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EXECUTIVE AIDS FOR
CRISIS MANAGEMENT

Interim Technical Report

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Sponsored by:
Defense Advanced Research Projects Agency

ARPA Order Number	2928, Amendment No. 5
Program Code Number	7W10K58
Contractor	CACI, Inc.-Federal
Effective Date of Contract	December 1, 1976
Contract Expiration Date	August 30, 1977
Amount of Contract	$148,397
Contract Number	N00014-77-C-0135
Principal Investigator	Dr. Leo A. Hazlewood
Short Title of Work	Crisis Management
Date of Report	April 15, 1977
Period Covered by Report	December 1 - April 1, 1977

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CHAPTER 1. INTRODUCTION

This report summarizes CACI, Inc.-Federal's progress between December 1, 1976, and April 1, 1977, in developing a prototype executive aid for crisis management under Contract No. N00014-77-C-0135. The research discussed in this report is funded by the Defense Advanced Research Projects Agency's Cybernetics Technology Office (ARPA/CTO) as part of its Crisis Management Program. Accordingly, the first part of this chapter briefly discusses the goals of the ARPA Crisis Management Program and the place of this project in that program. The second part of the chapter reviews the tasking required for this project and relates activities in each task to the rest of the report.

THE ARPA CRISIS MANAGEMENT PROGRAM

The ARPA Crisis Management Program is a major undertaking to develop, test, and transfer technologies in three areas:

1. Computer-based early warning and monitoring systems;
2. Computer-based executive aids for crisis managers; and
3. New quantitative methods for advanced warning, monitoring, and management.

Wide-ranging research has been directed by ARPA in each of these areas since 1974. Initial work through 1976 was directed toward certain basic research themes that are prerequisites for effective technology development in the social sciences. Characteristic of this type of research was CACI's attempt to inventory past U.S. crises (CACI, 1975) and to identify the major patterns of problems encountered in past U.S. crises (CACI, 1976).

By 1976, however, a corner had been turned in the research needs for crisis management. Significant new information had been developed that was directly applicable to producing user-oriented, computer-based aids to

- Assist defense operations centers in identifying what indicator and warning patterns signal the onset of a crisis; and
- Develop option generation and evaluation aids to assist crisis managers after the crisis has begun.

CACI's efforts under Contract No. N00014-77-C-0135 are directed toward developing a prototype executive aid for crisis management. The aid is focused on behavior and policy responses after the crisis has occurred. It is not an early warning device.[1] Rather, it seeks to inform response option recommendation by action officers and response option selection by decision-makers in the Department of Defense once extraordinary military management activity has begun and the manipulation of key military assets to achieve U.S. policy objectives is being discussed.

A voluminous literature exists on behavior of individuals and nations during international crises.[2] Almost all of this literature suggests that individuals placed under stress (as they are by definition in international crises) display reduced information search, consider fewer alternatives, overreact to isolated pieces of information, and generally engage in what would otherwise be suboptimal choice

---

[1] ARPA's early-warning efforts are reported in Andriole (1976), Andriole and Young (1977), Wittmeyer (1976), and Daly (1977).

[2] This literature has most recently been reviewed for ARPA in Shapiro and Gilbert (1975). Other major discussions of this research are found in Zinnes (1976), Hoole and Zinnes (1976), Holsti (1972), Janis (1972), Hermann (1972, 1969), Tanter (1974), Candela and Tanter (1974), Holsti, et al. (1968), Allison (1971), and many, many others. Attempts to develop organizational guidelines from this literature are found in Shapiro and Cummings (1976), Havron and Blanton (1977), Hermann (1975, 1974), Milburn (1969), and Phillips (1977).

generation and selection. Given the criticality of wide-ranging information search and alternative generation within the time constraints imposed by a crisis to optimal policy option selection, CACI is attempting to develop an executive aid that will assist crisis management in three ways.

1. Expand the range of alternative analogies of crisis situations available to the crisis manager in the Department of Defense.

2. Present systematic evidence on the relationship between a declared U.S. policy objective and actions that have historically been taken to achieve that objective.

3. Provide an algorithm to facilitate policy response selection based on the historical evidence when multiple (and perhaps inconsistent) policy objectives are followed in the crisis.

Expanding Available Alternative Analogies

Jervis (1976) has recently reviewed the evidence on the importance of personal experience and historical analogies in alternative generation and selection, particularly under stress. The preponderance of this research suggests that individuals tend to focus on major salient events from past experience and on rules and "lessons learned" from the past experience of the organization.[3] Accordingly, one thrust of the prototype executive aid is packaging information on past U.S. crises that can be recalled to show analogous situations in which the United States pursued similar policy objectives and/or considered similar actions. While a number of these incidents may be known to defense

[3] In interviews with a series of U.S. foreign policy advisors, Shapiro and Bonham (1973) encountered recurrent references to "the lessons from..." syndrome. Similar evidence is present in analyses of previous crises and previous intelligence shortfalls (Ben-Zvi, 1976; Shlaim, 1976; Lee, 1977).

crisis managers, it is unlikely that all or most action officers and decision-makers would have such detailed information at their disposal. Thus, crisis management may be improved simply by providing more systematic information on past crises that had many of the same characteristics.

Systematic Evidence on Past U.S. Actions and Objectives

Recent research by Blechman and Kaplan (1977) suggests that a clear "style" to U.S. crisis responses exists in which primary reliance is placed on naval forces. However, they also conclude that the most effective single means for obtaining the primary U.S. policy objective in a crisis is to use long-range, land-based aircraft.

The prototype executive aid for crisis management builds on this path-breaking research as well as other analyses on the limits to using force and coercive diplomacy (George, et al., 1971; Stern, forthcoming). Information on U.S. objectives is linked to actions taken in past crises to help guide response selection. Thus, with the prototype executive aid, the crisis manager will be able to examine what actions have been most strongly associated with any single objective over a sample of U.S. crises since 1956. In turn, this information should help crisis decision-makers to evaluate the likely efficiency of using different combinations of actions to achieve a specific policy objective.

Response Evaluation Given Multiple Objectives

Seldom, if ever, does the United States pursue a single policy objective in a crisis. Rather, a number of objectives, some of which may be inconsistent with each other, are simultaneously pursued. To respond to a very real crisis management problem -- how response options should be evaluated given multiple policy objectives -- the prototype executive

aid includes an algorithm for evaluating the effectiveness of past actions given a user-specified set of policy objectives. This algorithm should help crisis managers to evaluate response alternatives in a more realistic, multiple-objective setting.

RESEARCH TASKS

This research to develop a prototype executive aid for crisis management is being carried out in six interrelated tasks. Each task contributes toward developing and evaluating executive aids to assist crisis management. The six tasks are:

1. Analyze the Historical Data Base for the Crisis Management Executive Aid.
2. Design a Prototype Executive Aid to Assist Crisis Management.
3. Generate Interactive Computer Software for the Prototype Crisis Management Executive Aid.
4. Evaluate the Usefulness of the Executive Aid for Crisis Management.
5. Transfer the Executive Aid to an ARPA-Designated Computer System.
6. Prepare Software Documentation and Final Reports.

The remainder of this report discusses progress on completing these research tasks. Chapter 2 details progress on Tasks 2, 3, and 5 (designing, generating, and transferring the aid). Chapter 3 presents additional information on the role of historical evidence in operating the aid (Tasks 2 and 3). Supporting material on the historical data base is included in Appendices A-G. Chapter 4 summarizes progress to date and plans for evaluating the usefulness of the crisis management aid (Task 4).

CHAPTER 2. STRUCTURE OF THE PROTOTYPE CRISIS MANAGEMENT AID

The six sections of this chapter describe the structure of CACI's prototype executive aid for crisis management. The first section discusses the design characteristics of the aid. The second section presents an overview of the structure of the aid. The next three sections each outline the operation of a separate part of the crisis management aid. Finally, the major points on the structure of the prototype executive aid are summarized in the last section.

DESIGN CHARACTERISTICS FOR THE PROTOTYPE CRISIS MANAGEMENT AID

As indicated in Chapter 1, CACI's prototype executive aid is intended to increase the capability of crisis managers in the Department of Defense to evaluate and select response options during crises. The aid is structured to

- Provide additional historical analogies by identifying past U.S. crises in which the United States pursued similar policy objectives or undertook similar actions.
- Present empirical evidence on the relationships between a user-designated policy objective and the actions that have historically been most closely associated with achieving that objective.
- Enable crisis managers to evaluate the appropriate sets of actions given sets of policy objectives.

In addition to these assistance goals, CACI's prototype executive aid is designed to be empirically based, user-oriented, and portable across comparable computer systems.

Empirical Base

CACI's prototype executive aid for crisis management is heavily based on past U.S. crisis data. Unlike a number of other aids that are being developed under Defense Advanced Research Projects Agency (ARPA) funding, this prototype crisis management aid uses data on past U.S. crisis actions and policy objectives in a sample of 100 crises since 1956. Parameters used throughout the model are empirically derived to show the relationships between past U.S. actions and policy objectives given the actions and policy objectives of crisis initiator(s).[1]

User-Oriented Software

The interactive computer program that is being written for the prototype executive aid is self-prompting and heavily user-oriented. Users will be led through the program without having to resort to auxiliary materials or manuals. Moreover, the program will contain a long and short form of the prompting sequence so that more experienced users will not have to view the same detailed messages repeatedly. Finally, the program contains different levels so that users who only desire to search the crisis histories will not have to obtain other unwanted information. On the other hand, the program is designed to lead even naive users through the sequences.

Program Portability

As part of its research effort, CACI will transfer the program from the commercial computer system that is being used for development and testing to an ARPA-designated demonstration system. Accordingly, the program has been designed to minimize the problems likely to be encountered in transferring it from one computer system to another.

