Proceedings of the 1992 Winter Simulation Conference
ed. J. J. Swain, D. Goldsman, R. C. Crain, and J. R. Wilson

IMPROVING DECISION SUPPORT FOR AIR FORCE RESOURCE ALLOCATION

Gregory S. Parnell Daniel P. Barker
Air Force Studies and Analyses Agency
Resource Analyses Division
Pentagon
Washington DC 20330-5420

"Global Reach-Global Power reflects a renaissance in airpower thinking that began at the end of the cold war, triumphed in the Gulf War, and matters more to the future each day. It makes sense, from warfighting and management standpoints, to assess requirements, programs, resource allocation, training, operations, and organization in terms of what they contribute to global reach and global power missions."[1]

Donald B. Rice
Secretary of the Air Force

ABSTRACT

The paper describes the role of anlaysis in the new Air Force Resource Allocation process. After describing the new process, we show our analysis framework and illustration examples of the analysis products provided to AF senior leadership.

1 INTRODUCTION

In early 1991, Air Force senior leadership began to fundamentally reexamine the AF resource allocation process, while reorganizing the Air Staff and Secretariat to reduce manning by 21%. The Secretary of the Air Force (SECAF) and Chief of Staff (CSAF) resource allocation objectives were to: "better link planning, programming, and budgeting; focus on missions -- rather than functions -- as the resource drivers; improve accountability; and emphasize the development and analysis of options."[2]

On February 28, 1991, the Directorate for Programs and Evaluation (AF/PE) was formed with the Air Force Center for Studies and Analyses as a Field Operating Agency. The Center was renamed the Air Force Studies and Analyses Agency (AFSAA) on August 1, 1991.

On July 19, 1991 the SECAF and CSAF issued their "Policy on the AF Resource Allocation Process", summarizing the new resource allocation process.[3] The common reference point for resource allocationdecisions is program elements. Program elements are grouped into eight Global Reach-Global Power (GR-GP) mission areas. A resource allocation team is assigned responsibility for each mission area. The Deputy Chief of Staff, Plans and Operations (AF/XO) publishes the key programming document, the program guidance, which identifies areas for option development. AF/PE orchestrates option development and evaluation. The Assistant Secretary of the Air Force for Financial Management (SAF/FM) develops the fiscal guidance and orchestrates the budget preparation phase.

As a result, AFSAA has a new and additional primary mission: to provide analyses of capabilities and resources directly to the resource allocation teams, AF/PE, and the AF senior leadership. The agency continues its previous support to the Air Staff and Secretariat, especially AF/XO and Assistant Secretary of the AF for Acquisition (SAF/AQ), since much of this work provides the foundation for the new mission. AFSAA's capability analyses supports option development and option evaluation. This paper describes AFSAA's analytical support to senior decision-makers in the new AF resource allocation process.

---

[1] Air Force Association Speech by Air Force Secretary Donald B. Rice, September 17, 1991.

[2] "Air Force Restructure," White Paper, Department of the Air Force, September 1991.

[3] AF Policy memorandum, July 19, 1991.

2 NEW AF RESOURCE ALLOCATION PROCESS

The new resource allocation process is described in Figure 1. This process is repeated for every exercise in the programming and budgeting phases of theBiennial Planning, Programming, and Budgeting System. The process begins with the AF Program Presentation which includes the baseline resources and capabilities. The second step is the development of program guidance based on OSD guidance and Major Command (MAJCOM) inputs. Program guidance is the combination of the force structure guidance developed by AF/XO and the fiscal guidance developed by SAF/FM. Program guidance is approved by CSAF/SECAF. In the third step, options are developed to meet program guidance. The fourth step is the analysis of the options by AF/PE and staff agencies. The fifth step is the AF/PE presentation of the options to senior leadership. The CSAF/SECAF review the options. Tentatively approved options are included in the AF Program Presentation and new options may be requested. When final decisions have been made, the database is updated and a new program baseline is established.

