MILITARY OPERATIONS RESEARCH SOCIETY

OOTW Analysis and Modeling Techniques (OOTWAMT) Workshop Proceedings
January 1997

(Chairs)
Dr. Cyrus Staniec
Dr Dean Hartley
(Co-Chairs)
Mr. Robert L. Smith
Mr. William H. Dunn

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1.0   INTRODUCTION

The Military Operations Research Society (MORS) held a Workshop on Operations Other Than War (OOTW) Analysis and Modeling Techniques on 28-30 January 1997 at MacDill Air Force Base, Florida. Operations other than war are increasing in number and extent for the Department of Defense (DoD), and the need for analysis tools and methods to support these operations is growing. Recent efforts within the DoD have both catalogued the types of operations included in OOTW and described the area in which the tools and methods would be useful. Building on this base, the aim of the MORS Workshop was to look at each analysis area to identify useful methods and tools to assist in the desired analyses. Challenges for the working groups were varied — however, each group was required to cope with the demands of meeting analysis needs across differing operational applications. The mission for each working group was to identify, in as much detail as possible, the tools and methods appropriate to meet current and future analytic requirements. The meeting was attended by 105 individual analysts, managers and operational experts with widely varied and diverse backgrounds. There were attendees from Great Britain, France, Germany and Switzerland. The Non-Government and Private Volunteer Organizations (PVO) were represented by the International Federation of Red Cross and Red Crescent Societies and Interaction. MORS Sponsored the OOTWAMT Workshop to bring together analysts and operators to evaluate approaches, tools and techniques, and to map alternatives for future OOTW analyses and modeling.

2.0   BACKGROUND

Military missions involving operations other than war are becoming increasingly important for US forces as the 20th Century draws to a close. Because the nature of OOTW is significantly different from traditional military combat missions, the quantification, simulation and analysis of these missions lags far behind the progress of traditional force-on-force combat modeling. In order to develop the capabilities required to conduct OOTW analysis, there are multiple parallel efforts underway in the Joint and Service arenas to model or simulate OOTW.

Significant progress has been made in developing the requirements for analysis tools and techniques through two meetings sponsored and organized by USPACOM. The first, a symposium held at the Naval Postgraduate School in February 1996, provided an opportunity for operational commands and military services to identify their requirements for OOTW analyses and tools. The symposium also developed approaches for framing the OOTW mission area by categories, attributes and component tasks. Participants were provided the opportunity to contribute data to help develop the framework. The output of the symposium was a draft requirements document dated June 1996, which served as the basis for the second meeting. The second meeting, a workshop held in September 1996 at the Naval Postgraduate School, was used to refine and finalize the *"OOTW Requirements for Analysis Tools Research Report"* published December 1996.

3.0 ORGANIZATION OF THE WORKSHOP

The Workshop Terms of Reference (TOR), agenda and structure are summarized below. The complete TOR is included in Appendix A.

3.1 Purposes: The workshop objective was to recommend a collective vision or "way ahead" addressing how to improve the ability to perform analysis and conduct OOTW mission planning — and make existing information more useful.. The purposes of this Workshop were to:

- Develop and recommend a roadmap or a "way ahead" for acquiring the necessary analysis capabilities.
- Extend the development of OOTW analysis capabilities by building on requirements.
- Progress toward developing tools for OOTW analysis.
- Investigate, suggest and refine techniques and tools appropriate to meet requirements.
- Identify associated requirements and sources for data to support or drive the tools suggested.

3.2 Working Group Structure: The workshop was organized around nine Working Groups:

- **WG 1:** *Mission Definition and MOE/MOP/ROE Determination for Analysis.* Addressed tools and methods to assist in defining missions and tasks.

- **WG 2:** *Force Planning Tools.* Addressed the requirements to support the design of primary mission forces and the support forces for use in OOTW, where the primary mission may require forces normally considered to be in the support category in combat operations.

- **WG 3:** *Logistic and Mobility Planning Tools.* Addressed the timing and prioritization of logistics support planning and transport planning, including any transport needed for other agencies, coalition partners and NGOs/PVOs.

- **WG 4:** *Effectiveness Measurement and Course of Action Analysis.* Addressed COA development, analysis, comparison, estimates of success and casualty predictions, risk modeling and recommendations. The factors considered include location, intent, cultural and political environment, potential flash points and centers of gravity.

- **WG 5:** *C4ISR Tools and Methods.* Addressed the collection of information and intelligence to support the OOTW missions, including information concerning threat, friendly and neutral elements and environmental information.

- **WG 6:** *Operational Cost Estimation.* Addressed methods for computing the cost of conducting OOTW operations.

- **WG 7:** Impact Analysis, addressing methods for predicting where OOTW missions may occur in the future and how to assess the impact of OOTW missions on other missions (e.g. MRCs), defense strategy and JSCP tasking.

- **WG 8:** *OOTW Data Bases and Data Availability.* Addressed how to gather data, what data to gather, how to use data (i.e., answers what questions) and how to maintain data. This included a rigorous discussion of the databases and

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historical information in existence on OOTW modeling and analysis.

- **WG 9:** *Executive Planning Review.* Responsible for synthesizing insights across the groups and for recommending a "way ahead" for the development of OOTW modeling techniques.

3.3 Agenda: The workshop was broken into plenary and working group sessions, as follows:

Tuesday, 28 January
0700-0830	Registration
0830-1200	Opening Plenary Session
1300-1700	Working Group Sessions
1700-1900	Mixer

Wednesday, 29 January
0800-1700	Working Group Sessions

Thursday, 30 January
0800-1000	Working Group Wrap-up
1030-1300	Plenary: Working Group Reports
1400-1700	Working Group Chair and Executive Committee Wrap-up

3.4. Products: Each working group produced a **draft scripted briefing** of their findings, conclusions and recommendations. Specific content of working group products included the following:

- Validation of analytical needs identified by USPACOM.
- Definition of specific analytic requirements.
- Suggestions for analytical approaches and tools to address each need.

- Identification and/or evaluation of existing analytic tools and techniques.
- Suggestions for enhancements and validity of tools.
- Identification of data sources and projects.
- Identification of MOEs, MOPs, etc.
- Recommendations and Conclusions.

3.5 Participation: The workshop was limited in size and was open to invitees only. Demographics of the workshop participants are shown in Table 1.

Table 1: Participants

Category	Number	Percentage
DoD	57	52.8
Other US Government	2	1.9
US Commercial	36	33.3
US Non-Government (Non-Commercial)	4	3.7
International	9	8.3

3.6 Organizing Committee:

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4.0   GENERAL SESSION PRESENTATIONS

4.1   Opening Remarks, Dr Cyrus Staniec, Program Chair

Dr. Staniec welcomed the workshop participants to Tampa, providing a short introductory briefing for the audience. He reiterated the purpose of the workshop — to focus on identifying tools and analysis techniques — and made note of the diverse and talented group that had assembled to undertake the task. He further expressed his appreciation for the effort already invested in the workshop, principally by the MORS office in administrative organization, by SOCOM and CENTCOM in preparing the site facilities so well and by the working group chairs and other volunteers who were responsible for organizing the technical activities of the workshop. With thanks in advance to the participants for their anticipated effort, he passed the gavel to MORS President, Fred Hartman.

4.2   MORS President's Welcome, Mr Fred Hartman

The MORS President provided these brief opening comments and introduced the MORS Sponsor and Plenary Speakers: "As a volunteer organization, the success of MORS meetings is dependent upon the very hard work of a number of individuals. We are grateful for the work in preparing for and conducting this MORS Workshop. Our sincere thanks is provided to our Sponsors, the Organizing Committee, the Issue Group Leaders and in particular the General Chair,

Cy Staniec and his Co-Chairs Dean Hartley, Bill Dunn and Robert Smith. The meeting is being conducted here at MacDill AFB and jointly hosted by USSOCOM and USCENTCOM. We are indebted to them for the generous support which has made this meeting possible. The on-site support team was led by LTC Richard Wiles, Jr of SOCOM, who is the son of our MORS EVP Dick Wiles. This "father-son team" has produced a very smoothly run meeting with excellent host support.

An individual who needs no introduction to the MORS attendees is our OSD Sponsor, Jim Johnson. Jim has been an active participant in MORS meetings for many years and is a charter member of our standing MORS Working Group on Mobility. He was also the General Chair of the MORS special meeting on "Joint Mobility Analysis" in September 1995. It is a great pleasure to present the Deputy Director for Theater Assessment and Planning, OSD (PA&E), Mr. Jim Johnson."

4.3   Sponsor's Welcome, Mr. Jim Johnson, OSD PA&E

Mr. Johnson greeted the participants and expressed his appreciation for their participation in the workshop. He reiterated the growing importance of analysis of OOTW missions to Defense planning. He spoke further of the efforts currently under way within the Office of the Secretary of Defense, the Quadrennial Defense Review contained a significant component dedicated to Operations Other Than War. Efforts such as the Baseline Engagement force conducted by the Joint Staff were aimed at characterizing the typical levels of involvement of the military and, in particular, the areas where OOTW operations might impinge on our ability to perform traditional warfare missions like the

Major Regional Contingencies. In operational areas, it is clear that there is considerable need for improvement or additions to our analytical and operational tools to assist in mission performance. This is all occurring in an environment seeking to improve standardization, compatibility, and reuse in modeling and simulation. All of these factors make this OOTW analysis topic a relevant and important one. With this in mind, Mr. Johnson wished the workshop success in its efforts and looked forward to the contributions to come.

4.4 Plenary Address, BG Bryan D. Brown, USA, J5/J7 USSOCOM

Brigadier General Bryan D. Brown is the Director of Plans, Policy and Strategic Assessments, J5/J7 for the United States Special Operations Command. General Brown has experience that builds on his long years of service in Special Operations, which began on a Special Forces "A Team" early in his career. His career has been interspersed with assignments and command of Special Operations units. General Brown was Commissioned in the Field Artillery and commanded units in Artillery, Aviation and Special Operations. He was also the Assistant Division Commander for Maneuver, 1st Infantry Division (Mech) Fort Riley, Kansas.

General Brown provided the SOCOM welcome and indicated the need for analysis in the complicated operational areas of OOTW in which SOCOM expends a major effort. He indicated that he and the CINC are looking forward to the "fruits of the MORS effort" in the form of products for OOTW. By way of background, he discussed the value of tools in formulating the vision and discussed the Chairman's "Joint Vision 2010." The "fog of war" is hard to define, and any help from the

analysis community is most welcome. General Brown went into detail with slides from the SOCOM Command Briefing on Psychological Operations and Civil Affairs, key elements in many OOTWs. He then used Haiti as an example of the value of these important areas. The need for planning and Course of Action analysis is very important and must be done quickly — and extends right up to the last minute — before the operation is to kick-off. Situational awareness is an extremely important factor in OOTW as well as more conventional operations. In summary, in order to be of value to Special Operations, the tools for SOCOM should be accurate, small, quick and easy to use.

4.5 Plenary Talk, Lt Gen Anthony C. Zinni, USMC, Deputy CINC CENTCOM

In his Plenary discussion, Lieutenant General Anthony C. Zinni, Deputy Commander in Chief and Chief of Staff, United States Central Command, provided a detailed background of his considerable "on the ground" experience in Contingency Operations and OOTW. General Zinni is one of the most knowledgeable individuals in today's defense establishment in the area of OOTW with detailed operational experience in both Marine Corps and Joint assignments. As the Regimental Commander of the 9th Marines and Commanding Officer of the 35th Marine Expeditionary unit, he deployed twice to the Philippines to conduct emergency security operations and disaster relief. He was the Chief of Staff and Deputy Commanding General for Combined Task Force PROVIDE COMFORT during the Kurdish relief effort in Turkey. He served as Mission Coordinator for Operation PROVIDE HOPE, relief for the former Soviet Union. He was also Director of Operations for Operation RESTORE HOPE

in Somalia and served as the Assistant to the United States Special Envoy to Somalia during Operation CONTINUE HOPE and Commander of Operation UNITED SHIELD, which protected the withdrawal of the United Nations forces from Somalia. Liberally borrowing from this significant experience base, General Zinni discussed the unique features of OOTW operations and contrasted them with the traditional role of the US military forces. The nature of OOTW is significantly different from traditional military combat missions due to the variety and complexity of issues involving political, economic, ethical and cultural aspects. These categories reflect the need for thinking outside of the military box. Participants in OOTW include; coalition partners, non-governmental organizations, private volunteers, organizations, tribes, refugees, etc. The threat spectrum includes drugs, terrorists, international/crime and environmental security. Although some military tasks are similar to combat (e.g. operating a Reverse Osmosis Purification Unit (ROPU)), many are modified traditional (e.g. urban operations like Belfast and Stalingrad) and non-traditional (e.g. negotiating). Analysis prior to an OOTW should include Course of Action analysis and exploring ideas of psychological operations prior to deployment. However, there are many more opportunities for analysis that should be done in mission planning, force structure, cost estimating, MOEs, command and control, making assessments, information management, cultural intelligence and transition planning.

General Zinni went on to comment that, although the METT-T paradigm is useful for describing and planning our analysis needs, we need to move away from the baggage that the individual terms denote (e.g. the "mission" for military applications is mission-to-task which is thorough and

mechanical). OOTW has mission "creep" in a mushy, undefined world. The concept of "enemy" as it is included in METT-T should be replaced for peacekeeping, humanitarian assistance and other operations such as disaster relief, etc.)

4.6 PACOM Overview, Dr Dean Hartley, Technical Chair

Dr. Hartley presented an introduction to the previous work initiated by the Pacific Command in two prior workshops. That work provided a substantial basis for the MORS workshop. Dr. Hartley's briefing can be found in Appendix B.

5.0 WORKING GROUP REPORTS

Each working group pursued the general tasks listed below:

- Review the analytical need identified by the USPACOM workshop.
- Suggest analysis approaches and tools to address each need, considering the varying demands or applicability to the various broad OOTW mission areas.
- Examine existing tools (or those which can be developed) and suggest enhancements and validity of approaches for general OOTW application.
- Recommend actions for analytic/tool development and ideas for an OOTW "Roadmap."
- Address data types required and where found (or how to develop).

Modes of operation were different for each working group. The annotated working group briefing slides follow the "Recommendations" and "Conclusions" sections of this report.

6.0 RECOMMENDATIONS

Conclusions of the working groups are presented here in the form of recommended actions to be taken along with a short rationale. The recommendations are grouped together into two categories. The first category is General and Procedural, covering observations beyond analysis tools. The second category, Tools, roughly corresponds to a summary recommendation based on the results of each working group. Taken together, these recommendations point to the "way ahead" as it emerged from the workshop. Obviously, as the result of only two and one-half days of effort, the roadmap cannot be comprehensive, but it does offer many insights for shaping the future of modeling and analysis supporting operations other than war.

6.1 General and Procedural

Recommendation A: Conduct an open "decision support tools" symposium aimed at demonstrations of working tools.

Rationale: A tools-only focus, in demonstration mode like the INFORMS software displays, open to all participants (government, international, NGO) will allow immediate users to examine existing tools and explore potential bases for long term development.

Recommendation B: Designate a JAMIP-like process to manage OOTW-related developments.

Rationale: Such a body and process will provide positive leadership, set major requirements and manage resources, avoid duplication while ensuring interoperability with other critical systems and full functionality and will integrate data requirements into existing processes. This body will also provide a managerial-level link to other government and outside agencies.

Recommendation C: OOTW data requirements should be incorporated in the DoD Joint Data System.

Rationale: Centralized management of data requirements (not centralized location of data) will help ensure availability of data and compatibility with major tools, will facilitate coordination and communication with outside organizations/data providers, will provide standards for gathering of historical data and will be able to provide guidance on issues like (de)classification of data.

Recommendation D: Take steps to determine whether operations research analysts are properly trained to deal with the differing challenges of OOTW.

Rationale: Military Operations Research training provides a solid foundation in theory, but until recently, the focus of practice has been warfare. OOTW provides a disparate set of issues, measures and complications, which most analysts have not faced. Therefore, revisions to training may be beneficial.

Recommendation E: Include analysts throughout all OOTW development efforts, including in the field.

Rationale: The operator/analyst team constitutes a prime analysis "tool." On scene, the analyst can help with real time problem solving — and can also take on duties like gathering or coordinating gathering of complete and consistent data for historical reference and analysis.

6.2 Tool Implementation

Recommendation F: An integrated force planning and logistics planning tool should be implemented. CAPS and useful methodology from FAST-OR both appear to provide a good foundation for starting this action.

Rationale: WG 2 and 3 reviewed these models in light of requirements and found useful, but incomplete functionality. There is a good basis for an integrated, full functionality tool without starting from scratch.

Recommendation G: Study groups should sort out the models for infrastructure analysis, supply and service estimating and lift requirements to determine "legacy" models for joint maintenance.

Rationale: WG 3 found a rash of models of varying intent and capability in these areas. Sorting through these models based on requirements and capabilities will lead to standardization and consolidation for joint uses.

Recommendation H: Continue research in Domain Analysis of OOTW missions to support development of Course of Action analysis tools.

Rationale: WG 4 evaluated many existing models, but found none that generally satisfy requirements. Other tools (e.g. commercial) still warrant investigation, but the attributes and measures of OOTW need to be better specified to allow general tool building.

Recommendation I: Plan for and develop an orchestrated spectrum of tools to support the mix of tasks associated with C^7I^3SR.

Rationale: As noted by LtGen Zinni, there is a need for tools to support the generation of non-traditional, flexible C^2 organizations that can adapt to changing conditions (e.g., changes in missions). Furthermore, the increased demands of multi-faceted "actors" in OOTW places a greater demand on the information management function. Finally, physical management of communications connectivity among many players requires planning and execution tools. It is clear that failure to orchestrate these efforts would result in an inadequate capability.

Recommendation J: Build a tool to provide early rough estimates of the incremental cost of a specific proposed OOTW, and refine DFAS cost breakdown structures for more accurate and consistent costing.

Rationale: The knowledge exists to build this tool now, providing decision makers better visibility into the resource implications of decisions. Building this first model will naturally lead to more refined models spanning other applications. The details are outlined in the WG 6 report.

Recommendation K: Construct and execute a vigorous program of research and implementation of tools for impact analysis based on the recommendations of WG 7. Include a review and validation of the user requirements for tools in this area.

Rationale: Tools in this area seem to have significant value to preparing for and supporting the successful execution of OOTW, but are the least well developed. Many models were examined, but only a couple were promising in the near term. Theory building, more detailed workshops, further surveys and better data and data analysis are recommended for research before building other tools.

Recommendation L: Devise and execute a program focused on "Situational Awareness" for OOTW by integrating the proposed C^7I^3SR, impact analysis and data development programs.

Rationale: In the terminology of the workshop, information management constituted a center of gravity for OOTW success. Information management enables situational awareness. Data represents the input to or componentry of information. Awareness of the potential impact of our actions enhances decision making. Tools enhancing these areas — properly coordinated and integrated — should significantly enhance mission execution.

7.0   CONCLUSIONS

This MORS Workshop has provided a useful next step in advancing the state of analytic modeling and tool development for OOTW. Generals Brown and Zinni made it clear in their plenary talks that tools will never replace thinking people in executing these complex missions, but tools certainly have a place in preparing and assisting those responsible for mission execution.

The recommendations emerging from the working groups generally corroborate Dr. Hartley's assessment shown in section 4.6 of this document and expands on it with specifics. Force planning, LOG/MOB Analysis and Cost Analysis are all at the point where models can be developed to suit requirements. In each case, the primary implementation issue appears to be taking a joint/interagency approach to finding, fixing or building the suitable tool. Though not specifically reviewed by Working Group 1 at this workshop, other groups pointed to the potential of the Conceptual Model of Peace Operations (CMPO) being developed at George Mason University as a logical

foundation for examining mission planning requirements. Any model developments in these areas should be closely linked and interoperable.

As expected, Course Of Action analysis (COA), Impact Analysis (IA) and C^7I^3SR require further research before any widely accepted, widely applicable tools can be implemented. These areas would benefit from further joint/interagency oversight and planning to determine what tools are useful on a community-wide basis, then developing programs for development.

In the final analysis, the issue of "Information Management" stands out — in Dr. Hartley's terminology, this would encompass "database" and "situational awareness." Several groups commented on the lack and inconsistency of historical data for analysis and planning purposes. Others cited the lack of access to current data, while participants such as the NGOs stated that useful data is available — if one knows where to go and who to ask. Finally, Working Group 5's review of the complexities of acquiring and distributing information within OOTW resulted in several recommendations to deal with the resulting difficulties. Standards for data for historical purposes, access to data we hold, easy access to others who hold data and processes and tools to assist in managing and disseminating information are all high leverage areas deserving of coordinated action.

MORS Sponsorship of this event has been useful, but many of the next major steps must be taken by the government. Even in areas where further tool review is suggested, the government will have to determine the course of the efforts and what final selections will be made. On the other hand, MORS can be an apt leader for a tool

"exposition" and can continue to encourage members to actually participate in the development of concepts via smaller workshops in research areas.

The OOTWAMT Workshop respectfully submits these observations and recommendations in the hope of advancing the state of analysis and modeling in support of OOTW.

Operations Other Than War Analysis Methods and Techniques

WG 1 Final Report

Mission Definition, Measures of Effectiveness,
Measures of Performance, Rules of Engagement

MORS Workshop

MacDill Air Force Base

28 - 30 January 1997

WG 1: Mission Definition, MOEs, MOPs, ROEs

Introduction (1)

- ◆ Task Area:
  - Address missions definitions and task determination or analysis to include: MOE/MOP/ROE
  - Intended objectives were to describe military objective development, and to attempt cross cutting MOE/MOP/ROE development
- ◆ Mode of Operation:
  - Scope of expertise included 7 DOD, 3 Consultants, 2 international and 1 NGO participant.

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The area assigned to Working Group One was exceptionally broad, ranging from mission conceptualization at the NCA and CINC levels, through operational objectives, to employment, employment of measures of effectiveness and rules of engagement. The group worked sequentially on its assigned areas, but was not able to address all aspects in the time available.

WG 1: Mission Definition, MOEs, MOPs, ROEs
Introduction (2)

- ◆ Group Approach:
- ◆ Conducted mission analysis to assist in defining missions and tasks.
- ◆ Areas evaluated:
  - » Mission objective statement
  - » Qualitative and quantitative factors

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We worked as a committee, and subdivided into three and four sub-groups for consideration of OOTW mission categories. We attempted to evaluate the potential for adoption or new development of measures of effectiveness derived from mission objectives, which we had postulated for each of the four main categories assembled in the Hartley document (Appendix B).

The Working Group participants encountered considerable disagreement over the mission categories as listed in the Hartley document. Discussions arose in two related areas. First, the group discussed the differences evident in the mission groupings documented by Hartley as compared to the scope of the Joint Doctrine Publication 3-07 on Military Operations Other Than War. Then, the group debated whether or not the mission groupings in the Hartley document provided any operational benefit.

WG 1: Mission Definition, MOEs, MOPs, ROEs Introduction (3)

- ◆ Tools and models reviewed:
- ◆ USSOUTHCOM Model — Deployable Exercise System (DEXES), Civil Affairs war game module.
- ◆ Federal Emergency Management Agency/DOD disaster relief models:
  - − "Exercise Template" designs exercises for natural disaster preparedness, Director of Emergency Preparedness.
  - − "JFACC Planning Tools (JPT)" strategy to task analysis, Air Staff (Checkmate).

We considered a number of OOTW related models and examined three in some depth: (1) USSOUTHCOM's DEXES, Deployable Exercise System, civil affairs module; (2) FEMA's disaster preparedness "Exercise Template;" and, (3) the Air Staff's "JFACC Planning Tool," strategy to task analysis aid.

The general consensus was that all of these models have OOTW utility that should be explored. The group also recognized the need for further identification and examination of possible OOTW models of utility.

WG 1: Mission Definition, MOEs, MOPs, ROEs
Descriptions (1)

- ◆ OOTW Analytical Needs:
- ◆ Mission Objectives: Historical mission analysis required:
  - – Analytical Study:
    - » Capture critical operational mission characteristics and interrelationships between missions and international environment.
    - » Capture transitions between missions
    - » Basis for doctrinal element for OOTW
- ◆ Product — historical OOTW database

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OOTW is presently faced by a shortage of easily available, or existing, information from which to capture critical information to assess historical missions, or to create OOTW mission objectives. To adequately address issues in this area, and to assess the probability of occurrence of OOTW's, there is an analytical requirement for a United States Government study.

This requirement should capture critical OOTW strategic, theater and tactical operational mission characteristics and inter-relationships between the sixteen missions, and the international environment. This study will capture the participation of state and nonstate actors that were involved or influenced in historical OOTW missions.

This study should capture the transitions between missions, e.g., decline of state A in which a NEO operation was followed by a humanitarian assistance operation. Factors leading to the decline of a state should be evaluated to include political, socio-economic, environmental, military factors, etc., that may have contributed to this environment.

Historical analysis should include examination of the doctrinal elements as stated in Joint Publication 3-07. This focus will examine the doctrinal elements to ascertain their relevancy during historical OOTW operations.

Overall, two historical databases should be constructed to store the analytical data. One should be unclassified and the other classified. These data bases should also include data from civilian US government agencies, NIGO's and allied countries.

WG 1: Mission Definition, MOEs, MOPs, ROEs
Descriptions (2)

- ◆ Problems:
  - – Lack of awareness on an inter/intra-agency and international level of a comprehensive list of:
    - » Analytical tools
    - » Databases for after action review of OOTW's
    - » Archived information on MOE/MOP/ROE
- ◆ Needs: Method to quickly access data.
- ◆ Recommendations: US Government inter-agency requirement to provide information to address unclassified and classified requirements

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There is a poor general awareness of the full range of OOTW analysis tools, relevant/adaptable data bases, or Measures of Effectiveness (MOE), Measures of Performance (MOP) and Rules of Engagement (ROE) archives. This lack of awareness is the rule, rather than the exception within the Federal Government and outside, including non-US OOTW actors. A frequent consequence is ad hoc crisis management in the face of an OOTW mission design challenges. The need is evident, but the solution is not at this point.

The working group membership felt that a need exists to establish an interagency repository into which US Government Agencies can provide information on these areas. This data should be made readily available to all government agencies. Further discussion as to the specific data elements needed for information on MOE/MOP/ROE's is required, and should be conducted on an inter-agency level.

WG 1: Mission Definition, MOEs, MOPs, ROEs Descriptions (3)

◆ DoD needs to conduct research to develop taxonomy of mission objectives:
  - Regional orientation
  - Separated by mission type
  - Identifies variety of mission objectives
    » Political, Socio-Economic, Environmental, etc.
    » Public Health/Human Rights
  - Identifies agencies and critical types of specialists required to address planning and mission creation requirements
◆ Requires government inter-agency and CINC level study

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Department of Defense, probably more than other federal agencies, should construct a usable taxonomy of OOTW mission objectives. User friendly objectives would pertain to each OOTW mission, each major geographic region/sub-region, and would specify the type of operational response and lead agency required.

The CINC's would be important to the development of such a mission objectives taxonomy and to it's universal adaptation. The work in this area could utilize the information provided by an historical analysis.

WG 1: Mission Definition, MOEs, MOPs, ROEs
Summary Recommendations

- Get clear, precise (OOTW) mission definitions — before analysis decisions.
- A million "tools" exist, but are often unrecognized or under-appreciated; e.g., a field expert; a checklist; annotated bibliographies.
- MOE's and MOP's are used ubiquitously outside DoD; National Guard, Police Forces, NGO/PVO, economists and international multinational firms — capture.
- Need a comprehensive tools "inventory"
    - By CINC regions and OOTW Missions.
    - Get hooks among/between.

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A poorly or incompletely stated OOTW mission must result in poor or meaningless analysis thereof. Subject matter experts at national and CINC levels can assist in developing a coherent and actionable mission statement.

Tools abound, but are often disguised, e.g., field operational checklists, an expert civilian regional specialist, annotated bibliographies, area handbooks, etc. This presents a distorted image of OOTW analytical capabilities.

Non-DoD organizations create and use MOE/MOP and Measure of Merit (MOM) that may be very useful to adopt for military OOTW needs. They include: National Guard/Reserve units, police, US federal law enforcement, NGO, PVO, economists, multinational corporations (construction, oil, manufacturing).

A comprehensive OOTW-relevant "tools inventory" is required. Most useful tools are tailored for geographic regions, OOTW mission types or operations/task design, or combinations of these three areas. Many probably exist, but have deceptive titles or are in the possession of unassuming owners. Once inventoried, a method/system of linking them, by mission data requirements for example, should be established. This could be as simple as a continuously updated checklist, a descriptive spreadsheet/address device or a logic program.

WG 1: Mission Definition, MOEs, MOPs, ROEs Conclusions

- ◆ Discussed, debated, disagreed, learned.
- ◆ Contributions on the margin.
- ◆ To do: Division of labor decisions (MORS, DoD, Industry).
- ◆ MORS effort, possibly an analysis "tools only" workshop/mini-symposium/roundtable (global)

We engaged in a serious, often divergent, but ultimately productive series of debates and learned a great deal from each other. Our contributions were on the margin, relative to the full original group's assignment, but we often found insights as to the road ahead for OOTW analysis methods and tools.

First, there is much to do and room for all actors. DoD may certainly wish to review the doctrinal basis and generic mission descriptions for OOTW, with a view towards deriving some common measures of effectiveness, based upon a sufficient yet limited core of mission objectives. Second, MORS should consider leading a workshop to inventory and compare OOTW tools. The workshop would be open to industry with significant international, NGO and PVO participation. The goal here would be for the participants to each arrive with OOTW, or OOTW candidate analytical tools or aids for cross-comparison, and for possible data/procedural linkages with similar or logically sequential tools. The collective product would be an inventory of existing tools, by functions and design, including their potential for access, data updating and confederated use.

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Operations Other Than War Analysis Methods and
Techniques

WG 2 Final Report

Force Planning Tools
MORS Workshop

MacDill Air Force Base

28 - 30 January 1997

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Working Group 2 addressed the need for OOTW-specific force planning tools.
The group examined existing models and reviewed current techniques, and
synthesized all viewpoints to form a consensus on how to reach the goal of
having a CINC-level OOTW force planning tool.

WG 2: Force Planning

Introduction (1)

- ◆ WG Task Area:
  - – TOR: Sources and methods for estimating required forces for OOTW missions
  - – Intended objective: outline a CINC-level model
- ◆ WG Mode of Operation
  - – Scope of Expertise
    - » CINC representations — SOCOM
    - » International — French, UK
    - » NGO — International Red Cross/Crescent, other

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The Force Planning tools working group began by accepting the MORS Terms of Reference charge which asked the WG to look at methods and data sources for estimating the required forces for OOTW missions. Current techniques do not lend themselves to the easy identification and translation of OOTW tasks into requirements. Planners are well versed in the translation of military tasks into military force requirements, but the special needs of OOTW are not linked explicitly to planning methods. The group agreed that if, after discussion, it was clear that there were no acceptable OOTW mission planning tools available for planners, then the WG would attempt to outline the requirements for a simple model to assist planners.

The WG was comprised of a diverse set of technical experts which contributed greatly to the quality of the final results. CINC operational staff positions were represented by several SOCOM planners, while French and British planners gave the group key international perspectives. All services were represented by analytical personnel from their staffs or FFRDC's. And finally, the International Organizations and members of the NGO/PVO community were well represented by the International Red Cross/Red Crescent and Interaction. This happy collection of skills and viewpoints resulted in the drafting of a suggested model framework that moved the philosophy of planning OOTW missions beyond the traditional military assessment of OOTW tasks, and the obsolete paradigms of Cold War planning.

WG 2: Force Planning

Introduction (2)

♦ WG Mode of Operation (continued)
  – How we did business
    » Introduction presentation — set goals
    » Model review — CAPS, FAST-OR, OFP
    » Flow charts and viewpoints
    » Consolidate and correct flowchart
    » Factors and considerations
    » Outputs
    » Data and hooks to other models (WG 1, 3, 5, etc.)

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Following a short introduction to set the tone and schedule for work, the WG reviewed three existing models:

- CAPS, or Crisis Action Planning System, is an embryonic model commissioned by the J-8 to be developed at TRAC - Ft. Leavenworth.

- FAST-OR, or Force Analyzer Spreadsheet Tool for OOTW Requirements, is an Army CAA model designed to allocate support force structure to OOTW mission planning.

- OFP, or Objective Force Planner, is an Army task-based planning methodology used for OOTW mission analysis.

These 3 models served as potential candidates to fulfill the need for a CINC-level planner's tool for OOTW. The group determined that if these models were unsuitable, the next course of action would be to draft a flowchart of a potential model solution. After some discussion, the WG decided that none of these tools was optimal. Therefore, the WG continued to develop a suggested model outline. Three viewpoints (SOCOM, UK and OSD) were diagrammed as flow charts and then consolidated into a group product. In the final product, outputs of the notional model were described, and necessary data hooks to other working group efforts and data sources were suggested. This summarizes our business process.

- ◆ Tools & Models Reviewed
  - Formal Presentations — Models Discussed
    - » CAPS, TRAC-LVN/J-8
      - ◆ Crisis Action Planning tool
      - ◆ Task to force requirements
    - » FAST-OR, CAA
      - ◆ OOTW support force planning tool
      - ◆ Establish main force, calculate supporting forces
    - » OFP, CAA
      - ◆ Objective Force Planning
      - ◆ UJTL/METL based task methodology

The three tools reviewed were CAPS, FAST-OR and OFP. CAPS, or the Crisis Action Planning System, was created by TRAC - Ft. Leavenworth for the J-8. It is incomplete and offers a menu-driven method for planning an OOTW operation and determining force requirements. The structure of the tool is very useful, but the planning process contained in it is incomplete and does not focus enough on the uniqueness of OOTW planning.