---

[1] Chapter 3 details the data collection, sampling, and parameter estimation efforts.

Toward this end, the program is being written in standard FORTRAN without using many of the advantages that are specific to each individual computer system. The program will demand limited computer core so that it can be run on interactive operating systems with quite different program size ceilings.

OVERVIEW OF THE CRISIS MANAGEMENT AID

Figure 1 presents a preliminary flow diagram of the program for the crisis management aid. The program begins with some preliminary information on the sponsorship and purposes of the aid.

```
************  PROTOTYPE CRISIS MANAGEMENT AID  ************

THE PROTOTYPE CRISIS MANAGEMENT AID WAS DEVELOPED FOR THE
DEFENSE ADVANCED RESEARCH PROJECTS AGENCY/CYBERNETICS TECH-
NOLOGY OFFICE BY CACI, INC.-FEDERAL UNDER OFFICE OF NAVAL
RESEARCH CONTRACT NUMBER N00014-77-C-0135.

THIS CRISIS MANAGEMENT AID IS DESIGNED TO ENABLE DEPARTMENT
OF DEFENSE PERSONNEL TO EVALUATE PROPOSED COURSES OF ACTION
AND SETS OF U.S. OBJECTIVES IN AN ONGOING CRISIS AGAINST DATA
ON U.S. ACTIONS AND OBJECTIVES IN 100 CRISES INVOLVING THE
UNITED STATES BETWEEN 1956-1976.

THE AID IS INTERACTIVE SO THAT THE USER CAN OBTAIN DESIRED
INFORMATION BY RESPONDING TO QUESTIONS POSED BY THE COMPUTER.
THE AID OFFERS THE USER THREE LEVELS OF ANALYTIC ASSISTANCE.

     1.  THE CAPACITY TO SEARCH FOR HISTORICAL CASES FOR
         SETS OF USER-SPECIFIED U.S. ACTIONS OR OBJECTIVES.

     2.  THE CAPACITY TO IDENTIFY, ACROSS ALL CASES, THE
         ACTIONS THAT HAVE HISTORICALLY BEEN MOST STRONGLY
         ASSOCIATED WITH ACHIEVING EACH USER-DESIGNATED
         OBJECTIVE.

     3.  THE CAPACITY TO IDENTIFY, ACROSS ALL CASES, THE
         ACTIONS THAT HAVE HISTORICALLY BEEN MOST STRONGLY
         ASSOCIATED WITH ACHIEVING SETS OF USER-DESIGNATED
         OBJECTIVES.

TWO FORMS OF THE AID ARE AVAILABLE.  THE LONG FORM PROVIDES
DETAILED INSTRUCTIONS TO GUIDE THE USER.  THE SHORT FORM
```

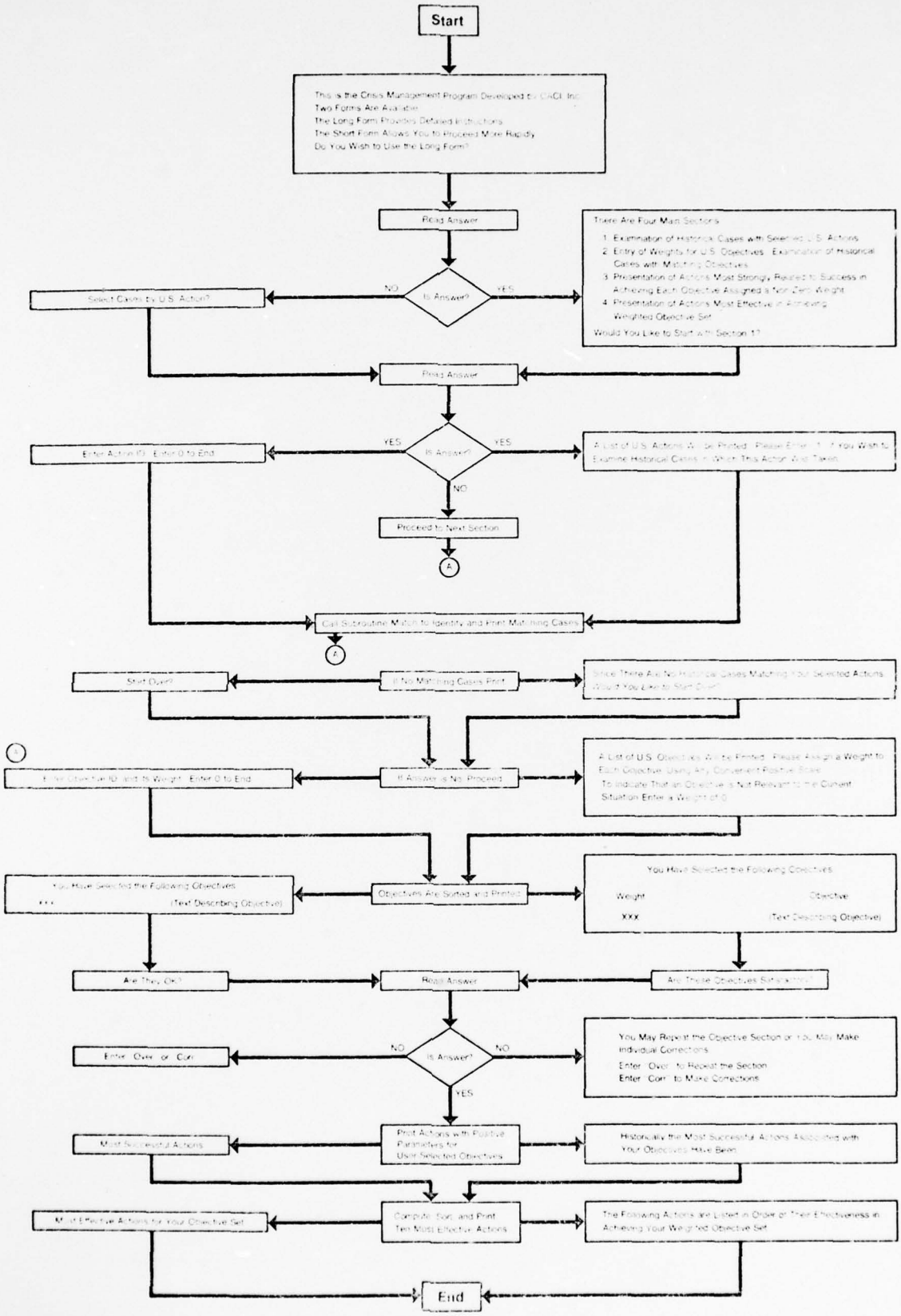

Figure 1. Flow Diagram of the CACI Crisis Management Program

PROVIDES FEWER INSTRUCTIONS TO ALLOW THE USER TO PROCEED MORE RAPIDLY.

DO YOU WISH TO USE THE LONG FORM?
(ANSWER YES OR NO).

If the user indicates that the long form is to be used,[2] the program prompts as follows:

THE PROGRAM HAS FOUR MAIN SECTIONS.

1. SEARCH FOR USER-SPECIFIED U.S. ACTIONS IN THE 100 PAST CRISES.

2. SEARCH FOR USER-SPECIFIED U.S. OBJECTIVES IN THE 100 PAST CRISES.

3. LIST ACTIONS MOST STRONGLY RELATED TO ACHIEVING EACH USER-SPECIFIED OBJECTIVE.

4. LIST ACTIONS MOST STRONGLY RELATED TO ACHIEVING USER-SPECIFIED SETS OF OBJECTIVES.

DO YOU WANT TO START WITH THE FIRST SECTION?
(ANSWER YES OR NO).

In short, after some initial information on sponsorship and purpose, the program leads the user into a prompting sequence to assist

- Information matching and retrieval on U.S. actions or policy objectives in previous crises;
- Action selection to achieve a single policy objective; and
- Action selection to achieve a set of policy objectives.

---

[2] Since the short form only reduces the message text of the long form, it is not presented at this time.

Each of these three areas results in separate outputs from the program. Each implies that the previous section has either been completed by the user or explicitly bypassed in an attempt to obtain more focused output. These three areas, which constitute the bulk of the program, are separately discussed in the next three sections.

ACTIONS OR OBJECTIVES MATCHING

The first level of the program matches user-specified crisis actions or policy objectives against the stored historical data. The sequence for an action search begins with the following message.

```
------------------------------------------------------------

A LIST OF U.S. ACTIONS WILL BE PRINTED.
ENTER A "1" IF YOU WISH TO SEARCH FOR HISTORICAL CRISES IN
WHICH THIS ACTION WAS TAKEN.
ENTER A "0" IF YOU DO NOT WISH TO SEARCH FOR A PARTICULAR
ACTION.
YOU MUST ENTER EITHER A "1" OR A "0" FOR EACH ACTION LISTED.

------------------------------------------------------------
```