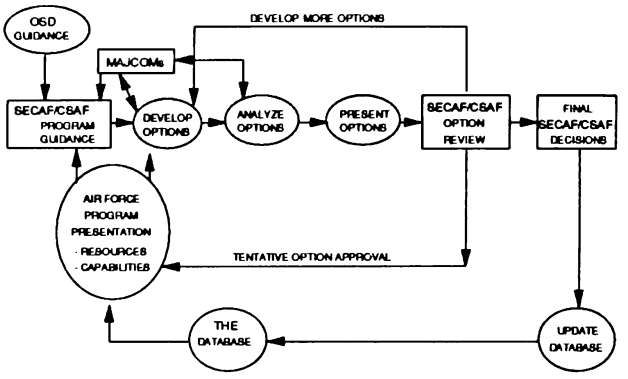

Figure 1. Resource Allocation Process

3 GLOBAL REACH-GLOBAL POWER MISSION AREAS

In response to the extraordinary international developments in the late 1980s, the SECAF published a white paper, The Air Force and U.S. National Security: Global Reach-Global Power, in June 1990. This planning framework identified five major AF planning objectives: nuclear deterrence, power projection, global mobility, space/C3I, and maintaining U.S. interests. The first four objectives were the foundation for the eight new resource allocation mission areas shown in Figure 2.