FAST-OR is the Force Analysis Spreadsheet Tool for OOTW Requirements, created by CAA. It is an Excel-spreadsheet based model which allows the analyst to analyze mission tasks and establish a main force. Then the model calculates, in iterative fashion, the supporting forces required. It is only capable at present of analyzing Army forces. Its routines could potentially be expanded to include joint forces.

OFP or Objective Force Planning is a METL or UJTL based planning methodology from CAA that relies on a task analysis to formulate forces needed. It does not calculate force lists in an automated way, and is too personnel-intensive to be used as a quick turnaround planning tool.

All three models were judged to be inadequate for the CINC planner's needs.

WG 2: Force Planning

Descriptions (1)

- ◆ Force planning needs
  - Purpose: CINC planning tool that captures OOTW missions — all forces
  - Extendible to OSD PA&E, J-8 analysis
  - Linkable to other tools, COA analysis and budget production
  - No current model captures need
- ◆ RECOMMENDATION: Build a model

The force planning needs were seen as requiring a CINC planning tool that captures the special factors of OOTW missions, generically enough to account for all Joint forces. The tool must help the force planner or analyst relate non-military OOTW mission tasks to the capabilities of DoD formations. The tool should also be extendible to OSD PA&E or J-8 analysis efforts. Ideally, this routine would be easy to use in a tactical or operational environment and be executable by very few or even one planner. It must be linkable to other tools, COA analysis, and be capable of output that can be related to budget production studies. The WG assessment was that no current model captures this need in total, and therefore the recommendation of the group was to build a model with these attributes.

WG 2: Force Planning

Descriptions (2)

- ◆ One model for all 16 missions
  - – Group product land-oriented, needs work
- ◆ Technical approach:
  - – CAPS framework, PC-based
  - – Access, Excel, MS vs. C++, Visual Basic, technical evaluation required
  - – Companion analysis methodology
  - – Build on FAST-OR techniques for support forces calculations

The WG was confident that one model could be made general enough to serve for all 16 missions in Joint Pub 3-07. The output of the current MORS WG was created in a very limited time and of necessity needs to be re-examined. The group admitted that the WG product at present was land-oriented, and needs work to be generalized.

The best features of CAPS and FAST-OR were suggested as the basis for the technical approach. The model should utilize the CAPS framework and screen structure, and be PC-based for maximum utility. A long discussion of modeling language and approach yielded the candidate techniques of Access, Excel, MS vs. C++, Visual Basic as potential programming techniques. A true technical evaluation is required to determine the best approach, as this was beyond the skill of the WG. It was also noted that the model must possess a companion analysis methodology to guide the planner or analyst in its use, for the logic of military force planning would be imbedded in its structure and hence a roadmap would be required for use by analysis personnel. And finally, it should build on FAST-OR iterative calculation techniques for support forces calculations. Essentially, the WG recommended taking the best features of the incomplete tools at present and combining them into a useful, robust tool.

WG 2: Force Planning

Descriptions (3)

- ◆ WG 2 flow charted model design!
  - Minimalist military force approach
  - Non-traditional, mission & enabling forces
- ◆ Focused on CINC
  - User friendly; transparent
  - Interactive w/planner
- ◆ Fundamental OOTW tasks missing from J-7 UJTL — needs re-look

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WG 2 then went on to flow chart the recommended model design, presented in a separate document to be developed. The group took a minimalist military force approach by having the tool calculate Allied and NGO/PVO force contributions before allowing US forces to be assigned to a given scenario. The recommended force calculations should be done in a non-traditional manner by splitting forces into the categories of mission and enabling forces, generally discarding the distinction between Combat, CS and CSS forces as used at present, at making it more acceptable to joint planning. It was agreed that the routine should be focused on C in C-level operations, and must be user friendly, transparent and interactive with the planner using it. It must certainly be useful for training exercises and COA evaluation, and therefore must accomplish planning based on tasks. In the course of this discussion, it was noted that several fundamental OOTW tasks were missing from the current J-7 UJTL. The WG recommended as an aside that the UJTL document needs a re-look and updating, to ensure it covers the tasks outlined in Joint Pub 3-07.

WG 2: Force Planning

Descriptions (4)

- ◆ Links:
  - – Start w/mission input (WG1)
  - – Link to C⁴ISR, Logistics tools (WG 5, 3)
  - – Consistent w/AMP, log tools
- ◆ Tool design shortfalls
  - – Green tint — needs Navy/Joint review
  - – Data availability/compatibility

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The WG stated that any new model must link to the efforts of the other OOTW WG at the workshop. The proposed model would start with mission input, as all military planning does, and build on whatever techniques are selected by WG 1 for use in mission definition. Any outputs or conclusions of this model would further link, ideally, to any and all C⁴ISR and Logistics tools as selected for use or development by WG 5 and 3. The model output would be in the form of a troop or force list, perhaps down to section, team or individual level, as required by the mission. This force list output must be consistent with the AMP family of tools, so that a planning staff can conduct basic transportation analysis on the results.

The current WG 2 proposed design has some shortfalls, notably a Green (Army) tint, due to the desire to tackle the harder or more complex problem of ground support planning first. It will need a Navy, Air Force or Joint review. The hardest portion of the effort, however, will be assuring unit data availability and compatibility. Only selected unit capability files exist today in JOPES, and the perception of the WG (which was limited in expertise) was that data reflecting unit capability with respect to OOTW mission accomplishment was not readily available to the force planner. This observation is more assumption on the part of the WG than confirmed fact, but it forms the basis for the comments about data availability being a potential problem.

WG 2: Force Planning

Descriptions (5)

- ◆ **Research required**
  - – Task to capability matching
  - – Specifying unit capability (Service)
  - – Generalizing unit capability (cross Service translations)
  - – UN/IO/NGO/PVO capability translation
    - » Data acquisition problem
    - » Translate into military arena as possible

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Some original research is required to make this model concept viable. The most difficult part of any effort such as this is "task to capability" matching for all potential units of selection. OOTW missions contain many tasks which translate easily to traditional military missions, such as security or establishing zones of separation. Other tasks are vague and oriented toward civil governance and do not lend themselves toward easy choice of units to accomplish. The hardest task of all is screening across the service spectrum to be able to substitute units of different service component for given tasks. Research will be necessary to specify unit capability by Service, and then generalizing unit capability across Services and translating capability with common terms into a Joint frame of reference. Some of this data will already exist, while other data will require some original research to translate. It will also be necessary to do a UN/IO/NGO/PVO capability translation, so that these actors may be represented in any given scenario. All of this poses a data acquisition problem, and the difficulty of translating civil operations into the military arena as best possible.

The ultimate goal is a data base, such as that currently maintained at OSD(PA&E), that is expanded to allow a planner to select, quickly, accurately and easily, those units most appropriate for a given OOTW mission task.

WG 2: Force Planning

Summary Recommendations (1)

- ◆ Combine techniques of CAPS and FAST-OR to build model
- ◆ Technical assessment of programming choice
- ◆ Research task to capability techniques
- ◆ Appoint lead agency (J-8), establish working group <u>across</u> <u>DoD</u> — must be Joint effort
  - – Funding
  - – Data provisioning

In summary, the WG recommended that the combined techniques of CAPS and FAST-OR be used to build this model. A complex model is not desired, but rather a functional, quick-running routine that links unit capability with mission task to assist the planner in task and requirement analysis. A technical assessment of programming choice must be made to select the most efficient techniques, but spreadsheet tools are recommended. Research must be conducted to match task to capability for all Joint units and use a common technique and mutually agreed data base.

To start the program, it will be necessary to appoint a lead agency, and the J-8 was recommended as the most logical and best choice to manage a program targeted at the CINCs. Following that, the sponsor must establish a working group that goes <u>across DoD</u> to shepherd model development. This must be a Joint effort in order to handle both funding and data provisioning. Unit capability data with drive force selection, and all services must agree on the data veracity. A long, complex and expensive development effort is NOT recommended.

WG 2: Force Planning

Summary Recommendations (2)

- ◆ DATA for scenario:
  - – JIC Trans worldwide trans infrastructure DB
  - – Interagency Data Bases (DOJ, FBI, OFDA), for CD, CT, HA missions
  - – Terrain/Country data
- ◆ Look up, push button style

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The WG was also tasked to recommend specific methods and sources for data. For scenario generation access to the following data was seen as necessary:

- The JIC Trans worldwide trans infrastructure data base. This data base will provide stationing and logistical infrastructure parameters for mission planning throughout the world.
- Interagency Data Bases (DOJ, FBI, OFDA), for Counter Drug (CD), Counter Terror (CT) and Humanitarian Assistance (HA) missions. A considerable body of data already exists for these missions, and it must be organized and made available to users of this proposed tool.
- Terrain/Country data such as DMA or CIA data, which forms the backbone of mission analysis.

All data would be accessed in look up, push button style. A good deal of this data is text based and will be used by the planner or analyst to set stage for the task determination. Much work remains to be done to define a total required data set.

The data required for task-to-resources match-up is more complex. Capability descriptions for units do exist on JOPES, and they need to be examined in detail to see if they can allow for sufficient task-to-capability matricing in the circumstances of OOTW planning.

As a minimum, however, it was seen as necessary to have task to UIC/UTC level of detail for the following organizations:
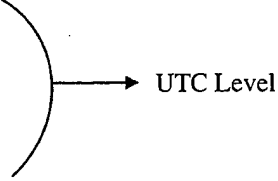
UN/IO/NGO/PVO's

Foreign Forces (Army, Navy, Air Forces, etc.)

Allied Forces (Army, Navy, Air Forces, etc.)

Host nation support types/categories

Interagency: FBI, DEA, DOJ, DOS

The intent of this data provisioning is so the force planner can visualize ALL the capability present in a given scenario, and thus be able to accurately judge the required US contribution. The UN/IO/NGO/PVO's have force packages defined in a manner analogous to military units, and these elements must be included accurately in the force planning calculus.

WG 2: Force Planning

Summary Recommendations (4)

- ◆ DATA to assign US military capability:
  - – Army
  - – Navy
  - – Air Force ────────► UTC Level
  - – USMC
  - – Coast Guard
- ◆ Must allow for Transportation Feasibility Estimate through JFAST or AMP family

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Likewise for all US forces, the model must have access to data to assign US military capability against given OOTW mission task. The services are diverse in this regard, with some services planning OOTW operations at the individual level of detail, while others use basic unit building blocks such as platoons or companies. All services must be represented with the same fidelity in order to study the uses and tradeoffs between units. UTC level data is judged to be necessary. All output data must allow for a Transportation Feasibility Estimate to be conducted using the JFAST or AMP family of models when mission requirements are completely assembled into a draft force list, not approaching the absolute detail of a TPFDD, but something with enough fidelity to allow basic transportation analyses.

WG 2: Force Planning

Conclusions

- ◆ What we did — laid down executable OOTW force planning model <u>framework</u>
- ◆ How we did — GREAT!
- ◆ What remains to be done:
  - – Concur on need, appoint lead and technical agencies, establish timeline
  - – Fund the effort!
  - – Establish the cross-DoD working group
  - – Conduct the research, build the model!

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What WG 2 did was to lay down a frame work for an executable OOTW force planning model. The framework itself is depicted elsewhere, but the principles involved in the recommendation are displayed here. There seems to be a great need to create a quick spreadsheet tool for this purpose. Two efforts have already begun in this direction, neither being complete. The need, we think, is there for such a tool.

This concept employs current technology and methods and should pose no great obstacle to execution. We hope the planning and analysis community will support our conclusions or happily prove us wrong by figuring out how to use current methods and tools to do the same job.

What remains to be done is for the community to concur on the need and appoint the appropriate lead and technical agencies. There is no secret to this process — it simply needs to be done. Once appointed, the sponsor can establish a timeline and arrange funding for the effort. Regardless of who the sponsor is, they must establish a cross-DoD working group to bring the effort forward. A single service cannot accomplish this job without the active involvement of the joint community.

In any regard, we strongly recommend that DoD conduct the research and build this recommended model to provide planners with the tool they need for OOTW planning in the post-cold war paradigm. Things are no longer what they were, and new tools are required.

Operations Other Than War Analysis Methods and
Techniques
WG 3 Final Report

LOGISTICS & MOBILITY PLANNING TOOLS
MORS Workshop
MacDill Air Force Base
28 - 30 January 1997

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WG 3: Logistics & Mobility Planning Tools

Introduction (1)

- ◆ WG Task Area:
    - Initiate/Track Reserve Call Up
    - Determine Deployment Timing
    - Determine Deployment Priorities
    - Determine Transport Capabilities
    - Establish LOCS
    - Logistics Planning/Resupply

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These are the tasks for the working group that were taken from the Terms of Reference for the MORS Workshop.

WG 3: Logistics & Mobility Planning Tools

Introduction (1) Cont.

- •WG Mode of Operation
    - –Scope of Expertise
        - •3 CINC REPS
        - •2 SERVICE
        - •1 STATE
        - •2 QUASI GOVT/COMMERCIAL

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The working group consisted of functional experts from these organizations. There was a good mix of experience from both operational and analytical environments. The working group did not include representation from either the non-governmental or international arenas. Representation should be included in future workshops.

WG 3: Logistics & Mobility Planning Tools

Introduction (2)

- How We Proceeded to do Business
  - » No Formal Presentations Per Se
  - » Overall Purpose Briefing To Agree On Tasks And Methodology
  - » Task Area Reviews
    - ◆ Inputs
    - ◆ Process
    - ◆ Outputs
    - ◆ Models
    - ◆ Attributes
  - » Used TOR/Hartley Document/Group Expertise

The working group began with a capability presentation on the Joint Flow Analysis System for transportation (JFAST), the Crisis Action Planning System (CAPS) and the Force Analysis Spreadsheet Tool for operations other than war (FAST-OR).

We reviewed the process that logisticians follow in determining logistics and mobility requirements that is expanded in the next several slides.

The MORS Terms of Reference and the Hartley document on previous workshops were used, together with the individual and group knowledge to set out process that would meet workshop objectives.

WG 3: Logistics & Mobility Planning Tools
What Working Groups Should Determine

OOTW MODULE OF THE OOTW MODEL

WORKING GROUP MODULE

NATIONAL

THEATER/CINC

OPERATIONAL

WHAT
INPUTS
FROM WHOM

FOR WHAT
OUTPUTS
TO WHOM

WHAT DECISIONS MADE,
CALCULATIONS OR
ALGORITHMS REQUIRED
FOR EACH DECISION LEVEL

INPUTS AND OUTPUTS CAN BE INTERNAL OR EXTERNAL
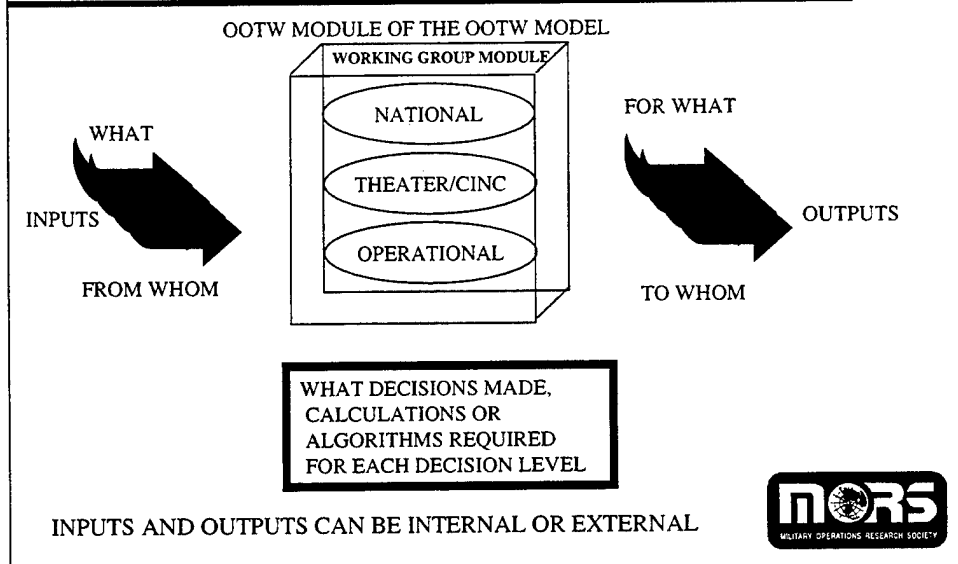
The Working Group recognized that there were specific information needs for the three decision levels of national, theater/CINC, and operational command and control/management. The working group set out to determine the process for consolidating and analyzing data. Specific models that might be applicable to each task were identified. The logistics process was similar for all 16 OOTW missions. No attempt was made to identify variances between OOTW mission areas.

Inputs must be able to satisfy the information requirements peculiar to the respective data needs of each level, individually and/or collectively.

Process outputs will be made available to multiple decision levels by both push and pull methods, internal and external to the decision making organizations. In some cases, this will be an iterative process where logistics and mobility are considered a module of a larger OOTW tool kit, as depicted on the next slide.

WG 3: Logistics & Mobility Planning Tools

WG Interfaces for OOTW Model Development
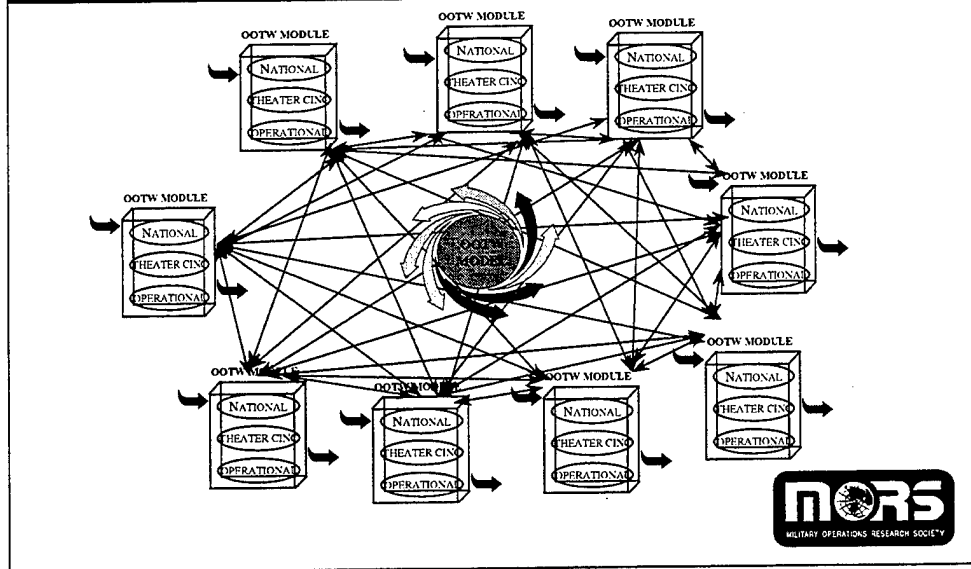
If the process described on the previous slide was expanded through all of the MORS workgroups, an OOTW model such as depicted here would result. This is a very complex process. The ability to achieve this OOTW tool kit requires identifying the models and establishing the links among all of the participating workgroups. This will be a *long* process that goes well beyond the current MORS Workshop.

WG 3: Logistics & Mobility Planning Tools

Log/Mob Analysis Process (1)
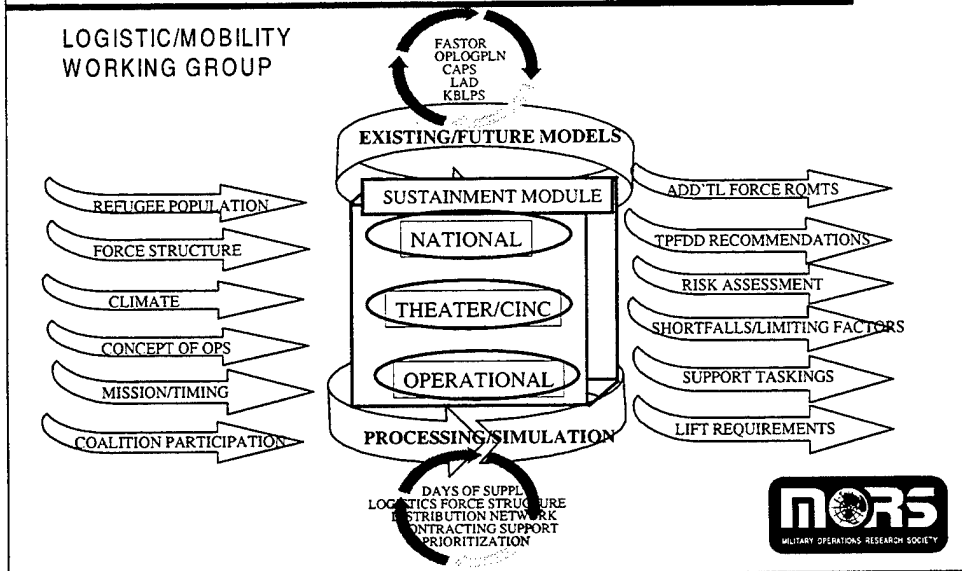
This slide and the next portray examples of the process applied to sustainment and transportation functions. The group identified the inputs and processes that occur at each level of analysis, the models currently available or desired to aid in the process, and the outputs.

WG 3: Logistics & Mobility Planning Tools

Log/Mob Analysis Process (2)
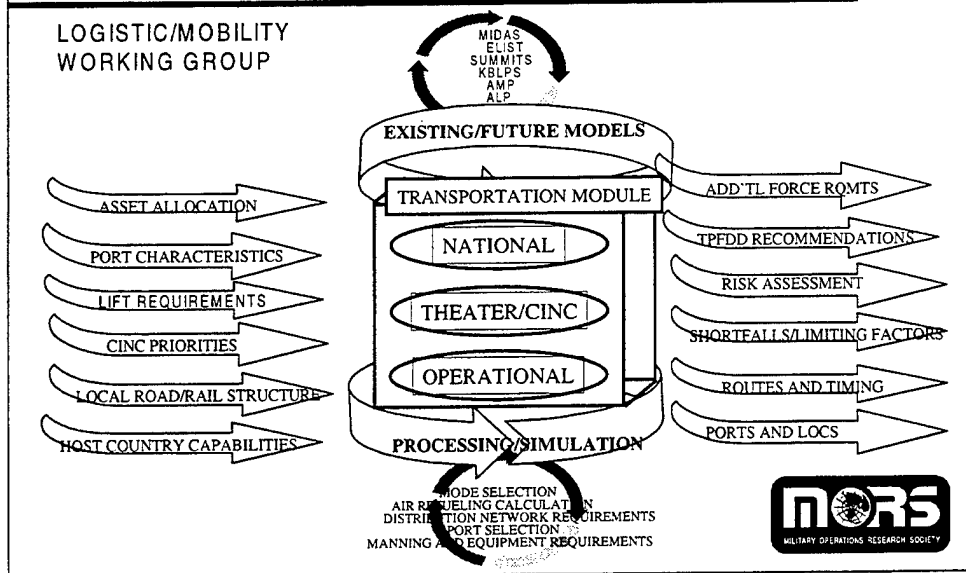
The Working Group applied this process to the following areas:

Mission

Infrastructure

Supply and services

Lift requirements and capability

Initiate/track reserve call-up

At the end of the analysis, we prioritized future efforts and recommended the appropriate method for further analysis, i.e. Government, MORS study group, etc.

WG 3: Logistics & Mobility Planning Tools

Logistics and Mobility Planning

INPUTS

- Type of operation
- Mission statement
- Duration, force ceiling
- Non-Gov't players
  & capability
- Previous operations

CONOPS
PLAN

MISSION
ANALYSIS
TOOL

DATA REPOSITORIES

- Country data
  •infrastructure
- Weather
- Terrain

RQMT's GENERATOR
- Personnel
- Units / equipment
- Tons of supply

LIFT / MOBILITY
RQMT'S
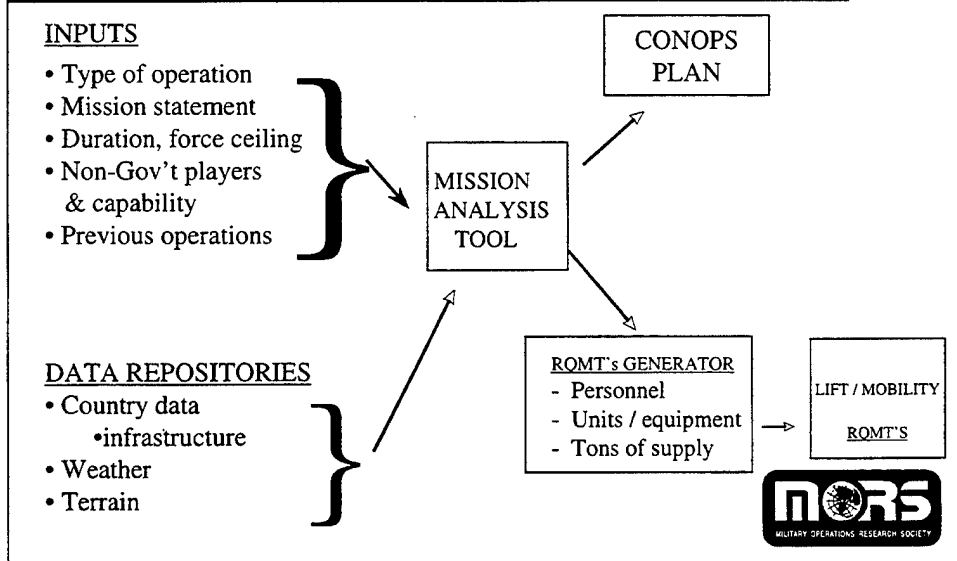
In order to meet the PACOM desire of a 6 to 8 hour turn around in a "no plan" situation, we believe that a new, high level mission analysis tool is needed. The key to success of this tool is the development of a "virtual collaboration" environment in which all players, both government and non-government alike, are connected through a common architecture and governed by a set of agreed upon standards.

The application of basic AI techniques, capturing data from previous OOTW's and storing that data in a format that facilitates future use is an important part of quickly determining an OOTW CONOPs.

We believe that some of the data repositories identified already exist in some fashion, with the greatest challenge being making the data easily accessible.

Desired outputs from the system include a "rough order of magnitude" of the personnel, units and equipment, and supply tonnage needed for the OOTW which would permit modeling the deployment and sustainment requirements in existing models.

The CONOPs generated would only be a "shell" to facilitate further planning and would eventually develop into a complete document as planning matures.

WG 3: Logistics & Mobility Planning Tools

Mission   GOVT. PROJ

INPUTS

COMMON INTERFACE
AMONG PARTIES

CHAIN OF CMD &
COORD AUTH

PARTICIPANTS
ACTIVITY
OBJECTIVES

MISSION(S)
CONOPS (SHORT)
POPULATION
FORCE CEILING

WEATHER/TERRAIN
THREAT
INTEL

TIMING
CONCEPT OF SUPPLY
POP COUNT/TYPE
PVO/NGO
CURRENT OPS

PROCESS   OUTPUT

COORD AND
REFINE RQMTS

REFINED LOG CONOPS

TO (FORCE DEVEL WG,

NCA, CINC, OPS LEVEL)

MODELS

CAPS(++)

Mission was seen as the foundation for all other analysis in logistics and mobility. It is essential that from the nation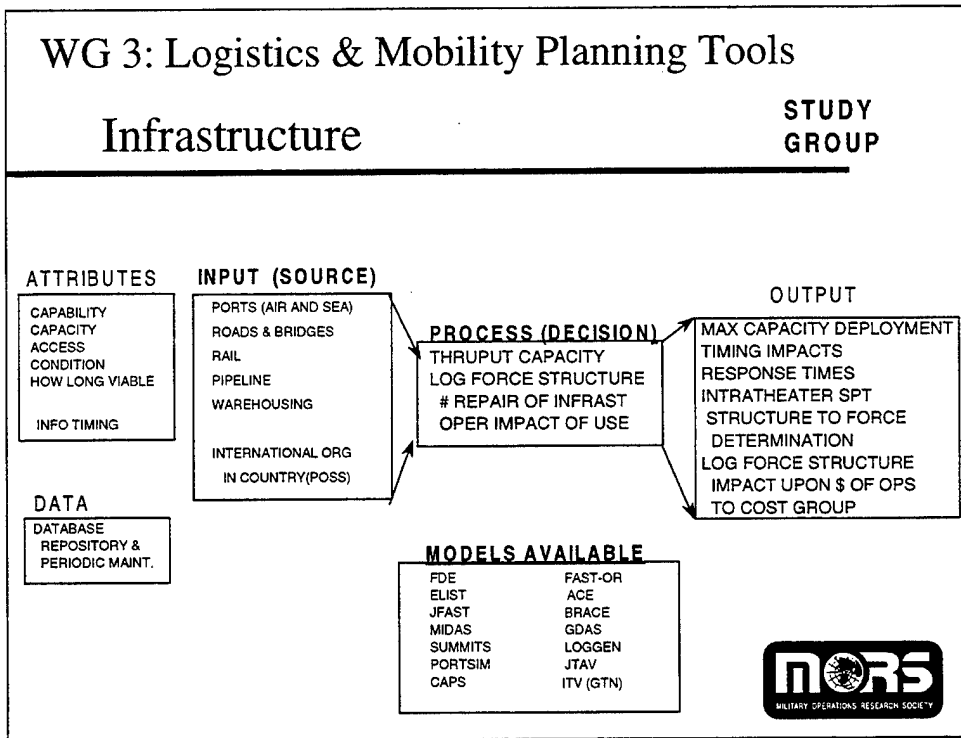al perspective, a good comprehensive mission statement is provided. The logistics professionals need a short statement up front that depicts the OOTW missions to be supported, the participants/actors, the weather and terrain, threat levels, population size, the size and scope of the ongoing PVO/NGO/IO operations in the area.

From this brief mission statement, an initial logistics estimate can be made, using a model not yet developed but perhaps similar in design to CAPS which we will call CAPS (++). We believe it could help provide a quick logistics force structure estimate useable initial total force package number estimates. This is also valuable at the CINC and operational level so that there is at least a point of common reference for establishing a refined logistics concept of operations from which all other logistics analysis will flow.

Most of the data for this model must be included in the decision to pursue a course of action. Though not specified; state, CIA, DIA, UNHCR, UNWFP, UNICEF and others should have some form of hard copy data or a data base that could aid in the evaluation of weather, terrain, intelligence, individuals at risk and current PVO/NGO/IO ops.

Recommendation: That development of this model, as our number one priority, should be designed and developed as a government project.

WG 3: Logistics & Mobility Planning Tools

Infrastructure — STUDY GROUP

ATTRIBUTES
CAPABILITY
CAPACITY
ACCESS
CONDITION
HOW LONG VIABLE

INFO TIMING

DATA
DATABASE
REPOSITORY &
PERIODIC MAINT.

INPUT (SOURCE)
PORTS (AIR AND SEA)
ROADS & BRIDGES
RAIL
PIPELINE
WAREHOUSING

INTERNATIONAL ORG
IN COUNTRY(POSS)

PROCESS (DECISION)
THRUPUT CAPACITY
LOG FORCE STRUCTURE
REPAIR OF INFRAST
OPER IMPACT OF USE

OUTPUT
MAX CAPACITY DEPLOYMENT
TIMING IMPACTS
RESPONSE TIMES
INTRATHEATER SPT
STRUCTURE TO FORCE
 DETERMINATION
LOG FORCE STRUCTURE
 IMPACT UPON $ OF OPS
 TO COST GROUP

MODELS AVAILABLE

FDE	FAST-OR
ELIST	ACE
JFAST	BRACE
MIDAS	GDAS
SUMMITS	LOGGEN
PORTSIM	JTAV
CAPS	ITV (GTN)

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At all levels of planning and execution, good infrastructure data is required because it affects all of the calculations that the logistician must perform. This data input has special attributes: the capability and capacity of the resources most likely to be available, the current condition of the resources, and the period during which it should be viable under different stress levels before it needs to be repaired. These attributes, together with the data itself, should be maintained and kept current in a common structured database.

Some of the inputs are known to be available in unspecified databases at DIA, CIA, DISA, DMA, USTRANSCOM and the UN. There are also commercial databases such as "Fair play" and "Lloyds of London" that maintain much of the best info on commercial infrastructure capabilities.

With this data, the logistician must do throughput capacity calculations and make judgments as to how much can be delivered in the timeframes anticipated and what the impact of operations on the country infrastructure will be. There are many known models that can aid in this process. None is complete or whole by itself
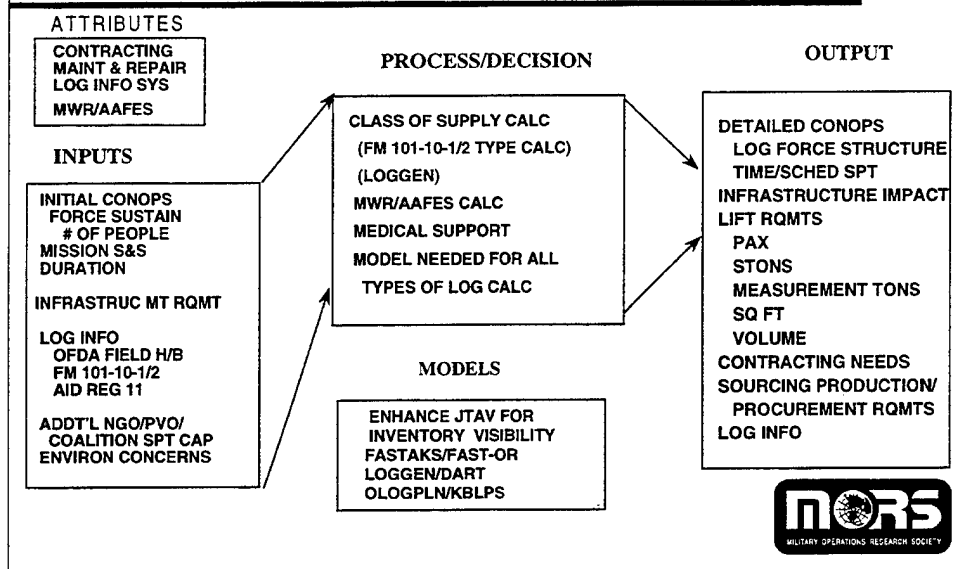
Once these models are employed, the logistician can determine a better concept of ops that will impact force structure and the cost, timing/duration and phasing of operational and logistical deliveries.

