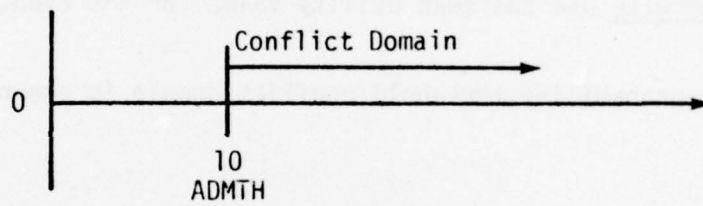


FIGURE 3-2. AVERAGE DEVIATION FROM THE MEAN CONFLICT DOMAIN

PRBTH, n < 5
P = 12, n = 5
 ((100/n)-6), n > 5

as n increases p decreases in order to make the threshold sensitive to the probability distribution for varying numbers of alternative events.

For an alternative event that is in conflict over utility assessments by the decision makers, the following expression checks the probability threshold criteria:

if (Prob.(event) > = p) "there is conflict"
otherwise use the mean utility value for the event node.

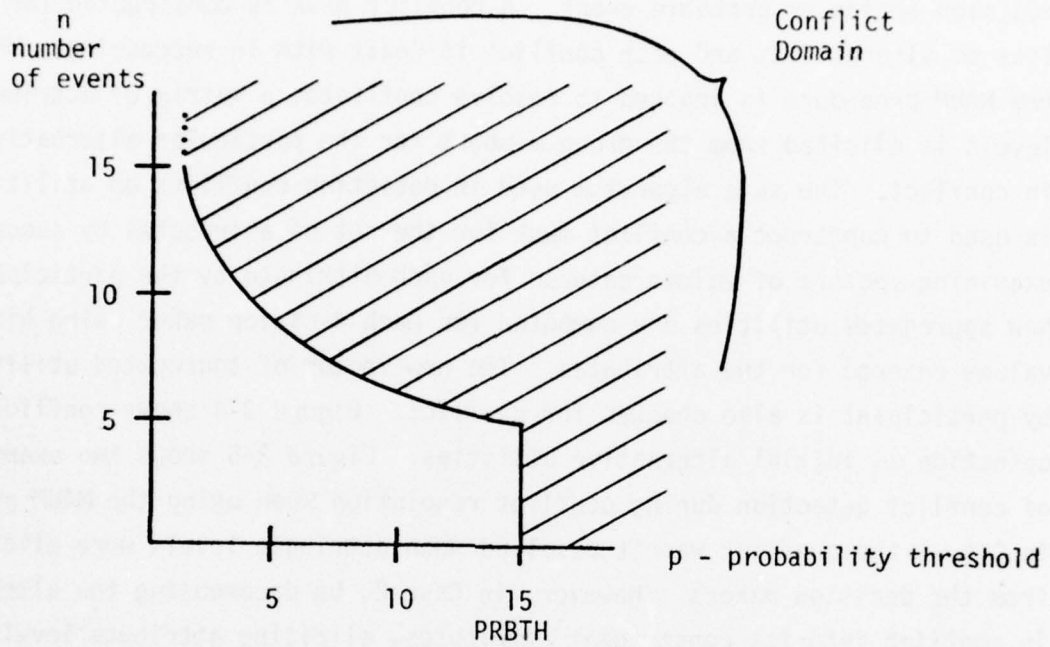
The probability threshold conflict domain is shown in Figure 3-3.

Example 1:

Let n = 8 be the number of successors of an event node. Under uniform probability distribution the elicited probability of occurrence for each event would be 12 (on our 0-100 scale). The computed probability threshold is: $p = (100/n) - 6 = 6$. If conflict was detected on the utility estimates for any of the events then an additional check is made on the events probability.

if (Prob.(event) > = p) "there is conflict"
otherwise use the mean value of utility estimates made by the participants.

For this case events in conflict whose probabilities are less than 6 are not subjected to the MAUM procedure for resolution.



The system imposes a bound of 15 alternative events, therefore, 0 or negative probability thresholds will not occur.

FIGURE 3-3. PROBABILITY THRESHOLD CONFLICT DOMAIN

Example 2:

The conflict detection algorithm identifies conflict over a vector of estimated utilities elicited from the group members for each alternative decision action or probable event. A conflict mask is constructed for a list of alternatives and each conflict is dealt with in succession. When the MAUM procedure is invoked to resolve conflicts, a matrix of attribute levels is elicited from the group members for the particular alternative in conflict. The same algorithm used in detecting conflicts on utilities is used to construct a conflict mask for the set of attributes by successively examining vectors of values entered for each attribute by the participants. New aggregated utilities are computed for each decision maker using his values entered for the attributes. The new vector of aggregated utilities by participant is also checked for conflict. Figure 3-4 shows conflict detection on initial alternative utilities. Figure 3-5 shows two examples of conflict detection during conflict resolution when using the MAUM procedure. In Case 1 the conflict wasn't resolved when attribute levels were elicited from the decision makers. However, in Case 2, by decomposing the alternative in conflict into its constituent attributes, eliciting attribute levels, and computing a new aggregated utility for each participant, the group members reached agreement without further discussion.

Justification - Conflict Detection Algorithm

During initial pilot testing of the group system, the threshold will be changed and data will be collected and analyzed to determine when optimal node value assessments are made for different sets of threshold criteria. This data will be measured against the tradeoff in time requirements for resolving conflicts on alternatives in order to maximize the efficiency of the system.

D_i - decision maker_i

ALT - alternative (action or event)_i

	D_1	D_2	D_3	Conflict Mask
Alt ₁	85	60	30	1
Alt ₂	45	55	40	0
Alt ₃	5	10	15	0

FIGURE 3-4. CONFLICT DETECTION OVER INITIAL ALTERNATIVE UTILITIES

D_i - Decision Maker i

ATT_i - Attribute i

CASE 1:

	D_1	D_2	D_3	Conflict Mask
ATT_1	75	60	35	1
ATT_2	90	80	20	1
ATT_3	50	40	55	0
ATT_4	40	50	35	0
New Aggregated Utility	[64	58	36]	1

CASE 2:

	D_1	D_2	D_3	Conflict Mask
ATT_1	65	55	35	1
ATT_2	20	35	30	0
ATT_3	95	55	60	1
ATT_4	40	55	45	0
New Aggregated Utility	[55	50	42]	0

FIGURE 3-5. CONFLICT DETECTION OVER ATTRIBUTE VALUES

3.3 Conflict Resolution

Immediately before and during conflict resolution the intermediary/director will be given numerical analysis information regarding type and extent of conflicts. In all conflict cases he will have the following options: (1) using the mean value and continuing, (2) suggesting a utility measure to the group, and upon confirmation using that value and continuing the program, (3) invoking the MAUM procedure if conflict is on initial alternative utilities, or (4) for attribute level conflicts - initiating discussion, then eliciting new levels for those attributes in conflict effecting recomputation of aggregated utilities and rechecking for conflicts.

3.4 Probability Aggregation

The current algorithm for probability aggregation uses the mean of the probability estimates elicited from the decision makers. Theoretical work is continuing in this area to arrive at a more accurate computation of a group probability value.

3.5 Utility Aggregation

There are three modes of utility aggregation. These are:

- (1) Where no conflict occurs - aggregate the individual utilities elicited from the group members and take the mean.
- (2) Where conflict does occur and is resolved - after use of the MAUM procedure new aggregated individual utilities over the attributes are used as input to mode 1.
- (3) Where conflict occurs and is not resolved - director suggests a utility value to the group and it is used. This can be

done implicitly by letting the system use the computed average or explicitly by recommending a utility value other than the mean to both the group and the program.

4. SOFTWARE DEVELOPMENT

4.1 System Configuration

The participants (i.e., the decision makers) and the intermediary/director are seated at a conference table facing an Advent large screen display system. Situated in front of each participant is an Interface Technology 732 data entry terminal (DET) which is used for entry of numeric values and voting. The DET's have an eight digit LED display, numeric keypad, function keys, and eight indicator panels that are under program control.