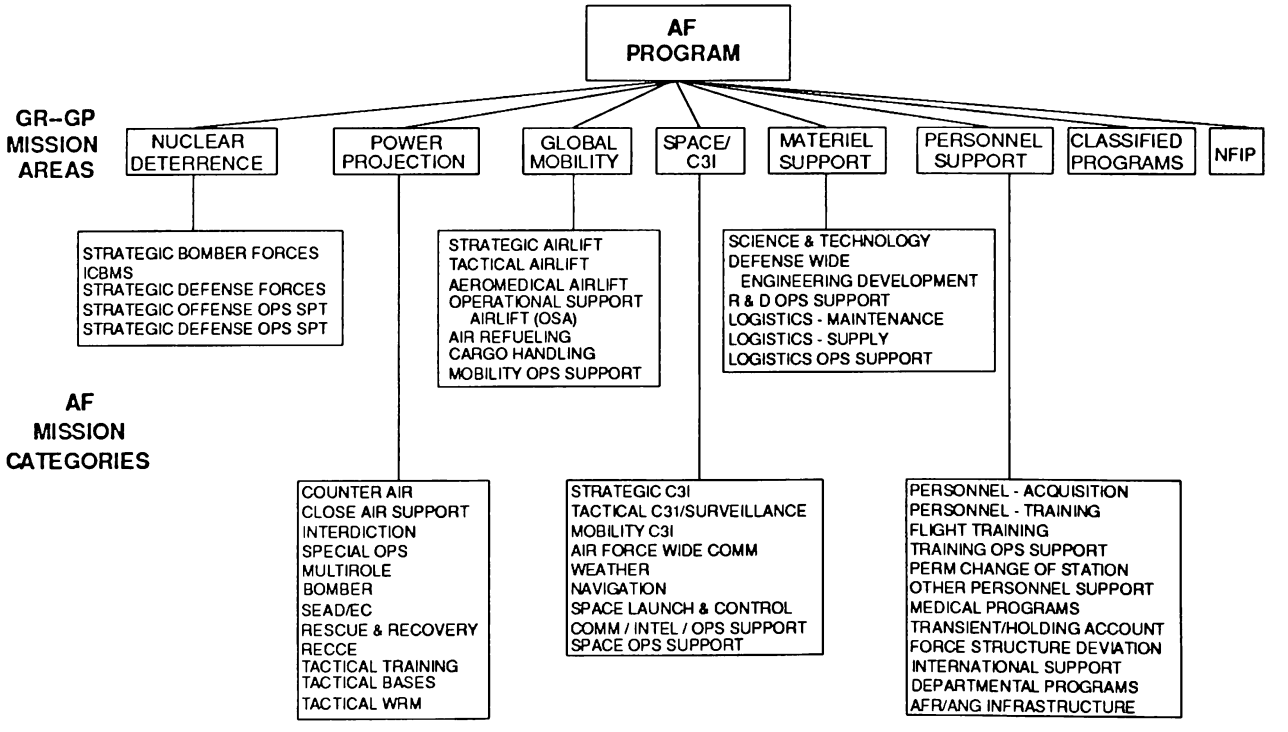

Figure 2. AF Mission Areas and Mission Categories

"The approach taken was to cluster the program elements into GR-GP [mission areas] as defined by the SECAF, and then within those [mission areas] define analytically meaningful packages of PEs, to be known as Air Force mission categories (AFMCs). The AFMCs follow AFM 1-1 with a mission area perspective. They also contain the resources (people, forces, dollars) which are inputs to capability models."[4]

Several factors influenced the selection of AFMCs, the placement of AFMCs in mission areas, and the assignment of PEs to AFMCs. The first four mission areas include AFMCs with the PEs for resources that directly contribute to or directly support the GR-GP mission area. For example, the AFMC "counter air"directly contributes to the "power projection" mission area, and the AFMC "tactical training" directly supports the "power projection" mission area. The materiel and personnel mission areas consist of AFMCs that indirectly support the four GR-GP objectives. The materiel mission area logically follows the AF decision to form the Air Force Materiel Command. The personnel support mission area includes the people programs, training programs, and many miscellaneous PEs. Finally, the Classified Programs, for Special Access Required (SAR), and the National Foreign Intelligence Programs (NFIP) mission areas were formed due to their special requirements. A resource allocation team is assigned to each of the eight mission areas.

4 AFSAA ANALYSIS GOALS

After being assigned our new mission, we set two major analysis goals that we believed were essential to improve analytical support to AF resource allocation decision-makers. Our first goal was to provide an AF Program Assessment; i.e., an assessment of the capabilities the AF is obtaining for its resources. This capabilities assessment would support senior leadership determination of the AF program guidance. Our second goal was to provide timely analyses for all major programming and budget decisions, including the evaluation of program options. For each option, our objective was to compare the change in capabilities relative to the AF Program Assessment. To support resource allocation decision-makers, our analyses must be timely, i.e., hours or days versus months.

We believe we can achieve these goals by an iterative, building process. We began by supporting the FY93 Amended Budget Estimate Submission (ABES) in Summer 1991 and expanded our support for the . Program Objective. Memorandum (POM 94) in Winter 1991-92. To achieve both major goals, we need to perform analyses on SAR programs since they provide significant capabilities.

5 LEVELS OF ANALYTIC CRITERIA

One of the first questions we had to answer was what level of analytic criteria would be most useful in resource allocation decision-making. Table 1 provides a summary of three levels of analytic criteria: engineering, engagement, and campaign.[5]

The engineering characteristic of airspeed, for example, may enhance engagement performance through timely destruction of enemy targets or a decrease in aircraft vulnerability, etc.. However, the value of the engagement depends on its contribution to campaign effectiveness. Of the three levels, the campaign contribution level is the most useful to resource allocation decision-making because it provides a perspective that considers all AF systems and, in many cases, other service systems. According to DoD:

> "to judge whether an alternative is worthwhile, one must first determine what it takes to make a difference. Campaign analyses are done to establish the military value of alternatives"[6]

Prior to 1991, however, AFCSA did not have the primary mission of routine support of the resourceallocation process. Although we did some campaign level analyses, which used the higher level criterion of contribution to campaign effectiveness, the studies were typically "ad hoc" and specifically requested to illuminate a particular decision. The studies often required the development of special analytic methodology (including the scenarios) and took a great deal of time. Thus the new requirement for AFSAA to perform timely analyses in all major mission areas at the high criterion level of campaign

---

4 Col George Seiler, Guide to Program Analysis, August 5, 1991, pp. 3-4.

5 Discussion with General Glenn Kent, Ret.

6 Defense Acquisition Management Documentation and Reports, DOD 5000.2-M, February 1991.

effectiveness required us to fundamentally reexamine the information level of analysis and our analytical architecture.