Recommendation: that a study group to sort out the actual computational requirements, models and their shortcomings be established. This is our number two priority.

WG 3: Logistics & Mobility Planning Tools
Supply and Services

STUDY GROUP

ATTRIBUTES

CONTRACTING
MAINT & REPAIR
LOG INFO SYS

MWR/AAFES

INPUTS

INITIAL CONOPS
   FORCE SUSTAIN
      # OF PEOPLE
   MISSION S&S
   DURATION

INFRASTRUC MT RQMT

LOG INFO
   OFDA FIELD H/B
   FM 101-10-1/2
   AID REG 11

ADDT'L NGO/PVO/
   COALITION SPT CAP
   ENVIRON CONCERNS

PROCESS/DECISION

CLASS OF SUPPLY CALC
(FM 101-10-1/2 TYPE CALC)
(LOGGEN)
MWR/AAFES CALC
MEDICAL SUPPORT
MODEL NEEDED FOR ALL
TYPES OF LOG CALC

MODELS

ENHANCE JTAV FOR
INVENTORY VISIBILITY
FASTAKS/FAST-OR
LOGGEN/DART
OLOGPLN/KBLPS

OUTPUT

DETAILED CONOPS
   LOG FORCE STRUCTURE
   TIME/SCHED SPT
INFRASTRUCTURE IMPACT
LIFT RQMTS
   PAX
   STONS
   MEASUREMENT TONS
   SQ FT
   VOLUME
CONTRACTING NEEDS
SOURCING PRODUCTION/
   PROCUREMENT RQMTS
LOG INFO

Supply and services is a key element in logistics planning and execution and follows directly from an analysis of mission and infrastructure. It follows that this is our third priority for development effort. By supply and services, we mean the logistics core competencies such as supply, maintenance and repair, contracting, logistics information systems and other less traditional support, such as AAFES.

From the mission and infrastructure modules, we have already derived a logistics concept of ops that includes timing, size of force/population supported, and what it might take to maintain the infrastructure essential to logistics support. Now using consumption data (service data bases, USAID, and State's Bureau of Population, Refugees, and Migration as well as additional NGO/PVO/IO planning factors) the logistician must make a multitude of calculations to determine the quantity of each class/type of supply and service that must be available in the operation. There are many models currently in use by different types of organizations, some are listed here, that can provide an automated and coordinated set of tools to assist in performing this work.
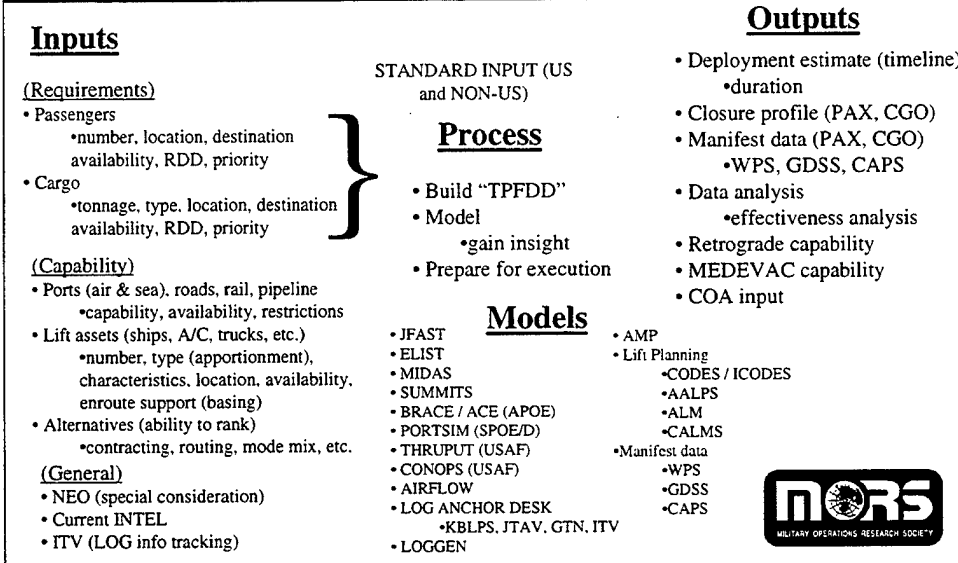
The results are the detailed CONOPS, that again may influence the size of the force structure. Normally the output is a requirements list in the form of people and tons over time that will also impact contracting. All of this data must be captured in a logistics information system that will be used by many different levels to track the support status. Another important output of this activity is the tasking and sourcing of the activities to actually provide these supplies and services.

Recommendation: It was beyond the scope and time available to pursue analysis of this activity. A study group or government project could sort this out. We believe that JLSC, DLA, TRADOC and ACOM have a role to play in this process. Although much effort may have already been put forth, we are not aware of the level of progress. This is our third priority of effort.

WG 3: Logistics & Mobility Planning Tools

Lift Requirements and Capability

STUDY GROUP

Inputs

STANDARD INPUT (US and NON-US)

(Requirements)
- Passengers
  - number, location, destination availability, RDD, priority
- Cargo
  - tonnage, type, location, destination availability, RDD, priority

(Capability)
- Ports (air & sea), roads, rail, pipeline
  - capability, availability, restrictions
- Lift assets (ships, A/C, trucks, etc.)
  - number, type (apportionment), characteristics, location, availability, enroute support (basing)
- Alternatives (ability to rank)
  - contracting, routing, mode mix, etc.

(General)
- NEO (special consideration)
- Current INTEL
- ITV (LOG info tracking)

Process

- Build "TPFDD"
- Model
  - gain insight
- Prepare for execution

Models

- JFAST
- ELIST
- MIDAS
- SUMMITS
- BRACE / ACE (APOE)
- PORTSIM (SPOE/D)
- THRUPUT (USAF)
- CONOPS (USAF)
- AIRFLOW
- LOG ANCHOR DESK
  - KBLPS, JTAV, GTN, ITV
- LOGGEN

- AMP
- Lift Planning
  - CODES / ICODES
  - AALPS
  - ALM
  - CALMS
  - Manifest data
  - WPS
  - GDSS
  - CAPS

Outputs

- Deployment estimate (timeline)
  - duration
- Closure profile (PAX, CGO)
- Manifest data (PAX, CGO)
  - WPS, GDSS, CAPS
- Data analysis
  - effectiveness analysis
- Retrograde capability
- MEDEVAC capability
- COA input

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In this illustration, we make the assumption that the format and construct of the Time Phased Force Deployment Data (TPFDD) will continue to be the method by which movement requirements are defined and communicated. It is expected that the use of the "TPFDD" will continue to present problems for allies, coalition partners, NGO, PVO and IO who are not familiar with the TPFDD" process and who communicate their movement requirements in a different manner. Therefore, a tool is needed to standardize the identification of the movement requirements of these organizations when the US Military coordinates the lift.

Because the "TPFDD" provides the basic input to some of the mobility models listed here, it is essential that the movement data be timely and accurate for the outputs to be of any value.

Other than a requirement to compress the time required to complete the analysis using this suite of models, the process is the same for an MRC as it is for an OOTW. This is our fourth priority.

Recommendation: That a study group, in coordination with ongoing standardization efforts be formed to evaluate existing models and assist in a determination of an appropriate means to provide this capability.

WG 3: Logistics & Mobility Planning Tools
Initiate / Track Reserve Call-up   STUDY GROUP

Process
- "Joint" view
  - monitor only

Inputs
- Determination of force requirements
  - capability in Reserves / NG
- Visibility of Service Requirements
  - assist w/Presidential Call-up decision
- Services and USACOM source
- Data from Service personnel systems

Outputs
- Reports
  - pre-defined
  - ad hoc
  - rotation workload

Models
- Service ??
- JRAMS

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It is not our intent to recommend the development of a new "system" to initiate and track reserve and national guard call-up. We recognize that the responsibility for these actions rests with the services and USACOM. We do propose that visibility into the existing service and USACOM systems be provided as a "joint view" for the use of the OOTW planner.

The services each have their own models for handling reserve and NG call-up and tracking. Because of the likelihood of continued reliance on the reserves and NG to provide support to OOTWS, using data from existing systems, is reasonable.

We see the primary output from the "joint view" as being various reports that would be shared throughout the community. This is our fifth priority.

Recommendation: That a study group be formed to investigate the feasibility of capturing common data on the reserve component selection and mobilization process.

WG 3: Logistics & Mobility Planning Tools
Conclusions

- What We Did
  - Examined and Prioritized Task Areas
- How We Did It
  - Group Expertise and Discussion
- What Remains to be Done
  - Study Groups/projects To Investigate And Refine Models
  - **Not Ready For Prime Time RFP**

The study group examined and prioritized the task areas in logistics and mobility planning and execution. Inputs, processes, models and outputs were determined for each of the areas.

Recommendations were developed for further action by appropriate activities to investigate and refine the models and capabilities required to improve logistics and mobility planning and execution.

Additional work needs to be done to refine the requirements before any attempt to establish a developmental contract for logistics and mobility models specifically for OOTW.

Operations Other Than War Analysis Methods and
Techniques

WG 4 Final Report

Course of Action Development & Course of Action Analysis
MORS Workshop

MacDill Air Force Base

28 - 30 January 1997

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WG 4: Course of Action Analysis

Synopsis

- ◆ Introduction/Background
  - – Workgroup's Task Areas:
    - » COA Development and Risk Assessment
    - » COA Analysis/Evaluation/Comparison/Selection
    - » COA Situational Awareness
  - – Workgroup's Expertise:
    - » CINCs (2); Joint (3); Services (3); Foreign Military (1);
    - » Other US Gov't (1); FFRDC (2); Commercial / NGO (0)
  - – Workgroup's Activities
- ◆ Tools/Techniques
  - – Conceptual Model for OOTW COA Development & Analysis
  - – Survey of Available Tools
- ◆ Recommended Actions
- ◆ Conclusions

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WG 4's focus was on COA development and analysis

Composition of Working Group 4, at the MORS Jan 97 Workshop on OOTW:

Mr. Kevin Brandt (Chair), MITRE/JWFC, brandtk@mitre.org,

Mr. Crawford, OASD/SOLIC, solicrp@policy1.policy.osd.mil

Lt Col (FR) Delamarre, EMAT/CROSAT (FR), delamarr@uranus.crosat.fr
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Mr. Elton, JTASC/ACOM, elton@acom.mil

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Miss Linda Weber (Co-Chair.). MITRE/JWFC, weberl@jwfc.army.rnil

LTC Wiles, HQ USSOCOM.

LCDR Cares (Executive WG)

LTC Marriott (Data WG)

Will detail activities, procedures, findings, recommendations and conclusions on following charts.

WG 4: Course of Action Analysis

Workgroup's Major Activities

- ◆ Reviewed METT-T and mission categories for OOTW.
- ◆ Developed conceptual model for COA development and analysis.
- ◆ Identified core <u>Object Domain Attributes</u> (ODAs) within the conceptual model for COA development.
- ◆ Identified a core set of <u>Governing Factors</u> for COA analysis.
- ◆ Conducted a crosswalk of object domain attributes (ODAs) against selected types of missions in OOTW.
- ◆ Conducted a representative mapping of object domain attributes onto the set of core governing factors.

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The group reviewed OOTW mission categories.

We prefer to retain identification of all 16 doctrinal mission categories and avoid the artificial subgroups.

We debated value of METT-T as a checklist tool for COA development in OOTW.

We concluded that it has a high potential for abuse and misunderstanding; hence, we developed an alternate.

We developed a <u>CONCEPTUAL MODEL</u> for COA development and analysis that will be shown and detailed on following slides.

We also brainstormed a core set of <u>OBJECT DOMAIN ATTRIBUTES</u> that should be used as the basis for a manual or automated COA development checklist in OOTW.

We concluded that established checklists should be incorporated to make this object domain attribute list as comprehensive and exhaustive as possible.

We also brainstormed a core set of <u>GOVERNING FACTORS</u> that extend beyond the doctrinal list of "principles for OOTW" to serve as a basis for COA analysis for OOTW.

Finally, we completed representative crosswalks between elements of the conceptual model to demonstrate the feasibility of the approach and reviewed known COA development tools and models.

WG 4: Course of Action Analysis

Conceptual Model for COA Analysis
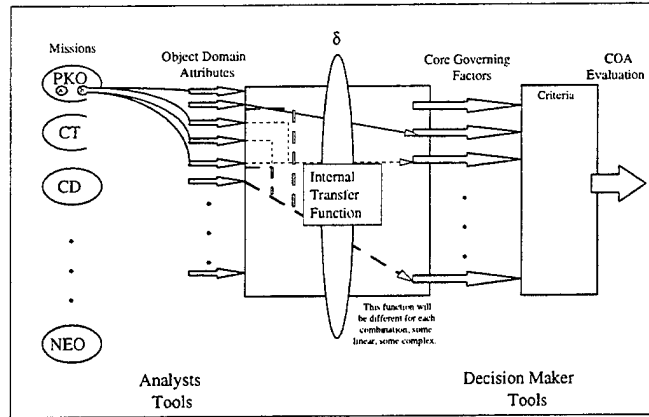
WG 4: Course of Action Analysis

Object Domains for Conceptual Model

◆ **M**ission

◆ **A**ctors and Capabilities

◆ **S**ynchronization and **S**equencing

◆ **P**hysical **E**nvironment

◆ **G**eopolitical, **I**nformational, and **E**conomic Factors

M
A
S
S

P
E
G
I
E

➜ OOTW COA Development Checklist

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WG 4: Course of Action Analysis

Object Domain: Mission Attributes

- ◆ Meet Mission Requirements/Degree of Success:
  - – Ensure mission is viable and success is feasible
  - – Assess risk to strategy of mission success or failure
  - – Identify end state/exit point/redeployment/transition strategy
- ◆ Foster Cooperation Among Key Actors:
  - national forces; coalition forces; NGOs; PVOs; OGAs ...
- ◆ Support Long-Range Strategy (commander's intent):
  - national, regional, theater and/or country (country team)
- ◆ Work within Established Constraints:
  - – Scope of conflict: rules of engagement, legal, level of intensity...
  - – Employment constraints: coalition forces, NGOs, PVOs ...
  - – Acceptable risk to the force — casualty thresholds
- ◆ Achieve Cost — Benefit Threshold Criteria
  - Political costs; Economic costs; Ecological costs

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Redeployment/Transition should consider:

- • Residual forces
- • Other missions faced by employed units
- • Reconstitution of forces
- • Training/Exercises
- • C^4 aspect/Integrated transition planning/Support for future operations
- • Flexibility
- • Demobilization/Disarming issues — reduce threat of trained armed personnel by transition into local police, etc.
- • Restoration of terrain/area (includes de-mining operations)
- • Reconstruction
- • Informational/psychological operations

WG 4: Course of Action Analysis

Object Domain: Actor Attributes

- ◆ Identify Issues and Interest for All Actors:
  - – Perceptions, Attitudes and Values
  - – Motivation for direct or indirect action or inaction - > behavior
  - – Spheres of interest for cooperation and competition
  - – Potential for development of actor coalitions
  - – Status and attitudes of key communicators and leadership
- ◆ Determine Level of Reliability and Resolve
  - – Cooperation within spheres of interests and/or actor coalitions
  - – Physical and moral support
- ◆ Determine Impact of Potential Actions on All Actors:
  - Direct actors, indirect actors, unengaged actors and bystanders
- ◆ Identify Potential Belligerents and Threats:
  - Standing military and paramilitary forces, organized groups, mass demonstrations and strikes, economic actions, resistance ...

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Identify Issues and Interest for All Actors:

ACTORS INCLUDE: Organized Military and Paramilitary Forces, Governmental and Quasi-governmental Agencies, Media, NGO, PVO, Other USG Agencies, Professional Organizations,Educational Institutions, Civic-Ethnic-Religious Groups, Key Communicators, Multinational Corporations, Commercial Sector... Selected the inclusive term Actors to encompass all interested and disinterested parties across the entire "WORLD STAGE."

Perceptions, Attitudes and Values

Motivation for direct or indirect action or inaction-> behavior

Spheres of interest for cooperation and competition

Potential for development of actor coalitions

Status, attitudes and location of key facilities, key communicators and leadership

Determine Level of Reliability and Resolve

Cooperation within spheres of interests and/or actor coalitions

Physical and moral support

Determine Impact of Potential Actions on All Actors:

Direct actors, indirect actors, unengaged actors and bystanders

Identify Potential Belligerents and Threats:

Standing military and paramilitary forces, organized groups, mass demonstrations and strikes, economic actions, resistance...

WG 4: Course of Action Analysis

Object Domain: Actors & Capabilities

◆ Identify Physical Capabilities:

Includes military, governmental, educational, commercial, informational, moral ... resources ... to accomplish mission tasks (organization, transportation, education, communication ...)

◆ Leverage Force Structure, Command and Control

Includes internal structure and external links for governmental agencies, national and regional organizations, international organizations, civic and educational organizations, regular (i.e. Active) military, reserve forces, paramilitary units, police forces ...

◆ Optimize Force and Agency Economics:

Includes force structure costs, funding sources, legal/contracting constraints, responsiveness ...

– Determine force size and ratio requirements

– Work tradeoffs for the mix of government - military - NGO - contractor support assets

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WG 4: Course of Action Analysis
Object Domain: Actor Constraints

- Maximize Interoperability with Other Actors
    - Physical and procedural links — social and political considerations — bridge technology gaps
- Provide Force Protection — Minimize Vulnerabilities
- Consider Resource Requirements vs. Assets Available
    - OM Funds — Reimbursability issues
    - Available Supplies & Logistical Support
- Accommodate Fiscal Responsibility Sharing
- Maintain Force Readiness
    - Maintain residual readiness for (military) contingency operations
    - Align OOTW mission tasks with contingency mission training
    - Husband critical resources for contingency operations
    - Manage OPTEMPO, PERSTEMPO, usage rates - > plan unit and mission rotations

Maximize Interoperability with Other Actors

Identify and exploit physical and procedural links

Reflect social and political considerations

Bridge technology gaps

Provide Force Protection — Minimize Vulnerabilities

Consider Resource Requirements versus Assets Available

OM Funds — Reimbursability issues

Available Supplies & Logistical Support

Accommodate Fiscal Responsibility Sharing

Maintain Force Readiness

(Need to define standing readiness for OOTW)

Maintain residual readiness for (military) contingency operations

Align OOTW mission tasks with contingency mission training

Husband critical resource for contingency operations

Manage OPTEMPO PERTEMPO, usage rates - > plan unit and mission rotations

WG 4: Course of Action Analysis

Object Domain: Actor Logistics

- ◆ Consider Impact of Logistical Support:
  - Maintain accountability — avoid leakage or diversion of supplies
  - Align with long-term strategic objectives: access, presence, obligations ...
  - Control adverse economic impacts - > inflation
- ◆ Ensure Adequate Logistics for Critical Items
  - Plan surge and sustainment levels
  - Leverage non-military structures - > contractor and third party sources
- ◆ Develop Movement Factors for All Actors

  Includes traditional load plans and other configurations for movement of own forces or other actors on available resources.

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Consider Impact of Logistical Support

> Includes direct and indirect effects on local and regional economies, political systems, national/regional development, infrastructure development, non traditional markets ...

> Maintain accountability, avoid leakage or diversion of supplies

> Align with long-term strategic objectives: access, presence, obligations ...

> Control adverse economic impacts - > inflation

Ensure Adequate Logistics for Critical Items

> Includes supplies, transportation resources, storage capacity, refrigeration, medical facilities, and supplies...

> Plan surge and sustainment levels

> Leverage non-military, structures - > contractor and third party sources

Plan Movement Factors for All Actors

> Includes traditional load plans and non-traditional configurations for movement of own forces or other actors on available resources. Consider special needs for "at-risk" cases: near-term expectant mothers, infirm, small infants) and high-profile cases (government officials. key communicators, criminals)

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WG 4: Course of Action Analysis

Object Domain: Synchronization

- ◆ Manage Timing of Operations and Actions
  - – Consider physical, political and social calendars and daily schedules
  - – Manage timing to enhance availability of critical resources and enhance the support other actors will provide to your actions.
  - – When missions are time-critical, provide needed responsiveness.
  - – Time actions to improve cost-benefit ratios, meet constraints and mitigate risks.
- ◆ Synchronize Operations — Seek Unity of Effort
  - – Use C⁴ISR systems and liaison teams to mesh actions with complimentary efforts by other actors - > unity of effort.
  - – Align operations with other missions, tasks, objectives and strategies conduct integrated planning.
  - – Exploit transient or emerging opportunities — retain flexibility.
- ◆ Consider Mission Duration
  - – Consider planning and execution time available, physical and political deadlines and the expected time scale (for many OOTW missions duration may be months vs. minutes/hours)

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WG 4: Course of Action Analysis

Object Domain: Physical Environment (1)

- ◆ Use infrastructure within the Area of Operations:
  - − Leverage LOCs, transportation assets, resources
  - − Determine strategic, operational and tactical movement factors for all actors into and within AO
  - − Secure basing and overflight rights — access for other actors
- ◆ Adapt to the topology :
  - − Identify military aspects of terrain [observation, cover and concealment, obstacles, key terrain, avenues of approach]
  - − Consider physical size and location of area of operations and staging areas — distance to logistical sites, supportability, flexibility, C⁴ISR connectivity (inter and intra regional)
  - − Identify impact of NBC hazards — determine ecological impacts
  - − Determine availability of MCGI products and production data
  - − Plan for expected climatology and potential weather
  - − Align force and actor locations with mission requirements and constraints (i.e. restricted areas, zones of influence ...)

Area of Operations:

Movement into the Area: How tough is it to get there? Can we get the resources there?

Modes of Transportation: What is best to get there?

Basing: Basing rights/overflight rights?

Infrastructure: Available infrastructure? Or do you have to bring resources to that area?

Size of Area: Size of operating area/demographics

Tactical Military Aspects of Terrain (OCOKA)

- Observation

- Cover/concealment

- Obstacles

- Key Terrain

- Avenues of Approach

Climatoloy/Weather

Nuclear, Biological, Chemical Aspects

Health and Safety Issues

Infrastructure/Resources

LOC Capacity/Efficiency of Operations: How fast can I get stuff there?

WG 4: Course of Action Analysis

Object Domain: Physical Environment (2)

- ◆ Use infrastructure within the Area of Operations:
  - – Leverage LOCs, transportation assets, resources
  - – Determine strategic, operational and tactical movement factors for all actors into and within AO
  - – Secure basing and overflight rights — access for other actors
- ◆ Adapt to the topology :
  - – Identify military aspects of terrain [observation, cover and concealment, obstacles, key terrain, avenues of approach]
  - – Consider physical size and location of area of operations and staging areas — distance to logistical sites, supportability, flexibility, C^{4}ISR connectivity (inter and intra regional)
  - – Identify impact of NBC hazards — determine ecological impacts
  - – Determine availability of MCGI products and production data
  - – Plan for expected climatology and potential weather
  - – Align force and actor locations with mission requirements and constraints (i.e. restricted areas, zones of influence ...)

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Other issues to be considered include:

C^{4}ISR connectivity (inter and intra regional)

Security

Legal aspects

Locations of other players

Interoperability with other players, culturally and technology-wise

Ethnic/cultural aspects

Supports the Mission

Ease in Getting Out

Strategic Interests

Response Time from CONUS-based Resources

Time for Potential Other Enemy to Impact Operations (different MRC)

Flexibility; Intermediate Staging, Base vs. Direct

Supportability

LOC

Cultural

Ecological / Parks concerns

Responsibility/liability with respect to terrain in laws of land warfare (very unique in OOTW)

Restricted areas

Mobility/trafficability

MCGI (Mapping, Charting, Geodesy, Imagery) Coverage

Political Costs/Benefits — Political issues with using a specific location

Economic Costs/Benefits — What is your cost to get there? What is cost of sustaining operations? The others are sub-attributes which affect the costs of this.

WG 4: Course of Action Analysis

Object Domain: Geopolitical, Informational and Economic

- ◆ Assess impact of diverse cultures and religions
- ◆ Consider political impact of actions
- ◆ Adhere to operational constraints:
- ◆ Determine long-term and second-order effects (economic and political)
- ◆ Control economic impact (positive and negative) on non-military centers of gravity
- ◆ Leverage information operations (public affairs, PSYOP, information warfare ...)
  - – Gain support from other countries

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Assess impact of diverse cultures and religions:

Review friendly, neutral and hostile ethnic groups

Understand and leverage cultural values

Consider political impact of actions:

Actions balanced or unbalanced and in favor of selected actors

Impact on perceived legitimacy of local government

Assess potential impact on perceived legitimacy of own actions - > domestic and international support

Adhere to operational constraints:

Status of forces agreements and host nation support

Rules of Engagement (ROE) constraints vs. force protection

Determine long-term and second-order effects (economic and political)

Control economic impact (positive and negative) on non-military centers of gravity

Leverage information operations (public affairs, PSYOP, information warfare, etc.

Gain support from other countries

WG 4: Course of Action Analysis

ODAs Matrixed against Mission Types

- ◆ Peace Keeping Operations
  - – Force protection
  - – Terms of Reference/Military protocol constraints
  - – Sustainability
  - – Interoperability
- ◆ Nation Assistance
  - – Force protection
  - – Political/diplomatic impact to assistance (internal/external)
  - – Economic impact
  - – Legal implications for US forces (US vs International Law)
  - – Stability (regional)
  - – Informational/cultural aspects

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WG 4: Course of Action Analysis

ODAs Matrixed against Mission Types

- ◆ Humanitarian Assistance
    - Responsiveness (timely)
    - Size of Request
    - Forces available
    - Consent of actors
    - Transition Strategy
    - Exit Strategy
    - Use of non-military assets
    - Political/cultural issues
    - US led (execute) or facilitate
    - Logistics supportable
    - Readiness impact

WG 4: Course of Action Analysis

COA Analysis: Core Governing Factors

- Legitimacy
- Objective
- Perseverance
- Unity of Effort
- Sustainability
- Security
- Adaptability and Flexibility
- Economy of Effort and/or Force
- Restraint

WG 4: Course of Action Analysis

ODA Location Matrixed to CGF

This example demonstrates mapping from location (object domain) attributes to core governing factors

- Movement to/from Area - > Sustainability, Security, Unity of Effort, Objective, Economy of Effort, Flexibility
- Modes of Transportation - > Sustainability, Security, Unity of Effort, Objective, Economy of Effort, Flexibility
- Basing - > Sustainability, Security, Unity of Effort, Objective, Economy of Effort, Flexibility, Legitimacy
- Infrastructure - > Sustainability, Security, Unity of Effort, Objective, Economy of Effort, Flexibility
- Size of Area - > Sustainability, Security, Unity of Effort, Objective, Economy of Effort, Flexibility
- Political Costs/Benefits - > Legitimacy, Perseverance, Objective, Restraint
- Economic Costs/Benefits - > Sustainability, Security, Unity of Effort, Objective, Economy of Effort, Flexibility

WG 4: Course of Action Analysis

COA Development and Analysis Tools

- ◆ Reviewed Existing Tools
  - Many tools available including: CATS, COAST; ACAAM; CAM; TARGET; RDSS; TPedit; SIAM; JTS; SWARM; Spectrum
  - Research to date has focused on tools developed by and for military
  - No exhaustive list of all potential tools
  - Need to explore non-military, commercial, and NGO tools
- ◆ Available tool sets do not satisfy all requirements
- ◆ Need an adaptive tool set or multiple tools sets for COA development and analysis across the range of OOTW missions

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Potential OOTW COA Development and/or Assessment with a number of developed tools:

CATS - Consequence Assessment Tool Set (uses ArcInfo, good tool)

COAST - Course of Action Selection Tool. A pairwise comparison of linear criteria for COA eval.

ACAAM - Air courses of action assessment. Air combat, not OOTW   limit use to planning for strikes and raids. Use of CTAPS more pervasive.

CAM - Civil Affairs Model (part of DEXES).

TARGET - Theater Analysis and Replanning Graphical Execution Toolkit. Environment to aid in plan development - now called Advanced Joint Planning

RDSS - a lot like Spectrum

TPedit - to build a TPFDD

SIAM - situational influence assessment model (SAIC developed for Intel, JWAC is looking to use it for OOTW there is a study), in progress.

JTS - Joint Tactical Simulation, an entity level combat model of joint operations. Application to a limited range of OOTW mission areas.

SWARM - multiple objective functions...used in artificial life models, artificial actors complex systems research...simulation environment for modeling large complex models.

Need to research other tools: (for example)

Transportation Models and Simulations

Application of COTS wargames and simulations (i.e. SIM CITY) need to be investigated.

Explore tools used by non-military organizations (i.e. CDC. FEMA...)

Identify and/or develop decision analysis tools and databases

Incorporate COTS and GOTS Geographic Information Systems (GILS)

Use the web (WWW)

WG 4: Course of Action Analysis

Recommended Actions

- ◆ Improve OOTW Object Domain Attribute (ODA) concept: expand list of ODAs, define all terms, determine information requirements and sources, matrix ODAs to OOTW missions
- ◆ Define & validate OOTW Core Governing Factors (CGF) and units of measure
- ◆ Develop ODA to CGF transition function matrix
- ◆ Identify non-linear, multiple attribute/multiple objective decision support tools/techniques to aid decision maker's selection of a preferred COA.
- ◆ Evaluate and validate the means versus the effects projected when using the planning tools

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1. Attributes fully defined and Matrixed

   a) Expand attribute list (using indicator lists from the military is a good start) [OOTW experts research presented to a WG]

   b) Description/Definitions of Attributes [OOTW experts research presented to WG]

   c) Determine and find the information/measurements needs (data elements) to feed the attributes [OOTW experts research presented to WG]

   d) Attributes matrixed to missions [provide strawman to a WG to do]

2. Governing Factors fully defined and matrixed

   a) Definitions of Governing Factors [personal task-develop strawman and talk with JWFC Doctrine developers]

   b) Validate governing factors [CINC/JTF/IGO planners to do at a conference]

WG 4: Course of Action Analysis

Conclusions

- ◆ Developed methodology for COA analysis and outlined specific work that remains.
- ◆ Provided strawman of Object Domain Attributes and crosswalked list against OOTW mission types.
- ◆ Developed Core Governing Factors for analysis and matrixed against OOTW mission types.
- ◆ Determined that analysts needs a situational awareness display and predictive model(s) to cover non-combat tasks along with traditional combat tasks.
- ◆ Analysts will need more detail in their supporting model(s) than the decision makers require.

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Operations Other Than War Analysis Methods and
Techniques

WG 5 Final Report

C[4]ISR Planning and Analysis
MORS Workshop

MacDill Air Force Base

28 - 30 January 1997

◆Working Group Participants

    – Chair: Prof. Wayne Hughes Jr, FS   NPS

    – Co-Chair: Dr Stuart Starr   MITRE

    – MAJ John Blitch   USSOCOM SOJ-7

    – MAJ Dan C Daoust   Naval Postgraduate School

    – CAPT Gay M Hanson   USAFSOS

    – Mr David G Haut   USCINCPAC

    – Colonel Jacod (France)   EMAT/CROSAT

    – Mr Albert Lubarsky   Arles Technology

    – LCDR Robert C Wilson   Naval Postgraduate School

    – Lynn Ramsey

◆Mode of Operations

    – 2 panels to focus in 2 areas:

        »Near Term: Use What is Available

        »Longer Term: Develop Tools and Methods

WG 5: C⁴ISR Planning and Analysis

Panel 1: Near Term Actions

- Focus On ISR
  - **Information Acquisition** is Central to **All** OOTW (Ref. Hartley)
  - Make it useful **now** : Improve current and impending ops
  - Adapt proven **methods** of search and screening
  - The best **tool** is an analyst-operator team
    - » Get the analyst with the operator
  - Ops analyst tool needs **retooling** for OOTW
- ◆ OOTW Precepts:
  - Focus is on better ops
  - Adapt proven wartime tools of ISR to OOTW
  - Plenty of real operations can be observed

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WG5 planned its focus on the ISR part of the equation which is primarily concerned with information acquisition

Near term effort: ISR is essential for all (ref Hartley). Adapt classic methods and get the analyst down to the operators.

However, we must re-tool the analyst half of the operator-analyst team.

WG 5: C⁴ISR Planning and Analysis

Use Proven Methods

- ◆ Put ops analysts in the field
- ◆ Deploy them where operators know the utility of analysis
- ◆ Observe real ops (there are a lot)
- ◆ Be problem specific

Unlike war and MRC's, OOTW are going on near-continuously. We have an opportunity to work with the field staffs and observe and analyze these operations as they occur. We can see very quickly how much the actions recommended will help.

We have real operations to study and proximate problems to solve that should proceed and inform any model building.

WG 5: C⁴ISR Planning and Analysis

ISR in OOTW

- Retool the ops analysts for OOTW
- Operators need to experience help from analysis
- Detection is always the 1st and vital step
- Target classification may be more important than detection in OOTW

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Ops analysts will need to work out how to apply old methods to OOTW problems — they're different!

Analysts will have to show operators some successes, but right now the operators have more experience and the analysts will have to catch up.