The intermediary/director has an Informer D301 terminal equipped with a 16 line by 32 character CRT, full alphanumeric keyboard, and function keys. Using the Informer terminal, the intermediary/director can enter and edit lists of alternatives, query and direct and system, and receive reports from the computer aiding system on group performance.

The Advent projection system is driven by a Genisco 3000 programmable color graphics system. Perceptronics' current Genisco system has 512 x 512 resolution, has a video lookup table for displaying up to 4096 colors, and can generate a wide range of alphanumeric as well as graphic material. In a separate room, a 19" Mitsubishi high resolution color monitor can be used to unobtrusively monitor what the group is doing.

4.2 Software Implementation

Software for the group decision aiding system was designed and implemented under the UNIX operating system, using the C programming language. During the third contract period covered by this report, the detailed software design was implemented for all major system components.

There are four major system software components totaling 5500 lines of code plus an additional 2600 lines of assembly code composing the Genisco graphics operating system. The major software components control: (1) the images produced on the Advent large screen display, (2) the interactions between the group members and the data entry terminals, (3) the operation and display of the intermediators terminal, and (4) the internal decision tree structure and the computational procedures that manipulate the tree. A more complete description of each component is detailed here.

LARGE SCREEN DISPLAY SOFTWARE

There are three levels of software that control the Genisco color graphics system. At the lowest level functions composed of Genisco assembly instructions provide the control interface between PDP-11 software and the graphics system. Another set of functions at the middle level provides X, Y raster positioning, color selection, and operation mode when displaying text or geometrical shapes. The top level procedures provide simple C program access to a formatted screen of n lines by m characters.

The Genisco system is easily initialized to a display position by designating line numbers and/or character column positions. Other procedures at this level can then write text or draw vectors on the display.

DATA ENTRY TERMINAL SOFTWARE

This set of procedures controls the interactive information flow between the decision makers and the system. Participants are prompted by lighted message windows for the various inputs required by the system, e.g., utilities, probabilities, and vote response. Feedback control is maintained by these procedures and information is displayed on the individual participant terminals to effect ease of terminal operation.

INTERMEDIATOR TERMINAL SOFTWARE

The software interface to the intermedicator/director terminal provides system and group supervisory control. The intermedicator is provided system processing information at all time. Option lists are displayed on the terminal at various points in the elicitation and node expansion cycle providing immediate control over system operation. The intermedicator also shares responsibility for program pacing during the decision aiding session.

DECISION TREE COMPUTATIONAL SOFTWARE

Decision tree processing software expands the representative tree structure, elicits utilities and probabilities from individuals, analyzes values for conflicts, invokes the multi-attribute procedures to resolve conflicts, graphically displays histograms and line graphs to distinguish areas of conflict, and displays the graphical form of the decision tree on the large screen display. Other tree processing functions include rollback calculations and sensitivity analysis. There are also procedures to determine best path, select the best node for expansion, aggregate utilities and probabilities, and update the decision analysis profile during the decision making session.

All software was implemented from a top down design which facilitates program modifications as problems are ironed out during pilot group testing.

5. SCENARIO DESCRIPTION

Preparations are currently under way for the initial testing of the group decision-making aid. Test sessions will include a preliminary tutorial scenario during which subjects will be introduced to principles of decision analysis and tree construction, including such concepts as event and decision nodes, utility and probability estimation, and attribute levels. Participants will be instructed in the use of the interactive aid and will run through a simple demonstration scenario for further practical familiarization with the system. At the conclusion of the tutorial, briefing materials for the actual test scenario will be distributed and a decision elicited from the group.

The demonstration and test scenarios, recently completed and submitted by CACI, are briefly summarized below.

5.1 Demonstration Scenario

The demonstration scenario has been constructed to address a realistic concern of decision-makers employing the interactive decision aid: the efficient use of limited time. The more actions and events considered during the decision-making process, the greater the amount of time required to reach a decision. Subjects will be asked to select the best means to choose the number of actions and events included in a decision tree such that the decision-making process will be expedited without affecting the quality of the decision. A simple two-level tree and an attribute list have been prepared to minimize the amount of time expended during the tutorial session. Subjects will be permitted to introduce modifications to both, should they so desire.

It is anticipated that the use of a tutorial scenario that highlights a problem the subjects will face as a group in the test

session will not only acquaint participants with the mechanics of the system, but also contribute constructively to the group's efficiency in subsequent decision tasks.

5.2 Test Scenario

A test scenario involving a mix of fictitious and real-world actors has been selected for the initial phase of testing in an attempt to limit the impact of substantive bias on the decision-making process. While such bias will indeed be operative in any real-world applications, it may unnecessarily complicate the primary task at this stage of examining the structural and procedural efficiency of the system.

Scenario Structure

Principal Actors: United States, Shamba

Secondary Actors: Marandi, Mandero City, Cuba

Decision-making Participants: U.S. Government Task Force, including representatives of JCS, NSC, CIA, NDS, STATE

Duration of Session: 3 hours

Materials:

- . Task force briefing booklet (cable traffic, situation reports, force situation reports, maps, background data).
- . Agency Briefing Updates
- . Briefing Slides

Background

The U.S. is committed to support the ruling military dictatorship of Shamba, a small third world ally. For 12 years, the military government has been plagued by skirmishes with an indigenous leftist rebel neutral southern neighbor. Neither U.S. nor Cuban personnel have been involved in direct combat, but both have supplied arms and training missions. The U.S. maintains a small non-nuclear military base at Komsa in northern Shamba.

Scenario Situation

A U.S. B-52 bomber carrying nuclear bombs on a routine flight is forced to land at an airport near Savin, the capitol of Shamba, due to problems with its onboard electrical system. A U.S. technical crew is expected to arrive in two hours to begin repairs.

Two hours after the B-52 lands, the rebels launch a successful coup virtually unopposed by regular Shamban forces. The B-52 and the bombs fall under thier control and the aircraft's crew is killed. The American technical crew is forced to turn back.

Rebels occupy the U.S. Embassy, killing ten Marine Guards, and all Embassy personnel are taken hostage. The U.S. base airstrip at Komso is strafed and no aircraft are left operable. One hundred howitzers and 100 medium-range tanks may still be operable, but the rebels have announced that the 2,000-man unit at the base is also being held hostage. Two U.S. aircraft carriers are stationed 12 miles offshore from Mendero City and Monque Bay, repectively. Both ships carry USMC assault forces.

Rebel Demands:

- (1) U.S. will give Shamba \$1 billion per year for 10 years as war reparations.
- (2) U.S. citizens are to be removed from Shamba, but must leave their equipment and factories behind.
- (3) The former dictator of Shamba, who escaped, is to be turned over to the new government.
- (4) U.S. is to declare its error in supporting the previous government and pledge non-interference.
- (5) U.S. must dismantle its nuclear bases throughout the world, beginning with NATO bases in Great Britain.

The U.S. has four hours to respond and 15 days to fulfill all five demands. Otherwise, the hostages will be killed and Mandero City bombed by the B-52.

The scenario, as developed by C.A.C.I., Inc., appears in full in Appendix B and the tutorial scenario in Appendix A. Both of the scenarios will be used for the scheduled test appropriate and evaluation of the group decision aiding system with modifications based on initial experiments.

APPENDIX A

TRAINING SESSION SCENARIO:
SUBJECT'S MANUAL

TRAINING SESSION SCENARIO:
SUBJECT'S MANUAL

Submitted to:

Adaptive Information Systems
Perceptronics, Inc.
6271 Variel Ave.
Woodland Hills, California 91367

November 9, 1977

TRAINING SESSION SCENARIO: SUBJECT'S MANUAL

INTRODUCTORY NOTE

This manual is used in conjunction with the associated Experimenter's Manual. It provides the basic decision alternatives that are presented to subjects in the course of the training scenario. This material can be displayed in booklet form or on the decision aid's display screen. The latter mode is preferable because it increases the subjects' familiarity with the operation and capabilities of the aid.