	ENGINEERING	ENGAGEMENTS	CAMPAIGN
PURPOSE	COMPARE ENGINEERING TRADEOFFS	COMPARE SYSTEM PERFORMANCE	COMPARE SYSTEM CONTRIBUTION
FOCUS	WEAPONS SYSTEM	MISSION/TASK	CAMPAIGN
MEASURES	MEASURES OF PERFORMANCE (MOPs)	MEASURES OF EFFECTIVENESS (MOEs)	MEASURE OF OUTCOME (MOOs)
EXAMPLES	TURN RATE RADAR CROSS SECTION BOMB LOAD CEP AIRSPEED RANGE	PROBABILITY OF KILL ATTRITION SORTIES GENERATED TIME ON STATION WEAPONS DELIVERED	TARGET VALUE DESTROYED FEBA MOVEMENT TIME UNTIL SUPERIORITY LEVEL OF SUPERIORITY

Table 1. Levels of Analytic Criteria

6 INFORMATION LEVEL OF ANALYSIS

Given that analyses of contribution to campaign effectiveness are the most useful for resource allocation, we next determined the appropriate information level of analysis. Table 2 describes three information levels: the Air Force level, the GR-GP mission area level, and the program/program element level. We believe the GR-GP mission area (level two) is the most feasible and useful level for resource allocation because of the following considerations.

	CAPABILITIES	RESOURCES		
INFORMATION LEVELS	MEASURES OF EFFECTIVENESS	DOLLARS	PAA	MANPOWER
1. AIR FORCE LEVEL	EACH GLOBAL REACH--GLOBAL POWER OBJECTIVE (e.g., SUSTAIN DETERRENCE)	GLOBAL REACH--GLOBAL POWER OBJECTIVES MAJOR FORCE PROGRAMS SIX PILLARS FLYING HOURS -ACTIVE/RESERVE/GUARD -MAJCOMs -MISSION CATEGORIES TOP 50 INVESTMENTS SCIENCE & TECHNOLOGY O & M APPROPRIATIONS SPACE MUNITIONS	GLOBAL REACH--GLOBAL POWER OBJECTIVES MAJOR FORCE PROGRAMS MAJCOMs ACTIVE/RESERVE/GUARD	GLOBAL REACH--GLOBAL POWER OBJECTIVES -ACTIVE/RESERVE/GUARD -OFFICER/ENLISTED/CIVILIAN
2. GLOBAL REACH--GLOBAL POWER OBJECTIVE LEVEL	EACH MISSION CATEGORY (e.g., STRATEGIC FORCES) EACH TASK (e.g., DESTROY SS-25 MAIN OPERATING BASE)	MISSION CATEGORY -TOP 50 INVESTMENTS -APPROPRIATION -SIX PILLARS -ACQUISITION PROFILE -O & M	MISSION CATEGORY -MAJCOMs -WEAPON SYSTEM TYPE -BEDDOWN	MISSION CATEGORY -ACTIVE/RESERVE/GUARD -OFFICER/ENLISTED/CIVILIAN
3. PROGRAM/PROGRAM ELEMENT LEVEL	EACH TASK (e.g., DESTROY SS-25 MAIN OPERATING BASE)	PROGRAM ELEMENT APPROPRIATION ACQUISITION PROFILE	WEAPON SYSTEM TYPE -BEDDOWN	ACTIVE/RESERVE/GUARD OFFICER/ENLISTED/CIVILIAN

Table 2. AF Program Assessment Information Levels

Contribution analysis at the AF level is analytically and politically intractable. This would require one single AF Measure of Outcome (MOO) or weights for the MOOs for each GR-GP mission area, e.g., nuclear deterrence versus power projection. We do not believe it is feasible to develop one universally acceptable AF MOO. Furthermore, we do not believe it would be useful to weight mission area MOOs to arrive at one AF MOO.