The user is then presented with a list of over 50 crisis actions on which historical data have been coded.

```
------------------------------------------------------------

***  U.S. CRISIS ACTIONS  ***

COMMIT LAND FORCES TO COMBAT
COMMIT SEA FORCES TO COMBAT
COMMIT AIR FORCES TO COMBAT
COMMIT SUPPORTING LAND FORCES
COMMIT SUPPORTING SEA FORCES
COMMIT SUPPORTING AIR FORCES
REPOSITION LAND FORCES
REPOSITION SEA FORCES
REPOSITION AIR FORCES
THREATEN NUCLEAR FORCES AS DETERRENT
REDEPLOY NUCLEAR FORCES AS A DETERRENT
CHANGE THE ALERT STATUS OF NUCLEAR FORCES AS DETERRENT
```

```
THREATEN NONNUCLEAR FORCES AS A DETERRENT
REDEPLOY NONNUCLEAR FORCES AS A DETERRENT
CHANGE THE ALERT STATUS OF NONNUCLEAR AS A DETERRENT
MILITARY OPERATIONS FOR PEACEKEEPING
SHOW OF MILITARY FORCE
MILITARY BLOCKADE OR QUARANTINE
ISOLATED MILITARY CONTACT
MILITARY FORCES USED IN RESCUE OPERATION
MILITARY INTELLIGENCE COLLECTION
MILITARY INTELLIGENCE DISSEMINATION TO AN ALLY
MILITARY INTELLIGENCE DISSEMINATION TO AN ANTAGONIST
MILITARY MANEUVERS OR TRAINING EXERCISES
MILITARY OPERATIONS TO IMPROVE FORCE READINESS
COVERT MILITARY OPERATION
MILITARILY INTERVENE BETWEEN COMBATANTS
MILITARY ADVISORY ASSISTANCE
MILITARY TRAINING FOR COMBAT TROOPS
OTHER MILITARY ASSISTANCE
MILITARY SUPPLIES DRAWN FROM U.S. UNITS
MILITARY SUPPLIES DRAWN FROM U.S. DEPOTS
MILITARY SUPPLIES DRAWN FROM OTHER SOURCES
MILITARY MAINTENANCE ASSISTANCE
OTHER MILITARY LOGISTICS SUPPORT
OTHER MILITARY SUPPLIES
ESTABLISH POLITICAL OR ECONOMIC COMMITMENT THROUGH NEW MILI-
     TARY MISSION
UNDERTAKE A NEW MILITARY MISSION
ACCEPT A NEW MILITARY COST
MODIFY AN EXISTING DEFENSE TREATY
MODIFY AN EXISTING BASE RIGHTS AGREEMENT
MODIFY AN EXISTING STATUS OF FORCE AGREEMENT
SEEK ASSISTANCE IN DECISION MAKING
TAKE NO ACTION EMPLOYED DIPLOMACY
MEDIATE A DISPUTE
THREATEN TO WITHDRAW SUPPORT
ADVOCATE PEACEKEEPING EFFORTS
IMPROVE SCIENTIFIC-TECHNICAL CAPABILITIES
REAFFIRM EXISTING POLITICAL-MILITARY COMMITMENT
LODGE PROTESTS
U.S. ACTS ALONE
U.S. ACTS WITH ONE OTHER NATION
U.S. ACTS WITH TWO OR MORE OTHER NATIONS

-------------------------------------------------------------
```

After the user has entered the set of actions that are to be searched for, the program scans the historical data and prints a list of all historical crises having the identical set of actions.

```
---------------------------------------------------------------

 THE FOLLOWING CRISES HAD THE SAME SET OF ACTIONS AS YOU
 DESIGNATED.

***ID NUMBER***              ***CRISIS INCIDENT***

       022                  MARTIANS INVADE PEORIA, 1979

       098                  EMBARGO BY THE ICE CREAM EXPORTING
                            NATIONS, 1984

2 MATCHES.

---------------------------------------------------------------
```

Where no historical cases have been found with actions that are identical to those specified by the user, the program prints:

```
---------------------------------------------------------------

NO HISTORICAL CASES HAVE BEEN FOUND IN THE DATA BASE THAT
MATCH ALL OF THE ACTIONS THAT YOU SPECIFIED.

WOULD YOU LIKE TO SPECIFY A NEW SET OF U.S. ACTIONS?
(ANSWER YES OR NO).

---------------------------------------------------------------
```

The user is then free to specify another set of actions. On the other hand, where matches have been found, the user is asked:

```
---------------------------------------------------------------

DO YOU WANT TO SEE MORE INFORMATION ON THE ACTIONS IN THESE
CRISES?
(ANSWER YES OR NO).

---------------------------------------------------------------
```

If the user requests more information on the actions taken in the crisis by entering a YES, a list of the actions taken in the crisis is printed. Since the match has been carried out on the actions specified by the user,

the printed list for a particular crisis will include the user-specified actions and any additional actions that were carried out in the historical crisis that the user did not specify.

ENTER THE TOTAL NUMBER OF THESE CRISES FOR WHICH YOU WANT MORE INFORMATION.
(FOR EXAMPLE, 03 FOR THREE CASES).

ENTER THE ID NUMBER FOR THE FIRST CRISIS ON WHICH MORE INFORMATION IS SOUGHT.
(FOR EXAMPLE, 001).

The program then prints the additional information.

---

022 MARTIANS INVADE PEORIA, 1979

U.S. ACTIONS TAKEN IN THE CRISIS

COMMIT LAND FORCES TO COMBAT

COMMIT AIR FORCES TO COMBAT

COMMIT SUPPORTING LAND FORCES

COMMIT SUPPORTING AIR FORCES

LODGE PROTESTS

If the user has requested information on more than one crisis, the program then asks for the next crisis identification number.

ENTER THE ID NUMBER FOR THE NEXT CRISIS ON WHICH MORE INFORMATION IS SOUGHT.

A parallel sequence exists for the user who wants to focus on U.S. policy objectives (rather than actions). This sequence begins with general instructions on the policy objectives.

A LIST OF U.S. OBJECTIVES WILL BE PRINTED.
ENTER A "1" IF YOU WISH TO SEARCH FOR HISTORICAL CASES IN WHICH THIS OBJECTIVE WAS SOUGHT.
ENTER A "0" IF YOU DO NOT WISH TO SEARCH FOR A PARTICULAR OBJECTIVE.
YOU MUST ENTER EITHER A "1" OR A "0" FOR EACH ACTION LISTED.

The program then prints a list of more than 40 U.S. crisis policy objectives.

U.S. CRISIS OBJECTIVES

DETER IMMINENT ATTACK
IMPROVE OR RECTIFY DETERRENCE POSTURE
PUT DOWN REBELLION
RESTORE A REGIME
REGAIN ACCESS TO ECONOMIC RESOURCES
RESTORE PEACE
RESTORE TERRITORIAL INTEGRITY
RESTORE MILITARY BALANCE OF POWER
RESTORE READINESS
PRESERVE READINESS
PRESERVE PEACE
CONFIRM OR REESTABLISH PRESTIGE
PRESERVE TERRITORY
PRESERVE REGIME FROM EXTERNAL THREAT
PRESERVE, RESTORE, OR IMPROVE AN ALLIANCE
PROTECT LEGAL AND POLITICAL RIGHTS
INDUCE COMPLIANCE WITH CURRENT POLICY
DISSUADE FROM A NEW POLICY
PROTECT A MILITARY ASSET
SUPPORT A NEW GOVERNMENT
INDUCE NATIONAL REORIENTATION

INDUCE ADOPTION OF A NEW POLICY
BRING ABOUT FALL OF A REGIME
DENY POLITICAL ACCESS
DENY MILITARY ACCESS
ASSURE CONTINUED ECONOMIC ACCESS
PRESERVE OR REGAIN CONTROL OF THE SEA
PRESERVE OR REGAIN CONTROL OF THE AIR
DENY SUCCESS TO TERRORISTS OR HIJACKERS
PROTECT HUMAN LIFE
PROVIDE SANCTUARY OR ASYLUM
SUPPORT CRITICAL NEGOTIATIONS
DISCOVER INTENTIONS OR ACTIONS
PREPARE FOR ALTERNATIVE MISSIONS
SUPPORT U.N. EFFORTS
CONTAIN OPPONENT(S)
PREVENT SPREAD OF WAR
PRESERVE LINE OF COMMUNICATIONS
REGAIN TECHNICAL ADVANTAGE
RESTORE PRESTIGE
PRESERVE BALANCE OF POWER
PREVENT SPREAD OF COMMUNIST INFLUENCE
PREVENT NUCLEAR PROLIFERATION

Once the set of policy objectives that are of interest have been specified, the user is asked to weight each objective by its importance in the current crisis. These weights, although not used in the basic information search, are central to subsequent sections of the program. Hence, information is obtained at this point so that the long list of policy objectives does not have to be repeated.

YOU MUST NOW WEIGHT THE OBJECTIVES THAT YOU HAVE CHOSEN FROM LEAST TO MOST IMPORTANT.
ASSIGN ANY POSITIVE (NON-ZERO) NUMBER THAT YOU WISH TO EACH OBJECTIVE THAT YOU HAVE CHOSEN. A MORE IMPORTANT OBJECTIVE SHOULD BE GIVEN A LARGER NUMBER THAN A LESS IMPORTANT ONE.
ENTER THE WEIGHT IMMEDIATELY AFTER EACH OBJECTIVE.

OBJECTIVE ***WEIGHT ASSIGNED***

[ ] [ ]

The program then repeats what the user has entered and permits corrections.

YOU HAVE SELECTED AND WEIGHTED THE U.S. OBJECTIVES AS FOLLOWS:

OBJECTIVE ***WEIGHT ASSIGNED***

[ ] [ ]

ARE THESE OBJECTIVES SATISFACTORY?
(ANSWER YES OR NO).

If the objectives and weights are not acceptable (that is, if the user entered NO), the program instructs as follows:

YOU MAY REPEAT THE POLICY OBJECTIVES SECTION OR
YOU MAY CORRECT INDIVIDUAL ITEMS.
ENTER "OVER" TO REPEAT THE SECTION.
ENTER "CORR" TO MAKE CORRECTIONS.

Depending on the answer given, the program then cycles back or permits changes in individual policy objectives or user-assigned weights. Where the user has indicated that the information is acceptable, the program searches for the user-specified objectives in the historical crises data base. After the search, the program responds:

THE FOLLOWING CRISES HAD THE SAME SET OF POLICY OBJECTIVES AS YOU DESIGNATED.