WHAT IS THE BEST AND FAIREST WAY FOR THE GROUP TO LIMIT THE
NUMBER OF ACTIONS AND EVENTS INCLUDED IN THE DECISION TREE?

- THE IMPACT ON REACHING A QUICK FINAL DECISION
- THE IMPACT ON BEING FAIR TO ALL MEMBERS
- THE IMPACT ON RETAINING THE BEST ALTERNATIVES
IN THE DECISION TREE

- MAJORITY RULE: ALLOW ALL ALTERNATIVES THAT RECEIVE A MAJORITY VOTE OF APPROVAL BY THE GROUP TO BE INCLUDED IN A DECISION TREE.
- CONSENSUS: ALLOW ONLY THOSE ALTERNATIVES THAT ALL MEMBERS OF THE GROUP AGREE UPON.
- GROUP LEADER CHOICE: ALLOW THE GROUP LEADER TO DETERMINE WHICH ALTERNATIVES WILL BE INCLUDED IN THE DECISION TREE.

1. THE MINORITY WILL BE DISSATISFIED WITH THE DECISION.
2. THE MINORITY WILL BE PLEASED WITH THE FINAL DECISION.

1. DECISION TREE BUILDING IS MORE TIME CONSUMING.
2. DECISION TREE BUILDING IS NOT SIGNIFICANTLY DELAYED.

1. THE GROUP LEADER CHOOSES FAIRLY AMONG THE ALTERNATIVES.
2. THE GROUP LEADER CHOOSES UNFAIRLY AMONG THE ALTERNATIVES.

APPENDIX B

SIMULATED BRIEFING MATERIALS: OPERATION TPCANYON

SIMULATED BRIEFING MATERIALS: OPERATION TPCANYON

Submitted to:

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PREFACE

This paper provides simulated briefing materials for use in the initial experimentation and demonstration phase of the Perceptronics computer-assisted decision aid.¹ Following a short introduction, the briefing materials are divided into four sections:

1. Task Force Briefing Booklet
2. Situation Report Booklet
3. Agency Briefing Updates
4. Briefing Slides

Items 1, 2, and 4 will be presented to all subjects. A separate version of Item 3 has been prepared for each subject, depending on the role s/he has been assigned. The five roles are:

- Representative of the Joint Chiefs of Staff (JCS)
- Representative of the National Security Council (NSC)
- Representative of the Central Intelligence Agency (CIA)
- Representative of the Defense Nuclear Agency (DNA)
- Representative of the Department of State (State)

Our recommendations concerning media are that the briefing slides should be projected on the decision aid's screen (either by using an overhead projector or the aid itself). The slides should also be provided as part of the simulated briefing materials package that is given to each subject. This is the most realistic way in which to present this type

¹ Perceptronics (1977) An Interactive Computer Aiding System for Group Decision Making, Technical Report PQTR-1046-77-9. Woodland Hills, Calif.: Perceptronics, Inc.

of information. To further increase the realism of the materials, typographical errors of the sort typically found in these types of crisis messages have been deliberately included in the texts; we recommend that these 'errors' be retained.

The "attributes" or potential "impacts" of the decision being simulated include

- Impacts on preserving U.S. security,
- Impacts on security of Mandero City,
- Impacts on U.S. citizens still in Shamba,
- Impacts on U.S. balance of payments, and
- Impacts on U.S. international prestige.

The material presented in this Preface should not be included in the package that is given to subjects.

INTRODUCTION

The materials in this briefing package have been designed to provide a realistic simulation of the types of communications and information that would be received by high-level U.S. decision-makers during a crisis and the types of decision recommendations that these decision-makers would have to make during such an incident.

The briefing material is divided into four sections:

1. Task Force Briefing Booklet
2. Situation Report Booklet
3. Agency Briefing Updates
4. Briefing Slides

The Task Force Briefing Booklet outlines the problem you face and provides copies of communications that the U.S. Government has received concerning the crisis. The Situation Report summarizes the crisis and provides background information. All group members receive these two reports.

Each task force group member represents a different agency and receives his or her own Agency Briefing Update. This material outlines your agency's crisis responsibilities, describes your agency's last contingency plan for this type of crisis situation, provides any additional information which your agency has, and lists the other agencies involved in the crisis task force. This information can be shared with other group members. You are not required to follow the contingency plan developed for the last crisis of this type.

Finally, after you have read the briefing materials, a short briefing will be given that summarizes the situation which your task force faces.

TASK FORCE BRIEFING BOOK

INTRODUCTION

You and the others in this Operations Center (Op Center) have just been chosen to participate in a U.S. Government crisis task force. There is an extremely sensitive situation developing in the country of Shamba which involves U.S. national security. Each of you represents a different U.S. Government agency, but together you must provide the President with an action recommendation to safeguard our national security interests.

Time is limited. In order to act effectively, the President needs your final recommendations in three hours. So, the task force will use the computer-based group decision-making aid to analyze the problem and decide on the preferred courses of action to pass on to the President.

BACKGROUND

Within the last 5 hours a crisis situation of grave proportions has developed. It began when a U.S. B-52 bomber on a routine flight was forced to land in Shamba's capital city of Savin due to problems with its onboard electrical system. The B-52 has nuclear bombs on board. There was no U.S. military base in the area, and the crew of the B-52 felt that the plane might crash if the opportunity to land was not taken immediately. At the time, the Shamba Government was friendly to the United States.

Before landing, the crew's decisions were approved by the U.S. Commander at its home base, and U.S. technicians with the needed parts were immediately dispatched to Shamba and expected in four hours.

The refitting would take another two hours, and departure time for the B-52 was scheduled for six hours from time of landing. Because of the sensitivity of the B-52's nuclear payload, this emergency mission was to be kept secret.

At the time of the B-52 landing, the Shamba Government was a major Third World ally of the United States. Despite its military dictatorship, reports of human rights violations, and mass arrests of political dissidents, the United States had long been committed to supporting the ruling junta. Over the last 12 years the military government has been plagued by continual military skirmishes and terrorist harassment by an indigenous leftist rebel movement supplied with arms by Cuba.

The United States had been the major supplier of heavy arms to the Shambanese regime over the past 12 years. But, because of the after effects of Vietnam and growing disenchantment with the human rights stance of the Shambanese Government, the United States has been slowing down the rate of arms transfers to Shamba during the last year. No military personnel from the United States or Cuba have been actively involved in the fighting, although both donor nations have sent training officers to assist in using equipment. Under agreement with the Shamba Government, the United States maintains a small nonnuclear military base in Komsa in the north, but U.S. personnel remain within the base while on duty. U.S. forces have never participated in any military confrontation with the rebels, either on their own or in the course of aiding Shambanese regular troops.

Within recent months the rebel movement, which is extremely antagonistic toward the United States and constantly broadcasting anti-U.S. propaganda from its headquarters in the country of Marandi to the south, has been making strong military gains in the countryside outside Savin. However, U.S. intelligence reports did not forecast any quick conclusion to the conflict in either direction.

Then, without any warning, the rebel forces staged a lightning coup d'etat that has seemingly succeeded in overthrowing the Shambanese regime. This occurred just two hours after the B-52 landed. Since the takeover three hours ago, communication has been sporadic and information updates have been incomplete. We are not exactly certain about the current status, but we know the situation has worsened -- the nuclear bombs aboard the B-52 are now in the control of the rebels and they have just begun to make their demands known to us.

This packet includes all of the cable traffic, situation reports, force situation reports, maps, and background data that we presently have on the situation in Shamba. Limited as it is, this is all we know and our independent communication lines in Shamba are quickly being cut off. You will receive no further information on the situation before you make your recommendations to the President. Each of the other representatives in the task force have received the same information. However, you also have received a short briefing paper from your own agency that only you will see directly. You may transmit this information to the others if you wish.