Contribution analysis at the GR-GP mission area level requires measures for one or more mission categories. MOOs and MOEs are readily available at this level. For example, the contribution of strategic bombers and ICBMs to the nuclear deterrence mission area can be measured in the number of alert weapons, number of arriving weapons, target coverage, and cumulative damage expectancy. Again, we believe it is more useful to decision-makers to present multiple measures than to arbitrarily weight the measures.

AFSAA has considerable experience with engineering and engagement analyses at the program level. However, campaign contribution analysis at the program level is only appropriate if the program is the only system capable of performing a particular task. We have found that we usually need to analyze program options using multiple programs from one or more mission categories, i.e., level two analyses.

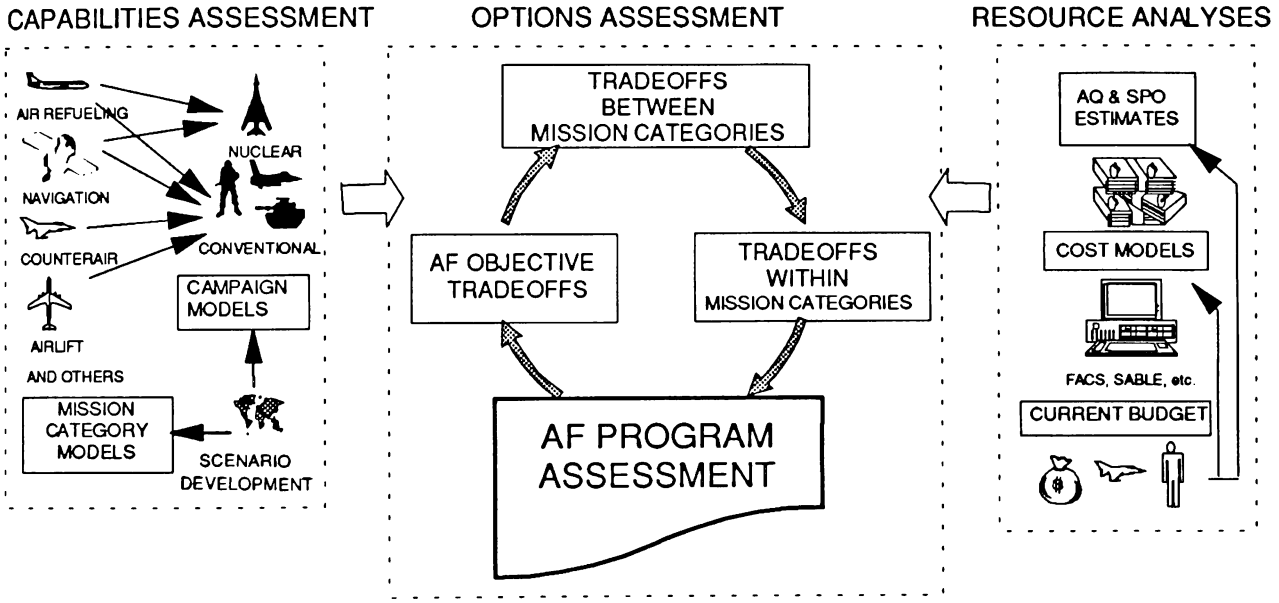

Figure 3. Analytical Architecture

7 ANALYTICAL ARCHITECTURE

As we developed our analytical architecture, we drew on our previous Global Reach-Global Power analyses.[7] Our analytical architecture is shown in Figure 3. In the previous two sections, we established that campaign level analyses involving multiple mission categories and many weapon systems are required to determine a weapon system's contribution.