ID NUMBER ***CRISIS INCIDENT***

```
012                          CUBA INVADES PUERTO RICO, 1981

054                          KURDS IN HUE CRISIS, 1985

2 MATCHES

--------------------------------------------------------
```

Where no historical cases have been found with policy objectives identical to those specified by the user, the program prints:

```
------------------------------------------------------------

NO HISTORICAL CASES HAVE BEEN FOUND IN THE DATA BASE THAT
MATCH ALL OF THE POLICY OBJECTIVES THAT YOU SPECIFIED.

WOULD YOU LIKE TO SPECIFY A NEW SET OF U.S. POLICY
OBJECTIVES?
(ANSWER YES OR NO).

------------------------------------------------------------
```

The user is then free to specify another set of objectives. On the other hand, where matches have been found, the user is asked:

```
------------------------------------------------------------

DO YOU WANT TO SEE MORE INFORMATION ON THE OBJECTIVES IN
THESE CRISES?
(ANSWER YES OR NO).

------------------------------------------------------------
```

If the user requests more information on the objectives taken in the crisis by entering a YES, a list of the policy objectives in the crisis is printed. Since the match has been carried out on the objectives specified by the user, the printed list for a particular crisis will include the user-specified objectives and any additional objectives present in the historical crisis that the user did not specify.

ENTER THE TOTAL NUMBER OF THESE CRISES FOR WHICH YOU WANT MORE INFORMATION.
(FOR EXAMPLE, 03 FOR THREE CASES).

ENTER THE ID NUMBER FOR THE FIRST CRISIS ON WHICH MORE INFORMATION IS SOUGHT.
(FOR EXAMPLE, 001).

012 CUBA INVADES PUERTO RICO, 1981

U.S. OBJECTIVES IN THE CRISIS

RESTORE PEACE
RESTORE TERRITORIAL INTEGRITY
CONFIRM OR REESTABLISH PRESTIGE
PROTECT LEGAL AND POLITICAL RIGHTS
PROTECT HUMAN LIFE

If the user has requested information on more than one crisis, the program then asks for the next crisis identification number.

ENTER THE ID NUMBER FOR THE NEXT CRISIS ON WHICH MORE INFORMATION IS SOUGHT.

Additional information is then printed for each case. Once the searches are completed, the aid will have provided information on analogues from past U.S. crises to aid the defense crisis manager.

RELATING ACTIONS TO A POLICY OBJECTIVE

The second major analytic support given to the defense crisis manager by the executive aid is evidence on the historical relationships between crisis actions and policy objectives. This part of the program builds on the analysis of the relationships between actions and objectives (discussed in Chapter 3) and the user-designated policy objectives.

THE ACTIONS MOST STRONGLY ASSOCIATED WITH YOUR POLICY OBJECTIVES ARE AS FOLLOWS:

OBJECTIVE	***ACTION***	***PARAMETER***
DETER IMMINENT ATTACK	REPOSITION SEA FORCES	1.50
	REPOSITION AIR FORCES	1.82
	CHANGE ALERT STATUS OF NON-NUCLEAR FORCES	2.71
SUPPORT A NEW GOVERNMENT	SHOW OF MILITARY FORCE	1.70
	ESTABLISH POLITICAL OR ECONOMIC COMMITMENT THROUGH NEW MILITARY MISSION	2.60
	REPOSITION SEA FORCES	1.10
	OTHER MILITARY ASSISTANCE	0.90

This printing is continued until all objectives specified by the user and the actions associated with them are printed. As presently formulated, all non-zero actions parameters developed from the historical data (described in Chapter 3) are printed. Higher magnitude criterion may be substituted after the parameters have been estimated and the relationships between actions and objectives more clearly established.

RELATING ACTIONS TO A SET OF POLICY OBJECTIVES

Responses during crises are rarely, if ever, formulated to achieve only one objective. While one objective may be more important than any other single objective or even all other objectives combined, crisis response evaluation and selection most commonly involve multiple policy objectives. Given this reality, an effort is being made to develop an algorithm for assessing the relationships between actions and a set of user-specified policy objectives.

Initial development efforts in this area focused on linear programming as a means to solve the multiple objectives question. Based on an evaluation of the problems and promises of this review, CACI's technical staff concluded that the data are insufficient at this time to justify using linear programming solutions to develop an optimal action set for a set of policy objectives. Accordingly, attention was directed toward producing a simpler solution that uses the user-specified objectives, the user-specified objectives weights, the historical data, and the historical parameters on the relationship(s) between actions and each objective. The resulting formulation is presented in Appendix H.

The program uses all previous user-specified and historical information summarized as follows:

FOR THE SET OF OBJECTIVES THAT YOU SPECIFIED AND WEIGHTED, THESE ARE THE MOST EFFECTIVE ACTIONS:

WEIGHTED OBJECTIVE	***MOST EFFECTIVE ACTIONS***
3.0 DETER IMMINENT ATTACK	7.51 CHANGE ALERT STATUS OF NONNUCLEAR FORCES
2.5 SUPPORT NEW GOVERNMENT	6.09 SHOW OF MILITARY FORCE
1.5 PROTECT A MILITARY ASSET	4.21 REPOSITION SEA FORCES
1.0 PROTECT LEGAL AND POLITICAL RIGHTS	2.04 OTHER MILITARY ASSISTANCE
	1.12 LODGE PROTEST

DO YOU WANT TO RUN AGAIN?

By rerunning all or part of the program, the analyst can evaluate different options against different sets of objectives. Moreover, the defense crisis manager will be able to assess more completely what could happen if particular sets of actions are not taken and to argue for the lack of usefulness in other sets of actions.

SUMMARY

This chapter presented the design characteristics, levels of assistance, and interactive sequences for CACI's prototype executive aid for crisis management. The aid contains three levels of assistance to the defense crisis manager based on historical evidence from U.S. crises. How that historical evidence is being gathered and processed to support the executive aid is discussed in Chapter 3.

CHAPTER 3. DATA USED IN THE EXECUTIVE AID

This chapter describes the data used in CACI's prototype executive aid for crisis management. The chapter is organized into five sections. The role of data in the executive aid is briefly discussed in the first section. The types of data gathered for the aid and the ways that they are to be used are described in the second section. The third section covers the sample of crises on which data have been gathered, while the fourth section presents some of the major coding conventions used to guide data acquisition. Finally, a summary section reviews the major topics covered in the chapter.

THE ROLE OF DATA IN CACI'S PROTOTYPE EXECUTIVE AID FOR CRISIS MANAGEMENT

CACI's crisis management aid is heavily dependent on data from past U.S. international crises. These data, described in the next section in greater detail, are used to guide the user in selecting and evaluating potential responses to international crises. Rather than deriving information from the user's subjective assessments, as is done in a number of decision analysis tools, CACI's prototype executive aid gives the user an historical perspective on the course(s) of action that are being considered for the current crisis. In short, it attempts to use actual historical information on past crises to expand both the range of information and analogies available to the user. It packages certain information from past U.S. experience in international crises to aid the user in evaluating responses and identifying relevant alternative analogies (Jervis, 1976: 270).

Data on past U.S. crises or data-based analyses of past U.S. crisis behavior are used to aid U.S. decision-makers in three ways.

1. Raw data on the crises are available to expand the range of alternative analogies available to the user. This broadens the consideration given to alternative responses to the crisis when time, organizational, and individual pressures to exclude options from consideration are the greatest.

2. Empirical parameters, derived from past U.S. behavior in crises, are used to help the analyst evaluate how well certain actions will contribute to achieving a particular objective.

3. Analyses based on combinations of historical occurrences are available to help the user determine the most advantageous means to achieve sets of objectives.

As was discussed in Chapter 2, these three areas constitute the aids that the prototype crisis management aid can give to the decision-maker. Each of them is empirically supported to facilitate more systematic use of past U.S. crisis management experiences in formulating and evaluating responses to current crises.

TYPES OF DATA GATHERED FOR THE PROTOTYPE EXECUTIVE AID

As described in the last section, both raw data and empirical analyses performed using these data are employed in the prototype crisis management aid. Each is discussed separately.

Data on Past U.S. International Crises

Past U.S. crises are being examined for four types of data:

1. Information on U.S. actions during the crisis.

2. Information on U.S. policy objectives during the crisis.

3. Information on actions taken by the country or countries that initiated the crisis.

4. Information on the policy objectives of the country or countries that initiated the crisis.

Data in each of these areas were coded from public sources. An initial analysis of the quality of information on problems encountered in U.S. crises between 1946 and 1975 (CACI, 1976) suggested that public reporting on U.S. crisis behavior was adequate to permit the research team to determine whether an action or policy objective was present during the crisis. Additional study of a number of official (but unclassified) U.S. Government publications, such as command histories, reports to the U.S. Congress, and annual reports by the Secretary of Defense and the secretaries of the three services, suggested that sufficient information for binary coding (that is, an action was present or absent) was available in the open sources. Accordingly, the data used for the prototype crisis management aid are solely from unclassified sources. Should greater specificity be needed for certain kinds of information at a later date, the classified sources can be employed at that time.

U.S. Crisis Actions. Appendix D lists over 50 distinct types of U.S. crisis actions that have been identified based on past crises, previous diplomatic responses, or requirements for systematically using military assets in the crises. These 50 discrete action types are grouped under 8 major headings:

1. Commitment to combat operations
2. Commitment of supporting service forces
3. Repositioning for combat contingency
4. Forces employed as a deterrent
5. Military operations
6. Military assistance
7. Other military actions
8. International participation in the crisis

Discrete codings were made for each of these general headings and for the many more specific variables contained under each for the crises covered in the project. Information coding was restricted to the presence or absence of the U.S. action. Thus, under Commitment to Combat Operations (Item 1) information was sought on whether land forces, sea forces, and/or aid forces were used in the crisis. Depending on which types of forces were used (if any), between zero and three entries would be made on the coding sheets. Similar procedures were followed for each of the other types of data.