TASK FORCE GOALS

Remember, your goal as a group is to develop preferred action alternatives to preserve U.S. national security in this crisis. Your recommendations are due on the President's desk three hours from the time you convened this task force meeting. After each of you has read all of your briefing materials, you must analyze the situation and determine jointly agreed preferred action alternatives by using the computer-based group decision-making aid.

To maintain confidentiality, the task force's mission will be referred to as "Operation TPCANYON." The State Department representative will act as chairman of the task force meeting.

UNCLASSIFIED

0515EST 04 JUL 79
FM AMEMBASSY SAVIN
TO SECSTATE WASH DC
INFO CIA WASH DC
SECDEF WASH DC
USMILBASE KOMSA

TPCANYON

SUBJ: SHAMBA REBEL SITUATION

1. AT 0500EST REBELS ATTACKED GOVERNMENT HQ IN SAVIN. PRESIDENTIAL GUARDS REPORTED KILLED. UNCONFIRMED REPORT THAT PRESIDENT AND OTHER TOP OFFICIALS HAVE ESCAPED.
2. AIRPORT UNDER ATTACK. LOST COMMUNICATION WITH B-52 at 0512EST. SUGGEST US TROOPS AT KOMSA BE FLOWN TO AIRPORT TO PROTECT B-52. NO WORD THAT REBELS HAVE ATTACKED KOMSA.
3. REBELS ALSO INVADE MCKOSAM AND BATU. GOVERNMENT FORCES APPEAR SYMPATHETIC TO REBEL CAUSE AND PUT UP NO REPEAT NO RESISTANCE.
4. AMEMBASSY AT OUTSKIRTS OF CITY SO NO IMMEDIATE DANGER SEEN YET. SECURITY INCREASED AT EMBASSY GATES.

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0520EST 04 JUL 79

FM AMCONSULATE MANDERO CITY

TO SECSTATE WASH DC

INFO CIA WASH DC

SECDEF WASH DC

TPCANYON

SUBJ: ASYLUM FOR SHAMANESE OFFICIALS

1. PRESIDENT, PRIME MINISTER, AND DEFENSE MINISTER HAVE
FLED TO MANDERO CITY AFTER APPARENT COUP BY REBEL FORCES.
AT 0515EST SHAMANESE OFFICIALS CONTACT USCONSULATE
SEEKING POLITICAL ASYLUM. REQUEST DIRECTIVES ON
ASYLUM REQUEST.

2. REBEL FORCES REPORTED MASSING ON MANDERO CITY-SHAMBA
BORDER. LOCAL TROOPS MOBILIZED BUT UNLIKELY TO BE SUFFICIENT
TO COUNTER REBELS. NO REPEAT NO FIRE REPORTED.

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0520EST 04 JUL 79
FM USMILBASE KOMSA
TO SECDEF WASH DC
INFO SECSTATE WASH DC
CIA WASH DC

TPCANYON

SUBJ: REBELS AT KOMSA MILITARY BASE

1. OUR COMMUNICATION LINES WITH EMBASSY IN SAVIN ARE CUT. UNCONFIRMED REPORTS OF REBEL-SHAMBA REGULAR FORCES FIGHTING IN MAJOR CITIES.
2. NO FIGHTING IN KOMSA ALTHOUGH REBEL TROOPS APPEAR TO BE MASSING HERE. AT APPROXIMATELY 0500EST REBEL MILITIA TOOK POSITIONS AT OUTSKIRTS OF KOMSA. ESTIMATE STRENGTH AT 1000. SHAMBA NATIONAL TROOPS APPEAR TO GIVE NO RESISTANCE. NO REBEL PROVOCATIONS BUT US BASE PUT ON ALERT.
3. REQUEST DIRECTIVE ON SENDING AID TO B-52 AT SAVIN AIRPORT.

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0525EST 04 JUL 79

FM AMEMBASSY SAVIN
TO SECSTATE WASH DC
INFO SECDEF WASH DC
CIA WASH DC

TPCANYON

SUBJ: EMBASSY SURROUNDED

10 MARINE GUARDS KILLED AT EMBASSY GATES AS REBELS INVADE
US COMPOUND AT 0520EST. APPROXIMATELY 50 REBELS RUSHED
GUARDS WITH AUTOMATIC WEAPONS. REBELS HAVE TAKEN POSITIONS
AROUND EMBASSY BUILDING. SHOOTING HAS ENDED. REBEL LEADER
HAS SHOUTED THAT IF WE PUT DOWN OUR WEAPONS NO ONE WILL
BE HURT. WE HAVE COMPLIED. EMBASSY PERSONNEL
FORCED INTO COURTYARD AND FRISKED. IT APPEARS THEY WANT
US AS HOSTAGES. NO REGULAR SHAMBA TOOPS IN
SIGHT. APPROXIMATELY 25 AMERICANS IN MAIN BUILDING AND

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0530EST 04 JUL 79

FM USMILBASE KOMSA
TO SECDEF WASH DC
INFO SECSTATE WASH DC
CIA WASH DC
COMBLUFLT EAST OCEAN

TPCANYON

SUBJ: USBASE DOMSA STRAFED

1. AT 0525EST BASE AIRSTRIP STRAFED IN LIGHTENING RAID BY
REBELS. NO REPEAT NO AIRCRAFT LEFT OPERABLE. 25 RECON
HELICOPTERS AND 30 FIGHTER BOMBERS STRAFED. 20 TROOP TRANSPORTS
ALSO DISABLED. 12 MEN KILLED.

2. GROUND BATTLE WITH REBELS BEGAN SIMULTANEOUSLY. REBEL
TROOPS NUMBER ABOUT 1000 TO OUR 2000. REBELS ARMED WITH
AUTOMATIC WEAPONS AND LIGHT AND HEAVY HOWITZERS. THEY
HAVE AIR SUPPORT. REBEL STRATEGY APPEARS TO BE TO SURROUND
BASE, KNOCK OUT OUR OFFENSE AND

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0545EST 04 JUL 79
FM COMBLUFLT EAST OCEAN
TO SECDEF WASH DC
INFO SECSTATE WASH DC
CIA WASH DC

TPCANYON

SUBJ: USFLEET DEPLOYED TO SHAMBA

1. AT 0545EST TWO US AIRCRAFT CARRIERS, ADAMS AND JEFFERSON, WERE DIVERTED FROM EXERCISE IN EAST OCEAN AND SENT ENROUTE TO POSITIONS 12 MILES OFF SHORE FROM MANDERO CITY AND MONQUE BAY. ARRIVAL TIME 0730EST. TO AWAIT DIRECTIVES. BOTH CARRIERS EQUIPPED WITH SURFACE*TO*AIR MISSILES AND ATTACK AIR WINGS.
2. AT 0540EST, INTERCEPTED MSG OF REFEL FORCES IN SAVIN TO REBELS IN KOMSA. MSG READS QUOTE WE HAVE B-52 AND NUKES STOP WHEN SITUATION STABILIZES WE WILL SEND DEMANDS UNQUOTE.