WG 5: C⁴ISR Planning and Analysis

Adaptation of Existing Tools for ISR

- Many problems are SEARCH
  - Medium may be new (e.g. cyberspace)
  - Counter-drug, counter-guerrilla
- Many problems are SCREENING
  - Combat terrorist, protect software
- Proven MOEs: search rate, coverage factors, search width

Search-primarily for the offensive. Search theory, models, algorithms and optimization methods ought to lend themselves to OOTW searches, but the new mediums create differences. NPS analysts have already demonstrated the power of traditional antisubmarine warfare search methods for theater ballistic missile defense.

Screening theory is the defensive counterpart and companion. Offensive and defensive "information warfare" have many things in common. Here, too, OOTW presents new and interesting operating mediums and opponents.

Search and screening theory MOE's have worked in study of search methods against theater ballistic missile launchers. Some of these are search rate, coverage factors, sweep width. We believe they will adapt to OOTW OPS and represent the key to understanding search **performance.**

WG 5: C⁴ISR Planning and Analysis

ISR sets up the "Kill"

- ◆ Scout (ISR)
- ◆ Command
- ◆ Move/Shoot
- ◆ What is OOTW "Shooting?"
  - – Capture drug runners, guerrillas, terrorists
  - – Deliver food, medicine
  - – Act against unreported income
  - – Monitor account transactions
- ◆ Shooting is Actions to Achieve Object

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"Shots" and "kills" take on new meanings in an OOTW environment. While there are some combat ops, there are also new domains (cyberspace, HA, DR, etc...) In which ISR information acquisition leads to a family of actions that are aimed toward an objective (which of course may not be a physical object).

WG 5: C⁴ISR Planning and Analysis

Nature of OOTW Analysis

- ◆ Real Data From Previous OOTW ops
- ◆ Every OOTW is different: location, objective, sequencing, responses
- ◆ Human factors drive, but simulations duck these
  - – Enough consistency in human behavior

Plenty of real data available, however because of the diversification of missions and uniqueness of each, analysts must apply their arts and skills to find the similarities and patterns that cut across all...

Evidently human factors drive the results, because this is heard from operators, staffs, commanders and historical studies. Yet models and simulations fail to capture the effects of the human variables and many do not even try.

In rough terms, consistent human failure can be represented as a degradation factor against performance such as sweep rate or sweep width or screening effectiveness. In some conventional operations the degradation is a 60-80% reduction from theoretical values, in other words a driving consideration.

WG 5: C⁴ISR Planning and Analysis
Near Term: ISR Conclusions

- ◆ **TOOLS** are deployed ops analysts (with retooling)
- ◆ **METHODS** are search and screening adapted to new domains (for now)
- ◆ Human factors **DOMINATE**
- ◆ **HUMINT** is vital
- ◆ Forget optimization. Be timely and **GOOD ENOUGH**
- ◆ Convince operators with **BIG WINNERS**

These summary conclusions about the evaluation of the "scouting" and screening processes will speak for themselves....

These summary conclusions about the evaluation of the "scouting" and screening processes will speak for themselves....

WG 5: C⁴ISR Planning and Analysis

Panel 2: Longer Term Tools & Methods

- Comprehensive look at "C⁷I³SR"
  - Information management and employment
- Organization for OOTW
  - Staff Differently: Plan for augmentation
  - Information Structure: Echeloned acquisition, flow and application
  - Create tool to aid organization set-up for OOTWs
  - All processes are interrelated
  - Mutually reinforcing tools
- Long range potential great
  - Including Actions to take now

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This section of the executive overview of the C⁴ISR Working Group report focuses on the longer term view of the subject area. It begins by introducing a framework for decomposing the subject area into meaningful (albeit strongly correlated) sub-areas. This is followed by a brief discussion of the approach that the subgroup employed in its deliberations. The major findings that emerged from this approach are then summarized. This is followed by a discussion of the primary issue that the subgroup addressed: tools to support information management. The discussion emphasizes the subgroup's long-term recommendations to resolve this critical issue. In addition, a brief overview is provided of the other primary recommendations developed by the subgroup. This section concludes with a summary of the subgroup's major conclusions.

WG 5: C⁴ISR Planning and Analysis

The OOTW "C⁷ I³ SR" Cube
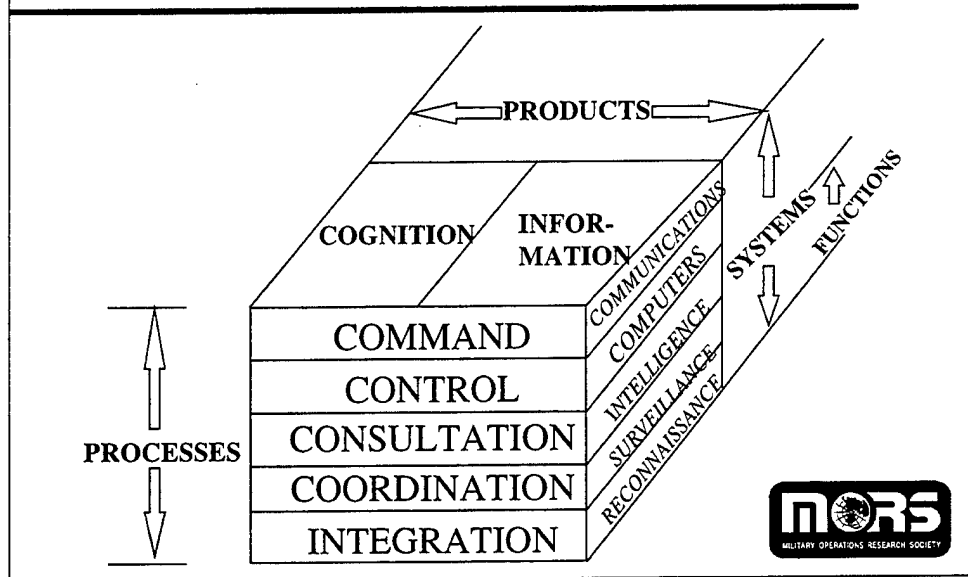
The icon presented above depicts the component parts of the subject area and their relationships. The decomposition into the 12 component areas suggests the inelegant acronym C^7I^3SR, vice the more traditional (and almost as inelegant) C^4ISR that is used by traditional warfighters.

The acronym C^7I^3SR will be used throughout this section of the report for the following reasons. First, it highlights the fact that **consultation** and **coordination** are generally of greater significance in OOTW operations than they are in traditional warfare. Second, it focuses attention on the difficult task of **integrating** the diverse processes, functions and systems into a coherent whole. Finally, it gives visibility to the fact that the key products that are generated by these interrelated processes, functions and systems are **information** and the **cognition** that guides the operators' actions.

WG 5: C⁴ISR Planning and Analysis Approach

- ◆ The Working Group explored the nature of the problem by
  - – Contrasting C⁴ISR for war and C⁷I³SR for OOTW
  - – Analyzing the needs articulated by users
  - – Identifying/validating high level requirements
- ◆ For each element of C⁷I³SR, the Working Group
  - – Identified key issues about the relevant tools
  - – Formulated a set of recommendations (near-/long-term) to ameliorate/resolve these issues
  - – Identified key organizations that should take the lead in addressing those issues
- ◆ Particular attention was paid to several key issues
  - – Information management
  - – Organizational issues
  - – The "scouting" issue in ISR

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The subgroup pursued the following approach. First it sought to clarify the nature of the problem. As an initial step, it contrasted the characteristics of C⁴ISR for war and C⁷I³SR for OOTW [note: the results of that analysis are contained in the main body of the report]. It then analyzed the needs for tools as articulated by the users. Particular emphasis was placed on understanding and analyzing the views of the two plenary speakers, LtGen Zinni and BG Brown and those of the operational members of the subgroup. The subgroup concluded this phase of the approach by identifying and validating the high level requirements that were called out in the Hartley Report.

The next phase of the deliberations employed the decomposition depicted in the icon cited above. Nine areas were addressed in turn (i.e., cognition, command, control, consultation, coordination, integration, communications, computers and information) [Note: the ISR area was addressed by another subgroup]. For each of the nine areas, the subgroup identified key issues about the relevant tools, formulated recommendations to ameliorate/resolve those issues and identified key organizations that should take the lead in addressing those issues.

Particular attention was paid to the issues of information management and non-traditional organization. The "scouting" issue in ISR was addressed by another subgroup.

WG 5: C⁴ISR Planning and Analysis

Findings

- C⁴ISR for war and C⁷I³SR for OOTW differ considerably with respect to many key factors (e.g., complexity; relevant information, questions)
- These differences mandate differences in selected associated tools
- There is a dearth of existing tools that are adequately matched to the nature of the OOTW problem, exacerbated by our lack of understanding of OOTW C⁷I³SR
- In the near term, opportunities exist to ameliorate deficiencies in the tools needed to address selected C⁷I³SR issues (e.g., enhancing analyst OOTW knowledge, skills)
- In the longer term, a strategic plan is needed to
    - Take advantage of information technology and broader knowledge and skills
    - Develop an integrated family of diverse tools
    - Address the full range of C⁷I³SR issues

The subgroup developed five major, inter-linked findings. First, it concluded that C⁴ISR for war and C⁷I³SR differ considerably with respect to many key factors. For example, as noted by LtGen Zinni, the broader scope of OOTW operations (e.g., subsuming humanitarian, social, political and economic factors, among others) generally makes a fundamental difference in the nature of relevant information. In war, the focus is on "known unknowns" and the basic issue is *how* to get the information. Conversely in OOTW, the focus is often on "unknown unknowns" and the basic issue is *what* information to get.

After analyzing these differences, the subgroup concluded that they mandated substantial differences in the kinds of tools that were needed to support OOTW C⁷I³SR operations. This was particularly apparent in the areas of cognition, command arrangements, selected staff control functions, consultation, coordination, integration across functions, and information management

The subgroup concluded that, currently, there is a dearth of tools to support operations in those areas. This problem is exacerbated by our lack of understanding of OOTW C⁷I³SR .

WG 5: C^{4}ISR Planning and Analysis

Findings (Concluded)

- ◆ C^{4}ISR for war and C^{7}I^{3}SR for OOTW differ considerably with respect to many key factors (e.g., complexity; relevant information, questions)
- ◆ These differences mandate differences in selected associated tools
- ◆ There is a dearth of existing tools that are adequately matched to the nature of the OOTW problem, exacerbated by our lack of understanding of OOTW C^{7}I^{3}SR
- ▷ ◆ In the near term, opportunities exist to ameliorate deficiencies in the tools needed to address selected C^{7}I^{3}SR issues (e.g., enhancing analyst OOTW knowledge, skills)
- ◆ In the longer term, a strategic plan is needed to
  - – Take advantage of information technology and broader knowledge and skills
  - – Develop an integrated family of diverse tools
  - – Address the full range of C^{7}I^{3}SR issues

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However, in the near term, the subgroup was able to identify several opportunities to ameliorate deficiencies in the tools needed to address selected C^{7}I^{3}SR issues. For example, it was felt that efforts to enhance education and training of the analyst-operator team, in the area of OOTW and C^{7}I^{3}SR, could significantly improve operational effectiveness. In addition, several information system products (e.g., commercial data mining tools, auto summarizer software) have the potential to ameliorate selected, specific deficiencies.

The subgroup felt, however, that it would take concerted, long term action to ameliorate the most critical deficiencies in tools across the full range of C^{7}I^{3}SR issues. The thrust of this effort should be to develop an integrated family of diverse tools, taking advantage of information technology and the broader reservoir of knowledge and skills that lie outside the traditional military OR boundaries. The following pages identify and discuss recommendations to respond to this finding.

WG 5: C⁴ISR Planning and Analysis

Key issue: Information Management (1 of 4)

- ◆ Issue
  - – There is a need to manage information strategically to provide a meaningful context for the product/process "Cs" (e.g., cognition, command, control, consultation, coordination)
- ◆ Recommendations
  - – Longer-term: Develop an orchestrated, tiered set of tools to address the issue
    - » A strategic conceptual framework (including a hierarchy of measures of merit)
    - » Strategic (highly distributed) database
    - » Data mining/information compression/visualization tools
    - » "Electronic rolodexes" (ultimately, establishing close relationships with key centers of excellence)
    - » Expert elicitation techniques
    - » Selected predictive models
    - » Handbook of key indicators

The primary issue identified by the subgroup revolves around the need to manage information strategically to provide a meaningful context for the product/process "Cs" (i.e., cognition, command, control, consultation, coordination).

To respond to this challenge, the subgroup recommends that an orchestrated, tiered set of tools be developed to address the issue. As a foundation for these tools, a strategic conceptual framework is needed. This would include a taxonomy that identifies key knowledge domains of interest, associated key variables and their relationships and a hierarchy of measures of merit (e.g., ranging from measures of system performance through measures of policy effectiveness).

Second, a database must be assembled that instantiates the conceptual framework. In view of the potential size of the database it is important to take a strategic perspective in conceiving and implementing it. It is envisioned that the data base will begin with a core capability and evolve in time, reflecting the knowledge derived from OOTW experiences. The database would subsume encyclopedic information, a world almanac, demographic information, media databases, maps, information derived from political and diplomatic sources and lessons learned from prior OOTW experiences. It is anticipated that the database will be highly distributed and that appropriate steps will be taken to assure access to authorized users.

- ◆ Issue
  - – There is a need to manage information strategically to provide a meaningful context for the product/process "Cs" (e.g., cognition, command, control, consultation, coordination)
- ◆ Recommendations
  - – Longer-term: Develop an orchestrated, tiered set of tools to address the issue
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    - » Expert elicitation techniques
    - » Selected predictive models
    - » Handbook of key indicators

Third, the analyst will need a set of tools to take advantage of the information contained within the database. These tools will include data mining tools (both to identify datasets that should be tapped to augment the strategic database and to extract meaningful data and relationships from the strategic database), information compression tools (to be discussed below) and visualization tools.

Fourth, it is recognized that any strategic database will be incomplete in terms of any new, unanticipated OOTW. To deal with this eventuality, the analyst will need an "electronic rolodex" to identify key subject matter experts and to facilitate access to them (e.g., at a minimum, phone numbers, e-mail addresses). If this source is to satisfy the analyst's needs, it is important to develop and nurture close relationships with key centers of excellence. As a model, the DoD has developed a strategic relationship with MEDEA, a set of environmental experts. A dialogue has been established to educate the environmental experts about the issues of interest to the DoD and to educate the DoD about how to work with them.

Fifth, it is often difficult to extract information from experts, particularly when there is no existing strategic relationship (e.g., "ask an expert what the time is and he will tell you how to make a watch"). To facilitate that dialogue, systematic expert elicitation techniques should be developed and implemented. As an example, it may prove useful to build upon and extend RAND's Subjective Transfer Function technique.

WG 5: C^{4}ISR Planning and Analysis

Key Issue: Information Management (3 of 4)

- ◆ Issue
  - There is a need to manage information strategically to provide a meaningful context for the product/process "Cs" (e.g., cognition, command, control, consultation, coordination)
- ◆ Recommendations
  - Longer-term: Develop an orchestrated, tiered set of tools to address the issue
    - » A strategic conceptual framework (including a hierarchy of measures of merit)
    - » Strategic (highly distributed) database
    - » Data mining/information compression/visualization tools
    - » "Electronic rolodexes" (ultimately, establishing close relationships with key centers of excellence)
    - » Expert elicitation techniques
    - » Selected predictive models
    - » Handbook of key indicators

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Sixth, the analyst will need a set of predictive models to help evolve the strategic database and to support the generation of key information needs. In the first instance, it would be useful to have a tool to assist the analyst predict where and when OOTW operations are likely to be conducted. Such a tool will provide the analyst with lead-time in identifying and accessing key data and in identifying and locating key experts. An example of such a tool is the instability predictor developed by EBR. In the second instance, decision aids are needed to help the analyst anticipate the implications of candidate actions (e.g., a transportation model to estimate the level of traffic congestion that would ensue if workers were sent home early in anticipation of an imminent natural disaster).

Finally, it would be valuable to provide an analyst with a handbook of key indicators to help him monitor and characterize an OOTW. LtGen Zinni noted that TRADOC had generated an early version of such a product.

Overall, it must be stressed that the analyst will need a family of orchestrated tools to support the broad information needs of the participants in an OOTW operation

WG 5: C^{4}ISR Planning and Analysis

Example: Auto Summarizer Software

- ◆ Tool
  - – Microsoft's Auto Summarizer Software
- ◆ Example: President Clinton's Second Inaugural Address
  - – Address: 2,010 words
  - – Summarizer output: 93 words
  - – Subgroup compression: 24 words (9 different)

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If an analyst is to be able to cope with the avalanche of data that can emerge from searching a strategic database, he will require several ancillary tools. One potentially interesting tool is auto summarizer software. To suggest the potential utility of such a tool, consider Microsoft's Auto Summarizer Software which is an element of Office 97. To suggest its capabilities, The New York Times employed the tool using President Clinton's 2,010 word Second Inaugural Address. The Auto Summarizer formulated a compressed 93 word version which effectively captures the main thrust of the Address [see the main report for the text generated by the tool]. As a tongue-in-cheek aside, one member of the subgroup further compressed the text to 24 words, only 9 of which were different (i.e., the word "blah" appeared16 times).

There are several points to draw from this example. First, it is obvious that the products of the media should be an intrinsic element of the strategic database. Second, even though this tool is just an initial version, it shows promise. Even though some workshop participants argued that a political speech is too easy a test case, analysts supporting an OOTW will have to mine political utterances for their information value. Third, it is likely that an analyst would have to work carefully with any output to ensure that it is meaningful and effectively compressed.

Such a tool might have another value in support of operations. Where Napoleon would employ a corporal to ensure that his orders were clear and unambiguous, such a tool might one day play an analogous role.

WG 5: C⁴ISR Planning and Analysis

Key Issue: Information Management (4 of 4)

- ◆ Recommendations (concluded)
  - – Near-term:
    - » Create a plan of action to develop the tiered set of tools [Lead: JS, CINCs]
    - » Implement a preliminary prototype set to
      - ◆ "harvest low hanging fruit"
      - ◆ establish proof of principle

The subgroup put forth two near-term recommendations on information management to establish a foundation for the longer-term recommendation.

First, in recognition of the complexity and size of the objective capability, it is recommended that a plan of action be developed to guide and focus community action. It would be appropriate for all the directorates of the Joint Staff to participate in the drafting of such a plan, with appropriate assistance from the CINCs. It is anticipated that such a team would gain access to appropriate technology expertise so that they are able to reflect those developments in their deliberations.

Second, it is recommended that a preliminary prototype set of tools be assembled and evaluated. As suggested above, there are several commercial off-the-shelf products available (e.g., SGI's data mining and visualization tools; Microsoft's and Apple's auto summarizers). These constitute "low hanging fruit" that could provide near-term support to the analyst. To establish proof of principle, it is recommended that such tools be assimilated and evaluated in on-going testbed programs (e.g., NRaD's Command Center of the Future).

Area	Selected Recommendations
Command	Exploit results from ONR's A^2C^2 program
Cognition	Enhance ways to characterize OOTW common operational picture
Coordination/ Consultation	Adapt, apply emerging Internet/collaborative technology
Control	Establish a testbed to experiment with emerging information technology products
Comms	Assemble database of feasible coalition communications combinations
Computers	Implement GCCS/Anchor Desk for OOTW operations
Integration	Develop a testbed to investigate integration issues (e.g., Joint Battle Center)

The subgroup developed several additional recommendations to respond to the needs of the other dimensions of the C^7I^3SR problem. A subset of these recommendations is identified and discussed briefly below.

• Command. As noted by LtGen Zinni, there is a need for tools to support the generation of non-traditional, flexible C^2 organizations that can adapt to changing conditions (e.g., changes in missions). It is recommended that the community take advantage of the tools techniques and insights emerging from the Office of Naval Research's (ONR's) Adaptive Architecture for Command and Control (A^2C^2) program (e.g., employ graph decomposition techniques). ONR should take the lead in this activity.

• Cognition. Due to the complexity and ambiguity of the situation, it is frequently difficult for the commander and the staff to develop a shared, coherent understanding of the situation. It is recommended that activities be undertaken to develop a conceptual framework and associated tools for characterizing the common operational picture, subsuming the military-political-social-economic aspects. A multi-disciplinary team is required, to include NDU (ACTIS) and the Service Laboratories.

Area	Selected Recommendations
Command	Exploit results from ONR's A^{2}C^2 program
Cognition	Enhance ways to characterize OOTW common operational picture
Coordination/ Consultation	Adapt, apply emerging Internet/collaborative technology
Control	Establish a testbed to experiment with emerging information technology products
Comms	Assemble database of feasible coalition communications combinations
Computers	Implement GCCS/Anchor Desk for OOTW operations
Integration	Develop a testbed to investigate integration issues (e.g., Joint Battle Center)

• Coordination/Consultation. There is a need for tools to support coordination/consultation among heterogeneous participants (e.g., political, diplomatic, coalition, military, NGO). In the interim, a near-term capability should be developed, with DISA in the lead, taking advantage of existing Internet technology. In the longer-term, DARPA (ISO), should adapt advanced Internet and collaborative technology to the problem area.

• Control. There is a need to make staff support tools more user friendly and less demanding on training. It is recommended that a testbed be established to enable users to experiment with innovative information technology products that promise to facilitate operator-system interfaces. Leading software innovators (e.g., MIT's Media Lab, Xerox PARC) should be tapped as a key source of technology. A facility like NRaD's Command Center of the Future should be considered as a potential testbed environment.

• Communications. The staff needs tools to facilitate the creation and management of communications networks that reflect the mix of systems in the inventories of potential multinational participants in OOTW. It is recommended that DISA take the lead in assembling a database of feasible communications combinations (e.g., expanded, updated versions of JINTACCS products).

WG 5: C^{4}ISR Planning and Analysis

Additional Recommendations (3 of 3)

Area	Selected Recommendations
Command	Exploit results from ONR's A^{2}C^2 program
Cognition	Enhance ways to characterize OOTW common operational picture
Coordination/ Consultation	Adapt, apply emerging Internet/collaborative technology
Control	Establish a testbed to experiment with emerging information technology products
Comms	Assemble database of feasible coalition communications combinations
Computers	Implement GCCS/Anchor Desk for OOTW operations
Integration	Develop a testbed to investigate integration issues (e.g., Joint Battle Center)

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• Computers. The networked computer systems of forces involved in OOTW operations must support required performance levels with a limited forward footprint. It is recommended that the DARPA/DISA JPO take the lead in achieving requisite performance levels through an application of the GCCS/Anchor Desk concept.

•Integration. There is a need for tools to support the conceptual synthesis of all of the above. It is recommended that a testbed be developed to investigate integration issues. One possibility is for the J8, Joint Staff, to take the lead and expand the Joint Battle Center to include coalition, diplomatic and NGO participation.

WG 5: C^{4}ISR Planning and Analysis

Conclusions

- There is a need for an orchestrated spectrum of tools to support the mix of tasks associated with OOTW C^{7}I^{3}SR
- In the near term, efforts should focus on
  - Developing a strategic action plan
  - Ameliorating selected tool needs by focusing on
    - » the analyst (and his relationship to operators and subject matter experts)
    - » the creative application of
      - existing information technologies
      - basic OR techniques
- In the longer term, a broader set of tools should be developed and orchestrated; e.g.,
  - Evaluation techniques (e.g., gaming activities, M&S, testbeds, exercises, lessons learned activities)
  - Data management techniques (e.g., very large databases, data mining)
  - Adaptation of advanced information technologies (e.g., advanced Internet; visualization tools)
  - Establishment of partnerships with selected centers of excellence

Based on its deliberations, the subgroup came to three broad conclusions. First, there is a need for an orchestrated spectrum of tools to support the mix of tasks associated with C^{7}I^{3}SR. It is clear that failure to orchestrate these efforts would result in an inadequate capability.

Second, a two-pronged effort should be pursued, in the near term. One prong should focus on developing a strategic action plan to ensure that the tool set is truly orchestrated.The other prong should seek to ameliorate pressing near term needs. This includes efforts to forge, educate and train analyst-operator teams and to begin to establish relationships with them and key subject matter experts (e.g., linguists, anthropologists, political scientists). It also involves the creative application of existing information technologies (e.g., data mining tools, auto summarizers, visualization tools).

In the longer term, a broader set of tools should be developed and orchestrated. These tools should include evaluation techniques (e.g., gaming activities, M&S, testbeds (such as the Joint Battle Center), exercises and expanded lessons learned activities); data management techniques (going well beyond current capabilities in creating, sustaining and exploiting extremely large databases), the adaptation of advanced information technologies (e.g., an advanced Internet, riding on NSF's Very-High Performance Backbone Network Service) and the establishment of partnerships with selected centers of excellence (e.g., MEDEA, Center of Excellence in Disaster Management and Humanitarian Assistance). This capability should be develop employing an evolutionary acquisition paradigm.

Operations Other Than War Analysis Methods and
Techniques

WG 6 Final Report

OPERATIONAL COST ESTIMATION

MORS Workshop

MacDill Air Force Base

28 - 30 January 1997

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This is the final report of the Operational Cost Estimation Working Group.

WG 6: Operational Cost Estimation

Outline

- ◆ Working group experience
- ◆ Working group objective
- ◆ Problem statement — OOTW cost
- ◆ 7 types of OOTW cost estimates and users
- ◆ Requirements of models
- ◆ Cost Breakdown Structure (CBS)
- ◆ Driver variables of OOTW Costs
- ◆ Input assumptions
- ◆ User specifications
- ◆ Data
- ◆ Procurement — what and how
- ◆ Tools and models reviewed

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This is the outline of the briefing. It resulted from our three major sessions: one for problem definition, one for a case study of the growth of the cost estimate for the US portion of the Bosnian operation Joint Endeavor and one for generating the briefing. Thanks in particular to Paul Goree and Jim Wilson of IDA who have been working on the Bosnia problem. Thanks also to Col Methered and Lt Karla Abreu-Olson for joining us for that session to give their perspective from EUCOM.

WG 6: Operational Cost Estimation Working Group Experience

- Maj Steve Aviles: Army CAA, Briefed "CANTELOUPES" for Maj Gordon
- Capt Gia Cromer: HQ USAF/XOOX (Regional Plans and Issues)
- Mr. Bill Dunn: Army Model and Simulation, Extensive overseas analysis
- MS Chris Fossett: General Accounting Office, MORS past president
- Mr. Paul Goree: Inst. for Defense Analyses, Dep. Director Cost Analysis
- Mr. Steve Keller: UNISYS (OSD (PA&E)) Data Support/ Force Structure Analysis
- Mr. Bob Osterhoudt: SAIC, former Fleet Comptroller/USTRANSCOM J-8
- Mr. Jean Smith: USAMICOM, Acquisition Expert
- Prof. Mike Sovereign: Naval Postgraduate School, Teaches Costing
- Mr. Jim Wilson: Institute for Defense Analyses, OSD/Air Force Cost analyst
- Mr. Ward Williams: SOCOM, J-8, Cost analyst of equipment & operations

Our working group was balanced across the Services and has over a hundred years of experience in costing. It included military, contractors, academia, FFRDC employees and GAO plus both Washington and field experience. Unlike other working groups we had neither international or volunteer organization representation but this was consistent with our focus on the ability to estimate the costs to the US military of OOTW. The chairman was Prof Mike Sovereign. He was ably supported by co-chairs Bob Osterhoudt and Paul Goree.

Working Group Objective

- ◆ A cost tool enabling analysts to estimate for decision making consistent categories of costs for an OOTW to be updated and reconciled with actual costs.

- ◆ The tool will include models called Cost Estimating Relationships (CER)s which are of the form $ = f (attributes of an OOTW). The function is usually linear with the coefficients on the attributes being standard cost factors per unit of the "driving" attributes.

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Working Group 6 has the above objective for its deliberations.

Our purpose has been to synthesize functions needed into a cost estimation tool or tools that would enable analysts to prepare and document standardized, consistent categories of costs used in all types of OOTW. The tool would be intermittently updated by units, services and OSD and with the updated information then reconciled with actual OOTW costs for further improvement in the models underlying the tool.

Our objective was tightly scoped in order to ensure our reaching the goal of the meeting, to advance the definition of the requirement for tools to be "ready for an RFP." We are looking for mathematical relationships which generate a dollar estimate from a set of inputs describing the OOTW, or its "attributes" in the terms of this meeting. Some cost coefficients will multiply each of these inputs. Unfortunately the data base on OOTW is not sufficient to allow us to estimate the coefficients statistically so these cost factors such as $/ton-mile must be collected to build the model. Important to the model are consistent cost structures and definitions.

Finally we insist that the model be built from the beginning in a manner to allow reconciliation with actual costs so that tracking of the estimate through changing conditions can be documented.

WG 6: Operational Cost Estimation

OOTW Cost Problem Statement

- ◆ Cost of OOTW: Process to develop/manage cost estimates is not well integrated
- ◆ Ambiguities in funding responsibilities
- ◆ Cost estimating structures are different
- ◆ Lack of useful past data on OOTW costs
- ◆ Lack of accepted cost estimating relationships (CERs)
- ◆ Data verification/relevance is difficult

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We derived this statement of our problem from the experience with the Bosnia estimate. That cost grew by a factor of two despite the limit of a one- year life for the operation. As a result there is considerable high- level concern in DoD for the need to improve costing of OOTW contingencies. Congress is not likely to entrust us with responsibilities in OOTW if we can't get closer than that!

The process to develop and manage contingency cost estimates is not well defined. At the working level there are differences between cost structures and definitions that result in problems between the Services when one Service is supposed to support another but their definitions vary. Ambiguities in the funding responsibilities lead to estimating errors where one service is "executive" agent for a common service like facility operations, communications, or transportation.

The lack of useful historical data on costs of Contingency Operations with relevant descriptive information on the "cost drivers" makes it difficult to integrate disparate information. Because of the lack of data there are no mathematical Cost Estimating Relationships (CERs) for OOTW but some relationships may be carried over from warfare operations such as deployment. Operational costs are much harder to document than procurement costs where the contractor is required to provide specific cost data which is governed by well-defined reporting systems.

WG 6: Operational Cost Estimation

7 Types of Cost Estimates/Users

- ◆ #1 Cost of Generic OOTW
- ◆ #2 Specific OOTW Engagement Decision
- ◆ #3 Alternative Courses of Action Costing
- ◆ #4 Cost Recovery
- ◆ #5 Budgeting for an OOTW Activity
- ◆ #6 OOTW Cumulative Impact Analysis
- ◆ #7 "Actual" Cost Accounting for OOTWs

Our objective is cost estimates to support decision making. Therefore we tried to identify the various decisions which require costs. We started with the three types of costs mentioned in the PACOM work and tried to add as many as we could. These seven types represent reasonably independent uses of costs but we aren't sure they are exhaustive (but we were exhausted). In general they become more complex with the higher numbers. We have not had time to label these very successfully so we often refer to them by number in what follows. They will each be described individually in the next few slides.

WG 6: Operational Cost Estimation

OOTW Cost Model Characteristics

	Generic	Engagement Decisions	Alternative Course Evaluation	Cost Recovery & Reimbursement	Low Level Budgeting	Cumulative Resource Impacts	"Actual" Cost Acct'ing
WHO:							
NCA		X					
OSD/JCS	X	X		X		X	
CINC/Comp		X	X	X		X	
Services			X	X	X	X	
Unit					X		
Policy Analysts	X						
Other	X				X	X	X
Type of Costs:							
Incremental	X	X	X	X	X		X
Full			X	X	X		X
Accuracy (+/-)	50%	35%	30%	30%	15%	50%	"Actual"

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This table summarizes the slides to follow in which we attempted to identify, at least in a relative sense, who makes the decision, in what setting and purpose, the accuracy required and whether the cost should be incremental or full cost estimate.

This last distinction is an important one. Even many cost estimators may not be familiar with the term "incremental" cost although it is suggestive of "marginal" or "variable" or "direct" cost. Rather than any of these however it means "not already in the budget" and is the basis of asking Congress for supplemental budget authority. Thus the regular pay of an active duty soldier in Bosnia is not incremental but his special allowances for being there would. The full pay of reservists called up to active duty would also be incremental.

Most of our existing cost structures are not set up to make incremental costs easy to collect. The Operating and Maintenance (O&M) appropriation costs are always a catch-all and the incremental nature of any particular expenditure is difficult to determine. Incremental costs are legally the basis for recoupment of costs from non-DoD governmental agencies such as the State Department or FEMA, who fund a significant number of OOTWs. Similarly some say we made a profit on the Gulf War in that allies reimbursed us for more than the incremental costs.

WG 6: Operational Cost Estimation

#1 Generic OOTW Cost

- Who: NCA,OSD, Joint Staff, Service, CINC
- Planning/Programming
- Order of magnitude discussions +/- 50%
- Training: games at War Colleges, etc.
- Incremental costs
- Variables:
    - size, duration, force characteristics
    - active, reserve composition
    - Relative Service emphasis (mobilization)

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This represents the cost of one of a class of OOTW, say a Non-combatant Evacuation Op (NEO), without specification of where or duration or how many people evacuated etc. Such a cost estimate would be useful in long-term planning, training games etc. For example in the on-going Dynamic Commitment series it could be used to help roughly estimate OOTW costs over the FYDP.

It should reflect only incremental costs and accuracy is obviously very rough. It could be estimated as a simple average of the cost of past NEOs if there was a good data base of NEO costs. A better estimate would consider some of the variables above that might be appropriate even for a standard fictitious scenario such as this.

We ended up giving this a low priority, by the way.

WG 6: Operational Cost Estimation

#2 Decision to Engage in an OOTW

- ◆ Who: NCA/CINCS, OSD, Joint Staff
- ◆ Feasibility test/affordability issue
- ◆ Accuracy: 50%
- ◆ Incremental costs
- ◆ Variables: Location, forces, possible combat intensity, duration, other agencies, cultural and environmental specifics.
- ◆ Other participants: NGO's, PVOs, Allies etc.