U.S. Policy Objectives in the Crisis. Over 35 different U.S. crisis policy objectives are listed in Appendix E. These policy objectives, based on current or past U.S. policy concerns during crises, are grouped into six general headings:

1. Deterrence
2. Restore status quo ante
3. Maintain status quo
4. Change in status quo
5. Access or denial objectives
6. Other policy objectives

As with the U.S. crisis actions, each of the crises covered in this research effort was coded for the U.S. policy objectives. Each crisis was coded for the presence or absence of the policy objective in the U.S. Government's response crisis.

Actions by Crisis Initiators. Appendix F lists the types of actions taken by the crisis initiators that were coded for each crisis covered in this research project. Fifty distinct actions by crisis initiators were binary coded (present/absent) for each crisis. These 50 actions are grouped into 9 general categories.

1. Overt aggression
2. Subversion
3. Terrorism
4. Force status actions
5. Military assistance
6. Other military actions
7. Initiate agreement
8. Undertake new commitment
9. Other, largely political, actions

Policy Objectives of the Crisis Initiators. To complete the set of data collected for the crisis management aid, information on the policy objectives of the crisis initiator(s) was gathered. Appendix G identifies the more than 45 policy objectives of the crisis initiators, grouping the objectives into 6 major headings:

1. Essentially military
2. Essentially political
3. Economic
4. Other (usually preparatory to initiating the crisis)
5. Maintain the status quo
6. Restore the status quo ante

Binary coding of the presence or absence of each of these 45 crisis policy objectives for each crisis initiator was undertaken using public sources. The results from these codings, together with the data for the initiator actions, U.S. actions, and U.S. policy objectives, were used as input data for the empirical parameters employed in the aid.

Empirical Parameters Used in the Prototype Executive Aid

Data collected on U.S. actions and objectives and the crisis initiator's actions and objectives were used to generate empirical parameters for the prototype executive aid. As noted in Chapter 2 on the structure of the executive aid, these parameters serve two purposes. First, they aid the analysts in evaluating the relationship between one or more actions that the United States might take in a crisis and any single objective that the United States might wish to pursue in that crisis. Second, they are used to develop the most effective sets of actions across a set of user-specified objectives.

Two problems arise in developing parameters for these purposes. First, potential estimation problems arise from the binary character of all data to be used in the analysis. If, as was suggested, the parameters are to assess the impact of a set of actions on a policy objective, then regression analysis is a familiar and acceptable estimating procedure. All of the predictor variables -- the U.S. actions -- are dummy variables that meet the scaling requirements of the regression model. However, the dependent variables -- the U.S. policy objectives -- are only dichotomously scored, even though variations in the centrality of that policy objective to each crisis exist beyond a dichotomous score. Thus, the technical problems involving the ordinary least squares assumption of homoscedastic error terms make the use of "standard" regression analysis a questionable research strategy (Goldberger, 1964: 248-251; Johnston, 1972: 182-186).

A promising alternative recommended by Goldberger (1964: 250-251) to counter this difficulty presented by dichotomous dependent variables is probit analysis, a regression model that relaxes the ordinary least squares assumptions of homoscedastic error terms that normally make the use of noncardinal dependent variables problematic. Briefly, probit analysis functions as ordinary least squares on noncardinal dependent variables, producing regression coefficients and statistics

to test the statistical significance of the individual coefficients and the entire equation. In other words, it differs from multiple regression only in its treatment of the dependent variable. McKelvey and Zavoina (1971, 1969), who present a formal development of the model, have programmed a multivariate n-chotomous probit model using maximum likelihood estimation of the regression coefficients. The resulting coefficients are conditional probabilities that assess the capacity of a unit change in the independent variable(s) to produce a change to the next response category in the dependent variable. Accordingly, probit analysis is used to assess the relationship between crisis actions and objectives.

The second problem arises in estimating parameters from a single equation to represent the very dynamic process of crisis management. In all likelihood, the actions taken to achieve an objective or a set of objectives are conditioned both by physical constraints and resources (where the crisis is located and what assets are available to U.S. crisis managers) and the actions of the crisis initiator(s). Moreover, as the crisis proceeds, the importance attached to different objectives may change as might the actions contemplated to achieve those objectives.

Several simplifying assumptions were made to meet these problems. First, the executive aid responds to a set of user-supplied actions and objectives based on conditions at the start of the crisis. Hence, the user must replay the aid to identify other useful options at later stages of the crisis since the aid merely looks at the actions that are historically associated with the objective at the start of the crisis. In short, the aid is only made dynamic by repeated passes through, as additional information is developed that might modify the U.S. crisis objectives sought and the U.S. actions that are being considered to achieve those objectives.

Another simplifying assumption was made in estimating the relationships between actions and objectives. Since the choice of actions to achieve a particular objective is conditioned by both resource constraints and

actions already taken by the crisis initiator, the prototype executive aid controls for initiator actions in estimating the relationships between U.S. actions and policy objectives in the crises. Given the large number of crisis initiator actions that have been coded for, the number of controls that would have to be introduced into the estimation equations would rapidly exceed the capabilities of even the most capable mini- or microcomputers. Accordingly, principal components analysis will be used to reduce the variance in the crisis initiator actions data before this class of information is introduced into the estimating equations. Hence, the relationships between U.S. actions and policy objectives during past crises will be estimated as follows: Given crisis initiator actions, what is the relationship between U.S. crisis actions and objectives?

SAMPLING PROCEDURES

Information was collected on U.S. actions and objectives and crisis initiator actions and objectives in 100 U.S. crises between 1956 and 1976. These crises were drawn from several different sources. First and foremost among the sources for the crisis sample was CACI's previous research on crisis management in which crises between 1946 and 1975 were inventoried (CACI, 1976, 1975). Additionally, crises identified in two other major studies of U.S. crisis and crisis-like behavior (Blechman and Kaplan, 1977; Mahoney, 1976) were examined to expand the CACI crisis list. Finally, U.S. crises during 1976 were inventoried to complete the lists to the end of the last calendar year. Together, these sources provided the basis for the sample of 100 crisis incidents drawn for this analysis.[1]

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[1] Appendix A presents the incidents developed primarily from Blechman and Kaplan that seemed to fit the U.S. crisis definition developed in CACI's previous research (CACI, 1976). Appendix B lists the potential crises identified for 1976. Appendix C identifies the 121 cases that were included in the sample. One hundred cases were drawn from these 121 based on data availability in unclassified sources.

Unlike the crisis cases examined in CACI's research on crisis management problems (CACI, 1976), only international crises are included in the 100-case sample. Since domestic crisis responses by the U.S. military are both very constrained (occurring only after Presidential-level decisions have been made) and now very routinized, only the less certain, potentially more threatening international crises since 1956 have been chosen to support the prototype executive aid.

Case selection for the sample of 100 crises also took into account CACI's major empirical findings on crisis behavior (CACI, 1976). Thus, crises selected for the sample were primarily politico-military since this type of incident was most commonly encountered in recent U.S. history. Similarly, major power crises were emphasized as were crises completed in less than 7 or more than 30 days.

CODING PROCEDURES

Information on U.S. actions and policy objectives and the crisis initiator's actions and objectives was coded for each of the 100 crises. Three coders from CACI's professional staff (two with Ph.D.'s and a military background, one with a Ph.D. and some military service) were used to examine historical material on each crisis. As already noted, only unclassified data sources were consulted.

After reading the available source materials on each of the crises, a coder determined the U.S. actions and policy objectives and the actions and objectives of the crisis initiator. When a set of crises had been coded in this manner the three staff members jointly considered the codings before finally entering the information into the data file. During this process each coder had to relate the events of the crisis and defend the coding made in each category. The results of this process are dichotomously coded data files for U.S. actions and policy objectives and the crisis initiator's actions and objectives for a sample of 100 U.S. crises between 1956 and 1976.

SUMMARY

This chapter described the types of data used in the prototype executive aid for crisis management, the uses of the data in the executive aid, the sample of cases for which the data have been coded, and the coding procedures used for data gathering. Several different types of judgmentally coded data on past U.S. crises are used in the aid. Listings of the categories of data sought are presented in Appendices D-G of this report. Progress toward completing the prototype aid and examining the data for the aid is reported in the next chapter.

CHAPTER 4. RESEARCH AGENDA FOR THE REMAINDER OF THE PROJECT

As Chapters 2 and 3 indicated, considerable progress has been made in designing and developing the prototype executive aid for crisis management. This chapter charts additional efforts under Contract No. N00014-77-C-0135 to complete and test the executive aid. Further efforts on the program, the data and parameters for the aid, and plans for testing the aid are each discussed separately in this chapter.

PROGRAM DEVELOPMENT

An initial version of the executive aid described in Chapter 2 is operating. This initial version, developed on a commercial computer system, is now being more fully developed by checking out all user options, incorporating additional text for the user messages, and processing progressively larger test data files. Moreover, preliminary preparations are underway for transferring the prototype system to a demonstration system designated by the Defense Advanced Research Projects Agency (ARPA).

DATA COLLECTION AND PARAMETER ESTIMATION

Initial coding of the 100 crises has been completed, and preliminary analysis of the data has begun. Data on U.S. actions and objectives and the actions and objectives of the policy initiators are being transferred to machine readable form for statistical analysis on a commercial computer system. Attempts to obtain the probit estimating program are underway through several universities. Analysis of the crisis initiator's actions and objectives, which does not require any program that is not contained in the Statistical Package for the Social Sciences (SPSS) (Nie, et al., 1975), will begin as soon as the data are punched. Parameter estimation for U.S. actions and policy

objectives will begin shortly thereafter. All parameter estimation should be completed within 1 month of the date of this report, pending unforeseen difficulties with the probit program or the data.