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0605EST 04 JUL 79
FM AMCONSULATE MANDERO CITY
TO SECSTATE WASH DC
INFO SECDEF WASH DC
CIA WASH DC
COMBLUFLT EAST OCEAN

TPCANYON

SUBJ: FIGHTING NEAR MANDERO CITY

1. ONE UNIT OF SHAMANESE REGULAR ARMY HAS APPARENTLY REMAINED LOYAL TO THE GOVERNMENT AND IS EXCHANGING FIRE WITH REBEL FORCES ACROSS MANDERO CITY- SHAMBA BORDER. FIGHTING BEGAN AT 0545EST. HEAVY CASUALTIES ON BOTH SIDES.
2. MSG INTERCEPTED FROM REBEL HQ THAT AMEMBASSY AT SAVIN QUIET WITH NO FURTHER GUNFIRE. MSG INDICATES REBELS HOLD AMBASSADOR AND STAFF HOSTAGE. COMMUNICATIONS CUT AT SAVIN EMBASSY.
3. B-52 APPARENTLY SURROUNDED. FATE OF CREW AND PAYLOAD UNKNOWN. BUT %%%\$\$_ INTERCEPTED MSG INDICATES THAT LOYAL SHAMBA TROOPS AT AIRPORT WERE DEFEATED BY REBELS WHO ARE IN COMPLETE CONTROL AS OF 0545EST.
4. REBEL MSG ALSO IMPLIES HEAVY FIGHTING NEAR KOMSA MILBASE BETWEEN UUS AANNDD RREEBBEELL FORCES. HEAVY CASUALTIES BY US DUE TO LACK OF AIR COVER AND SUPPORT.

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JUL 4 06:20EST 1979 PAGE 10F2 W)OW_63248F

//88!!xx

TPCANYON

MANDERO CITY (AP) - REBEL FORCES IN THE NEIGHBORING COUNTRY OF SHAMBA HAVE STAGED AN APPARENTLY SUCCESSFUL COUP AGAINST THE 15 YEAR OLD MILITARY DICTATORSHIP AND HAVE INITIATED A CHAIN OF EVENTS THAT MAY CORENER THE UNITED STATES INTO AN UNEXPECTED NUCLEAR CRISIS.

SOME AMERICAN LIVES HAVE BEEN LOST, THE EMBASSY HAS BEEN TAKEN OVER BY THE REBELS, THE AIR BASE HAS BEEN ATTACKED, AND AN UNEXPLAINED B-52 BOMBER SITTING ON THE RUNWAY AT SAVIN AIRPORT WITH A NUCLEAR PAYLOAD HAS BEEN CAPTURED BY THE REBEL FORCES.

THE EARLY MORNING REBEL ATTACKS WERE CARRIED OUT WITH LIGHTENING SWIFTNES IN ALL OF SHAMBA'S MAJOR URBAN CENTERS BEGINNING AT 5AM EASTERN STATNDARD TIME. REGULAR SHAMBANESE TROOPS HAVE CAPITULATED IN MOST CASES WITH LITTLE RESISTANCE ALTHOUGH SOM UNITS, ESPECIALLY NEAR THE INDEPENDENT NEUTRAL CITY STATE OF MANDERO CITY, HAVE REMAINED LOYAL AND ARE ENGAGING IN BATTLE WITH THE REBELS.

THE U. S. EMBASSY COMPOUND IN SAVIN, THE CAPITAL OF SHAMBA, IS BEING OCCUPIED BY THE REBELS AND AMBASSADOR YOUNG AND 25 EMBASSY PERSONNEL ARE BEING HELD HOSTAGE. UNOFFICIAL REPORTS INDICATE THAT 10 MARINE GUARDS HAVE BEEN KILLED BY THE REBELS IN THE TAKEOVER. HEAVY FIGHTING IS ALSO CONTINUING BETWEEN REBEL AND U.S. FORCES AT THE U.S. MILITARY BASE AT KOMSA. ALL AMERICAN AIRCRAFT AT THAT BASE WERE DESTROYED.

JUL 4 06:20EST 1979 PAGE 20F"2 777&&&890)

REPORTEDLY DESTROYED, WHILE STILL ON THE GROUND, BY AN
EARLY MORNING REBEL AIR STRIKE.

A PUZZLING ASPECT TO THIS SURPRISE REBEL COUP THAT TURNS
THE SITUATION INTO A VERITABLE CRISIS FOR THE U.S. IS THE
UNEXPLAINED B-52 BOMBER WITH A NUCLEAR PAYLOAD THAT WAS
PARKED ON THE RUNWAY AT SAVIN AIRPORT AT THE TIME OF THE
COUP. RELIABLE SOURCES FROM THE JUST DEPOSED SHAMBA GOVERNMENT
WHO HAVE FLED TO THIS INDEPENDENT CITY STATE HAVE CONFIRMED
THAT A U.S. B-52 BOMBER LANDED EARLY JULY 4 PRIOR TO THE
COUP ATTACK.

WHY THE B-52 WAS SENT TO SHAMBA IS A MYSTERY. DEFENSE
DEPARTMENT SPOKESMEN HAVE NO COMMENTS TO MAKE ON THE B-52
AND WOULD NOT ACKNOWLEDGE ITS EXISTENCE IN SHAMBA UNTIL MORE
FACTS ARE RECEIVED.

HOWEVER, INTERCEPTED REBEL COMMUNICATIONS HERE INDICATE
THAT NUCLEAR BOMBS ARE INDEED ABOARD THE B-52 AND THAT
THE REBELS HAVE COMMANDEERED THE AIRCRAFT. THE FATE OF
THE B-52'S CREW IS UNKNOWN. THERE IS ALSO WIDE RANGING
SPECULATION AS TO WHAT THE REBELS WILL DO WITH THEIR NEW
NUCLEAR ACQUISITIONS. THEIR RABID ANTI*U.S. STANCE IS
WELL KNOWN AND THERE IS FEAR THAT THE LIVES OF MANY AMERICANS
STILL LIVING IN SHAMBA ARE IN DANGER. THERE ARE ALSO FEARS
THAT THE NUCLEAR POWER PLACED IN THE HANDS OF THE REVOLUTIONARIES
MAY LEAD TO AN UNCONTROLLABLE NUCLEAR HOLOCAUST.

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UNCLASSIFIED

0645 EST 04 JUL 79
FM AUSTRIAN EMBASSY SAVIN
TO AMCONSULATE MANDERO CITY
INFO SECSTATE WASH DC
SECDEF WAH DC
CIA WASH DC

TPCANYON

SUBJ: REBEL MSG TO US

AUSTRIAN AMBASSADOR INSAVIN CONTACTED THE US CONSULTE IN MANDERO CITY AT 0640EST. THEY HAVE BEEN CONTACTED BY THE REBELS, NOW HEADQUARTERED AT SAVIN AIRPORT, AND ASKED TO BE THE GO BETWEEN WITH THE U.S. THE REBELS HAVE TRANSMITTED THE FOLLOWING INFORMATION:

1. THE REBELS ANNOUNCE THE ESTABLISHMENT OF THE NEW FREE GOVERNMENT OF THE SHAMBA PEOPLE AS THE OFFICIAL REPRESENTATIVES OF THE SHAMBA PEOPLE.
2. REBELS ARE IN CONTROL OF USEMBASSY IN SAVIN. ALL CIVILIAN PERSONNEL ARE SAFE AND BEING HELD AS HOSTAGES.
3. REBELS ARE IN CONTROL OF AIRPORT AND HAVE NATIONALIZED THE B-52 AND ITS PAYLOAD. THE CREW HAS BEEN KILLED.
4. REBELS HAVE NEUTRALIZED THE US MILITARY BASE AT KOMSA AND ARE HOLDING ALL US MILITARY PERSONNEL THERE AS HOSTAGES.
5. DEMANDS WILL BE TRANSMITTED TO US WITHIN AN HOUR VIA AUSTRIAN EMBASSY IN SAVIN.
6. THE US MUST BE PREPARED TO MEET THE DEMANDS QUICKLY OR BE RESPONSIBLE FOR A HOLOCAUST.

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RADIO BROADCAST

OW 04JUL79Y VOICE OF SHAMBA IN ENGLISH 7:15AM(EST)

(STATEMENT) "WE, THE SHAMANESE PEOPLE, WILL NO LONGER BE THE PAWN OF AMERICAN IMPERIALIST POWER. THE CORRUPT AND USURPING PIGS WHO HAVE KEPT US IN OUR SHACKLES AND COLLABORATED WITH THE IMPERIALISTS HAVE FLED LIKE SCARED RABBITS. THE ENEMIES OF THE PEOPLE HAVE BEEN DEFEATED. THE REBEL CAUSE HAS BEEN WON. THE PEOPLE OF SHAMBA ARE ONE.