Resource analyses will be based on the Forces and Financial Plan (F&FP), cost analyses (from cost models,e.g., FACS and SABLE), and SAF/AQ cost estimates provided by System Program Offices. The foundation for the evaluation of options will be the AF Program Assessment described in the next section.

8 AF PROGRAM PRESENTATION

The central role of the AF Program Presentation (which includes the AF Program Assessment) is shown in Figure 1 and Figure 3. We completed the first AF Program Assessment in June 1991 to support the FY93 ABES. This analysis detailed the capabilities provided for the resources allocated in the FY92 President's Budget for FY92- 97. The primary

[7] Parnell, Lt Col Gregory S., et. al., "Methodology for Analyzing Global Reach-Global Power", White Paper, Air Force Center for Studies and Analyses, October 11, 1990.

source of resource data was the F&FP database. We also included installation data from the USAF Program, Installations, Units, and Priorities (PD). In order to show the full benefit of modernization, the analysis was extended out to FY01 for some mission areas.

Level 1 and level 2 of Figure 4 are examples of the type of data included in our AF Program Assessment. For the FY93 ABES, the level 2 analyses included only selected mission categories. The scope of an analysis was expandedin the POM 94 AF Program Assessment.

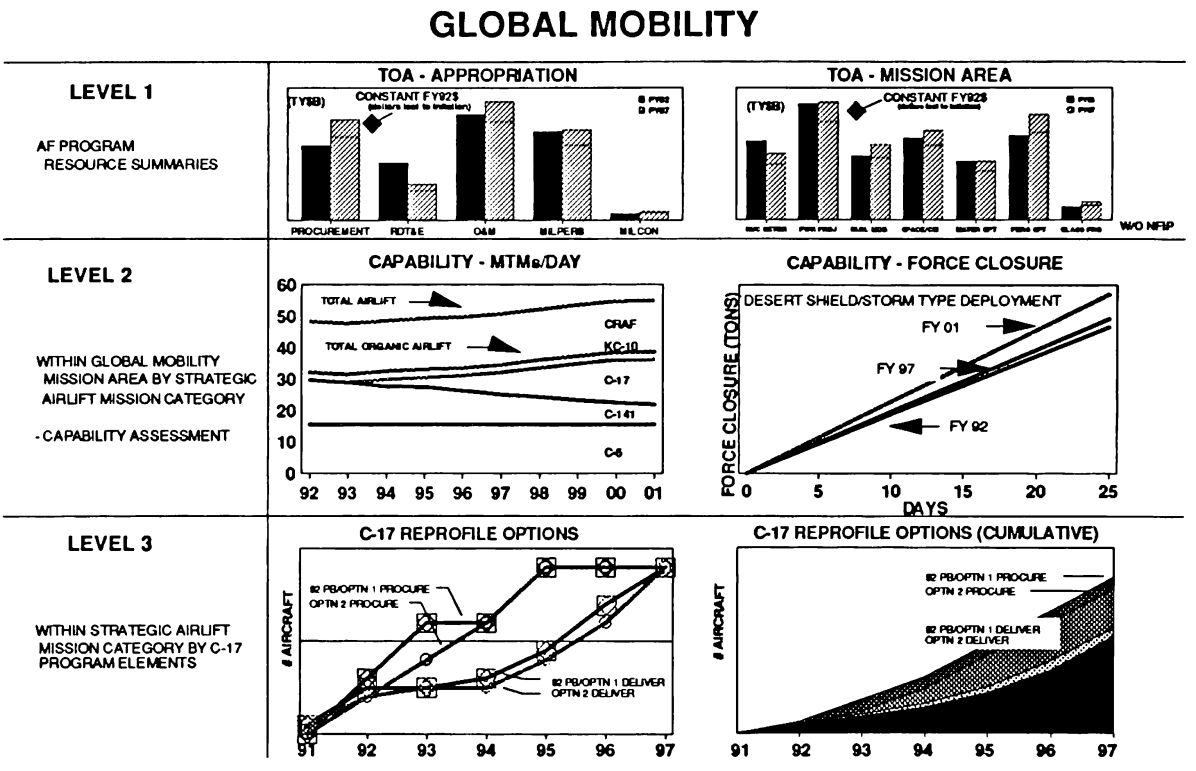

Figure 4. Examples of three levels

Level 1. This level included resource summaries by AF GR-GP mission areas and appropriations. (See Figure 4, level 1.)