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This is an important decision made at the highest levels. Unfortunately many of the "attribute" variables may not be readily apparent at this early stage. As a result we can't expect great accuracy. But we should demand that the estimate be updated in a consistent manner as more information becomes available. It is better to have a rough but trackable estimate earlier than to delay the decision.

The cost accuracy will be driven by the accuracy of the size of commitment and the duration estimate. If the duration is defined to be one year (as in Joint Endeavor), then accuracy should be considerably better than the +/- 50%.

Again because there may well be a request for supplemental authorization or recoupment, the incremental costs are what is needed.

With a particular OOTW evolving, the role of NGOs and PVOs as well as allies must be identified because the US military often provides some support for everyone involved.

An "end-state" and "transition plan" must also be identified in order to make a reasonable cost estimate. Otherwise US support costs can go on indefinitely.

WG 6: Operational Cost Estimation

#3 Alternative Courses of Action Costs

- ◆ Who: CINC, components and service
- ◆ Use cost as surrogate for efficiency
- ◆ Accuracy:+/- 30%
- ◆ Full and/or incremental cost
- ◆ Limited to subset of relevant costs
- ◆ Options for medical services, active/ reserve participation, modes of transportation, etc.

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Many decisions concerning alternative courses of action are made by staffs in planning an OOTW. Many of these are based on other considerations but relative dollar cost is a good measure of efficiency that should often be considered in mode of transportation, use of reserves, contracting for support etc.

These decisions and costs are affected by major force structure decisions and employment options (i.e. move into Bosnia from South vs. North). Early identification of relative costs might highlight impacts that are significant and for spark generation of feasible alternatives that exist but have not been considered.

Reasonable accuracy is required and should be possible here.

In this regard sub-models for relevant costs such as deployment should be easy and appropriate — a total, balanced model is not required.

For some decisions there may be a need for comparison of full costs rather than incremental cost alone. For example comparing contracting out may require full costs.

WG 6: Operational Cost Estimation

#4 Cost Recovery

- Who: OSD, State Dept., Services down to individual unit
- Recoupments/Reimbursements from "outsiders" to Services
- Incremental and full costs depending on legislation
- Legal constraints on cost elements
- Accuracy +/- 30%

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Since many OOTW are funded outside of DoD there is the necessity of identifying their costs for recoupment. Careful preparation for collection may lead to higher recovery that will contribute to less impact on readiness, right down to the lowest units which often suffer the most when unplanned OOTW occur (particularly if towards the end of the budget year).

There are often legal constraints to only allow incremental costs rather than full costs but sometimes there is the requirement for collection of full costs. This raises related questions of how Services reimburse each other for support costs such as airlift but that is outside our scope.

Accuracy for this purpose is approximately +/- 30%.

WG 6: Operational Cost Estimation

#5 Budgeting for an OOTW Activity

- ◆ Who: Service Unit involved in continuing OOTW: Counter Drug, SOF?
- ◆ Budgeteers at CINC down to unit
- ◆ Accuracy: +/- 50%
- ◆ Full costs for most appropriations
- ◆ Sources of funds: Supplemental, reprogramming, reallocate within appropriation

As a corollary to the category above we addressed the necessity of sometimes needing to budget operational costs for OOTW ahead of time. This might be the case for a continuing OOTW that extends for several years for example. At the other extreme some units may have repeated participation in short OOTW and may need a budgeting model for preparing their own plans and programs.

For some appropriations this may require full costs. It is likely that rough estimates will be all that is possible given the unforeseeable nature of most OOTW.

In the end we had difficulty finding anyone who said they needed this tool.

WG 6: Operational Cost Estimation

#6 OOTW Cumulative Impacts

- ◆ Who: Programmers, Service and OSD including Reserves
- ◆ Long-term implications, life-cycle costs
- ◆ Assess impacts of OOTW on the future capabilities, force structure and resources
- ◆ Effects on personnel skill mix, modernization, recapitalization
- ◆ Accuracy: +/-50%

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The other uses of costs all address only a particular OOTW. It is widely speculated that our rough incremental costing may not fully capture the cumulative effects of several OOTW. If so, military readiness may suffer.

We have attempted to provide for this aspect by suggesting the need for the analysis of the aggregation of effects that may come from the higher utilization of forces and systems that is not captured in incremental OOTW costs.

For example the cost of replacing the capability that may be depleted in our airlift equipment is not covered in current deployment costs. We don't depreciate our equipment and charge that to OOTW incremental costs. For almost any one single OOTW the depreciation might not be significant. But over the lifetime of some deployment assets they may possibly be used as often for OOTW as for warfare or training.

Perhaps reserve recruitment and training costs are raised because of the high call-up rates of some units for OOTW.

We need to examine some of the potential areas for major effects of this kind. The models here will be varied and more complex than just cost estimating relationships.

Accuracy in these difficult areas will start out quite rough.

WG 6: Operational Cost Estimation

#7 "Actual" Cost Accounting For OOTW

- ◆ Who: Controller, auditors
- ◆ Accountability required
- ◆ Need to reconcile estimates for accuracy
- ◆ Incremental and full costs
- ◆ Cost structure needs to be consistent with estimating structure and definitions

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It is essential if we are going to improve OOTW cost estimation that the actual costs of OOTWs be measured as they occur. Otherwise there is no incentive to make better estimates and they will likely be driven by political factors.

Fixing this may require significant departure from DoD policy/practice. We ordinarily do not ask troops in the field to be careful to record their costs by operation. In war there may not be time. But if we are going to be in the business of OOTW, it may be necessary to produce better records as specific resources are used so that recoupment is possible, for example.

The benefit of better estimates will flow if the cost structures and definitions are consistent and reconciliation is required. Nobody likes to balance their checkbook but if you don't....

WG 6: Operational Cost Estimation

Summary of the 7 Uses

- ◆ Same OOTW tool should work across the mission spectrum
- ◆ Similar model (Cost Estimating Relationships) across 6 of 7 uses
- ◆ #6 Cumulative Impacts modeling may be more extensive
- ◆ Primary model should estimate incremental $
- ◆ Also need model for full $ but much lower priority (not sure there is really demand for use #5 Budgeting of OOTW)

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Having discussed the 7 uses in detail we constructed the table used earlier as introduction and drew some tentative conclusions.

First we firmly believe that the same cost tool can be used for all of the types of OOTW.

Similarly the same tool should be useful across the seven uses with the exception of #6 Cumulative Impact where a variety of tools will have to be developed because a dollar cost may not be an appropriate measure of the impact on readiness.

All cost estimating tools will depend heavily on good tools for force structuring, logistic and C^3 planning etc.

The primary emphasis in OOTW costing should be on a tool for the incremental cost as opposed to the full cost of an OOTW.

WG 6: Operational Cost Estimation
Requirements of Models

- ◆ Performance or Functional Specifications
  - – Phases must be identified
  - – Incremental Costs
  - – Cumulative Impacts (prototype only)
  - – Components and Communities
  - – Cost Structure & Definitions
  - – Organizational Responsibility
  - – Time Increment for Reporting — Month?

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Although we had only a limited time we believe the primary cost tool should have the following characteristics:

- – a. Phases are seen as preparation, deployment, sustainment, redeployment, post-operation, reconstitution.

- – b. Incremental costs may include variable support costs. Most models are incremental for "OM" and NEI Pers. Cumulative impacts model must be the most inclusive.

- – c Active, Reserve, civilian, contractor, allies, host nation etc Generate different capabilities and support requirements and must be distinguished.

- – d. Cost Work Breakdown Structure & definitions thereof should be established.

- – e. Organizational level (responsibility): Service, unit (primary and support).

- – f. Time increment: Monthly periods for reporting incremental or full cost.

We were unable to discuss in detail the question of the applicability/ feasibility of variable support costs or incremental cost estimation.

WG 6: Operational Cost Estimation

Cost Breakdown Structure

- ◆ DFAS as a starting point (4 categories)
  - – Personnel
  - – Personnel Support
  - – Operations and Maintenance (O&M)
  - – O&M Support
- ◆ OSD Comptroller to establish better definitions (in progress)

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The Defense Finance and Accounting Service (DFAS) categorizations are specified for incremental cost for supplemental authorizations and are similar to the cost structure used in the existing OOTW cost models we reviewed (See last 3 slides of presentation).

The DFAS structure has three major categories; personnel, personnel support and O&M. Some existing models break the latter into Operations and Operations Support, a perhaps difficult distinction.

Transportation is a very large contributor to OOTW cost. In the case of the Somalia Operation Restore Hope it was about half of the cost.

OSD Comptroller has initiated an effort to refine the definitions of incremental costs and their structure should be made the standard after it is reviewed by the Services.

WG 6: Operational Cost Estimation

"Driver" Variables for Cost Estimation

- Duration and urgency
- Force characteristics, # of units, # and types of personnel, initial OOTW readiness
- OPTEMPO (flying hours & steaming hours)
- Characteristics of area of operations (infrastructure, location, weather)
- Support to Non-DoD participants
- Semi-qualitative factors such as C^4ISR, QOL and rotational policy

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These are the easily identified drivers of operational cost. Others may be identified in the course of development for the detailed models.

Clearly the forces involved and the intensity (OPTEMPO) and duration of their activity are paramount. Thus the importance of good force planning tools to good cost estimates.

The forces supported must include the non- military and allied units because we often support them as well as the troops. Indeed it is sometimes necessary to support much of the civilian population as well, particularly refugees.

The environment also drives costs as well as policy decisions regarding quality of life, rotation policy, and sophistication of command and control structures.

It is anticipated that the costing of use #3, Courses of Action, will require considerable refinement.

Use #6. Cumulative Impact, will also require refinement of the driving variables.

WG 6: Operational Cost Estimation

Input assumptions (Standard $ factors)

- ◆ Readily available
  - – Direct and indirect personnel costs
  - – Transport $/ton mile
  - – Flying hour costs for most aircraft
- ◆ More difficult
  - – Consumption rates which vary with environment
  - – Infrastructure condition and improvement and maintenance
  - – Port handling costs
  - – Host nation support & coalition readiness efforts

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Because the small data base for OOTW doesn't allow us to estimate the coefficients of the driver variables statistically, it is necessary to obtain standard cost factors such as cost per ton-mile to apply to driver such as distance to deploy.

We note in this table some examples of standard cost factors we believe are easy to obtain such as cost per person and ton-mile.

However there are many standard factors which may not actually apply to OOTW. For example the standard pounds of supply per person per day by Army class may not be appropriate for OOTW (ammo for example).

OOTW are often conducted in very austere conditions which raise costs. Large influxes may overwhelm the local infrastructure and require considerable investment.

Sometimes allies come woefully under-equipped. Host nation support. such as all POL from the Saudis in the Gulf War, can make a large difference.

Training support will vary widely. There is a substantial amount of work to be done in this area but we believe it is doable with rough accuracy.

WG 6: Operational Cost Estimation
User Specifications

- ◆ Easy "What If" analyses. Cost estimating tool kit (Baseline CERS, standard parameter tables, pointers to data bases, report generator)
- ◆ Interoperability with planning models
- ◆ Support distributed use.
- ◆ Interface requirements — state of art Open System hardware and software environment (portable)
- ◆ Education/training for users on-line training/documentation available

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- May borrow other user requirements from JWARS specification
- Compatible with accepted planning models and existing productivity software suites
- Cost estimating utility using standard parameter tables & data sorting techniques, CER baselines and a versatile report generator
- Education/training through on-line tutor and a "hot link" help utility

WG 6: Operational Cost Estimation
Data

- ◆ a. Standard parameters from Service and other documentation
- ◆ b. Resources data: interface to existing units, logistics, deployment systems
- ◆ c. Historical record of OOTW "attributes"
- ◆ d. Consideration of special coding of expenditures for specific OOTW operations for full, direct costs
- ◆ e. Releasability and security provisions

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- Several types of data are needed by developers OOTWA cost models and by users to apply cost models to specific operations.

- Standard cost and usage parameters will be required. A significant percentage of these data are already in use within the Services and CINCs such as TRANSCOM. Other data will need to be derived from examining historical records of past operations.

- It is this latter class of data that require some additional effort to document summary characteristics and attributes of specific operations. A prior chart described the types of data cost analysts consider the principle cost drivers.

- Future improvements to the accuracy of OOTW analysis cost will depend on a better understanding of the actual costs of prior operations. To get better data in the future, some improvements are required in the way costs are recorded in the DoD accounting system. perhaps through the use of coding of the direct expenditures for specific OOTW operations.

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WG 6: Operational Cost Estimation

Procurement — Priorities for #1 - #7

- ◆ Highest priority is for use #2 (Engagement) and it is feasible
- ◆ #3 (Alternatives) use may follow development of #2 closely for several major tradeoffs
- ◆ #4 (Recoupment) use (incremental cost only) may also follow with development of some different factors
- ◆ Use #1 (Generic) may flow from building and use of the high priority model #2 model. We are not sure that its accuracy will be worthwhile
- ◆ Have not yet identified any specific users of #5 Budgeting for OOTW
- ◆ #6 (Cumulative impact) is hardest. Recommend focused prototype be started ASAP on sensitive readiness impacts
- ◆ #7 (Actual cost) is different but essential to long-term development of quality estimates. Start now in parallel.

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We have made an initial assessment of the priority of the tool building across the 7 uses. In this we have included the relative feasibility of reaching an acceptable level of accuracy soon.

The first priority is to build a tool to provide early rough estimates of the incremental cost of a specific proposed OOTW (#2) so that decision makers realize the resource implications of decisions. The capability exists to accomplish this goal, we believe. We also believe that the development of this first tool will quite naturally build our understanding and unearth data sources that will make similar but more refined models available for looking at staff tradeoffs in courses of action (#3). This effort should be undertaken after the first tool is built and evaluated. Specific high payoff trades should be identified before proceeding to build the model. We believe that a cost recovery tool (#4) could then be built. This might even be started in parallel with the #3 effort.

Somewhat similarly the building of a model for generic OOTW cost may follow the first effort in parallel if a specific user is identified and steps forward.

The tool for use in #5, OOTW budgeting, must wait for a specific potential user command to be identified. Also it may be too specialized to the command to allow wide-spread use.

Finally a variety of tools will be needed for the use #6. Cumulative Impact, so only exploratory or prototype work should begin at this time on a single high pay-off area.

As noted earlier better measurement of actual costs. should start now in parallel.

WG 6: Operational Cost Estimation

Procurement — How

- ◆ OSD Comptroller lead, with Services participation, refinement of DFAS format
  - – Issue guidance to improve "actual" cost definition and collection
- ◆ OSD Comptroller lead effort with services to build model #2 (Engage) now.
- ◆ OSD PA&E lead development prototype tool to support assessing #6 (Cumulative Impact) possibly starting with transport equipment.

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- The OSD Comptroller should take the lead, with Services participation, to refine the cost breakdown structure, currently used by DFAS, to collect actual costs. This format should be integrated into the OOTW cost estimate preparation process to enhance the ability to compare cost estimates with their actual cost. This effort should include issuing guidance to improve "actual" cost definitions, documentation and estimation.

- The OSD Comptroller should also take the lead to build model #2 (Engagement Decision) now.

- OSD PA&E should take the lead in developing tools to support assessing, #6 (Cumulative Resource Impacts) of OOTW.

WG 6: Operational Cost Estimation
DFAS Standard Cost Reporting Structure
For Incremental Contingency Costs

Personnel
Military Personnel
Reserve Call-up
Reserves on Active Duty
Other Guard/Reserve
Imminent Danger Pay
Family Sep Allowance
Foreign Duty Pay
Other MILPERS

Operation and Maintenance
TDY/TAD
Civilian Overtime
Civilian Temporary Hires
Other Personnel

Personnel Support
Subsistence
Consumables
RC Activation
Hospital/Supply Ships
Medical Support
Other Support

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This is a quick version of the three part incremental cost definition by DFAS for supplemental budget authorizations.

WG 6: Operational Cost Estimation

Tools and Models Reviewed

◆ **DoD Deployment Model, OSD(C) & JCS-J8**

- Driven by high level, generic force and operational characteristics
  - (e.g., fractional divisions, CVBGs, etc.)
  - Force description can not be tailored based on mission tasks
- Estimates Personnel, Personnel Support, Operations Support, and Transportation costs for all services
  - Prone to miss non-standard activity costs
- Currency of cost factors is varied in quality
- First generation, limited flexibility, incomplete, difficult to use and difficult to maintain

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Some of the members had recently reviewed the DoD Deployment Model which is in use at OSD Comptroller. It requires a limited number of inputs and gives a first estimate of incremental cost. It appears to be applicable to any deployment to one of 19 world areas. The focus is on major units rather than their total support packages. The appropriateness of some of the cost factors is questionable. The model is spreadsheet based and is not configuration managed.

WG 6: Operational Cost Estimation

Tools and Models Reviewed

- ◆ **CANTELOUPES, Army CAA**
  - – Direct interface with FAST-OR, CAA's Force Model
  - – Cost estimates driven by force description that is tailored based on task
  - – Uses Army's existing force cost database
  - – Full range of <u>Army funded</u> costs
    - • Strength for Army use, weakness for joint applications
  - – May miss non-standard activities and costs
  - – Uses cost breakdown similar to DFAS

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The Cost Analysis Tool to Estimate Light Operations and Unfunded Peacekeeping Scenarios (CANTELOUPES) was described by Major Aviles of the Army's Concepts Analysis Agency (CAA). Major Aviles was a stand-in for Joel Gordon from CAA who runs CANTELOUPES but who could not make the meeting. Major Aviles kindly came over from the force planning working group where he was also briefing the Army's force structure model FAST-OR which is used to build a total force structure for an OOTW including support units. FAST-OR provides detailed force lists to CANTELOUPES. CANTELOUPES uses a standard Army force costing data base which may not always be appropriate for a particular OOTW. It may be considered prototypical of the Army portion of a tool for the estimation of the cost of an OOTW before engagement. However a calibration run against Bosnia costs was not totally successful, thereby pointing out the difficulty of making accurate estimates early in an OOTW when support policies are not yet clear.

Tools and Models Reviewed

- **SOF Cost Model**
    - Cost estimates driven by force description that is tailored based on task
    - Uses consolidation of numerous Service- level data bases
    - Provides cost by MFP-11 and Non-MFP-11 appropriations
        - Limited to SOF Applications only
    - Uses cost breakdown similar to DFAS

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One member of the group was somewhat familiar with the Special Operations Forces Cost Model and provided the above information. It is believed that SOCOM has shelved this model.

Operations Other Than War Analysis Methods and
Techniques

WG 7 Final Report

Impacts Analysis

MORS Workshop

MacDill Air Force Base

28 - 30 January 1997

WG 7: Impact Analysis
Summary

- ◆ Prediction and Impacts Analysis covers a broad range of tasks and tool requirements
- ◆ Working Group 7 focused on refining and defining tasks and analysis requirements
- ◆ Some common themes for Research and Development did emerge:
  - OOTW database — rich with background and influence factors
  - Prediction of conditions which drive NCA to act
  - Leverage projects initiated as part of QDR process
  - Leverage non-DoD government, NGO and commercial databases and models
  - Improve metrics for assessing readiness and skill availability

♦ **WORKING GROUP TASK AREA**

    – To develop methods for predicting where OOTW missions may occur in the future and how to assess the impact of OOTW missions on other missions (e.g., MRCs), defense strategy and JSCP tasking.

    – Parallels "Impact Analysis" category identified by PACOM workshop

♦ **OBJECTIVES FOR WORKING GROUP 7:**

    – Define, Describe, Design Tools, Techniques and Methods to:

        » Predict where OOTW missions may occur in the future

        » Assess the impact of Blue, Red and White actions in the current (OOTW) mission on other missions, and future plans and strategies

Terms of Reference for working group 7 covered broad range, and in addition referred to the following definition of Impact Analysis from the Hartley report (section 5.1.2):

"This tool supports the analysis of the impact of human actions (own-side, opposition or neutral parties) on the current situation and future plans. The human environment that must be considered includes the political environment, the economic environment and the cultural environment. The tool includes both an operational mission component and a non-mission, regional or global, component.

Elements include:

Impact of proposed or current OOTWs on strategy and other missions, such as MRCs and other MOOTWs and:

•   Joint Strategic Capabilities Plan (JSCP) tasking;

•   Instability Analysis — predicting future trouble spots; and

•   Visibility for unintended consequences."

Group 7's first task was to clarify objectives and scope of activity.

WG 7: Impact Analysis

Introduction (1) Cont'd.

◆ **SCOPE OF EXPERTISE**
  – CINC
  – DoD
  – Expert Consultants

LIST OF PARTICIPANTS:

> Ms. Betty Lou Beatty, UNISYS
>
> Mr. Paul S. Bloch, Naval Postgraduate School
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> Dr. Karen Parsons, Joint Warfare Analysis Center
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> Dr. Grace I. Scarborough, Evidence Based Research, Inc.
>
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WG 7: Impact Analysis

Introduction (2)

- **Session 1**
  - Introduction
  - Hartley Report Recap.
  - Refine/Define Task
- **Session 2.a.**
  - Describe Tools and Techniques
    - » What should tools help analysts do?
    - » Fit against mission categories
    - » Attributes
- **Session 2.b.**
  - Describe Tools and Techniques
  - Tools: Existing, Modify, R&D
- **Session 3**
  - Road Map and Wrap-Up

WG 7 followed this agenda, a recap of OOTW Mission Categories, Attributes and Specific Tasks cited for Impacts Analysis in the Hartley report gave everybody a basis from which to start.

WG 7: Impact Analysis

Refine/Define Task: Prediction Analysis

A. Current and Near-Term

- When, Where, Why CINC goes

B. Long-Term Issues

- Where Instability

- Natural Disasters (Time-Dependent)

C. Continuing Ongoing Missions

- National Integrity
- Sanctions
- Immigration
- Peacetime Engagement

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Prediction Analysis was further refined according to time-specific needs.

Current and near-term prediction requires higher granularity. Much instability may occur, but the critical need is identifying when and where an OOTW mission is required; i.e., predicting when and where CINC will have to go.

Longer-term requires less detail, general knowledge of the region and its instability.

WG 7: Impact Analysis

Refine/Define Task : Impact Analysis

A. Current/Near-Term Future
- Impact of Current Operation on Other Potential Mission in Same Time-Frame
- Impact of Current Actions on MPES Factors Relevant to Current Mission
- Impact of Current Action on Current Mission Aims, Goals, Objectives

B. Longer-Term Impacts
- Impact on Future Mission Requirements and Concepts
- Impact of Current Success or Failure on Perceptions, Nature of Future Operations

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The first bullets under A and B refer to force numbers and readiness

Second Bullet under B refers to capturing the impact on how US actions affect perceptions and thereby influence adversary and coalition partner actions. Likewise, how success and failure influence the way future US operations are conducted.

For example:

Message sent to terrorists when US did not pull out of Saudi Arabia after residential area bombing.

Impact on future operations after death of Rangers in Somalia.

WG 7: Impact Analysis
Process/Procedure/Tool/Model/Research Need

i.e., Help the Analyst To ...

PREDICT

◆ **Predict the Counter-Intuitive**

◆ **Identify Conditions that Drive NCA to Act**

◆ **Forecast 7-10 Years Out**

  • Demand for/Mix of Future OOTW Missions

◆ **Forecast 2 Years Out**

  • General Idea of Country

  • Why Things are Changing

  • Allow Prioritization of Resources

◆ **Forecast 3 Months Out**

  • Kind of Operations Required

  • Validate, Confirm Expert Thinking

◆ **Predict External Perceptions Based on Prior Missions**

7-10 yr. forecasts' role is mainly concerned with aiding CINCs in long-term issues such as procurement and force-structuring priorities.

2 yr. forecasts allow prioritization of resources, training and proactive ramp-up. Mainly concerned with assessing area background conditions, country assessments, identifying sources of instability in countries and why situation is changing. This entails identifying essential conditions such as vulnerability to natural disasters, capability of indigenous government to handle disasters, presence and persistence of internal conflict, economic conditions, presence and persistence of political crises. These forecasts may entail identifying the key data elements from a large number of indicators.

3 month forecasts mainly concerned with identifying which potentially unstable countries are most likely to become actual conflicts, or are most vulnerable to natural disaster threats and other conditions which drive the NCA to task the CINC. CINCs concerned with where to prepare for imminent action and what types of action may be required. Also identifying areas where low-level actions now may prevent need for more forceful actions in the future, and whether actions are likely to be conducted in friendly or hostile environment.

External perceptions concerned with how US-led actions, or successes and failures, affect ability to deter other adversaries, and attract support from allied forces for joint actions.

WG 7: Impact Analysis
Process/Procedure/Tool/Model/Research Need
i.e., Help the Analyst To ...

IMPACTS ANALYSIS

1. Assess Impact of Current Mission On...

- Readiness
- Subsequent Missions
- Assess Unit and Skill Availability
- Current Strategy
- Perceptions

WG 7: Impact Analysis
Process/Procedure/Tool/Model/Research Need
i.e., Help the Analyst To ...

IMPACTS ANALYSIS

2. a. Assess Impact of current Actions On Military, Political, Economic, and Social (MPES) Factors of Current Mission

- Assess Each Aspect of Mission on
  - Military Impact
  - Political Impact
  - Economic Impact
  - Social Impact
- Tracking
- Establish Baseline
- Identify When Change Occurs

Understanding MPES impacts enables understanding of mission change (see next slide, 2.b.) and provides framework for managing and adapting mission change.

Data and observations covering sufficiently long timeframe are needed to establish what is the "normal" state of affairs in countries and when significant changes take place.

Tracking of current and recent trends in MPES indicators is compared to the established baseline of what is "normal."

WG 7: Impact Analysis
Process/Procedure/Tool/Model/Research Need
i.e., Help the Analyst To ...

IMPACTS ANALYSIS

2. b. Impact of Current Action on Aims and Goals

- Study Lessons Learned

- Branch and Sequel COA's

- Develop Red Cell, Access to Regional Experts

- Assess and Control Change

- Assess Perceptions

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Discussion on 3rd bullet emphasized need for better links between field-level and analysts so field-level commanders can obtain analysts' results and assessments in timely manner. CINC can not afford to wait for links to previously employed analysts to be reestablished or a new group of analysts to be cultivated.

WG 7: Impact Analysis
Process/Procedure/Tool/Model/Research Need
i.e., Help the Analyst To ...

IMPACTS ANALYSIS

3. a. Impact on Future Mission Requirements and Concepts

- Long-Term Readiness Implications

- Trend/Pattern of Historical OOTW's

- Assess Force Structure/Skill Mix

- Concept Development

- Strategy Development

- Requirement Development

- Intelligence Requirements

- Planning Process — Roles and Missions

  - NGO, Coalition Partners, IOs

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OOTW database could support this analysis. Institute for Defense Analyses (IDA) regression analysis on their dataset of OOTW operations indicates no significant change in frequency of OOTW operations, but a significant decline in traditional military missions.

WG 7: Impact Analysis
Process/Procedure/Tool/Model/Research Need
i.e., Help the Analyst To ...

IMPACTS ANALYSIS

3. b. Impact of Current Success or Failure on Perceptions,

Nature of Future Operations

• Assess Perception of Key Players

• Recognize Historical Baggage

• Measure Deterrence Value

• Assess Signaling Value of Demonstrations of Capability

    • Internal Impact

    • External Impact

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WG 7: Impact Analysis

Tool/Technique Attributes

- ◆ Time-Tested Empirically
- ◆ Agile, Robust, Changeable, Adaptable
- ◆ Quick and Easy to Use
- ◆ Parsimonious Model
- ◆ Timely and Cost-Effective Data Collection
- ◆ Components Capable of being Used by CINC Staff and Above (Transparent to NCA)
- ◆ Variable by Mission
- ◆ Variable by Strategic and Operational Level
- ◆ Transportable
- ◆ Simple Sensitivity — Allow "What If?" Drills
- ◆ Assumptions Available, but Unchangeable by User

CINC-level need for tools that could feasibly be used in short-term, rather than be denied use of any tools until they are perfected. "Bad" tools that people understand and can use to some limited benefit in short term may even be preferable to "good" tools that are unusable or currently unavailable at CINC level. Short-term spin-off products of broader, long-term research and development initiatives may be useful products in themselves which CINCs need to have available while long-term enhancement and perfection of tools continues.

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WG 7: Impact Analysis
Tool/Technique Fit Against Mission Categories

◆ **Apply Across All in Principle (although some variation by mission type — NEO vice Complex H.A.)**

◆ **Vary in Criticality**

  • Duration of Mission

  • Frequency of Mission

  • Relation to Normal Mission

◆ **Vary According to Relative Mission Priority and Strategy**

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Members of Group 7 asserted that scope of Impacts Analysis activities are actually broader than those identified in Hartley report (see diagram). Impacts analysis was said to actually cover both Strategic and Operational levels and Mission-Specific as well as Non-Mission-Specific activities.

WG 7: Impact Analysis
Tools for Prediction Analysis

EXISTING:

– **EBR's "Assessing Vulnerability to Instability"**

  • Expert System — 6 Months Prediction

Dr. Grace Scarborough, Evidence Based Research (EBR) developed the model.

Covers instability, political change against government, not between groups.

Focuses on specific groups in society and ability to achieve specific goals in 6 months.

Does not involve huge indicator set.

Decision making model of a group, to determine group actions and change.

Excellent predictor of form and level of stability, is better at forecasting specific groups than country as a whole.

Model has been validated for 6-months forecasts.

Briefing attached.

WG 7: Impact Analysis
Tools for Prediction Analysis

PROMISING TOOLS (requiring further test and evaluation)

Structural — longer than forecast

- State Failure Project — multiple indicators
- Pericles — cultural, ethnic strife
- Canadian model (Norbert Gass)
- Venice Process (UNESCO)

Events-Based-Shorter term, focused forecast

- Global Events Data System
- Kansas Events Data System
- Protocol for Assessing Nonviolent Direct Action
- Africa and Latin America Database, Unclassified

Brief description of tools mentioned above:

Pericles: cultural indicators, POC Ted Ahrens, CAA

Venice Process: POC Larry Seaquist, Strategy Group (brochure attached)

GEDS — semi-automated, includes inter-state and domestic/inter-ethnic conflict and cooperation trends. Higher accuracy and detail, but still some intensive human labor required.

KEDS — automated coding tool based on word parsing. Eliminates most human labor requirements, but success so far limited to inter-state activities with large volumes of news coverage and not sufficiently detailed for domestic or ethnic conflict.

PANDA — intra-state

ALADUN — Evidence Based Research's approach for measuring accuracy of forecasts based on consensus of experts. Limited so far to small set of countries due to lack of automated information retrieval and management system.

WG 7: Impact Analysis
Tools for Prediction Analysis, Cont'd.

PROMISING TOOLS, Cont'd.

Other

- EUSIS
- Famine Early Warning system
- Humanitarian Early Warning System

- **Gaming**
  - Pathgames
  - SIAM (Bayesian Influence Net)
  - Grey Team (Expert System)

EUSIS — German model, US POC Vince Roske (J8 Deputy)

SIAM — SAIC-developed tool developed primarily for decision making, rather than forecasting. Used to map and specify decision makers' consensus on priorities for action.

Govt. aid agencies and NGO's have accumulated variety of data and systems for forecasting future humanitarian crises which are likely to require international assistance; i.e., predicting when and where need for humanitarian assistance and relief missions will occur.

NGOs such as Red Cross also have developed operational/logistic expertise that military planners may want to integrate.

WG 7: Impact Analysis

Tools for Prediction Analysis

Existing Early Warning Systems for Special Conditions

- **FEMA Models**
- **Fleet Numerical Operational Weather Central**
- **Centers for Disease Control**
- **Greenpeace**

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These were some examples of groups known to have models for predicting when and where natural and public health disasters are most likely to occur.

WG 7: Impact Analysis

Tools for Prediction Analysis

R&D Requirements

- Collect data/establish links to other agency models for special conditions

- Develop OOTW database for historical extrapolation

- Identify conditions that drive NCA to act

- Predict external perceptions based on prior missions

Leverage non-DoD agencies' models for DoD use; e.g, environmental models, demographic models.

OOTW database could reveal trends and patterns in types of missions and scenarios. Various databases are being developed. Disparate efforts need to be coordinated to develop and maintain a common historical database of OOTW operational experience (rich with background and influencing factors).

Research and Development is needed to develop tools under the last two bullets.

WG 7: Impact Analysis
Tools for Impact Analysis:
Assess Impact of Current Mission On...

RESEARCH AND DEVELOPMENT

Develop methodology to collect data from currently available databases on ability to conduct concurrent and subsequent missions

◆ **Distinguish between "committed" or "deployed" measurement**

◆ **Capture below-the-line forces and critical occupational skills**

◆ **Further development/expansion of "A Model for Evaluating Naval Readiness" (D.E. Vance II, M. Sovereign)**

◆ **Leverage analysis to support QDR**

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Possibly use JSORTS, TPFDL, "unrolled" JMETL and other databases on unit availability.

Explore the following QDR initiatives:

    Dynamic Commitment War Game

    Major Task Organized Forces (MTOFS)

WG 7: Impact Analysis

Tools for Impact Analysis: Military, Political, Economic and Social
(MPES) Impact of Current Action on Current Mission

- ◆ **Promising Models**
  - – DEXES, SPECTRUM, CANs
  - – **SIAM Influence — Net Modeling**
  - – **CMPO (Concept Model of Peace Operations)**
  - – **Normality Analysis Process**
  - – **Grey Team Gaming**
- ◆ Modify/Incorporate Other Models
  - – Commercial/Business Tools (Wall Street, Political Risk services)
  - – **Other Agency Tools (Econometric, Polling)**
- ◆ **R&D**
  - – **Develop methodology for assessing consequences of actions**
    - » Intended / Unintended
  - – **Modify Predictive Tools**
    - » - for "What If?" Operational Use
    - » - for Use Internal to Operation

CMPO developed by Dave Davis, GMU (Institute on Public Policy).