"THE GREAT SYMBOL OF AMERICAN IMPERIALISM IS ALSO NOW OURS. WE HAVE NATIONALIZED THEIR AIRPLANE OF NUCLEAR DESTRUCTION. THEY INTENDED TO USE IT TO CAUSE DESTRUCTION TO THE PEOPLES' REBELLIONS NOT ONLY IN SHAMBA, BUT ALL OVER THE THIRD WORLD. BUT THE IMPERIALIST IS A SLOW AND CLUMSY BEAST AND THE PEOPLE WERE ABLE TO STOP HIM IN HIS TRACKS.

"WE WILL NOW USE THIS NUCLEAR POWER TO FREE THE PEOPLE ONCE AND FOR ALL. WE HAVE THE TECHNICAL KNOW-HOW TO USE THIS POWER AND CHANNEL IT TO DESTROY THE IMPERIALIST. WE HAVE STUDIED IN THEIR SCHOOLS AND TRAINED WITH THEIR ENGINEERS. IT IS FITTING THAT WE SHOULD PUT A STOP TO THE CHAINS THEY PLACE AROUND OUR PEOPLES' NECKS. LONG LIVE THE SHAMANESE PEOPLE. DEATH TO THE IMPERIALIST."

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0745EST 04 JUL 79
FM AUSTRIAN EMBASSY SAVIN
TO USCONSULATE MANDERO CITY
INFO SECSTATE WASH DC
SECDEF WASH DC
CIA WASH DC

TPCANYON

SUBJ: LIST OF REBEL DEMANDS

AT 0740EST THE FOLLOWING MSG WAS TRANSMITTED BY THE REBELS
TO AUSTRIAN EMBASSY SAVIN.

QUOTE THE IMPERIALIST AMERICAN POWER WILL BOW TO THE
DEMANDS OF THE SHAMANESE PEOPLE. WE HOLD YOUR AMBASSADOR
HOSTAGE, WE HOLD YOUR MILITARY BASE HOSTAGE, AND YES, WE
HOLD YOUR DESTRUCTIVE B-52 AND ITS BOMBS HOSTAGE. WE
DEMAND THE FOLLOWING:

1. THE US WILL GIVE THE SHAMANESE PEOPLE 2½ BILLION
SWISS FRANCS (ABOUT 1 BILLION U.S. DOLLARS) A YEAR FOR THE
NEXT 10 YEARS AS WARTIME REPARATIONS.

2, ALL US CITIZENS WILL LEAVE SHAMBA BUT WILL LEAVE
BEHIND ALL EQUIPMENT, FACTORIES, AND POSSESSIONS TO BE
NATIONALIZED FOR THE GOOD OF THE SHAMANESE PEOPLE.

3. THE US WILL NOT GIVE ASYLUM TO THE OVERTHROWN
FORMER DICTATOR OF SHAMBA AND HIS POLITICAL CRONIES, BUT
INSTEAD WILL ESCORT THEM TO THE SHAMANESE BORDER SO
THEY CAN BE PUT TO TRIAL BY THE PEOPLE OF SHAMBA.

4. THE US WILL DECLARE ITS ERROR IN SUPPORTING THE
FORMER SHAMANESE DICTATOR AND WILL PLEDGE NOT TO INTERFERE
IN THE SHAMBA STATE.

5. THE US PROMISES TO DISMANTLE IMPERIALIST NUCLEAR
BASES OF DESTRUCTION THROUGHOUT THE WORLD AND WILL BEGIN
BY WITHDRAWING NUCLEAR WEAPONS AND PERSONNEL FROM NATO
BASES IN GREAT BRITAIN.

YOU HAVE 4 HOURS TO RESPOND TO OUR DEMANDS. IF YOU ACCEPT

0745EST 04 JUL 79 Page 222222222

YOU WILL HAVE 15 DAYS TO ACCOMPLISH ALL FIVE THE DEMANDS
IF YOU DO NOT ACCEPT, WE WILL KILL ALL OF THE AMERICAN
STOOGES WE HOLD AS HOSTAGES AND WILL AIM YOUR NUCLEAR
BOMBS AT THE PEOPLE OF MANDDERO CITY WHO WILL
BE THE SACRIFICIAL LAMBS OF YOUR VICIOUSNESS.

DO NOT FEAR, WE HAVE THE KNOW HOW TO FLY YOUR B-52 AND
DROP YOUR BOMBS. THE SHAMBANESE PEOPLE PRAY YOU WILL
TAKE THE HUMANITARIAN PATH, BUT WE WILL NOT FLINCH AT
FOLLOWING THROUGH ON OUR TREAT IF YOU DO NOT. UNQUOTE.

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1. STATUS OF B-52

As of approximately 0545EST the B-52 is in rebel hands. The crew has been killed. Nuclear payload is still on board. Electrical system onboard is still crippled and may impair any flights. (The American technicians who were inflight to Savin to repair the B-52 were instructed to return to home base after the coup.) It is uncertain as to whether the rebels know about the faulty system. However, they may have the technical capability to patch up the system though it may take them several days. In any case, the state of the electrical system is unpredictable. It may be in sufficient order to allow the B-52 to reach Madero City.

2. STATE OF THE U.S. EMBASSY AT SAVIN

The Embassy compound is in rebel hands as of 0520EST. Approximately 50 gunmen are holding the Ambassador and about 25 Americans as hostages at gunpoint. Ten Marines were killed. Direct communications lines cut. Last hard report 0525EST.

3. STATE OF THE U.S. MILITARY BASE AT KOMSA

All aircraft were disabled and 12 Americans killed in rebel raid at 0525EST. Rebel ground attack began at 0525EST with 1000 rebel troops and massive air support. Heavy U.S. casualties reported. Rebels armed with automatic weapons and howitzers. Direct communication lines cut. Last hard report 0530EST. At last report the runways at the base were still operational, despite the damaged planes.

4. REBEL DEMANDS

At 0740EST the rebels issued the following demands through the Austrian Embassy in Savin:

- a. 2 and one-half billion Swiss francs (about \$1 billion U.S. dollars)
- b. Removal of all American citizens from Shamba.
- c. Return of former Shambanese President and high officials now seeking asylum at U.S. Consulate in Mandero City.
- d. Admission of U.S. error in foreign policy toward Shamba and pledge of noninterference.
- e. A promise to dismantle U.S. nuclear bases throughout the world, and to begin withdrawing nuclear weapons from NATO bases in Great Britain.

Their stated deadline for a response is four hours from time of demand. They threaten to use the B-52 to destroy the civilian population in Mandero City if there is noncompliance with their demands.

5. REBEL FORCE STATUS

The rebels have distributed their forces throughout the country but are concentrated in the urban areas and in the south. They number about 25,000 men. They have experienced air support, manned by Cuban pilots; Cuban and rebel-flown aircraft cannot deliver nuclear bombs. There is no evidence of offensive sea power in rebel hands.

6. LOYAL SHAMBA FORCE STATUS

All but one Shamba unit has surrendered to the rebels without extensive fighting. The Shamba infantry numbers about 30,000 and is basically located in a belt between Savin and Mandero City. It is uncertain

as to whether the surrendering troops will now take up arms on the rebel side in the event of U.S. military action. The one loyal Shambanese unit is currently in heavy combat with rebel forces just outside of Mandero City.

7. U.S. FORCE STATUS

The small military base at Komsa houses all U.S. military personnel and equipment under U.S. control in Shamba. There is only a caretaker unit of 2,000 men at the base due to the recent U.S. policy to withdraw militarily from Shamba. All aircraft are destroyed as of 0525 EST. However, 100 howitzers and 100 medium-range tanks may still be operable. The carriers Adams and Jefferson of COMBLUFLT in the East Ocean are stationed 12 miles offshore from Mandero City and Monque Bay, respectively. Both carry USMC assault forces.