Level 2. This level included resource summaries by mission category for each of the first six mission areas in Figure 1. The following are the major assumptions and major capability analyses presented in each of the first four mission areas.

Nuclear Deterrence. Strategic offensive forces were analyzed using the Arsenal Exchange Model (AEM). The scenarios were day-to-day alert and generated alert postures. The MOEs used were number of alert weapons, number of arriving weapons, target coverage, and cumulative damage expectancy against a Soviet target base.

Power Projection. A preliminary analysis of tactical forces was done using TAC Thunder and the Theater Attack Model (TAM). The initial presentation included only one Southwest Asia scenario. The POM 94 analyses assessed two regional contingencies fought concurrently but with staggered beginnings.[8] The measures were days to achieve objectives, aircraft losses, target value destroyed, munitions usage, and sorties flown.

Global Mobility. Initially, two AFMCs were analyzed: strategic airlift and air refueling. Strategic airlift MOEs were million-ton-miles per day and force closure for a Southwest Asia scenario. (See Figure 4, level 2.) Air refueling scenarios were day-to-day and generated alert postures. The conventional scenario was a Desert Storm-like contingency. The MOE was the number of available KC-135R model equivalents per year. The POM 94 assessment included a detailed two MRC analysis of tanker and tactical airlift

8 The development of power projection scenarios has been a significant effort. See the referenced scenario briefing for further details.

requirements.

Space/C3I. The Global Positioning System of the navigation mission category was analyzed. The MOEs were percent 3-D world coverage and percent 2-D world coverage. The POM 94 assessment included analyses of DSP, DMSP, DSCS, and MILSTAR.

The AF Program Assessment explicitly showed the resource and capability trends over the FYDP. While the resources were decreasing in constant year dollars, modernization provided improved combat capabilities in several mission categories. This analysis was provided to the CSAF/SECAF, the Air Staff, the Secretariat, and the AF Major Commands. The Secretary used this analysis to provide options development guidance for the FY93 ABES and POM 94.

The AF Program Assessment has significantly increased the dialogue between AFSAA, other Air Staff analyses offices, and the MAJCOM analyses offices. The MAJCOMs are very interested in the scenarios and measures that will be used to analyze their programs in a resource constrained environment.

In summary, our AF Program Assessment provides the AF senior leadership with an important new perspective on the capabilities the AF will have for its planned resources. This analysis provides critical information to support the difficult resource allocation issues facing AF leaders. The AF Program Assessment will be used by the senior leadership to determine program guidance for option development and was the baseline for analysis of options.

9 SUPPORT TO FY93 ABES AND POM 94

Option analyses include resource and capabilities analyses. The resource allocation teams and AF/PE developed resource summaries of each option. As decisions were made, AFSAA summarized the individual options into AF-wide resource summaries by mission area and appropriation (part of AF Presentation in Figure 1).

In the FY 93 ABES, three major resource analyses were done. In the first analysis, we identified the budget areas with large growth between years (ramps). In the second analysis, we identified areas where Congresswas making changes (marks) to the FY92 PB or FY 93 APB. These analyses helped decision-makers evaluate the potential risks of budget reductions by OSD or Congress. The third analysis was requested by the SECAF. The SECAF asked us to examine the tooth and tail trends over the FYDP.