Normality Analysis Process — Dr. George Rose for IFOR.

Spectrum — developed by National Simulation Center, Ft. Leavenworth, Kansas. POC Dennis Chrisman.

DEXES used by SOCOM.

WG 7: Impact Analysis
Tools for Impact Analysis:

Impact of Current Action on Aims and Goals

Research and Development

- ◆ Apply Branch and Sequel COAs
- ◆ Grey Teaming
- ◆ Reconstruction of Past Operation Events
- ◆ After Action Reviews Applied to Branch and Sequel Analysis
- ◆ Modify predictive Tools and Others (e.g., CARE, World Vision, OXFAM, UNHCR, FEMA) to do "What If?" Analysis at Operational and Tactical Level

Other

2-4 Analysts Accompanying mission

- • Perform Analysis and Assist Commanders
- • Provide Link to Expert Cells not in Theater
- • Link to Joint Vision 2010
  - • (coordinate, collect, preserve data)

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Tools could also be used for pre-operation planning.

Tools and models will never fully replace value of on-site analysts.

WG 7: Impact Analysis
Tools for Impact Analysis: Impact on Future Mission
Requirements and Concepts

Research and Development

- ◆ OOTW database
- ◆ POM preparation of data displays based on results of near-term impacts R&D collection
- ◆ Strategic theater and operational models
- ◆ Long-term links between OOTW and readiness issues
- ◆ Joint readiness analysis (readiness impacts across services)
- ◆ Capture processes and tools used for QDR analysis projects

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Many OOTW databases are being created for various studies and project groups. There's a need to integrate information from all of these, establish and refine data elements, establish format and collection requirements, maintain integrated Joint database at common site.

Reference to POM preparation (2nd bullet above) refers to incorporating into the POM process, the product of R&D work on readiness metrics proposed for development under near-term impacts tools (see previous slides).

WG 7: Impact Analysis

Tools for Impact Analysis : Impact of Current Success or Failure on Perceptions, Nature of Future Operations

Research and Development

- ◆ Causal Analysis of Reports and Historical Databases

- ◆ Methodology to Measure Deterrence Value

- ◆ Methodology to Assess Signaling Value

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WG 7: Impact Analysis

The Road Ahead:

Prediction, 3-6 Months

- **RFPs**
  - EBR Forecasting Political Instability Model
- **RFPs/Research Grants/Workshops**
  - Conditions Driving NCA
  - Select/Refine Existing Theory/Data/Processes
  - Address Database Maintenance/Ownership Issues

Prediction, 2 Years

- **RFPs/Research Grants/Workshops**
  - Select/Refine Existing Theory/Data/Processes
  - Theory Building
  - Historical OOTW Database (as validation check)

WG 7: Impact Analysis

The Road Ahead:

Prediction, 7+ Years

◆ **RFPs/Research Grants/Workshops**

  • Theory Building, with emphasis on prevention/amelioration

  • Survey Ongoing Efforts in Commercial Area

Special Cases

◆ **RFPs/Research Grants/Workshops**

  • Survey Other Agency Efforts

  • Build theory on Assessing Country Capability

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WG 7: Impact Analysis

The Road Ahead

Impacts Analysis, Current Impacts

◆ **RFPs/Research Grants/Workshops**

- Capture/Build on QDR Projects/Process Initiatives

- Identify Relevant Metrics for OOTW Readiness

- Improve DoD Process for Tracking Forces/Availability/Special Skill and Specialized Sub-Units

◆ **Initiate policy**

- Collecting Readiness Data Relevant to OOTW

Impacts Analysis, Current Impacts — MPES

◆ **RFPs/Research Grants/Workshops**

- Select/Refine Existing Theory, Tools and Processes

- Theory Building

- Survey Other Organizations (non-DoD, non-govt., Allies)

WG 7: Impact Analysis
The Road Ahead

Impacts Analysis, Future

◆ **RFPs/Research Grants/Workshops**

- Apply Improved DoD Tracking for POM Evaluation

- Build POM Displays Once Relevant Metrics are Established

- Prototype Development in Limited Areas (e.g., training)

- OOTW Database

- Capture/Build on QDR Process/initiatives

- Joint Readiness Analysis

Impacts Analysis, Perceptions

◆ **Basic Research**

- Database Exploration

- Basic Research on Past Operations

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Operations Other Than War Analysis Methods and
Techniques
WG 8 Final Report

OOTW Databases and Data Availability
MORS Workshop
MacDill Air Force Base
28 - 30 January 1997

Working Group 8 was organized to deal with data needs, specifications and
availability. Upon reflection, it became clear that data definitions and needs
cannot be addressed in a vacuum, but must be related to military functions and
tasks. The report of Working Group 8 therefore overlaps with the reports of the
other seven topical working groups. Some redundancy is not necessarily a bad
thing.

WG 8: OOTW Databases and Data Availability

Working Group Task Area: Data

- ◆ How to collect desired data
- ◆ What data to collect
- ◆ How to use the collected data
- ◆ How to maintain the data

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The Terms of Reference for the workshop call for Working Group 8 to determine what data are needed, how to obtain or access them, how to use the data and how to maintain them. Not all the charges were met. For those unmet, there are suggestions as to how they might be met. Particularly, methods of data collection and data maintenance, were not well discussed at the workshop and hence are not well addressed in this report. There is considerable emphasis on the data needed to carry out analysis on Operations Other Than War.

WG 8: OOTW Databases and Data Availability

Working Group Mode of Operation

- ◆ Expertise
  - CINC planners
  - Operators
  - International community
  - Database designers and implementers
- ◆ How we got on with the task
  - Data do not exist in a vacuum
  - Members were assigned to functional working groups for the bulk of the time (8 of 13 hours)
- ◆ Find common and disjoint data needs across the seven functional areas

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The working group was composed of representatives from USEUCOM, OSD, the Army Secretariat, MSOSA, UNISYS and the United Kingdom. The members, without regard to the organizations from which they came, consisted of planners, operators and analysts. This mixture of experiences and institutions was admirably well suited to the work of the group.

The group quickly realized that data do not exist in a vacuum (as stated above), but are related to functions, operations and tasks. Therefore, after a brief organizational session devoted to clarification of broad definitions and the development of a plan of action, the group members we re deployed individually to the other seven working groups with each group receiving about two members of Working Group 8. Near the end of the time set for working group activities, Working Group 8 members reassembled as a group to bring together their observations and findings with respect to data needs by functional area. The principal objective was to identify data sets and data bases that were common to two or more functional areas and those that were unique to a single functional area. The principal objective was not fully met.

WG 8: OOTW Databases and Data Availability

Data Needs

- ◆ Traditional data needs
  - – Data compilation and reduction leads to information
- ◆ OOTW needs
  - – Information mined to produce data
- ◆ Security issues

Data relevant to operations other than war seem to fit a different paradigm than that traditionally seen for data relevant to the analysis of combat military operations. The more classical data processing follows the intelligence paradigm, that is, one goes from the collection and reduction of raw **data** to the development and provision of **information.** Thus, in the traditional process, the target was the production of information. Analyses of operations other than war are leading us to a reverse sequence. We will be mining **information** to develop **data** sets. For example, after action reports, reports of lessons learned and open source information will be drawn upon to produce data on movement rates, casualty rates and results of military interventions, including success and political impacts. This reverse sequence is a return to the early days of military operational analysis, wherein descriptions (information) of series of similar military operations were analyzed to yield statistical and other summary data useful in developing hypotheses about military operations, and often leading to models (generic descriptions) of military operations.

The expanded roster of participants in operations other than war, including non-military governmental groups and non-governmental and private volunteer organizations (many of which are international), raises a new topic for military forces to consider. The matter requiring careful consideration is that of the military tendency to put security classifications on operations and the information associated with them. It is important that military units involved in operations other than war remain sensitive to the need to keep data sets and bases unclassified. If military units on the ground judge that particular data must be classified, the judgement should be reviewed by higher, authority to determine its need.

WG 8: OOTW Databases and Data Availability

Common Data Needs Across the Functional Areas

- ◆ Military organizations (US, allies, coalition partners and adversaries)
    - – Force structure and capabilities
        - » Availability
        - » Training status
        - » Readiness
        - » Component (AC, RC) and Service
- ◆ Non-Military organizations (civil agencies, contractors, country teams, etc.)
    - » Number of people
    - » Tasks being performed
    - » Liaison requirements

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Almost all the functional working groups identified a need for data bases covering all the potential military and non-military institutions that might become involved in operations other than war. The data bases should include organization, political structure. policy processes and capabilities, including transport. It was universally recognized that today's operations would most likely involve many national and international, military and non- military, willing and unwilling, partners. Specifically, military organizational data are needed on US, allies, coalition partners, adversaries (potential as well as active) and indigenous (to the areas of potential operations) forces. Data should include force structures, sizes and capabilities; availability, including transport closure times; training and equipage status; readiness in whatever terms seem appropriate; identification of components by service (i.e., Army, Navy, Marine, Air Force, or other), that is, whether active, reserve or other (e.g. militia).

WG 8: OOTW Databases and Data Availability

Common Data Needs Across the Functional Areas

- ◆ Allies, coalition partners and adversaries
  - Cultural, ethnic and national characteristics
  - Goals, objectives, limitations, ROEs
  - Experience in AOs
- ◆ NGOs, PVOs and IOs
  - Capabilities
  - Charter
  - Experience in AOs
  - Attitude toward military cooperation
- ◆ Infrastructure in the AOs
  - Physical and environmental
  - Political, social, cultural, security
  - Demographics

Similar data are needed for non- military institutions (e.g., civilian agencies, contractors and country teams). Specifically, the data should include numbers and types of people; organizational structure including lines of authority (with particular emphasis on local versus international decision making); capabilities; objectives and plans; and liaison and materiel needs. A particular topic raised by many of the working groups had to do with cultural differences. The groups were almost unanimous in their call for considerable cultural, ethnic and national descriptive data, with emphasis on acknowledging differences between the US and others, and on identifying the potential impacts of those differences. It was also emphasized that it is important to understand how the US is seen by others, That is, US personnel must be sensitive to the effect cultural differences have on the perceptions of allies, coalition partners, adversaries, indigenous forces, nonmilitary governmental, non-governmental and private volunteer organization personnel.

The most prevalent expressed need is for a very detailed data base describing all possible areas of operations affecting the US The emphasis is on infrastructure which includes considerable detail on the physical and environmental features and characteristics of the areas of operations. Detailed descriptive information is desired on political, cultural. social. security and demographic features. This type of data base is likely to be the most difficult to compile and maintain. Some thought should be given to organizing such a data base on regional or other grounds. perhaps in accordance with a priority process incorporating a risk-of-engagement classification.

WG 8: OOTW Databases and Data Availability

WG Observations: General Information Sources

- US Army CALL
- SORTS database
- Lessons Learned
- State Department
- Intelligence sources
- National Mapping Agency (now known as NIMA)
- MSOSA Help Desk
- FEMA and other disaster assistance agencies
- International Federation of Red Cross and Red Crescent Societies

When working with existing data bases, each analyst must recognize that the data were collected by an organization for a specific purpose and the collation and definitions may not be consistent with accepted practices or with the specific needs of the analyst.

Data **sources identified in course** of the workshop deliberations are:

> US Army Center for Army Lessons Learned (CALL), Fort Leavenworth, KS; Web site: http://call.army.mil: 11 00/call.html; e-mail address: <call@leav.emhl.army.mil>. The CALL web site has a data base which can be searched by key words and other mechanisms. At the moment, access to that data base is limited to US Army personnel only. The reason for the restriction is unclear. The Working Group suggests that the matter be looked into by relevant authority to see if the constraint cannot be removed.

MSOSA Help Desk; Web site: http://www.msosa.mil.inter.net; e-mail address: <msosahelps(@msosa.mil. inter. net>; telephone: US: 1-800-510-6399; Germanv: 0130-81-9147; Korea: 0078-1-1-800-2807.

WG 8: OOTW Databases and Data Availability

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Data sources identified in course of the workshop deliberations are:

The International Peacekeeping Archive of Canada contains a wide range of original and derivative material covering, at the time of this writing, ONUCA, UNEF I and II, UNFICYP, UNIFIL, UNIKOM, UNPROFOR and UNTAC. The web site is: http://www.cdnpeacekeeping.ns.ca; an e-mail address for the librarian is <Ikarnenno@ppc.cdnpeacekeeping.ns.ca>; telephone: 902-638-8611, ext. 162; facsimile: 902-638-8576.

The International Federation of Red Cross and Red Crescent Societies, headquartered in Switzerland, maintains a large data base covering many non-governmental and private volunteer organizations. Ways to access to that data base should be publicized.

Other potential data sources suggested during the workshop include the SORTS database (not otherwise identified), the US Department of State, intelligence sources, the National Imaging and Mapping Agency (NIMA) and Federal Emergency Management Agency (and other disaster assistance organizations). The Working, Group recommends that MORS undertake a special task. as a follow-on to this workshop, to more completely define available data base sources and procedures for accessing them.

WG 8: OOTW Databases and Data Availability

WG Observations: Means to Access Data

- ◆ Web sites
  - – Relatively easy to access and update
  - – Data can be downloaded and mobile
  - – HTML format allows users at every level to get to the level of detail they need
- ◆ Technology is making it possible to create a catalog or an architecture enabling different existing sources of data to be read in their current form

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A general observation is that the natural development of the world-wide web has resulted in the compilation of information, including data, that is relatively easy and cheap to access and update. Information is widely available, relatively easily down-loaded. The HTML format allows users at all levels to get to the level of detail needed. Technology is now making it possible to create a catalog or develop architectures (meaning processes) enabling existing sources of data to be "read" in their current and natural forms.

Operations Other Than War Analysis Methods and
Techniques
WG 9 Final Report

Executive Planning & Review Group

MORS Workshop

MacDill Air Force Base

28 -30 January 1997

Working Group 9 functioned as the Synthesis Group and Senior Review panel
to monitor the progress of the other working groups. In that capacity, its
members gathered insights for consideration within WG 9, provided over-
arching insights to the individual working groups and helped solve problems as
they arose in working groups. In the capacity of planning group, WG 9
attempted to coalesce ideas into general insights and proposed actions to
develop a "way ahead."

WG 9: Executive Planning & Review
Introduction

- ◆ Workshop Summary
- ◆ Observations
  - – Three Levels of Operations
  - – Group Interactions
  - – General Observations
- ◆ "Centers of Gravity"
  - – Data
  - – Planning
  - – Information Management
- ◆ Recommendations

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The outline presented above provides an overview of the information to be presented in this briefing. Centers of Gravity refers to the central, critical concepts of OOTW mission planning and analysis that became clear as a result of workshop deliberations. Observations covers other insights from the workshop. Each is presented in more depth in the ensuing slides.

WG 9: Executive Planning & Review Workshop Summary

- ◆ Quality of effort was uniformly high
  - – Working Groups
  - – Individuals
- ◆ WG Subjects were Uneven
  - – Difficulty of Topic
  - – Breadth of Subject Matter
  - – Proximity of Solution
  - – Progress varied accordingly
- ◆ International and Non-Military were Critical
  - – Should be continued
- ◆ Have the feeling we missed some existing tools
- ◆ Will Review Overall Progress to Determine Next Steps

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It was clear throughout the workshop that a high quality effort was under way. The credentials of the individuals spoke for themselves. The value added by the international participants and non-governmental organizations proved to be invaluable. The working groups, well-organized by their chairmen, clearly were task oriented and put forth superior efforts to meet their goals. Each contributed to the goals of OOTWAMT in its own way.

But the going was not easy! Entering the workshop, we knew that the subject was broad and difficult (a feeling reinforced by Lt. Gen. Zinni's address). Many of the working groups faced a very broad scope. Several, such as the force planning group, were working where significant work had preceded, but others, such as impact analysis, were faced with relatively new needs. Even the familiar area of course of action analysis took on a new flavor for OOTW.

As might be expected, then, progress varied greatly across the groups. Each contributed to the overall synthesis observations, and each has helped establish a "mile marker" and direction for the way ahead. These items are addressed in the following slides, and in the workshop conclusions.

It was evident that the limited number of participants and the limited time available led to situations where credible tools and models received a cursory look or were left out altogether. As a result, there is a broad sentiment that a special opportunity to gather and display tools and models would be beneficial to users. This concept is discussed more later.

Finally, it is worth reiterating the value of the NGO and international participants, a practice that should be continued.

WG 9: Executive Planning & Review

Observation: Three Levels of Use and Connectivity

- ◆ *(Strategic, Operational, Tactical)*
- ◆ Stated purpose of tools
  - – Shorten planning timeline
  - – Small (portable), fast-running, easily understood, robust
  - – Support different levels of analysis (requiring a variety of tools)
- ◆ Accomplish through horizontal and vertical connectivity
  - – Pass decisions and assumptions by higher levels (Mission Statement)
  - – Known information (situation, parameters of missions)
  - – Common data (Situation, Parameters of Missions)
  - – Common data (Infrastructure)
- ◆ Desired Outcome
  - – Reduce traffic requesting clarifications
  - – Common start point and view of mission
  - – Critical information automatically passed down

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One of the issues raised during the workshop was the recognition that many of the tools must be viable or active across the three levels of OOTW: strategic, operational and tactical. A subset of this observation was that if the tool did not operate across all of these levels, its input or output most likely came from or fed another tool. This requires that many of these tools be vertically and horizontally connected.

This connectivity includes the ability to pass:

a. Information, assumptions, and decisions (such as, mission analysis)

b. Common data that can be aggregated or disaggregated (such as going from generic unit types to specific units or lower levels of detail)

c. Common data for further use in analysis (such as, infrastructure).

The advantages of this connectivity are seen as: a saving in time; reduction in confusion or interpretation of intent or guidance; reduction in error by using same data sets; ability to accomplish some tasks such as mission analysis simultaneously; and, reduction in time spent seeking clarification.

WG 9: Executive Planning & Review

Observation: Primary Working Group Interactions
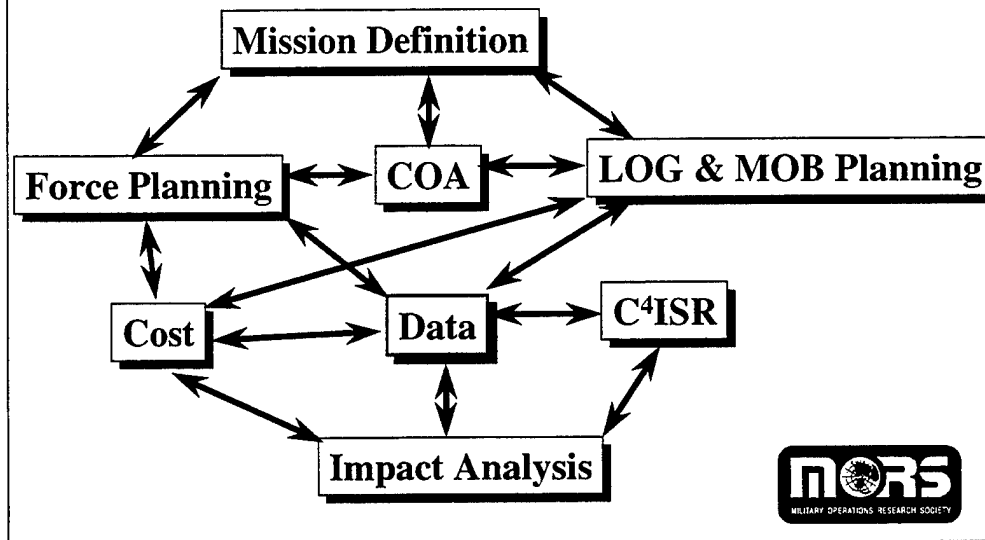
We knew when we developed the terms of reference that there was considerable overlap and interplay among the work areas. Many of the primary interactions are shown in this slide. This observation leads to a realization that the maximum benefit of "tool" development can only be achieved if these primary interactions are taken into account when tools are designed.

Data is, not surprisingly, a primary interaction for all other areas. But data is a particularly demanding design issue because of the many dimensions it takes beyond the typical warfighting application. Data is discussed later as a "center of gravity."

The interrelation among mission planning, course of action analysis, force planning and LOG/MOB planning should be clear. Both BG Brown and Lt. Gen. Zinni commented on the importance of mission planning and course of action analysis to OOTW. Because of their importance and the leverage of a complete, well-integrated set of tools in these areas, they also constitute a "center of gravity."

C^4ISR could, arguably, have more arrows radiating from it, but we restricted the picture to one main interaction, data — and one less obvious one, impact analysis. The connection to impact analysis relates to Lt. Gen. Zinni's observation, and our conclusion that information management is one of the centers of gravity of OOTW. Thus, predicting or understanding the mission impact of information managed well or managed poorly is a significant factor in managing mission success.

Cost analysis, as usual, depends on information from other areas, exacerbated by the additional dimensions of OOTW.

WG 9: Executive Planning & Review

Observations: General

- ◆ Need for a conceptual and management framework that links individual tool development to the broader national strategy.
- ◆ The pervasive nature of the data issues: Multi-dimensional nature, inconsistency of data gathering, incompleteness of current databases.
- ◆ Tools should free the analyst for the broad range of non-automated requirements. Many tasks require Commanders judgment not necessarily a tool
- ◆ Tools have difficulty dealing with non-military actors.

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The observations presented here are general thoughts picked up during the workshop. Some tie to our broader observations, others are stand-alone.

Some participants observed that some difficulties in describing other than operational support tools lies in the fact that we do not know how OOTW tools really support national strategy development. As opposed to the clear use of combat models in analyzing strategy issues, it is not as clear what decision makers want to know, or where to present information, to influence national strategy. Consequently, what tools will help also remains unclear.

Data again arose among general comments. Discussed in more detail later, we simply mention here that many working groups observed both the need for keeping of better data for historical purposes, and the need for access to a broad spectrum of data for operations and planning.

Recognizing the realities of Lt. Gen. Zinni's anecdotes on real-time problem solving and decision making, many participants reiterated the idea that the most valuable tools will take over repetitive tasks or streamline tedious, detailed, protracted tasks. Doing so will free commanders to make informed judgements and analysts to think.

Finally, we recognize the general difficulty of dealing with non-military actors. They impose additional data demands, behave differently than military tradition and training suggests, and have may have motives significantly different than the military components even within the same mission framework. To capture all of these factors for all possible actors is unreasonable. Thus, many tools should deal only with the most mundane "actor" details.

WG 9: Executive Planning & Review

Center of Gravity: Data

- Need data on "everything"
    - Joint Task Force Builder Tool
    - Cost Model - Full costing versus incremental costing
        - Force Structure
        - Location
        - Combat Intensity
        - Coalition Partners
        - NGOs/PVOs Participating
        - Cultural Factors
        - Environmental Factors
        - Non-monetary Factors - QOL, etc
        - Logistics/Mobility -JTAV
        - COA Analysis
    - Central Repository
        - Mission by Mission
        - Validity (ability to make regional adjustments critical)

- Push data to users from lessons learned
- More flexible data structures (e.g.adaptable to region, application

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A conclusion that is not surprising, since we dedicated a working group to it, is the centrality of data. What may be less obvious is the extent of the need. Every working group added to the breadth of the requirement.

The traditional force building process is expanded to include internationals, NGOs and other governmental agencies. The need is expanded by geographic, infrastructure, and cultural requirements, on a country-by-country basis. The need to keep cost records and make cost estimates adds another layer of data. Finally, more detailed data relationships, some of which must be developed empirically, need to be met. Especially important are task-to-resource estimators (who takes how much to do a task of specified size).

Higher level data needs include who to contact to find answers, capabilities or estimate needs.

Data availability and data gathering are both issues. Historical analysis was cited as useful by several groups, but it is clear that the quality and consistency of existing historical data is lacking.

These observations suggest a centralized management system (like JDS for JWARS) is required to establish standards and processes. Since the data must be valid to the region in which it is applied, the issue of central versus decentralized repositories must be considered during design of the process.

WG 9: Executive Planning & Review
Center of Gravity: Planning

- ◆ Mission Analysis/Definition
  - – Scenario
    - » Terrain/Country Data
    - » Inter-agency Data
    - » Transportation/Mobility Models
    - » Military/Political
- ◆ Force Planning/Structure/Design
  - – Some UJTL Tasks Missing for OOTW
  - – NGO/DVO Capabilities Needed
  - – Task to UTC (Skill) Level
  - – Allied Forces
  - – Host Nation Support
  - – US. Inter-agency

Mission planning and force planning are two of the highest leverage areas for improved tools. Improvements here would address one of the needs presented by our plenary speakers. Considerable work has been done in the areas of force planning and and logistics and mobility planning, but even these areas are not complete. Mission planning continues to be an area requiring research, particularly because of the different dimensions of "mission" for OOTWs, as addressed by Lt. Gen. Zinni.

This slide coalesces some of the observations of working groups 1, 2, 3 and 4 into a single picture. As depicted in the slide on primary working group interactions, mission planning, force planning and log/mob planning are interdependent. Course of Action Analysis, specifically mentioned as central by BG Brown, logically ties mission analysis to force planning and log/mob planning by providing the context of how the mission is to be executed.

The simple observation is that these efforts must integrate smoothly. To be executed efficiently, they depend on availability of data that is broader than data for combat operations, because it must work for any location and it must include interagency, international and non-governmental as part of the "force."

LOG/MOB models abound, but require focus, enhancement and integration. Again, an existing model (CAPS) may be the right vehicle for this process. Mission planning requires much work, but the Conceptual Model of Peace Operations (CMPO) of George Mason University holds promise. Work to be done includes completing the mission/task analysis. Interrelating to force planning models with capability estimating relationships for all parties must be accomplished.

WG 9: Executive Planning & Review

Center of Gravity: Information Management

- ◆ Central Importance
- ◆ Magnitude
  - Number of Actors
  - Diverse Perspectives
  - Sheer Volume of Data
- ◆ Sensitivity
  - Criticality of Timing
  - Criticality of Distribution
    - » Don't Miss Essential Node
      - ◆ Impair Vital Link
    - » Don't Violate Security
      - ◆ Jeopardize Coalition
      - ◆ Impair Operational Security

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Information Management — including generation, organization, processing, distribution and storage — is of central importance in OOTW. Every Working Group observed the need for more, better, better organized or more accessible information.

However, the magnitude of OOTW information seriously complicates its management. First of all, there are many actors involved — not just "us" and "them," or friendly and enemy. There are many degrees of alliance, many languages and cultures, and thus many diverse perspectives. The sheer volume of information is overwhelming.

Beyond the volume, there are sensitivities critical to the management of information. Timing of distribution is one criticality. An operation may fail because a message arrives too late. Or the distribution list may be flawed. someone who needs a message may be missed, or someone who should not see a message (or a message written in a particular fashion) may get it. A vital member of a coalition may be insulted and an alliance jeopardized. Or one who opposes an operation may receive information that enables him to defeat it.

Adding to the possibilities of such mistakes are imperfect language translations and insensitivities to cultural characteristics.

WG 9: Executive Planning & Review

Recommendations

- ◆ Analyst
  - – MORS Education Colloquium
  - – Fund analyst in operational context (w/"tool box" and comms)
- ◆ Tools
  - – Data Classification
  - – Exposition of Decision Support Tools
  - – Interagency Inventory
- ◆ Community Support
  - – DOD "JAMIP-like" Leadership on OOTW
  - – Interagency Leadership on OOTW (planning and symposium)

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The overall recommendations of the Workshop can be grouped into three categories;

First, there was strong sentiment that the analyst needed to be a part of every OOTW, both to contribute to current mission analysis, and to assist in gathering data for analysis in the future. That really means that the analyst must be involved in planning, be in the field with the operator, and be able to conduct post-operational analysis at several levels. Furthermore, because the demands of analysis for OOTW are considerably different than combat operations, we need to examine whether the analyst is properly prepared and how training might be improved. A starting point for this review is the MORS Education Colloquium.

Second, with respect to the current tool situation, several steps can be taken to improve our level of knowledge. As existence of more tools came to light, it became obvious that a "tool symposium" might be beneficial. Model proponents have, in the past, been invited to rather limited settings to display their wares. An open "decision support tools for OOTW" symposium — like the software booths at INFORMS, perhaps at a MORSS — would allow open review of available tools and concepts. A related idea is to gather an interagency inventory for users to draw and learn from.

We also suggest beginning to address the data availability issue, including the issue of data classification. While some data requires special protection, much of the data supporting OOTW could be unclassified, easing the burden of transmission, handling and sharing among participants.

Finally, the persistent need for components such as the data management aspect and lack of a focal point begs a leader, similar to JAMIP. Furthermore, interagency involvement suggests a "CMOC" for OOTW tools should be established.

Terms of Reference
MORS Workshop on
OOTW Analysis and Modeling Techniques

28-30 January 1997

1.   Background: Military missions involving Operations Other Than War are proliferating for US forces as the 20th Century draws to a close. Because the nature of OOTW is significantly different than traditional military combat missions, the quantification, simulation, and analysis of these missions lags far behind the progress of traditional force-on-force combat modeling. In order to develop the capabilities required to conduct OOTW analysis, there are multiple parallel efforts underway in the Joint and Service arenas to model or simulate OOTW.

Significant progress has been made in developing the requirements for analysis tools and techniques through two meetings sponsored and organized by USPACOM. The first, a symposium held at the Naval Postgraduate School in February 1996, provided an opportunity for operational commands and military services to identify their requirements for OOTW analyses and tools. The symposium also developed approaches for framing the OOTW mission area by categories, attributes, and component tasks. Participants were provided the opportunity to contribute data to help develop the framework. The output of the symposium was a draft requirements document dated June 1996, which served as the basis for the second meeting. The second meeting, a workshop held in September 1996 at the Naval Postgraduate School, was used to refine and finalize the draft OOTW requirements document. That document is expected to be published in December 1996.

A general conclusion of the workshop is that tools and methods desired tend to be small, fast, PC-based applications with graphical user interfaces for ease of use, robust enough to apply to a wide range of missions. One product of the USPACOM workshops important to this workshop is a listing of analysis areas which would possibly benefit from new or improved tools and methods. The following list of ten areas had been proposed:

1. Situational Awareness
2. Impact Analysis
3. Define mission, MOEs
4. Force Planning/Design Forces
5. Determine Mobility Requirements
6. COA Development, Analysis
7. Transition Planning/ Data Tracking
8. Communications Analysis
9. Cost Analysis
10. Information Availability/Analysis

These areas constitute umbrella categories most of which contain several more detailed analytic tasks within them.

In order to facilitate further rapid technological development in this area, MORS is sponsoring a workshop which will bring together analysts and operators to evaluate

approaches, tools and techniques, and to map alternatives for future OOTW analysis and modeling techniques.

2.   Purposes: A desired outcome of the workshop is a collective vision or "way ahead" addressing how to improve the ability to perform analysis and conduct OOTW mission planning,   and make more useful, existing information. The purposes of this workshop are to:

- Develop and recommend a roadmap or a way ahead for acquiring the necessary analysis capabilities.
- Extend the development of OOTW analysis capabilities by building on requirements.
- Progress toward developing tools for OOTW analysis.
- Investigate, suggest, and refine techniques and tools appropriate to meet requirements.
- Identify associated requirement and sources for data to support or drive the tools suggested.

3.   Agenda: The workshop will consist of a three-day meeting, broken into four functional components. In general, each of the working groups will base their deliberations on the PACOM requirements efforts. The USPACOM initiative provides the tie-in and basis for analytical requirements and will be provided to participants in advance of the workshop.

The first will be a **Plenary Session** consisting of welcoming remarks, a keynote address, and a presentation of OOTW Modeling Requirements (i.e. output of the USPACOM workshops). This will form the basis for the charge to the working groups and will include time for discussion. It will orient all participants to the task and provide the basis for the ensuing discussions of how to effectively model and analyze OOTW missions.

The second workshop component will be the **working group breakouts** pursuing assigned tasks as listed below. In order to mesh effectively with the requirements process, the working groups have been designed to cover analysis areas that span the twenty two analytic requirements presented in the Background section.

The responsibilities of the working groups include the following:

- Review the analytical need identified by the USPACOM workshop.
- Suggest analysis approaches/tools to address each need, considering the varying demands or applicability to the various broad OOTW mission areas.
- Examine existing tools (or those which can be developed) and suggest enhancements and validity of approaches for general OOTW application.
- Recommend actions for analytic/tool development and ideas for an OOTW "Roadmap."

- Address data types required and where found (or how to develop).