8. REGIONAL BACKGROUND

a. Mandero City

An independent and neutral city-state on the western coast of Shamba. It has favored neither the military dictatorship nor rebel cause during the last 15 years of fighting in Shamba.

b. Marandi

A major nation comprising the entire southern border of Shamba. Although Marandi has been officially neutral in the conflict between the regime and the rebels, it has tolerated the presence of rebel training operations within Marandi territory, provided a haven for fleeing rebel troops, and allowed the rebels to set up their temporary headquarters in Marandi City.

9. REBEL LEADER BIOGS

a. Joseph Coshambayatta

Coshambayatta has been the Commander-in-Chief of rebel forces for the last 15 years and has recently been named President-in-exile. He received a B.S. and M.S. in aeronautical engineering from Northwestern University in the late 1950's. He also worked for a major American aircraft manufacturing firm. On his way back to Shamba in 1962, he visited Cuba and since then has become highly politicized and a major leftist agitator in his native region.

b. Nenya Mebaqshoo

Mebaqshoo has been involved with the rebels since 1970. She has been characterized as Coshambayatta's Chief of Staff. She received a doctorate in political science at New York University in 1969, where she had been extremely active in revolutionary student groups and was a known contact of Cuban agents. She is known for her flowery rhetoric and sometimes ruthless actions, such as the mass murdering of villagers near Batu in 1978.

c. Boka Nobushq

Nobushq is the Defense Minister in exile of the rebel movement. He is credited with developing the structure of the modern rebel army. He was instrumental in introducing highly sophisticated weaponry into battle and training the rebel forces over the years from an agrarian populist army into the most mechanized, well-disciplined, and well-trained army in the region. He and his staff have extensive experience in aircraft maintenance and weapons deployment.

10. COMMUNICATION LINES AVAILABLE

a. Contact With U.S. Military Base at Komsa

No direct links. Communication may be established through Austrian Embassy in Savin or through the loyal Shambanese army unit on the outskirts of Mandero City.

b. Contact With Rebels

Rebel contact has been established formally through the Austrian Embassy. Informal contacts have been established through an independent agent in Mandero City.

11. MAP OF SHAMBA

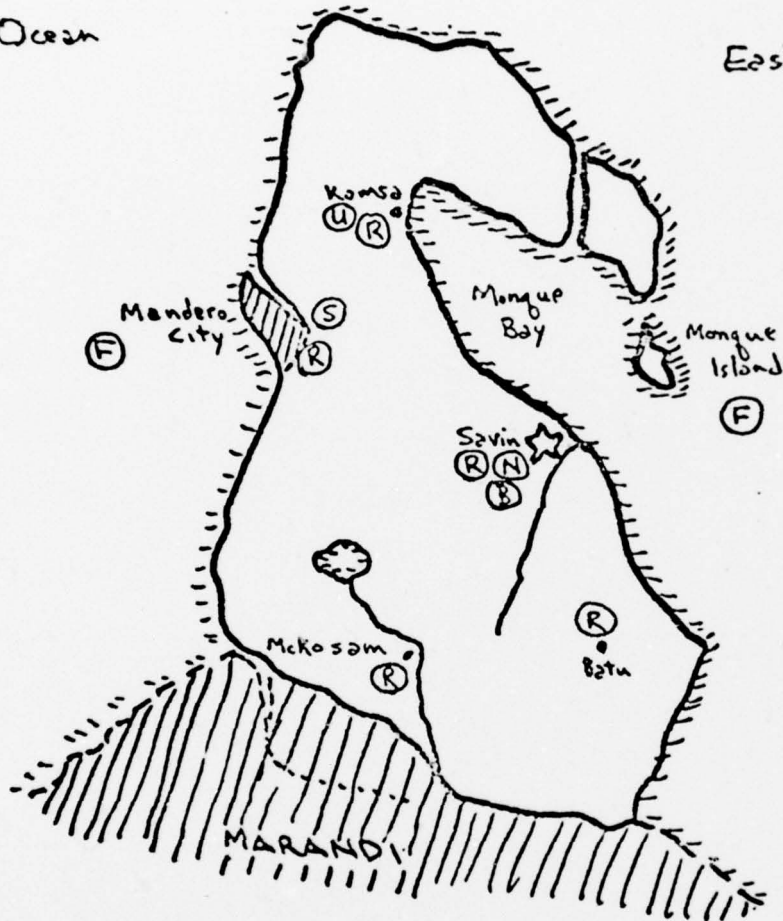
See next page.

UNCLASSIFIED

SHAMBA

East Ocean

East Ocean



KEY:

- B = B-52
- F = U.S. Fleet
- N = Nuclear Bombs
- R = Rebel Troops
- S = Loyal Shamba Troops
- U = U.S. Troops

UNCLASSIFIED

AGENCY BRIEFING UPDATES

JOINT CHIEFS OF STAFF

RESPONSIBILITIES

- Represent Defense Department position.
- Protect physical security of U.S. and military personnel, facilities, and equipment overseas.
- Support the execution of the task force decision by providing personnel and command facilities.

LAST DEFENSE DEPARTMENT CONTINGENCY PLAN

Use force on rebel positions to regain or destroy the B-52 and its nuclear payload.

INFORMATION UPDATE

(Phonecom): It has just been learned that as of 0755EST fighting at Komsa between U.S. and rebel troops has subsided. U.S. troops have retreated within the military base, and rebel troops have staked out positions surrounding the base but have not entered it.

MEMBERS OF THE TASK FORCE

- Department of State, Chairman of Task Force
- National Security Council (NSC)
- Central Intelligence Agency (CIA)
- Defense Nuclear Agency (DNA)
- Joint Chiefs of Staff (JCS)

STATE DEPARTMENT BRIEFING UPDATE

RESPONSIBILITIES

- Safeguard U.S. personnel and property overseas.
- Use diplomatic channels to achieve U.S. national security interests.

LAST STATE DEPARTMENT CONTINGENCY PLAN

Set up framework for negotiations with the rebels and attempt to delay them.

INFORMATION UPDATE

(Phonecom): At 0755EST, the U.S. Consulate at Mandero City was able to make positive contact with authoritative rebel representatives there on an informal secret level. They are willing to discuss their demands before the deadline.

MEMBERS OF THE TASK FORCE

- Department of State, Chairman of Task Force
- Joint Chiefs of Staff (JCS)
- Central Intelligence Agency (CIA)
- National Security Council (NSC)
- Defense Nuclear Agency (DNA)

CENTRAL INTELLIGENCE AGENCY BRIEFING UPDATE

RESPONSIBILITY

- Collect intelligence information worldwide to protect U.S. national security.
- Carry out other (special) operations, as directed by the President.

LAST CIA CONTINGENCY PLAN

Use rebel agents on CIA payroll to sabotage B-52 and its nuclear payload on the runway and disrupt the rebel command structure.

INFORMATION UPDATE

(Phonecom): At 0755EST, it was reported that the nuclear payload was being removed from the B-52 and hidden away from the airport to prevent a lightning attack by the United States to destroy the rebel's source of leverage.

MEMBERS OF THE TASK FORCE

- Department of State, Chairman of Task Force
- Central Intelligence Agency (CIA)
- Joint Chiefs of Staff (JCS)
- National Security Council (NSC)
- Defense Nuclear Agency (DNA)

NATIONAL SECURITY COUNCIL BRIEFING UPDATE

RESPONSIBILITY

- Develop national security policy for the President.

LAST NSC CONTINGENCY PLAN

Set up the framework for negotiations with the rebels and attempt to delay them while setting up immediate plans for a lightning air raid on the airport.

INFORMATION UPDATE

None.