TESTING THE PROTOTYPE EXECUTIVE AID

After the prototype executive aid for crisis management has been developed and tested internally at CACI, its performance as a crisis management tool will be evaluated. Given the operational constraints of a crisis center (significant threat, short decision time, involvement of senior personnel from the Department of Defense), the aid could be tested and evaluated in "real time" crisis conditions. But individuals who have been involved in prior crisis center operations will be used as test subjects to evaluate the usefulness of the crisis management aid. This evaluation will assess the crisis management aid along three dimensions.

1. Validity. Does the executive aid evaluate decision options in the same way as do decision-makers who do not have the aid?

2. Reliability. Does the executive aid produce option evaluations that are reproducible, precise, and accurate given the information available to the decision-makers at the time of the crisis?

3. Acceptance. Do those who have used the aid tend to evaluate it positively, particularly concluding that it improved the speed and quality of decision-making?

Retired senior military personnel who are experienced in crisis planning, option formulation, evaluation, and execution will be the experimental subjects for assessing the executive aid. They will be taken through several simulated crises in decision-making groups. The experimental treatment is the availability of the aid to some decision-making groups but not to others. The results of each of the group decisions and the reactions of the participants in each of the groups to the experiment and the executive aid will be recorded.

In the experimental assessment of the validity of the executive aid, the decisions produced by groups that used the aid and groups that did not use the aid will be compared against a standard developed from other informed subjects who have similar backgrounds. These subjects will be given the same scenario, background information, and options as the experimental group and asked to select the best response for the crisis. Responses from these subjects will be considered as the validity standard against which the aid is to be assessed. Results from those groups having the aid and those not having the aid will be compared to this validity standard. A second comparison will be a crisis option selected by a CACI team using the aid. If the executive aid is to be valid, groups using it, groups not using it, and CACI results based on the aid must produce comparable results.

Establishing the validity of an aid, while clearly important, is not sufficient. A useful aid should both speed and assist the process and provide valid results. Hence, validity is assessed as one of the attributes of a useful executive aid. Additionally, reliability will also be assessed. In these evaluations, different groups that are placed in the same experimental crisis with the same experimental treatment should evaluate options similarly. Thus, when several experimental groups are given a crisis scenario and permitted to use the executive aid, strongly similar decisions must be produced for the aid to be considered reliable. In other words, the aid will be evaluated on whether the results produced over repeated applications under the same experimental conditions yield option selections that are reproducible, precise, and accurate across the different experimental groups.

A third major evaluation dimension is acceptance. The critical question in acceptance is whether those who have used the aid value it positively as an aid to decision-making. Do they think that it is a useful tool that improves the speed with which the decisions were made, the certitude with which the decision was reached, and the overall quality of

the decision process? This information, which is clearly critical to establishing trust in the aid and acceptance of its assistance in decision-making, will be obtained as the retired military personnel are debriefed after the experiments.

SUMMARY

This chapter presented the planned research progress on the prototype executive aid for crisis management over the remaining 4.5 months of Contract No. N00014-77-C-0135. Progress is expected in three major areas -- program development, data base development to support the executive aid, and prototype testing -- over the remainder of the contract. Timely completion of the aid within the period of contract performance is still expected in sufficient time to demonstrate the aid to interested individuals and groups designated by the Contracting Officer's Technical Representative (COTR) and/or ARPA personnel.

APPENDIX A

ADDITIONAL POTENTIAL CRISES, 1946-1975

ADDITIONAL POTENTIAL CRISES, 1946-1975

Review of several recent inventories of international crises (Blechman and Kaplan, 1977; Mahoney, 1976; Atkeson, et al., 1974; Atkeson and Kennedy, 1975) has identified some incidents that may meet CACI's definition of crisis behavior as extraordinary military management activity (CACI, 1976). These incidents have been compiled in this appendix as potential supplements to the 289 crises identified by CACI.

Date	Incident Title
February 1957	Egypt-Israel conflict in the Red Sea
February 1957	Political-military crisis in Indonesia
July 1957	China-Taiwan conflict
December 1957	Indonesia-Netherlands crisis
January 1958	Coup and civil strife in Venezuela
February 1958	Political-military crisis in Indonesia
July 1958	Political crisis in Jordan
January 1959	Castro seizes power in Cuba
August 1959	Cuba supports insurgents in Haiti
November 1959	Improved relations with Indonesia
April 1960	Insurgents in Cuba

Date	Incident Title
August 1960	Coup and civil war in Laos
December 1960	Security of Guantanamo base in Cuba
December 1960	Improved relations with Iraq
January 1961	Civil war in Congo
February 1961	Civil war in Laos
April 1961	Bay of Pigs
June 1961	Unidentified submarine off Ecuador
July 1961	Security of Kuwait
November 1961	Trujillos refuses to leave Dominican Republic
December 1961	Civil war in South Vietnam
January 1962	Civil strife in Guatemala
May 1962	Hostile Soviet naval activity in the Baltic Sea
May 1962	Civil war in Laos
August 1962	Political developments in Haiti
December 1962	Political instability in Guatemala
February 1963	Inauguration of President in Dominican Republic
February 1963	Civil war in Yemen
April 1963	Political crisis in Jordan
May 1963	Civil war in Laos

Date	Incident Title
June 1963	Buddhist crisis in South Vietnam
September 1963	Coup in Dominican Republic
September 1963	China-Taiwan crisis
November 1963	Cuba supports insurgents in Venezuela
December 1963	Improved relations with Soviet Union
January 1964	Coup in South Vietnam
March 1964	Political developments in Cambodia
April 1964	Civil war in Laos
May 1964	Civil strife in British Guiana
July 1964	Cuba supports insurgents in the Dominican Republic
August 1964	Civil war in Congo
August 1964	Greece-Turkey crisis over Cyprus
September 1964	Indonesia-Malaysia crisis
October 1964	Cuba supports insurgents in Venezuela
January 1965	Worsened relations with Tanzania
April 1965	Cuba supports insurgents in British Guiana
April 1965	West German parliament meets in Berlin

Date	Incident Title
May 1965	West German parliament meets in Berlin
July 1965	Cuba supports insurgents in Colombia and Venezuela
July 1965	War in Vietnam. Withdrawal of troops from Europe
August 1965	Civil war in Yemen
October 1965	Attempted coup in Indonesia
December 1966	Israel attacks Jordan
December 1966	Insurgents in Thailand
April 1967	Coup in Greece
May 1967	Improved relations with France
July 1967	Insurgents in the Congo
August 1967	Political developments in Cyprus
October 1967	Egypt sinks Israeli destroyer Eilat
December 1968	Israel attacks Beirut airport in Lebanon
December 1968	North Korea attacks South Korean fishing boats
May 1969	Civil strife in Curacao
November 1969	Political developments in Libya
June 1970	Civil strife in Jordan
October 1970	Soviet submarine base in Cuba

Date	Incident Title
January 1971	Civil war in Cambodia
February 1971	Withdrawal of troops from South Korea
May 1971	Standdown in Sea of Japan
February 1972	Seizure of merchantmen by Cuba
February 1973	Civil war in Laos
February 1973	Civil war in Cambodia
May 1973	Civil strife in Lebanon
August 1973	Civil war in Cambodia
February 1974	Egypt-Israel Sinai agreement
April 1974	Improved relations with Egypt
November 1974	Arab oil policy
April 1975	Collapse of regime in Cambodia

APPENDIX B

POTENTIAL CRISIS INCIDENTS DURING 1976

POTENTIAL CRISIS INCIDENTS, 1976

Date	Incident
760107	Fall of Italian Government brings threat of Communists in government
760107	Lebanese Christian attack brings Syrian warning
760107	United States warns Soviet Union against Angola naval presence
760107	Moroccan-Algerian dispute and U.S. arms aid
760110	Cuban refueling in Azores brings U.S., Portuguese protests
760112	Egypt warns Israel of military action
760113	Japan announces China treaty intent
760113	China's eighth nuclear test
760115	Angolan conflict enters new phase
760127	China's loss of UNITA cpaital and threat to mercenaries
760206	Rhodesia-Mozambique guerrilla war intensifies
760225	Cambodia alleges U.S. bomb attack at Siem Reap
760303	United States renews arms sales to Egypt
760314	Sadat ends Soviet-Egypt treaty
760314	Beirut truce broken in heavy fighting
760320	Thailand orders U.S. bases closed directly
760405	Soviet-Cuban military presence in Somalia
760408	Soviet Union warns United States against Lebanese intervention
760412	Greek protest over U.S.-Turkish defense pact
760418	United States, Israel warn Syria against intrusion near border

760427	Kissinger initiates Rhodesian intervention at Lusaka
760511	Ethiopia counter-Eritrean drive and European arms sales
760513	Lebanese fighting escalates to most intense of war
760521	France offers troops to Lebanon
760521	North Atlantic Treaty Organization (NATO) foreign ministers express concern over Warsaw Pact buildup
760531	Syrian troops enter Lebanon (with U.S. force knowledge
760616	First evacuation from Lebanon
760619	United States pledges arms to Kenya, Zaire
760701	Greek-Turkish dispute over Aegean waters
760727	Second evacuation from Lebanon
760818	North Koreans kill Americans in tree-cutting incident
760819	Soviet sale of fighter-bombers to Peru
760828	Iranian Marxists kill U.S. "Operation Ibex" employees
760829	United States discovers Taiwan secret N-fuel reprocessing
760830	Soviet Union warns Egypt, supplies weapons on Libya's behalf
760831	Israeli gunboats attack U.S. oil rig
760906	Defector delivers MIG-25 to Japan
760909	Death of Mao
760920	Major NATO training exercise in response to Warsaw Pact strengthening
760921	United Nations International Atomic Energy Agency (IAEA) warns of breakdown of Nuclear Proliferation Treaty
760926	China explodes twentieth large-radiation nuclear weapon
761006	Armed forces seize power in Thailand
761007	Panama talks resumed after student riots