Specific working groups and tasks are assigned as follows:

WG 1: Mission Definition and MOE/MOP/ROE Determination for Analysis. These discussions will address tools and methods which assist in defining missions and tasks. The WG will also consider sources for or ways to develop measures of effectiveness which support the CINCs, the Services, and senior OSD decision makers. The working group would explore intuitive tactical measures of effectiveness used during key operations and programmatic MOE that must be modeled. The group should also specifically explore non-traditional MOEs for measuring force effectiveness in OOTW. Non-Government Organizations (NGO) must be included to allow for consideration of the perspective of these important players in the OOTW arena. *This Working Group parallels the "Define Mission, MOEs" category identified in the PACOM workshop.*

Sub-elements for consideration: *Transition Planning*
Create mission, MOEs,   *Joint/Interagency/Coalition Support*
Track MOEs, MOPs, etc.   *Media/Public Affairs*

WG 2: Force Planning Tools. These discussions will address the requirements to support the design of primary and secondary forces for use in OOTW, where the primary forces may consist of forces normally considered to be in the secondary category in combat operations. These forces include US non-military and non-US elements. Discussion should include consideration of tooth to tail ratios, US/coalition/UN/NGO/PVO/interagency elements, active/reserve mix, employment of small and partial units and support thereof, and, command arrangement details. The working group should also consider sources and methods for estimating force requirements given the nature and extent of mission tasks. The working group will address the need to balance effectiveness against availability/feasibility and determine the methodology for trade-off analysis and estimation of force effectiveness. *This Working Group parallels the "Force Planning" category identified by the PACOM workshop.*

Sub-elements for consideration: *Determine MP and Law Support*
Determine Medical Support   *Joint/Interagency/Coalition Support*
Determine Engineer Support   *Media/Public Affairs Assessments)*
Determine Indigenous/Refugee Support   *Civil Affairs/Psyops*

WG 3: Logistic and Mobility Planning Tools. These discussions will address the timing and prioritization of logistics support planning and transport planning. The USPACOM goal is to support a 6-8 hour turn-around from a no-plan situation. The need addresses general deployment scheduling requirements, including US, non-military and non-US. elements. The discussion should not be just US military oriented because there is a need to specifically address inter- and intra-theater seams and provide mobility network analysis. Attention should be placed on the determination of availabilities and capabilities of transport resources needed to accomplish the mission, including any

transport needed for other agencies, coalition partners, and NGOs/PVOs. *This Working Group parallels the "Force Planning: Deployment Scheduling" category identified by the PACOM workshop.*

Sub-elements for consideration: *Determine Transport Requirements*
Determine Supply Requirements   *Joint/Interagency/Coalition Support*
Determine Deployment Schedules

WG 4: Effectiveness Measurement and Course of Action Analysis. These discussions will address COA development, analysis, comparison, estimates of success and casualty predictions, risk modeling, and especially recommendations. This working group should address the situational awareness picture identified in the USPACOM report. It includes both an operational mission component and a non-mission, regional or global component. All elements of the situation are included: red elements (threat, both human and natural, e.g., volcanoes) white (ostensibly neutral) elements, and blue (allied) elements. The factors that should be considered include location, intent, cultural and political environment, potential flash points, and centers of gravity. *This Working Group parallels the "COA Development, Analysis, Comparison" category identified by the PACOM workshop.*

Sub-elements for consideration: *Strike, Raid, Mission Rehearsal*
Determine Force Effectiveness   *Joint/Interagency/Coalition Support*
Predict Mission Success   *COA Development, Analysis.*

WG 5: C4ISR Tools and Methods. These discussions will be led by military and government personnel who can define Intelligence, Surveillance and Reconnaissance (ISR) needs and can discuss the collection of information and intelligence to support the OOTW missions, including information concerning threat, friendly and neutral elements and environmental information. *This Working Group parallels the "Communications Analysis" and "Situational Awareness" categories identified by the PACOM workshop.*

Sub-elements for consideration: *Threat-like Intelligence*
Communications Analysis   *Joint/Interagency/Coalition Support*
Blue-like Intelligence   *Media/Public Affairs Assessments.*

WG 6: Operational Cost Estimation. The focus of this group will be to determine methods for computing the cost of conducting OOTW operations. The WG should consider techniques for making rapid but accurate estimates of cost of conducting operations considering discussions will address how to gather data. *This Working Group parallels the "Cost Analysis" category identified by the PACOM workshop.*

WG 7: Impact Analysis. The focus of this group will be to develop methods for predicting where OOTW missions may occur in the future and how to assess the impact of OOTW missions on other missions (e.g. MRCs), defense strategy, and JSCP tasking.

This Working Group parallels the "Impact Analysis" category identified by the PACOM workshop.

WG 8: OOTW Data Bases and Data Availability. These discussions will address how to gather data, what data to gather, how to use data (i.e. answers what questions), and how to maintain data. This will include a rigorous discussion of the data bases and historical information in existence on OOTW modeling and analysis. Data in this arena is hard to come by, and such data as exists is not in a form which is useful. The WG would focus on available data sources and ways to datamine information sources. Discussion should culminate in ways to improve the current state of OOTW data. Outcome should be collective vision or "way ahead" addressing how to improve, and make more useful, existing information. *This Working Group parallels (in part) the "Transition Planning and Tracking of Operational Data" and "Information Availability/Analysis" category identified by the PACOM workshop.*

Sub-elements for consideration   *Data Collection and Analysis*
Instability Analysis/Prediction   *Joint/Interagency/Coalition Support.*

WG 9: Executive Planning Review: This working group will have the responsibility to produce the "road map" or recommended way ahead for the development of OOTW modeling techniques. They will act as synthesis group during the working group breakouts, observing the WG discussions, also meeting following the second Plenary Session to integrate the emerging WG results into a draft plan. Their product should describe alternative modeling techniques for OOTW analysis.

The third component is a **Plenary Report Session** on the third morning to allow working groups to report out their results. This session, lasting about three hours, would close out the general workshop at 1300 hours.

The final component of the workshop, during the afternoon of the third day, will be the **Leaders Wrap-up**. During this period, each working group will finalize a draft report of its efforts, findings, and recommendations. This material will be collected and integrated by the planning committee, representing the interim final report to be presented to workshop sponsors.

4.   **Products:** Each working group will produce a **draft scripted briefing** of their findings, conclusions, and recommendations, before the close of the workshop. The final Plenary Session will approve the "road map" draft. The executive WG will then combine all products into a final paper to be published NLT 90 days following the conclusion of the work shop. A **sponsors' briefing** will be presented and a **final proceedings and** *PHALANX* **article** will be completed by March 31, 1997. Specific content of working group products should include the following:

- Validation of analytical needs identified by USPACOM
- Definition of specific analytic requirements

- Suggestions for analytical approaches/tools to address each need
- Identification and/or evaluation of existing analytic tools/techniques
- Suggestions for enhancements/validity of tools
- Identification of data sources and projects
- Identification of MOEs, MOPs, etc.

5.   Participation: The workshop will be limited in size and open to invitees only. Participation To ensure focused efforts, working groups will be limited in size to 10-15 participants. Total participation is estimated to be 100-150. Operational commands and major analytic organizations will be represented, with effort taken to ensure an adequate mix of analysts and operators in each working group. Non-governmental and other governmental agencies will be represented to ensure breadth of coverage. Workshop will be held at the <u>unclassified</u> level.

6. Organizing Committee:
<u>Co-Chairs:</u>
>   Dr Cyrus Staniec, Logicon, (703)-486-3500; x 2031
>>   Email: staniecc@erols.com
>   Mr Robert L. Smith, Raytheon E-Systems, (703) 413-1220
>>   Email: rsmith@esitx.esi.org

<u>Site Coordination:</u>
>   MAJ(P) Richard I. Wiles, Jr, HQ SOCOM (J7),
>   (813)-828-3820, DSN: 968-3820, Email: wilesri@hqsocom.af.mil

<u>Administration:</u>
Natalie S. Addison, MORS, (703)-751-7290, Email: naddison@msis.dmso.mil
Richard I. Wiles, MORS, (703)-751-7290, Email: morsone@aol.com

7.   Schedule and Administration:
>   Location: HQ SOCOM/CENTCOM, MacDill AFB, Florida
>   Dates: January 28-30, 1997
>   Fees: $175.00, Federal Government, $350.00, all others.

<div align="center">

**MORS Workshop on
OOTW Analysis and Modeling Techniques**

</div>

Planning Calendar and Responsibilities

• Distribute Draft TOR	October 4	Staniec
• Comments on TOR	October 18	Potential Sponsors
• Determine Location	October 31	Organizing Committee

- Finalize TOR   November 8   Organizing
Committee
- TOR Coordination   November 18-26   MORS
Sponsors
- MORS Approval   November 19   Executive Committee
(telephonically)
- Establish Working Group Chairs November 27   Organizing
Committee
- Develop Invitees   November 27   Organizing
Committee
- Distribute Requirements Document   November 22
- Confirm Keynote Speaker   November 27   Organizing
Committee
- Site Coordination Visit   December 2-3   Site Coordinator,
Admin Staff
- Requirements Doc Final Comments December 13   PACOM
- Submit Read-aheads   January 3   Organizing
Committee,

                                                 WG Chairs
- Mail Read-aheads   January 6   MORS Office
- Working Group Chair Pre-brief   January 15   Organizing
Committee,

                                                 WG Chairs
- Workshop Arrival   January 27   All
- Workshop   January 28-30   All
- Assemble draft Report   March 4   WG Chairs,
Organizing

                                                 Committee
- Report to MORS Office   April 1   Co-Chairs
- *PHALANX* Article to MORS Office   April 1   Co-Chairs
- Report Coordination & Clearance   April 22   MORS Office
- Report Publication   April 28   Office

REQUIREMENTS FOR OOTW ANALYSIS TOOLS[1]

Dean S. Hartley III
Oak Ridge Federal Facilities[2]

MORS OOTW WORKSHOP

Tampa, FL
January 1997
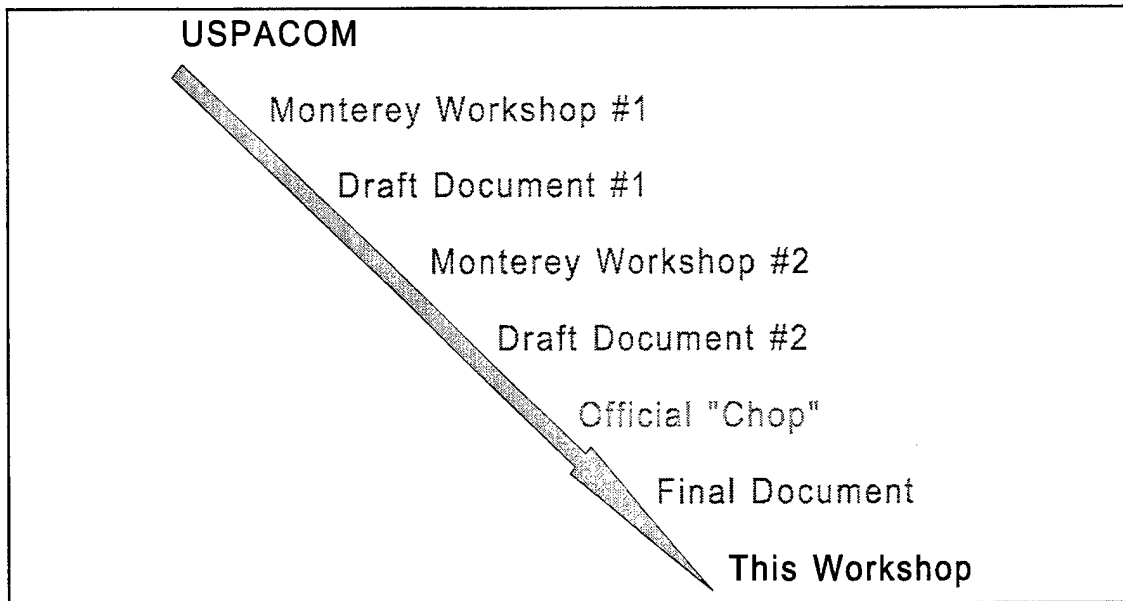
Figure 1

USPACOM conceived the need for analysis tools for OOTW support. They sponsored a workshop held at the Naval Postgraduate School in Monterey in February 1996. I created a draft document based on this workshop, other conferences on OOTW, and research of the literature on OOTWs. The second Monterey workshop was held in September 1996 to review and extend the

draft document. I refined the document and USPACOM circulated the result to the CINCs, the Services, OSD, and J-8. The resulting document provides the basis for this MORS workshop.

This series of slides give context to the problem of analysis tool support. OOTWs generate tasks that require analysis to produce results. If a tool is needed, and available to support the analysis, it is still the analyst who produces the result, not the tool.
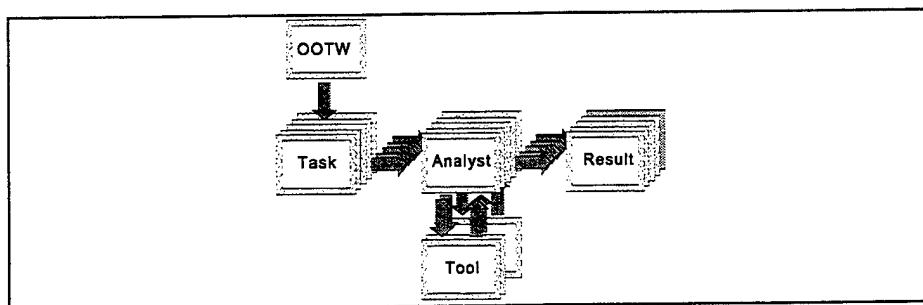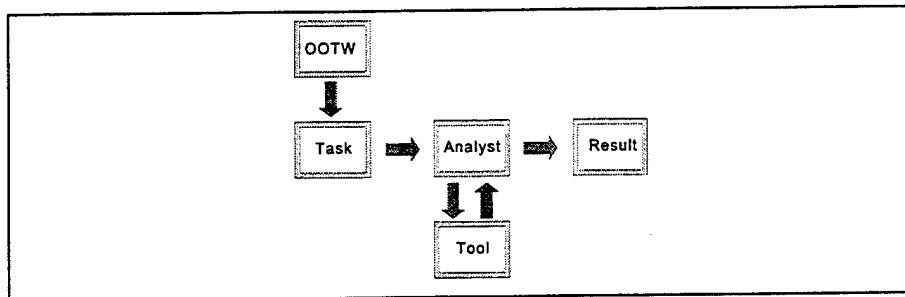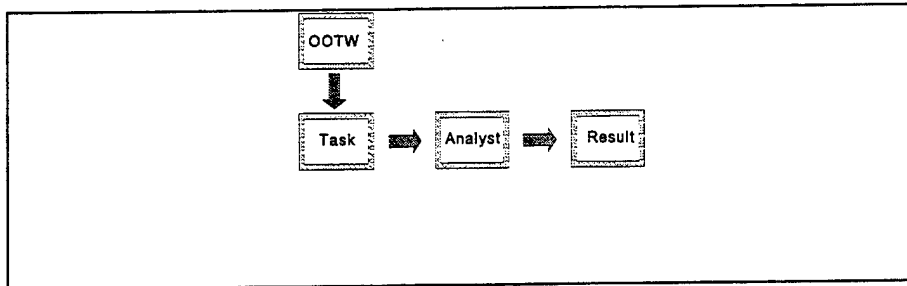
Not all OOTW tasks require tools for analysis support. Not all OOTW tasks that do require tools have those tools available. These requirements are based on those tasks that require tools, but for which none are available or adequate.

As a reminder, not all OOTW tasks require analysis. These other tasks may or may not require tools; however, such needs are not addressed here.

The tool requirements discussed here may coincidentally support non-analysis or non-OOTW tasks; that is a bonus benefit, not central to the current agenda.This series of slides describes the process that was undertaken to define the analysis tools requirements.
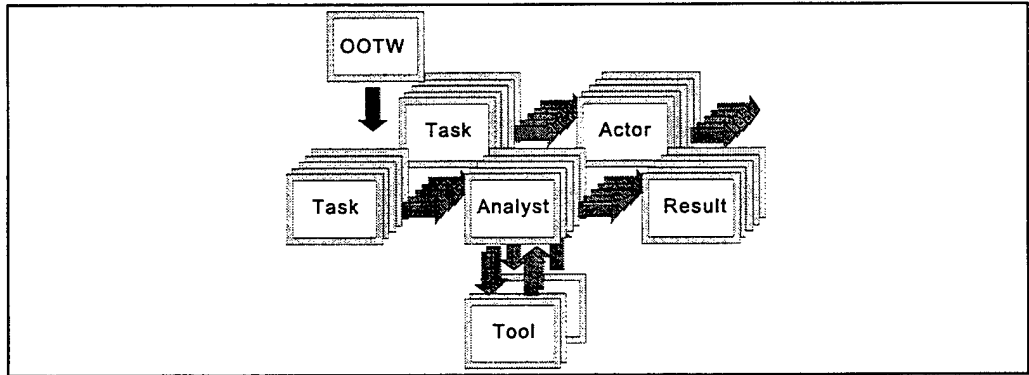
The first phase of the process was (naturally) research. Understanding of the OOTW context and the questions of senior authorities led to enumerations of the categories of OOTWs, the attributes needed to describe an OOTW, and the (analytically significant) tasks required to plan or execute OOTWs. An understanding of current tools, modeling capability and data availability, and
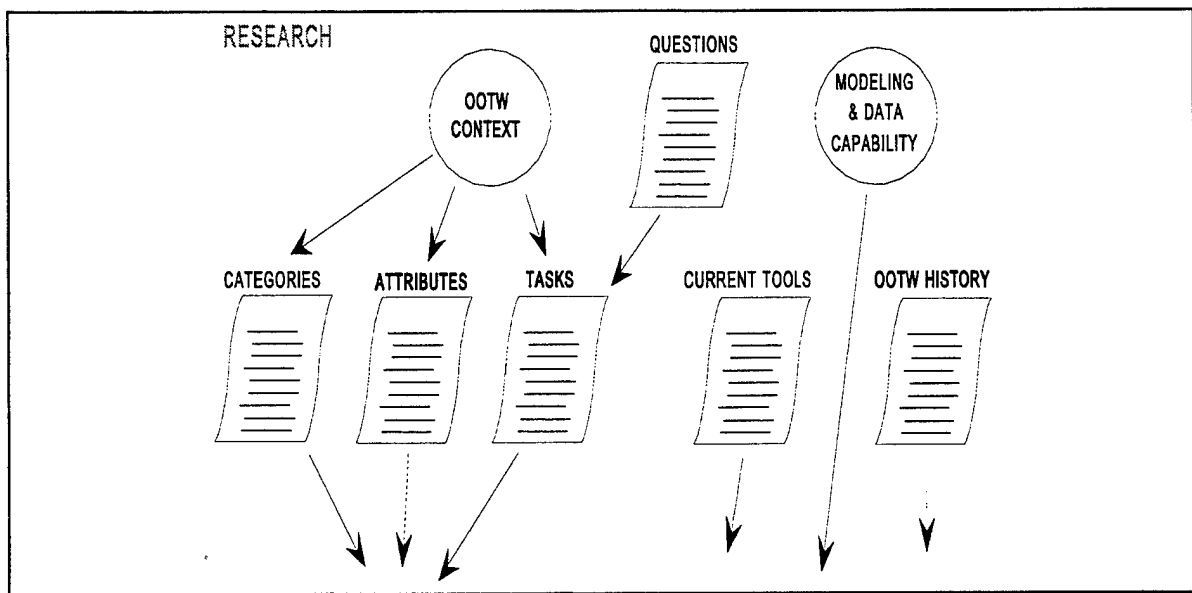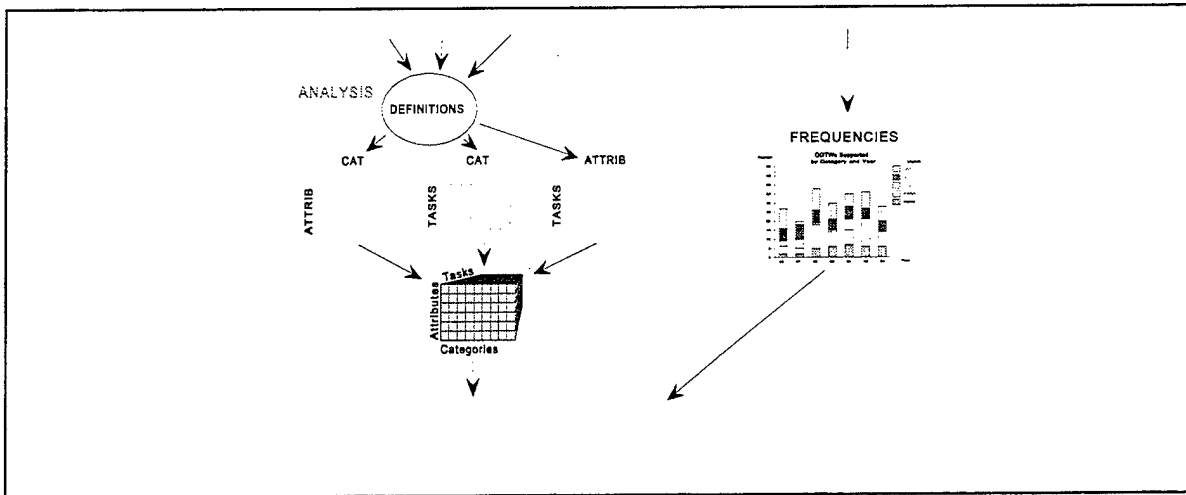

the history of recent OOTWs was also acquired.

Figure 6

The second phase of the process was analysis. The categories, attributes, and tasks were defined and their two-way connections were analyzed (producing implications for three-way connections.

The historical record was also analyzed to produce frequency distributions to drive inferences

concerning future OOTWs.

Figure 7

The third phase of the process was synthesis. The category/attribute/task analysis, the historical analysis, and the data on current tools and modeling and data capabilities were synthesized into a set of requirements. Each requirement (tool or set of tools) was identified with a description, reference to tasks to be supported by the tool, users of the tool, estimate of modeling and data capabilities, requirement priority, and recommended action.
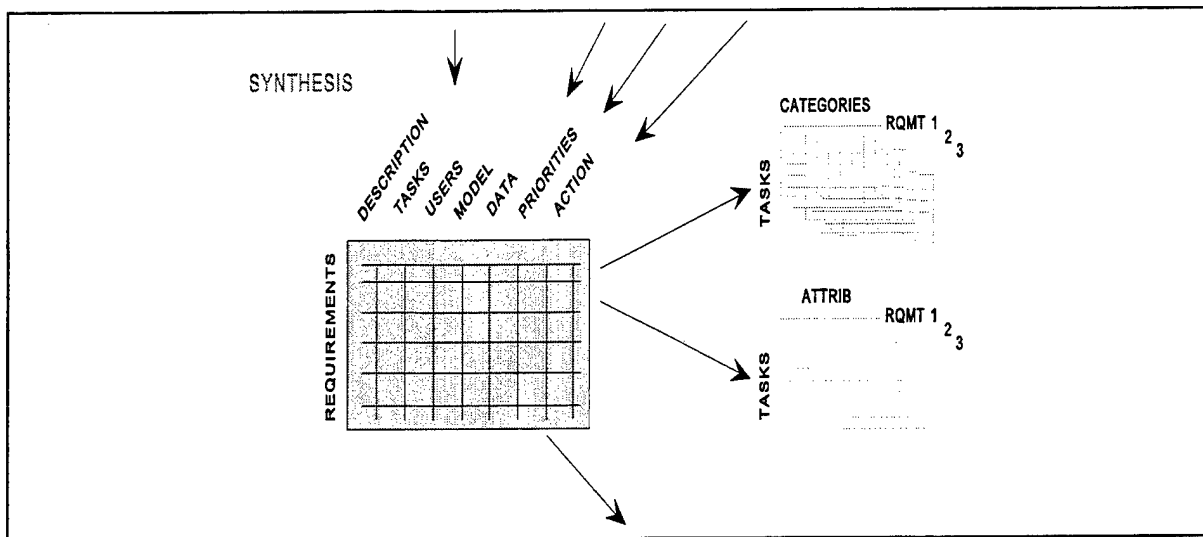

Figure 8

The identification of subsets of the total OOTW tasks with each requirement yielded a subset of the two-way connections, task vs categories and task vs attributes, that were identified with each requirement. These products will be useful in defining detailed specifications for each requirement.

The fourth phase of the process was producing recommendations. The requirements matrix was used to create a roadmap, associating the recommended actions within each priority and a relative time scale for performance of those actions.
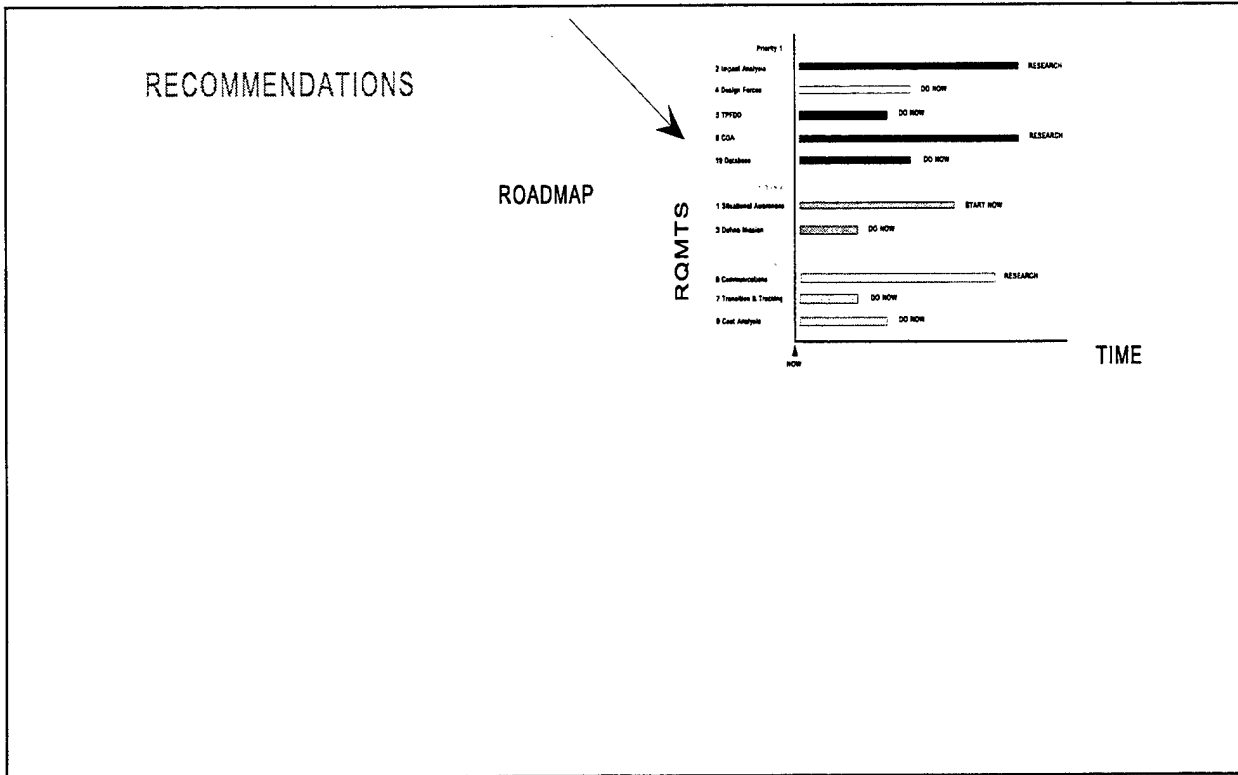

Figure 9

Figure 10, on the following page, puts all of the process phases together into a single vision of the study approach.
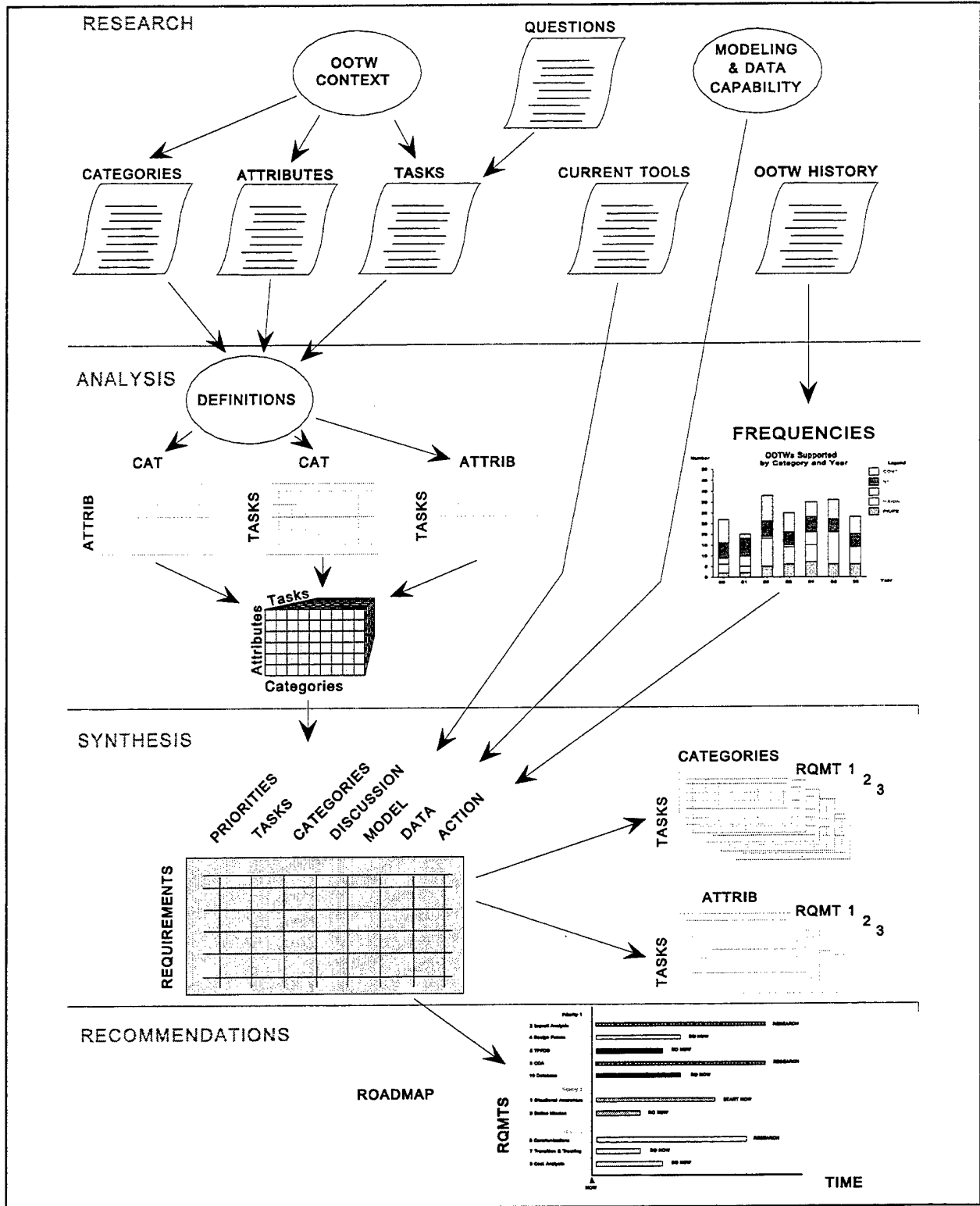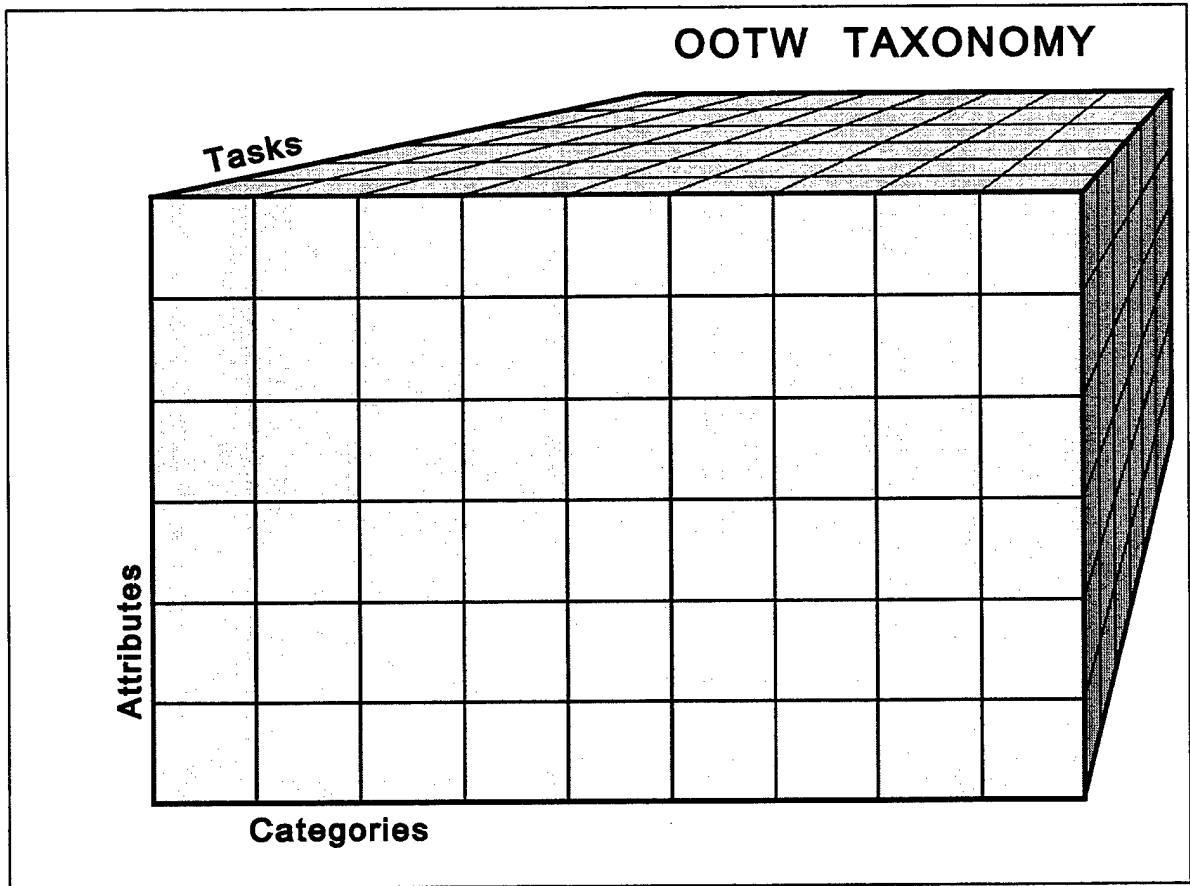
Figure 10

The cube of three-way connections of categories, attributes, and tasks introduces a series of slides describing these elements in more detail, permitting a more ready understanding of the

research report.