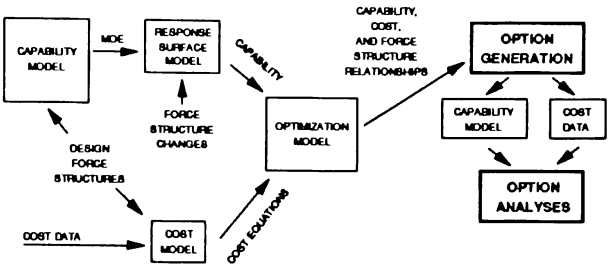

Figure 5. Methdology

Option capability analyses for the FY93 ABES were limited by DoD ground rules (DoD directed minimum changes) and the lack of models. If we had an appropriate model, AFSAA provided capabilities analyses for each option. A global mobility example is shown in Figure 4, level 3. The impact of these options were shown on all level 2 MOEs. These capability analyses were provided to the resource allocation teams and were included in the AF/PE presentations to SECAF/CSAF.

We expanded our option analyses in additional mission areas to support POM 94 since more changes were allowed. Our power projection portion of the analytical architecture was implemented in time to support the POM 94 resource allocation decisions. Significant analyses were performed in the nuclear deterrence and space/C3I mission areas.

10 SUMMARY

The AF resource allocation process has changed significantly. Eight GR-GP mission areas have been established. Each GR-GP mission area includes the mission categories that support the GR-GP mission area. Each mission category contains the programelements, i.e., the resources (force structure, manpower, and dollars) to support the mission category.

AFSAA has been tasked to provide resource analyses and GR-GP mission area capability analyses to support resource allocation decision-makers in the new process. We have developed a flexible, distributed approach that combines capability and cost data for selected mission categories. Using this approach, we have completed an AF Program Assessment that provides the GR-GP resource allocation teams and the AF senior leadership the basis for AF program guidance and option development. Our option analyses methodology uses the best available capability models and cost data to

generate and evaluate options. Our approach is significantly improving the resource and capability analyses provided to resource allocation decision-makers.

While the revised resource allocation process and AFSAA role in the process are new, the Secretary of the Air Force and the Chief of Staff have concluded that the new resource allocation process provides better support for their decision- making. In their words, "we have improved the resource allocation process."[9]

REFERENCES

Adams, Lt Col Richard A., Lt Cols Emmet R. Beeker III and Steven J. Cristiani, Captains Robert A. O'Neill, Michael D. Reading, and Michael A. Shields, and Mr. Daniel P. Barker, "Tooth and Tail Trends", Briefing, Air Force Studies and Analyses Agency, September 5, 1991.

Burgess, Major Gregg and Major Russ Towe, "TAC RAM", Briefing, Air Force Studies Analyses Agency, September 12, 1991.

Air Force FY93 ABES Baseline Program Assessment", SECRET, Executive Summary Briefing, Air Force Center for Studies and Analyses, 24 July 1991.

Air Force Restructure", White Paper, Department of the Air Force, September 1991.

The Air Force and U.S. National Security: Global Reach--Global Power, A White Paper, June 1991

Defense Acquisition Management Documentation and Reports, DOD 5000.2-M, February 1991.

McIntyre, Capt Gregory A., "Scenarios for Analyzing Power Projection", Executive Summary Briefing, Air Force Studies and Analyses Agency, September 17, 1991

Parnell, Lt Col Gregory S, Lt Cols Steve Doucet and Philip A. Richard, Majors Gregg Burgess, John Burkhart, Patricia M. Fornes, and Patrick J. Thomas, "Methodology for Analyzing Global Reach-Global Power", Air Force Center for Studies and Analyses, October 11, 1990

"Policy on the Air Force Resource Allocation Process", Memorandum, Signed by SECAF and CSAF, July 19, 1991.

Seiler, Col George J., Guide to Program Analysis, AF Programs & Evaluation, August 5, 1991

Rice, Donald B., Secretary of the Air Force, Speech to Air Force Association, Washington, D.C., September 17, 1991.

---

9 AF Policy Memorandum, July 19, 1991.