MEMBERS OF THE TASK FORCE

- Department of State, Chairman of Task Force
- National Security Council (NSC)
- Joint Chiefs of Staff (JCS)
- Central Intelligence Agency (CIA)
- Defense Nuclear Agency (DNA)

DEFENSE NUCLEAR AGENCY BRIEFING UPDATE

RESPONSIBILITY

- Safeguard Defense Department nuclear materials, weapons, and facilities.

LAST DNA CONTINGENCY PLAN

Use force to destroy the B-52 and its payload at the airport.

INFORMATION UPDATE

None.

MEMBERS OF THE TASK FORCE

- Department of State, Chairman of Task Force
- Defense Nuclear Agency (DNA)
- Joint Chiefs of Staff (JCS)
- National Security Council (NSC)
- Central Intelligence Agency (CIA)

BRIEFING SLIDES

OPERATION TPCANYON SITUATION BRIEF

MAJOR EVENTS OF 04 JUL 79

0315EST B-52 With Nukes Lands At Savin Due to Electrical Problems
0500EST Rebels Attacks Throughout Shamba; Overthrow Government
0525EST U.S. Embassy Occupied
0530EST U.S. Military Base at Komsa Under Attack and Without
Air Support
0545EST Rebels Gain Control of Airport and B-52
0640EST First Rebel Contact
0740EST Rebels State Demands

AMERICAN CASUALTIES TO DATE

- 10 Marines at Embassy
- 12 Army Personnel at Komsa
- B-52 Crew
- U.S. Aircraft at Komsa

REBEL DEMANDS

1. 2 and one-half Billion Swiss Francs Annually for 10 Years
2. Removal of U.S. Citizens
3. Return of Former Shambanese Officials
4. Declaration of U.S. Error in Foreign Policy
5. U.S. Promise to Dismantle Nuclear Bases Starting With NATO Bases in Great Britain

Deadline: 4 Hours from 0740EST

If We Accept: 15 Days to Comply

If We Do Not Accept: Threat to Use Nukes on Mandero City

U.S. FORCE STATUS

1. Komsa Military Base Under Siege
 - 2,000 Men With Tanks and Howitzers
 - No Air Cover
2. Adams and Jefferson from COMBLUFLT in East Ocean 12 Miles Off Shore from Mandero City and Monque Bay
3. No Assistance Likely From Shambanese Regular Troops

B-52 STATUS

- Nuclear Payload Aboard
- Electrical System Crippled
- May Be Able to Fly to Manderero City

TASK FORCE RESPONSIBILITY

- Choose Preferred Action Alternatives for OP TPCANYON to Preserve U.S. National Security
- Deadline: 3 Hours

APPENDIX C

DIFFERENCES BETWEEN SRI AND PERCEPTRONICS PROGRAMS

DIFFERENCES BETWEEN SRI AND PERCEPTRONICS PROGRAMS

1. Provisional Estimates

SRI's program does not elicit provisional values on nodes but computes these values from provisional assessments of outcome variables (which we name attribute levels). For every terminal node of the partially expanded tree the user is asked to estimate the range and likely value for each outcome variable (e.g., aircraft losses, ship losses) as a result of events possibly emanating from the node under discussion. The effect of each variable on the value of the node is computed using a linear aggregation model with fixed coefficients.

SRI's program can afford to work with a fixed linear model since it is designed for a fixed domain of applications; the outcome variables as well as their relative contributions do not vary significantly from one problem situation to another, thus, the set of variables and their coefficients constitute a domain specific knowledge which can be elicited "off board" and preprogrammed.

In as much as Perceptronics program is designed to be domain independent one cannot utilize the luxury of preprogrammed value structures. SRI's technique, however, could still be used if the program begins with eliciting the value structure before any tree expansion, and then the value attributes and their weights could be used in the queries.

For example, in the case of a terrorist attack, after eliciting the value attributes: (1) number of hostages killed; (2) degree of deterring future attacks, etc., the program would elicit the following type of information: "Assuming _____, estimate the number of hostages killed thereafter," or "Assuming _____, estimate the degree of deterring future attacks thereafter."

On the basis of these estimates (most likely value plus range) the program would compute the provisional value and provisional range for the node in question and, using sensitivity analysis, would rank terminal nodes in order of expansion worthwhileness.

The advantage of this mode of elicitation is its accuracy. It is much easier for the user to envision a range of tangible things (e.g., number of ships lost or number of hostages killed) than to estimate a range for an abstract provisional node value. In fact, in order to arrive at these provisional value estimates the user is required to perform the multiattribute analysis by mental calculations.

The disadvantage of conducting a MAU analysis at every stage along the expansion is the length of time it consumed. This was identified by SRI to be the main limitation of their system (p. 79). Indeed, since the only use of the provisional estimates is to determine the order of node expansion, it seems unreasonable to spend that much time on refining these estimates, especially in the first few expansion stages.

Mental aggregation may be sufficiently accurate for the purpose, keeping in mind that the procedure for node selection in itself is suboptimal and that in group decision making value ranges can be estimated directly from the group differences.

In summary, it is recommended to adopt some of SRI's elicitation procedures only at the last stages of the tree expansion where MAU are more likely to be required for resolving group differences.

2. Order of Node Expansion

SRI's program elicits three estimates for every outcome variable: likely value \hat{x} , upper limit X_{imax} , and lower limit X_{imin} . These give

rise to three estimates of the value of each terminal node: \hat{u} , u_{imax} , u_{imin} . The program would then fit a distribution (presumably linear) to these estimates which reflects the user's uncertainty in value. On the basis of this distribution the program then calculates the "value of modelling", V ; for each terminal node. This number reflects the expected increase in the utility of the decision due to resolving the uncertainty in the value of mode i . It is identical to the calculations reported in Perceptronic's progress report (PQTR-1046-77-9) September, 1977, pages 3-7. SRI's expression:

$$V = P * Pa (v + D - m)$$

is identical to Perceptronic's expression:

$$\Delta U_i = \begin{cases} \frac{\Pi_i}{4\sigma_i} (\sigma_i - S_i)^2 & \text{For } \sigma_i > S_i \\ 0 & \text{otherwise} \end{cases}$$

for the case of uniform distribution of values over the range $v - \sigma \leq v^* \leq v + \sigma$. The interpretation we gave in page 3-7, that the value of expanding a node is proportional to the mean overswing $\Pi \frac{\sigma - S}{2}$ times the probability of overswing occurrence $\frac{\sigma - S}{2\sigma}$ is true for all distributions as is shown in SRI appendix.

It is doubtful, however, whether the additional accuracy achieved by eliciting a distribution is merited over the simpler method of eliciting a range and assuming a uniform distribution over it. The user may have a definite knowledge of skewness when estimating a tangible entity such as number of ships lost, but not when required to estimate ranges on provisional values. At any rate it would be very easy to modify the formula for ΔV_i in order to take into account skewed distributions

3. Assistance in Recalling Relevant Events

SRI's program contains a feature which assists the user in recalling events which are crucial to the decision strategy, and incorporates them in the decision tree. The main difference between Perceptronics' method of eliciting events and that of SRI is that instead of asking "are there any events that could happen after _____" SRI asks; "Are there any events that could make outcome variable X_i go higher?" X_i is selected on the basis of attribute sensitivity analysis. (They choose the variable with highest $r_i = a_i (X_{i\max} - \hat{X}_i) / \Delta$, in fact, they should choose the one with the highest $V_i = \pi_i [a_i (X_{i\max} - \hat{X}_i) - \Delta] / a_i (X_{i\max} - \hat{X}_i)$ according to our ΔU_i formula).

This is a desirable feature that should and could be adopted by Perceptronics system. It is part of the more radical proposal to organize queries around "issues" rather than scenarios as proposed by Leal and Pearl, 1977, and more recently by Pearl in an informal proposal to ARPA. One can, also, incorporate this feature locally in the present system using attribute sensitivity analysis followed by queries of the type: "What does _____ depend on?" or "Try to think about events that might have a significant impact on _____." The entry _____ should contain an attribute name which was identified as highly sensitive.