Figure 11

OOTW Categories (4, 11)

Peace Operations (PO)	Peacekeeping (PK) Peace Enforcement (PE)
Humanitarian Assistance/ Disaster Relief (HA/DR) Operations	Humanitarian Assistance (HA) Disaster Relief (DR) - Foreign DR - Domestic
National Integrity (NI) Operations	Counterdrug (CD) Combatting Terrorism (CT) Counterinsurgency (CI) Nation Assistance (NA)
Military Contingency Operations	Noncombatant Evacuation Operations (NEO) Many others

For purposes of this project, four OOTW categories have been defined: Peace Operations (PO), Humanitarian Assistance/Disaster Relief (HA/DR), National Integrity (NI) operations, and Military Contingency operations. These four categories have been subdivided, resulting in 11 subcategories: Peacekeeping (PK), Peace Enforcement (PE), Humanitarian Assistance (HA), Disaster Relief (DR) - Foreign, DR - Domestic, Counterdrug (CD), Combatting Terrorism (CT), Counterinsurgency (CI), Nation Assistance (NA), Noncombatant Evacuation Operations (NEO), and other Military Contingency operations.

50 OOTW attributes were identified. These were organized as an aid to understanding using an expansion of the Army's METT-T (mission, enemy [human or physical], troops, terrain/weather [environment] - time) paradigm. The values of certain attributes discriminate among the OOTW categories and these attributes are labeled "definitive."

OOTW Attributes (50)

Organized by mission, enemy, troops, terrain/weather (environment) - time (METT-T), examples:

Mission: Constraints	
ROE	**definitive attribute**
Legal	**definitive attribute**
Degree of risk	
Use of force	**definitive attribute**
Scope of conflict	
Casualties	
Enemy	
Consent	**definitive attribute**
Impartiality	
Human enemy exists	**definitive attribute**

53 OOTW tasks were identified and grouped into non-mission-related analyses and phases of mission planning and execution.

OOTW Tasks (53)

Non-Mission-Related Analysis examples:

Perform instability forecast, impact forecast (psycho-social)
Estimate cost of operations

Mission Definition and Analysis examples:

Develop mission, MOEs, etc.
Determine ROEs
Define end-state, transition criteria
Develop COAs

Each category, attribute and task was carefully defined. The categories' definitions were based on Joint definitions; however, many concepts were not fully defined there and the great number of other sources of definitions were not consistent. Hence, the definitions were created to serve the purpose of defining requirements for analysis tools. The tasks were defined and related to the Uniform Joint Task List (UJTL), version 3.0.

Definitions

Categories and Types: UN Chapter VI 2 Peace Operations
Operations requiring a show of force, or small tactical operations, to enforce peace - part of **peace enforcement**.

Attributes: Consent Consent refers to the parties of a conflict and whether they consent to third party mediation, peacekeeping, etc. **Definitive attribute: peacekeeping vs peace enforcement.**

Tasks: Develop mission, MOEs, etc., task # 2.1: Develop the proposed mission and its elements and the MOEs necessary for evaluating the progress of the mission.

X	ST 5.3.2.1 *Identify firm mission elements & elements in flux*
X	OP 5.3.1.1 *Develop mission*
X	OP 5.3.1.2 *Develop MOEs for mission*

There are 550 cells in the attribute vs category two-way connections matrix (50 tasks x 11 categories). This slide shows a portion of the matrix to convey the types of information contained in the matrix. Attributes are grouped by the extended METT-T paradigm and the definitive attributes are identified. Each cell contains indications of the types of values the attribute may be expected to have for that category.

Attributes and Categories (50x11=550)					
Categories		**Peace Operations**		**HumanitarianAssistance /Disaster Relief**	
Attributes		**PK**	**PE**	**HA**	**DR-dom**
M i s s i o n **Mission, objectives, and MOEs**	DEF	keep peace national, CINC, force planner, important	impose peace national, CINC, force planner, important	help people complex	fix damage simple
M i s s i o n Political vs economic vs ideological vs symbolic interest		political national, prime consideration	political national, prime consideration	economic, symbolic	economic
M i s s i o n **Assistance required**	DEF	varies	varies	full spectrum	med/secur, s/t engin

There are 583 cells in the tasks vs categories matrix (53 tasks x 11 categories). The tasks are grouped by their phase and include references to their underlying UJTLs. The cells contain an estimate of which categories might be satisfied by a similar tools for the given task. Thus, for a given task, one group of categories will be labeled "A," another will be labeled "B," etc., to indicate which categories are to be grouped together. Other information may also appear in the cell.

| Tasks and Categories (53x11=583)							
			Categories	Peace Operations		Humanitarian Assistance/ Disaster Relief	
UJTL #		#	Tasks	PK	PE	HA	DR-dom
Non-mission-related analysis	SN 5.1.4 SN 5.2 ST 2.4.1.3 ST 2.4.1.4 ST 2.4.2.1 OP 2.4.2.1	1.1	Instability fcst, impact fcst (psycho-social)	A	A	A	C
	SN 1.1 SN 4 SN 5.3 SN 7 ST 5.3.1.5	1.2	Estimate cost of operation	A	A	B	B
Mission definition & analysis	ST 5.3.2.1 OP 5.3.1.1 OP 5.3.1.2	2.1	Develop mission, MOEs, etc.	A	B	C	D

There are 2,650 cells in the tasks vs attributes matrix (53 tasks x 50 attributes). The contents of the cells indicate whether that attribute should be considered to be an input variable (or set of variables) for a tool needed for the given task.

Tasks and Attributes (53x50=2650)

		Attributes	Mission						
	#	**Tasks**	**Mission**	**Pol-econ**	**Assist**	**ROE**	**Legal**	**Risk**	**Force**
Non-mission-related analysis	1.1	Instability fcst, impact fcst (psycho-social)	!	!	!	!	!	!	!
	1.2	Estimate operation cost	!	!	!	!	!	!	!
Msn definition & analysis	2.1	Develop mission/MOEs	!	!	!	!	!	!	!
	2.2	Determine ROEs	!	!		!	!	!	!

The next series of slides deal with the historical analysis of OOTWs. The data includes for each operation, the date, locations, responsible CINC, identifying name, and category. Operations that span more than one calendar year are counted once for each year. Operations that include more than one category are counted for each category. Certain categories are poorly counted, e.g., counternarcotics operations by each of the JTFs assigned to that role are only counted as one operation per year per JTF.

Historical OOTWs				
YR	PLACE	CINC	NAME	TYPE
95	SINAI	USCENTCOM		PK
95	CALIFORNIA	USACOM	FLOOD	DR
95	OKLAHOMA	USACOM	OKLAHOMA CITY BOMBING	DR
95		USACOM	HURRICANE OPAL	DR
95		USACOM	HURRICANE MARILYN	DR
95	NEW YORK	USACOM	LONG ISLAND FIRES	DR
95	TEXAS	USACOM	FLOODS	DR
95	CARIBBEAN	USACOM	MONSERRAT VOLCANO	DR
95	CARIBBEAN	USACOM	HURRICANE LUIS	DR
95	ICELAND	USACOM	AVALANCHE	DR

Despite data short-comings, the frequency distribution of OOTWs by year and category clearly shows that the execution of OOTWs is not a minor effort, nor an infrequently practiced one.

OOTWs Supported by Category and Year
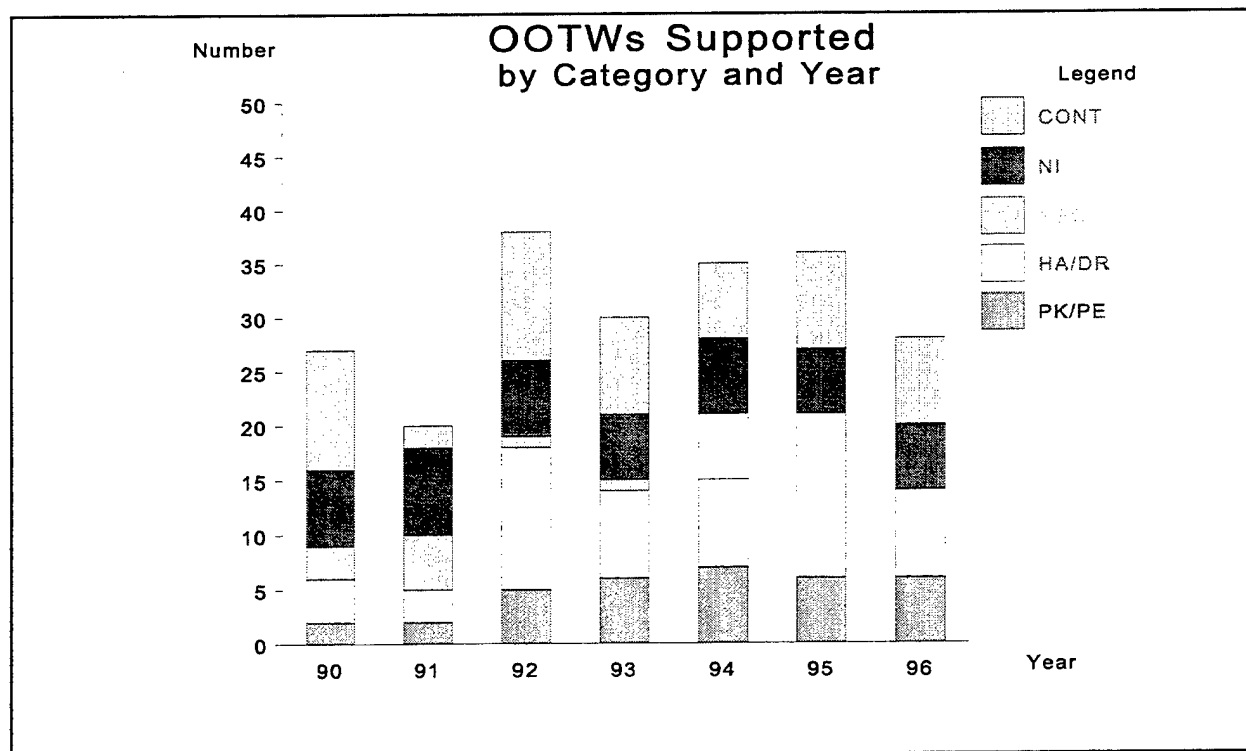
The frequency distribution of OOTWs by CINC and category, while missing data from SOUTHCOM on the full impact of its NI operations, still shows some different emphases among the different CINCs.
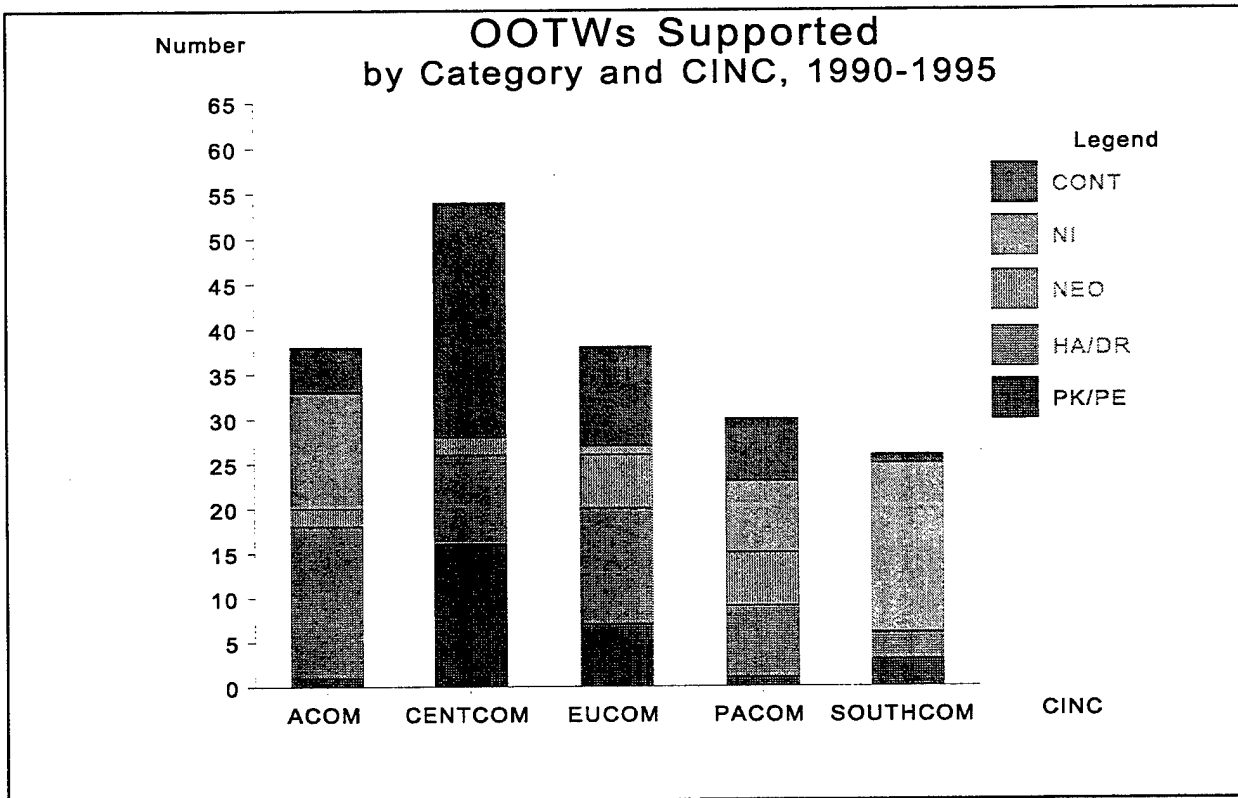

The following matrix of analysis tools requirements consists of the following elements:
- a requirement number;
requirement title;
brief description of the requirement;
task numbers that generate the requirement;
potential users of any tool that satisfies the requirement,
modelability [green (G) for extant tools or relatively easy to build, yellow (Y) for where the basic structure and algorithms required are known, but requiring fair amount of effort, red (R) where difficult to construct or too many unknowns];
data availability [readily available data (OK), data requires funding to gather ($), Very Hard (V) where data unavailable and require definition];
priority ["1" represents a critical need for an automated supplement, "3" represents an important need, "5" represents an enhancement]; and
proposed action.

#	Title	Description	Task Refs	Used by	M	Analysis Tool Requirements (10)		
1	**Situational Awareness**	supports the generation of a complete picture of the current and likely future situation	1.1, 2.4, 2.10, 3.5, 3.6, 3.7, 3.9, 3.10, 5.3, 5.5, 5.6, 6.7	NCA CINCs JTF Service	Y	V	2	start now

The major relationships among the 10 requirements are shown in this diagram. **Define Mission** and **Cost Analysis** occupy the Strategic National Command Authority (NCA) level. The Strategic CINC level contains **Analyze Mission**, **Force Planning: Design Forces**, **Force Planning: Deployment Schedule**, **Cost Analysis**, and **COA Development, Analysis, Comparison**. The Operational Joint Task Force (JTF) level contains **Situational Awareness**, **Communications Analysis**, **COA Development, Analysis, Comparison**, **Transition & Tracking**, and **Impact Analysis**. The Non-Mission Specific Activities level contains **Situational Awareness**, **Impact Analysis**, and **Cost Analysis**. **Information Availability & Analysis** spans all levels because it supports all analysis efforts.
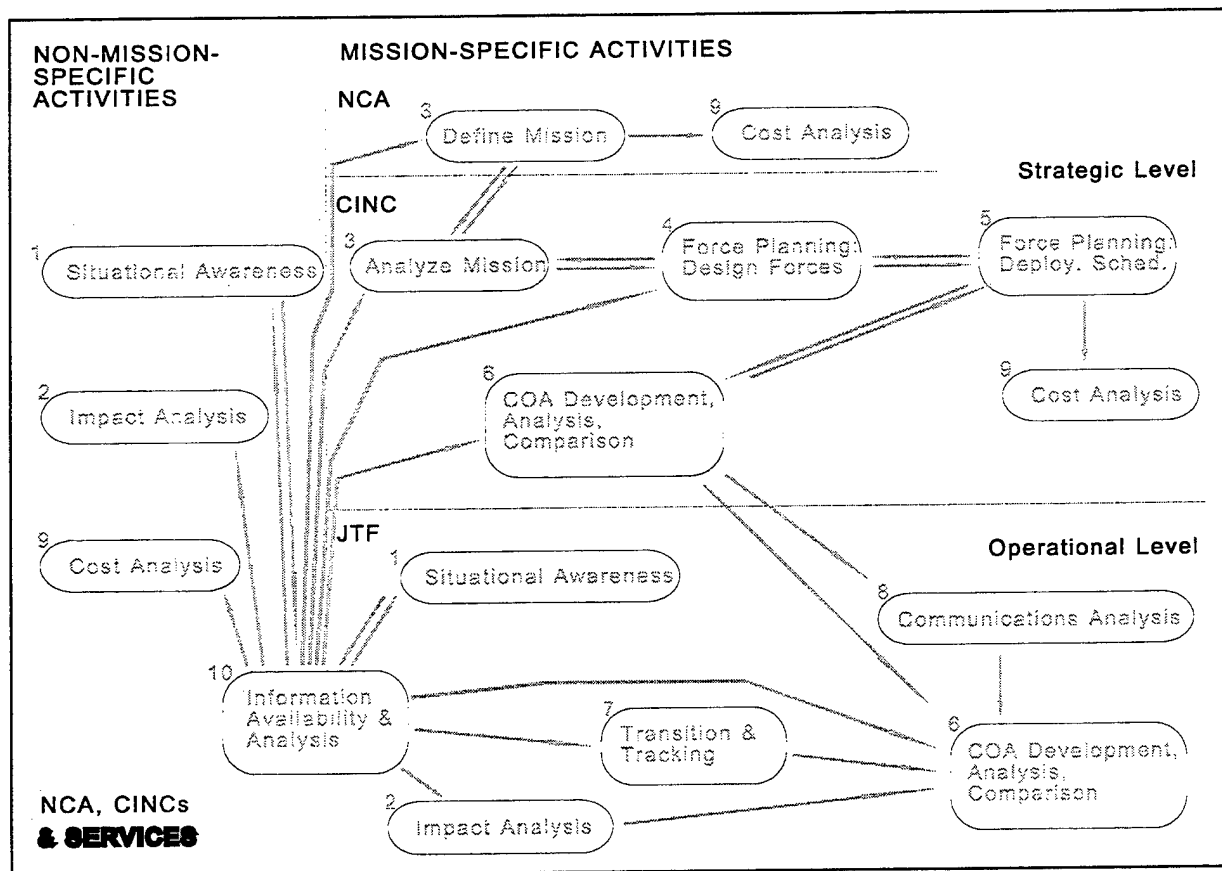
The initial roadmap is shown with the requirements grouped by priority. Those recommended to "do now" are shown as requiring a relatively short time to accomplish, while those recommended for "research" are shown with longer durations. The requirement with a "start now" recommendation is shown with an intermediate duration. Within these duration groups, each requirement shows a relative estimate of difficulty in its duration variation from the rest of the category.
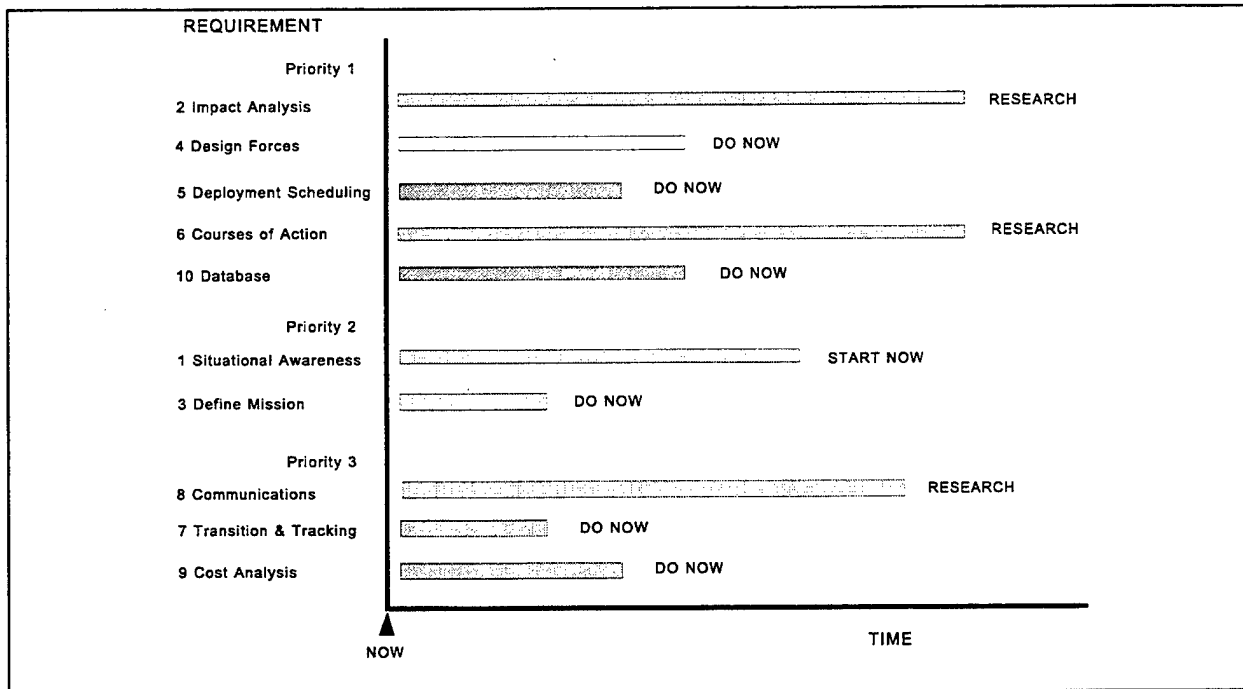
NEXT STEPS

Validation of Requirements
CINCs
Services
OSD
Joint Staff

MORS Workshop
Flesh out the requirements
Suggest analytical approaches
Identify data requirements
Recommend development plans

At this time, the requirements have been validated by the CINCs, the services, OSD, and the Joint Staff. The goal of the workshop is to carry the work forward toward the actual creation of tools to satisfy the requirements.

Acronyms

A^2C^2	Adaptive Architecture for Command and Control
AAFES	Army and Air Force Exchange System
AALPS	Automated Air Load Planning System
AC	Active Component
ACAAM	Air Courses of Action Assessment
ACE	Models Available An infrastructure assessment model, paired with BRACE (i.e. ACE/BRACE)
ACOM	Atlantic Command
ACTIS	Advanced Circular Scan Thermal Imaging System
AI	Artificial Intelligence
ALADUN	Africa and Latin America Database, Unclassified
ALM	Airlift Loading Model/Aviation Logistics Model
ALP	Automated Logistics Planner
AMP	Analysis of Mobility Platform
AO	Areas of Operations
APOE	Aerial Port Of Embarkation
BRACE	An infrastructure assessment model, paired with ACE (i.e. ACE/BRACE)
C++	Programming Language
C^2	Command and Control
C^3	Command, Control, Communication
C^4	Command Control, Communication, Computers
C^4ISR	Command Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance
C^7I^3SR	Command Control, Communication, Consultation, Coordination, Cognition, Integration, Information, Intelligence, Surveillance and Reconnaissance
CAA	Concepts Analysis Agency
CALL	Center for Army Lessons Learned
CALMS	Combined Allowances for Logistics & Maintenance
CAM	Civil Affairs Model
CAN	Crisis Action Network Analysis model
CANTELOUPES	Cost Analysis Tool to Estimate Light Operations and Unfunded Peacekeeping Scenarios
CAPS	Crisis Action Planning System
CARE	Cooperative for Assistance and Relief Everywhere
CATS	Consequence Assessment Tool Set
CBS	Cost Breakdown Structure
CD	Counter Drug
CDC	Centers for Disease Control and Prevention
CER	Cost Estimating Relationships
CGF	Core Governing Factors
CGO	Coalition or Cooperating Government Organizations
CHEMTREC	Chemical Transportation Emergency Center

CI	Counter Intelligence/ Counter Insurgency
CIA	Central Intelligence Agency
CINC	Commander in Chief
CISA	Certified Information Systems Auditor
CMD	Command
CMOC	Civil-Military Operations Center
CMPO	Conceptual Model of Peace Operations
COA	Course of Action
COAST	Course of Action Selection Tool
CODES	Common Digital Exploitation System
CONOPS	Contingency Operations
CONT	Contingencies
CONUS	Continental United States
COTS	Commercial Off the Shelf
CS	Chief of Staff or Combat Support
CT	Counter Terror
CTAPS	Contingency Theater Automated Planning System
CVBG	Carrier Battle Group
DARPA (ISO)	Defense Advanced Research Project Agency
DART	Dynamic Analysis and Replanning Tool, Disaster Assistance Response Team, Downed Aircraft Recovery Team (DoD Dictionary of Acronym - DTIC Web Site)
DEA	Drug Enforcement Agency
DEF	Demilitarization Enterprise Fund
DEXES	Deployable Exercise System
DFAS	Defense Finance and Accounting Service
DIA	Defense Intelligence Agency
DISA	Defense Information Systems Agency
DLA	Defense Logistics Agency
DMA	Defense Mapping Agency
DoD	Department of Defense
DOJ	Department of Justice
DOS	Department of State
DR	Disaster Relief
DSWA	Defense Special Weapons Agency
EBR	Evidenced Based Research
ELIST	Enhanced Logistics Intratheater Support Tool
EPRI	Electric Power Research Institute (located in Palo Alto, CA)
EUCOM	European Command
EUSIS	German operational model, acronym unknown
FASTALS	Force Analyzer Spreadsheet Tool for Assessing Logistic Support
FAST-OR	Force Analyzer Spreadsheet Tool for OOTW Requirements
FBI	Federal Bureau of Investigation
FDE	Force Deployment Estimator
FEMA	Federal Emergency Management Agency
FFRDC	Federally Funded Research and Development Center

FYDP	Five Year Defense Program
GALM	General Air/Land Model
GAO	General Accounting Office
GCCS	Global Command and Communication System
GDAS	Global Deployment Analysis System
GDSS	Global Decision Support System
GEDS	Global Events Data System
GILS	Geographic Information Systems
GMU	George Mason University
GOTS	Government Off The Shelf
GTN	Global Transportation Network
HA	Humanitarian Assistance
HTML	HyperText Markup Language
HUMINT	Human Intelligence
IAW	In Accordance With
IDA	Institute for Defense Analyses
IFOR	International Forces
IGO	Inter-Governmental Organization
INFORMS	Institute For Operations Research and Management Science
INTEL	Intelligence
IO	International Organization
ISR	Intelligence, Surveillance and Reconnaissance
ITV	In Transit Visibility
J-8	Director for Force Structure, Resource, and Assessment, Joint Staff
JAMIP	Joint Analysis Model Improvement Program
JFACC	Joint Force Air Component Commander
JFAST	Joint Flow Analysis System for Transportation
JIC	Joint Intelligence Center
JINTACCS	Joint Interoperability of Tactical Command and Control Systems (DoD Dictionary of Acronym - DTIC Web Site)
JLSC	Joint Logistic Support Center
JMETL	Joint Mission Essential Task List
JOPES	Joint Operation Planning and Execution System (DoD Dictionary of Acronym - DTIC Web Site)
JPO	Joint Petroleum Office (DoD Dictionary of Acronym - DTIC Web Site)
JPT	JFACC Planning Tools
JRAMS	Joint Readiness Automated Management System
JSCP	Joint Strategic Capabilities Plan
JSORTS	Joint Status of Resources and Training System
JTASC/ACOM	Joint Training, Analysis and Simulation Center/ Atlantic Command
JTAV	Joint Total Asset Visibility
JTF	Joint Task Force
JTS	Joint Tactical Simulation

JWAC	Joint Warfare Analysis Center
JWARS	Joint Warfighting System (computer model).
JWFC	Joint Warfare (Warfighting) Center
KEDS	Kansas Events Data System
LAD	Latest Arrival Date
LANL	Los Alamos National Laboratory
LOC(s)	Lines of Communication
LOG	Logistics
LOG/MOB	Logistics/Mobilization
LOGGEN	Logistics Plan Generator
MCGI	Mapping, Charting, Geodesy, Imagery
MEDEA	European Institute for Research on Mediterranean and Euro-Arab Cooperation.
MEDEVAC	Medical Evacuation
METL	Mission Essential Task List
METT-T	Mission, Enemy, Troops, Terrain/weather - Time
MFP-11	Major Force Program - 11
MIDAS	Model for Intertheater Deployment by Air and Sea
MOE	Measure of Effectiveness
MOM	Measure of Merit
MOOTW	Military Operations Other Than War
MOP	Measure of Performance
MOR	Military Operations Research
MORSS	Military Operations Research Society
MPES	Military, Political, Economic and Social Factors on Current Mission
MRC	Major Regional Contingency
MS	Microsoft
MSOSA	Modeling and Simulation Operational Support Activity
MTOFS	Major Task Organized Forces
MWR/AAFES	Morale Welfare Recreation/Army Air Force Exchange Service
NA	Nation Assistance
NBC	Nuclear, Biological, Chemical
NCA	National Command Authority
NDU	National Defense University
NDV (ACTIS)	NASP Derived Vehicle (Advanced Circular Scan Thermal Imaging System)
NEI	New Equipment Introduction
NEO	Non-combatant Evacuation Operation
NGO	Non-Government Organization
NI	National Integrity
NIMA	National Imaging and Mapping Agency
NPS	Naval Postgraduate School
NRaD	Naval Research and Development
NSF	National Science Foundation
O&M	Operating and Maintenance

OASD/SOLIC	Office of Assistant Secretary of Defense, Special Operations and Low Intensity Conflict
OB OBJECTS	Order of Battle
OCOKA	Observation, Cover/Concealment, Obstacles, Key Terrain, Avenues of Approach
ODA	Object Domain Attributes
OFDA	Office of Foreign Disaster Assistance (DoD Dictionary of Acronym - DTIC Web Site)
OFP	Objective Force Planner
OGA	Other Government Agencies
OLOGPLN	Operational Logistics Plan(ning)
OM	Operations and Maintenance
ONR	Office of Naval Research
ONUCA	UN Observer Group in Central America
OOTW	Operations Other Than War
OOTWAMT	Operations Other Than War Analysis Methods and Techniques
OPS	Operations
OPTEMPO	Operational Tempo
OSD	Office of the Secretary of Defense
OXFAM	OXford Committee for FAMine Relief
PA&E	Program Analysis and Evaluation (Directorate)
PACOM	Pacific Command
PANDA	Protocol for Assessing Nonviolent Direct Action
PARC	Palo Alto Research Center [Xerox]
PAX	Passengers
PE	Peace Enforcement
PERTEMPO	Personnel Tempo
PK	Peace Keeping
PO	Peace Operations
POC	Point of Contact
POL	Petroleum, Oil and Lubricants
POM	Program Objective Memorandum
PORTSIM	Port Simulation Model
PSYOP	Psychological Operations
PVO	Private Volunteer Organizations
QDR	Quadrennial Defense Review
QOL	Quality of Life
R&D	Research and Development
RC	Reserve Components
RDD	Required Delivery Date (at destination)
RDSS	like Spectum
RFP	Request for Proposal
ROE	Rules of Engagement
RQMTS	Requirements
SGI	Silicon Graphics, Inc.
SIAM	Situational Influence Assessment Module

SIM CITY	Simulation software package
SOCOM	Special Operations Command
SOF	Special Operations Forces
SOLIC	Special Operations Low Intensity Conflict
SORTS	Status of Resources and Training System
SPECTRUM	Developed by the National Simulation Center
SPOE/D	Seaport of Embarkation/Deportation
STOW	Synthetic Theater of War
SUMMITS	Scenario Unrestricted Mobility Model for Inter Theater
SWARM	The Swarm simulation system (no acronym)
TAD	Temporary Additional Duty
TARGET	Theater Analysis and Replanning Graphical Execution Toolkit
TDY	Temporary Duty
TOR	Terms of Reference
TPedit	to build a TPFFD
TPFDD	Time Phased Force Deployment Data
TPFDL	Time Phased Force Deployment List
TRAC	TRADOC Analysis Center
TRADOC	Training and Doctrine Command
TRANSCOM	Transportation (Tracking and) Communications (System)
UIC	Unit Identification Code
UJTL	Uniform Joint Task List
UK	United Kingdom
UN	United Nations
UN/IO/NGO/PVO	United Nations/International (Independent) Organization/ Non-Government Organization/Private Volunteer Organization
UNEF I & II	UN Emergency Force
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFICYP	UN Peacekeeping Force in Cyprus
UNHCR	United Nations Office of the High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNIFIL	UN Interim Force in Lebanon
UNIKOM	UN Iraq-Kuwait Observation Mission
UNISYS	UNISYS (Burroughs & Sperry Consolidated Corporation)
UNPROFOR	UN Protection Force
UNTAC	UN Transitional Authority in Cambodia
USACOM	United States Atlantic Command
USAF	US Air Force
USAFSOS	US Air Force Special Operation Squadrons
USAID	United States Agency for International Development
USAMICOM	US Army Missile Command
USCENTCOM	United States Central Command
USCINCPAC	US Commander-in-Chief Pacific
USEUCOM	United States European Command
USG	United States Government
USPACOM	US Pacific Command

USSOCOM	US Special Operations Command
USSOUTHCOM	US Southern Command
USTRANSCOM	US Transportation Command
UTC	Unit Type Code
WPS	Worldwide Port System
WWW	World Wide Web
Xerox PARC	Palo Alto Research Center

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