761009	North Korea proposes new peace treaty to United States, South Korea
761015	Castro voids the U.S.-Cuban anti-hijacking agreement
761017	China conducts four megatonnage nuclear test
761018	France withdraws 10,000 troops from West Germany
761018	NATO considers coping with Soviet SS-20 intermediate--range ballistic missiles (IRBM)
7611	U.S. Navy loses Tomahawk plane at sea
761204	U.S.-Philippine base negotiations collapse
761216	Soviet "killer" satellite goes operational
761216	Soviet Union seeks fishing, processing base in West Samoa

APPENDIX C

PRELIMINARY SAMPLE OF CRISIS INCIDENTS FOR PARAMETER ESTIMATION

PRELIMINARY SAMPLE OF CRISIS INCIDENTS

560108 - 560510	Growing Arab-Israeli tensions. Terrorist attacks. Israel-Egypt fighting.
560719 - 570309	Middle East war. United States stops military aid. Britain and France involved.
560110 - 590301	Insurgency in Cyprus.
560822 - 560922	Sixteen killed as U.S. Navy patrol bomber is shot down by Chinese Communists off Formosa.
560628 - 561216	Poznan riots. Gomulka takes over in Poland.
561023 - 561215	Hungarian revolution. Soviets quell uprisings with tanks.
570414 - 570525	Hussein ousts pro-Egyptian elements in Jordan.
570621 -	U.N. Command renounces Korean armistice agreement.
570801 - 590101	Violence flares against Batista in Cuba. Castro takes control.
570813 - 571030	Syrian disputes with the United States and Turkey.
570901 - 580617	French forced out of Tunisia. United States and Britain give arms to Tunisia.
571004 - 610525	Soviet Union launches Sputnik I. United States speeds up space and weapons programs.
580509 - 581025	U.S. and British forces reinforce governments of Lebanon and Jordan.
580513 - 581013	French Army rebels seize Algiers. Demand return of De Gaulle.
580513 - 5805	Vice President Nixon's car attacked during visit to South America.
580627 - 580709	Unarmed U.S. transport plane shot down near Armenian border.
580806 - 581008	Chinese Communist activity increases in Taiwan Straits. Quemoy-Matsu crisis flares up.
581114 - 590928	Soviet harassment of Allies in Berlin. Soviet ultimatum on Berlin.

590221 - 590324	"Norvorossisk Incident." U.S. Navy boards Soviet trawler that damaged Atlantic cables.
590416 - 590504	Panama unsuccessfully invaded by Cuban forces.
590517 -	Matsu Islands heavily bombarded. U.S. Undersecretary of State warns of war.
590730 - 591231	Insurgency in Laos. Guerrilla raids. Laos requests U.N. defense force.
600 - 601216	Growing dissension between United States and Cuba.
600426 - 600623	Protests against U.S.-Japanese peace treaty.
600213 -	France becomes a nuclear power, announces explosion of plutonium bomb.
600129 -	Additional confrontations between Soviet and Allied powers in Berlin.
600501 - 600819	U.S. U-2 reconnaissance plane shot down over the Soviet Union.
600710 - 601212	Congo crisis.
601114 - 601207	Nicaragua repels invasion force from Costa Rica. U.S. Navy ordered in.
610122 - 610203	Portuguese rebels seize the Santa Maria.
610415 - 610422	U.S.-Cuban relations are severed. Bay of Pigs invasion.
610104 - 611217	Sanctions against Dominican Republic. Trujillo assassinated.
610411 - 611211	U.S. considers sending combat units to South Vietnam.
610516 - 610817	Gen. Chang Do Yung and pro-U.S. junta seize control in South Korea.
6106 -	Nuclear test ban talks fail.
610608 - 611229	East-West border in Berlin closed by Soviets. Berlin Wall started.
620224 - 620309	People's Republic of China accuses United States of threatening peace in Vietnam. U.S. pilots involved.
620506 - 621201	Crisis in Taiwan Straits.

620512 - 620701	United States deploys troops in Thailand.
620701 - 621130	France seeks nuclear club membership.
6208 - 630107	Cuban missile crisis.
621020 - 611120	India-China conflict.
630422 - 631231	U.S. Seventh Fleet units deployed to Gulf of Siam.
630428 - 630603	Haiti-Dominican Republic dispute.
630730 -	North Korean infiltrations across demilitarized zone (DMZ). U.S. soldiers killed.
631221 - 640406	Continued trouble in Cyprus. U.S. Navy prepared for evacuation.
640109 - 640403	Panama Canal Zone flag riots.
640112 - 640407	African rebels overthrow Arab government in Zanzibar.
640223 - 640822	Libya refuses to renew lease for U.S. and British military bases.
640310 - 640322	Soviet forces shoot down U.S. reconnaissance plane over East Germany.
640802 - 640805	Naval incidents in the Gulf of Tonkin.
64106 - 641218	Communist China explodes first atomic bomb.
640812 - 641201	U.S. involvement in Congo civil war.
641024 -	Cambodia shoots down U.S. C-123.
640203 - 640206	United States seizes Cuban fishing vessels. Cuba shuts off water to Guantanamo.
640331 -	Coup in Brazil.
640420 - 640529	Tensions with Cuba.
650205 - 651211	Insurgency in Thailand. United States starts huge military complex.
650403	United States accuses the Soviet Union of harassing U.S. naval vessels on the high seas.
650409 - 651204	India-Pakistan conflict.

650424 - 651219	Army rebellion in Dominican Republic. Inter-American armed force takes over.
660117 -	U.S. B-52 and KC-135 collide over Spanish coast. Four H-bombs fall.
660221 - 660331	France severs relations with the North Atlantic Treaty Organization (NATO). The NATO crisis.
670514 - 670611	"The Six-day War." Israel wipes out Egyptian and Syrian forces.
670608 - 670628	The Pueblo incident.
6807 - 680702	U.S. jet airliner forced to land in the Kuriles.
680717 - 680918	Czech revolt crushed by Soviet troops. U.S. and Allies warn the Soviet Union.
681209 -	Two U.S. destroyers enter Black Sea despite Soviet protests.
690126 - 720515	Japan demands restoration of Okinawa.
690216 -	Anti-U.S. rioting in Istanbul over visit of ships of Sixth Fleet.
690302 -	Sino-Soviet border clash. Fighting over Damansky Island in Ussuri River.
690415 - 690426	U.S. Navy EC-121 shot down by North Koreans. United States moves Navy task force.
690523 - 690604	Tense relations in South America.
690722 -	Department of Defense admits lethal gas munitions shipped overseas. Operation "RED HAT."
700314 - 700408	Columbia Eagle, carrying U.S. munitions, seized by crew.
701021 - 701110	U.S. Air Force plane with two U.S. general officers lands in Soviet Armenia.
700901 - 700923	Syria-Jordan conflict. President Nixon moves U.S. forces.
710118 -	Arms to Ecuador suspended in retaliation for seizure of fishing boats.
- 710126	Department of Defense admits U.S. force in civilian clothes seized helicopters at Phnom Penh.

50428 - 750429	U.S. and South Vietnamese personnel evacuated from Saigon.
750512 - 750514	Cambodia seizes the U.S.S. Mayaguez. U.S. forces recapture ship and crew.
751110 - 760115	Portuguese leave Angola. Civil war intensifies. Cuban troops involved.
760616 -	U.S. citizens evacuated from Lebanon.
760727	Second evacuation of U.S. personnel from Lebanon.
760107 -	Moroccan-Algerian dispute. U.S. arms aid to Morocco.
760225 -	Cambodia alleges U.S. bomb raid at Siem Reap.
760204 -	Sadat ends Soviet-Egypt treaty.
760320 -	Thailand orders U.S. bases closed immediately.
760412 -	Greece protests U.S.-Turkish defense pact.
760521 -	Warsaw Pact buildup leads to NATO response.
760701 -	Greek-Turkish dispute in Aegean waters.
760818 -	North Koreans kill American soldiers at Panmunjom.
760906 -	Soviet defector delivers MIG-25 to Japan.
760909 -	Death of Mao Tse-tung.
760926 - 761017	People's Republic of China explodes large nuclear weapons. Extensive fallout monitored.
761009 -	North Korea proposes new peace treaty to United States and South Korea.
76108 -	France withdraws 10,000 troops from West Germany.
7611 -	U.S. Navy loses Tomcat fighter in North Atlantic.
761204 -	U.S.-Philippine base negotiations collapse.
761216 -	Soviet "killer" satellite goes operational.

APPENDIX D

U.S. CRISIS ACTIONS

INTRODUCTION

The list of categories and variables included in this appendix has been used to code data on 100 international crises that involved the U.S. military from 1956 to 1976. These data are used in the prototype crisis management aid developed under Contract No. N00014-77-C-0135.

- Commitment to Combat Operations
  - Land Forces
  - Sea Forces
  - Air Forces
- Commitment of Supporting Service Forces
  - Land Forces
  - Sea Forces
  - Air Forces
- Repositioning for Combat Contingency
  - Land Forces
  - Sea Forces
  - Air Forces
- Employed as Deterrent
  - Nuclear Forces
    - Threatened Use
    - Actual Redeployment
    - Change in Alert Status Only
  - Non-Nuclear Forces
    - Threatened Use
    - Actual Redeployment
    - Change in Alert Status Only
- Military Operations
  - Peacekeeping Deployment
  - Show of Force
  - Blockade or Quarantine
  - Isolated Military Contact

- Rescue Operation
- Intelligence Operations
  - Collection
  - Disseminate to Ally
  - Disseminate to Antagonist
- Maneuver or Training Exercise
- Improve Force Readiness
- Covert Military Operation
- Intervene Between Combatants

Military Assistance

- Advisory
- Training
  - Combat Troops
  - Other
- Logistics
  - Supply
    - Drawdown From U.S. Units
    - Drawdown From Depot Stocks
    - Other
  - Maintenance
  - Other Log Support
- Other Assistance

Other Actions

- New Military Mission
  - Political or Economic Commitment
  - Undertake Actual Mission
- Accept a New Military Cost
- Modify Existing Military Commitment
  - Defense Treaty
  - Base Rights Agreement
  - Status of Forces Agreement
- Seek Assistance in Decision-Making

Take No Action

Employ Diplomacy

Mediate a Dispute

Threaten to Withdraw Support

Advocate Peacekeeping Efforts

Improve Scientific-Technical Capabilities

Reaffirm Existing Political-Military Commitment

Lodge Protest

Other

International Participation

United States Acting Alone

United States Acting With One Other Nation

United States Acting With Two or More Other Nations

APPENDIX E

U.S. CRISIS OBJECTIVES

INTRODUCTION

The list of categories and variables included in this appendix has been used to code data on 100 international crises that involved the U.S. military from 1956 to 1976. These data are used in the prototype crisis management aid developed under Contract No. N00014-77-C-0135.

Deterrence
- Deter Imminent Attack
- Improve or Rectify Deterrence Posture

Restore Status Quo Ante
- Put Down a Rebellion
- Restore a Regime
- Regain Access to Economic Resources
- Restore Peace
- Restore Territorial Integrity
- Restore Military Balance of Power
- Restore Readiness

Maintain Status Quo
- Preserve Readiness
- Preserve Peace
- Confirm or Reestablish Prestige
- Preserve Territory
- Preserve Regime From External Threat
- Preserve Regime From Internal Threat
- Preserve, Restore, or Improve Alliance
- Protect Legal and Political Rights
- Induce Maintenance of Current Policy
- Dissuade From a New Policy
- Protect a Military Asset

Change in Status Quo

- Support a New Government
- Induce National Reorientation
- Induce Adoption of a New Policy
- Bring About Fall of a Regime

Access or Denial Objectives

- Deny Political Access
- Deny Military Access
- Assure Continued Economic Access
- Preserve or Regain Control of the Sea
- Preserve or Regain Control of the Air
- Deny Success to Terrorists or Hijackers

Other

- Protect Human Life
- Provide Sanctuary or Asylum
- Support Critical Negotiations
- Discover Intentions or Actions
- Prepare for Alternative Missions
- Support U.N. Efforts
- Containment
- Prevent Spread of War
- Preserve Line of Communications
- Regain Technical Advantage
- Restore Prestige
- Preserve Balance of Power
- Prevent Spread of Communist Influence
- Prevent Nuclear Proliferation

APPENDIX F

ACTIONS TAKEN BY CRISIS INITIATORS

INTRODUCTION

The list of categories and variables included in this appendix has been used to code data on 100 international crises that involved the U.S. military from 1956 to 1976. These data are used in the prototype crisis management aid developed under Contract No. N00014-77-C-0135.

- Overt Aggression
  - Initiate War
  - Border Dispute
  - Isolated Military Contact
- Subversion
  - Begin or Support Insurgency
  - Incite or Initiate Revolt
  - Overthrow a Regime by Revolution
  - Overthrow a Regime by a Coup
- Terrorism
  - Initiate Repression
  - Execute a Terrorist Attack
  - Take Hostages or Hijack
- Force Status Actions
  - Repositioning
    - Land Forces
    - Sea Forces
    - Air Forces
  - Show of Force
  - Force Buildup
  - Establish New Naval Presence
- Military Assistance
  - Advisory
  - Training
    - Combat Troops
    - Other

- Logistics
  - Supply
  - Maintenance
  - Other
- Other Assistance

Other Military Actions

- Carry Out Intelligence Operation
- Introduce or Reveal Weapon Breakthrough
- Conduct Critical Weapons Test

Initiate Agreement

- Negotiate Landing or Refueling Rights
- Negotiate Base Rights Agreement

Undertake New Commitment

- Military
- Political
- Economic
- Political Support in a Third-Nation Crisis
- Military Support in a Third-Nation Crisis
- Political Penetration Operation

Other Actions

- Oligopoly in Critical Resources
- Seize Initiative
- Propose Arms Limit
- Prevent Free Flow of Peoples
- Carry Out Internal Repression
- Take Defensive Action
- Put Down a Revolt
- Take Retaliatory Action
- Lodge a Protest
- Escalate Conflict
- Protest to United Nations
- Seek Technical Assistance
- Induce Policy Change
- Deter Invasion
- Gain Political Influence
- Crisis Caused by U.S. Action

APPENDIX G

OBJECTIVES OF CRISIS INITIATOR

INTRODUCTION

The list of categories and variables included in this appendix has been used to code data on 100 international crises that involved the U.S. military from 1956 to 1976. These data are used in the prototype crisis management aid developed under Contract No. N00014-77-C-0135.

Essentially Military

- Defeat an Adversary
- Outflank NATO Defense by Political Means
- Outflank NATO Defense by Military Means
- Bring About Western Alliance Disunity
- Gain Military Superiority
- Weaken Adversary Military Power
- Foment War Between Others
- Induce or Support Guerrilla War
- Induce Intrastate Conflict
- Gain Control of the Sea
- Gain Control of the Air
- Gain Superiority in Space

Essentially Political

- Undermine Prestige
- Enhance Own Prestige
- Overthrow Government or Establish New Regime
- Affect a Policy Change
- Gain Political Access
- Change or Rectify a National Border
- Induce National Reorientation
- Gain Negotiating Advantage
- Induce Intrastate Dissension
- Establish International Rights

- Economic
  - Destabilize Economies
  - Deny Resource Access
  - Acquire Economic Dominance
- Other
  - Improve or Gain Intelligence
  - Deny Military or Political Access
- Maintain Status Quo
  - Military
    - Improve Deterrent or Defensive Posture
    - Protect a Military Asset
    - Prevent Territorial Intrusion
    - Preserve, Restore, or Improve Alliance
  - Political
    - Dissuade From New Orientation
    - Preserve a Regime
    - Deny Political Access
    - *Preserve Secrecy*
- Restore Status Quo
  - Restore a Regime
  - Restore Territorial Integrity
  - Restore Peace
  - Preserve Territorial Integrity
  - Gain Political Influence
  - Induce Interstate Conflict
  - Modify Balance of Power
  - Insure Respect for International Legal Rights
  - Become a Nuclear Power
  - Preserve Own Prestige
  - Restore Prestige

APPENDIX H

BEST CHOICE SELECTION ALGORITHM

INTRODUCTION

Statistical analysis of the historical crisis data base produces a set of parameters designed as $\{\beta_{ij}\}$. In turn, this set is constructed from an equation for each policy objective.

$$\Phi_1 = \beta_{11}A_1 + \beta_{12}A_2 + \ldots + \beta_{1n}A_n$$

$$\Phi_2 = \beta_{21}A_1 + \beta_{22}A_2 + \ldots + \beta_{2n}A_n$$

$$\Phi_3 = \beta_{31}A_1 + \beta_{32}A_2 + \ldots + \beta_{3n}A_n$$

$$\vdots$$

$$\Phi_m = \beta_{m1}A_1 + \beta_{m2}A_2 + \ldots + \beta_{mn}A_n$$

where:

Φ_i represents the i-th objective, coded as the presence (1) or absence (0) of that objective for the United States in the crisis.

A_j represents the j-th action taken by the United States in some historical crisis situation(s), coded as the presence (1) or absence (0) of that action in a specific crisis.

β_{ij} is an empirically derived conditional probability of the impact of A_j on Φ_i.

If all of the policy objectives are equally weighted, then:

$\sum_{i=1}^{m} \Phi_i$ represents the maximum objective "value" attainable for a set of actions;

$\sum_{j=1}^{n} \beta_{ij}$ represents the value associated with the i-th objective if all actions are taken; and

$\sum_{i=1}^{n} \beta_{ij}$ represents the contribution of the j-th factor to the sum of all objectives.

The algorithm uses W_i as the user-assigned weight for the i-th objective. This user-entered "raw" weight can be based on any convenient, positive, numeric scale (such as 0-10, 0-100, and so forth). The program scales these raw entries to a standardized weight, ω_i, such that $\sum_{i=1}^{m} \omega_i = 1$. Then, $\sum_{i=1}^{m} \omega_i \beta_{ij}$ represents the contribution of an action (A_j) to the user-specified set of objectives. When ω_i is large, an action (A_j) can make a relatively large contribution to the policy objectives specified by the user even though the action itself is not very effective. On the other hand, a very effective action may be relatively useless if it contributes to a low priority objective.

The program computes the total contribution of each action, C_j, where $C_j = \sum_{i=1}^{m} \omega_i \beta_{ij}$. These C_j's are then sorted and printed in descending magnitude.

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This Interim Technical Report documents research to date on developing a prototype executive aid for crisis management. The report contains four chapters, eight appendices, and a bibliography. Chapter 1 describes the effort in the context of ARPA's Crisis Management Program. Chapter 2 reviews the structure of the prototype executive aid while, Chapter 3 considers the role of data in the aid and the types of data required. Chapter 4 gives a completion schedule for the remaining research tasks. The eight appendices highlight various →

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(20.) facets of the research, including potential crises found for 1976, the sample for which data have been collected, the types of data gathered, and the best option solution algorithm.