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The US Army's Center for Strategy and Force Evaluation



CAA ANNUAL REPORT

Fiscal Year 1992

NOVEMBER 1992



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US ARMY CONCEPTS ANALYSIS AGENCY
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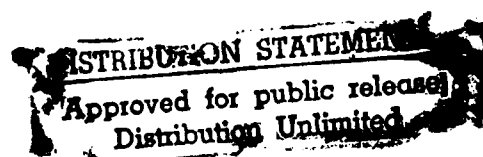
SUBJECT: United States Army Concepts Analysis Agency FY 92 Annual Report

1. Throughout Fiscal Year 1992, the United States Army Concepts Analysis Agency (CAA) remained fully involved in conducting the many studies, evaluations, and planning activities supporting the Army transformation plan. As the crucial process of reshaping the Army and reorienting its mission on redefined National Security and National Military Strategies proceeds, CAA will continue systematically assessing the many pressing issues emanating from such fundamental change. Central to the force reshaping process are many CAA analytical efforts aimed at identifying, evaluating, and supporting actions promoting the Army's fullest combat potential in a downsized force. These analyses and those that will follow are vital for minimizing the risks of downsizing and assisting in mapping the way to the most efficient and effective Army for the future.

2. At the close of FY 92, CAA emerges as a smaller more streamlined organization with a clear focus on the analysis needs of an Army in transformation. As CAA continues sharing in the difficult and painful process of downsizing, the increasing impacts of the continued decline in operating resources will constrain CAA's analytical support capabilities and present a formidable challenge. That challenge will be to continue meeting today's most important analysis needs, maintaining quality, and preparing capabilities for answering future analysis needs. If we are to meet that challenge, core analytical skills and production capabilities must be sustained.

3. This publication presents CAA's analytical contributions to the Army during FY 92 and serves as a report of Agency stewardship. Given the difficult challenges confronting CAA during this period, this record of performance is impressive. Throughout FY 92, CAA effectively and responsively met the Army's most important analyses needs with recognized high quality products.

E. B. VANDIVER III
Director



FY 92 ANNUAL REPORT

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CHAPTER 1

INTRODUCTION AND OVERVIEW

US ARMY CONCEPTS ANALYSIS AGENCY FY 92 ANNUAL REPORT

- **Report Purpose.** The Fiscal Year (FY) 1992 Annual Report profiles the US Army Concepts Analysis Agency, highlights key elements of FY 92 mission performance, presents the current posture of the Agency, describes CAA's direction for the near-term future, and serves as the historical record of the Agency's activities for FY 92.

- **Report Organization.** This report is organized into the eight major components illustrated at Figure 1-1 and described below.

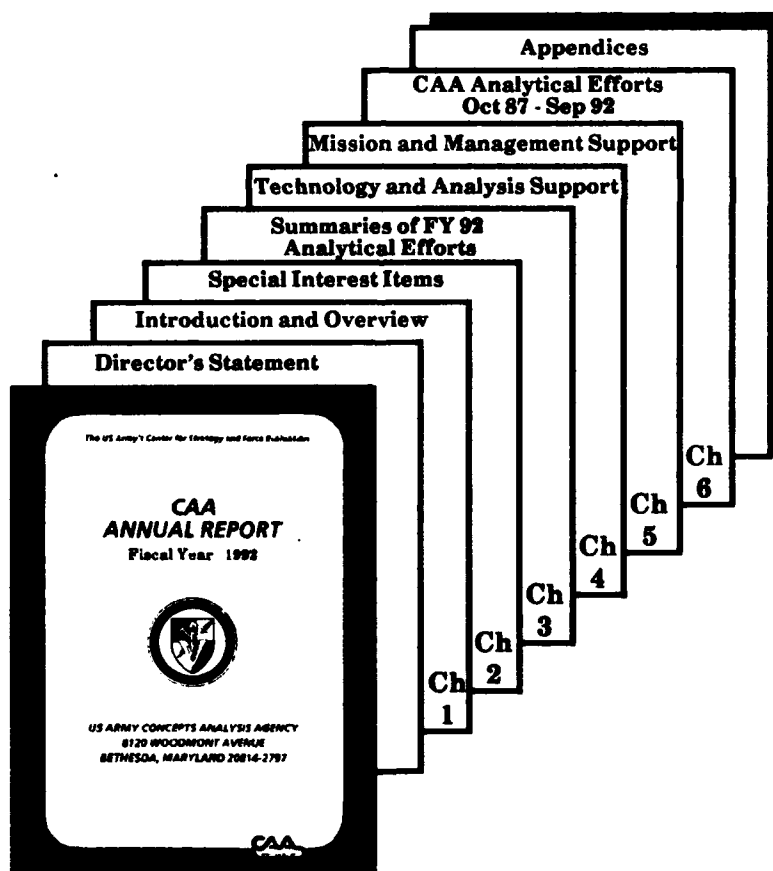


Figure 1-1. Organization - FY 92 CAA Annual Report

The Director's Statement which-

- Summarizes FY 92 mission performance
- Profiles the state of the Agency
- Articulates the Director's vision for CAA's near-term future (1 to 3 years out).

Chapter 1 presents --

- An introduction to the FY 92 Annual Report
- An introduction to CAA and its organization, mission, products, and sponsors
- A background CAA perspective on global trends
- A profile of FY 92 analysis support to sponsors
- A statement on CAA's Total Quality Management (TQM) program
- An identification of CAA's near-term future objectives
- A summary.

Chapter 2 highlights selected CAA analysis activities considered to be of special interest.

Chapter 3 contains summaries of CAA analytical efforts completed during FY 92.

Chapter 4 describes selected technology research and analysis support activities.

Chapter 5 highlights internal CAA mission and management support activities and the stewardship of resources.

Chapter 6 chronologically lists all CAA analytic efforts completed during the past 5 years.

Appendices present information to supplement selected topics addressed in other sections of the Report.

CAA ORIGIN, ORGANIZATION, MISSION, PRODUCTS, AND SPONSORS

• **Origin.** CAA was formed as a result of the 1973 STEADFAST Army reorganization study which combined missions, functions, and elements of the former Combat Developments Command (CDC) and the Strategy and Tactics Analysis Group (STAG), Figure 1-2. CAA was created to function as the central force analysis activity for the Department of the Army and its leadership.

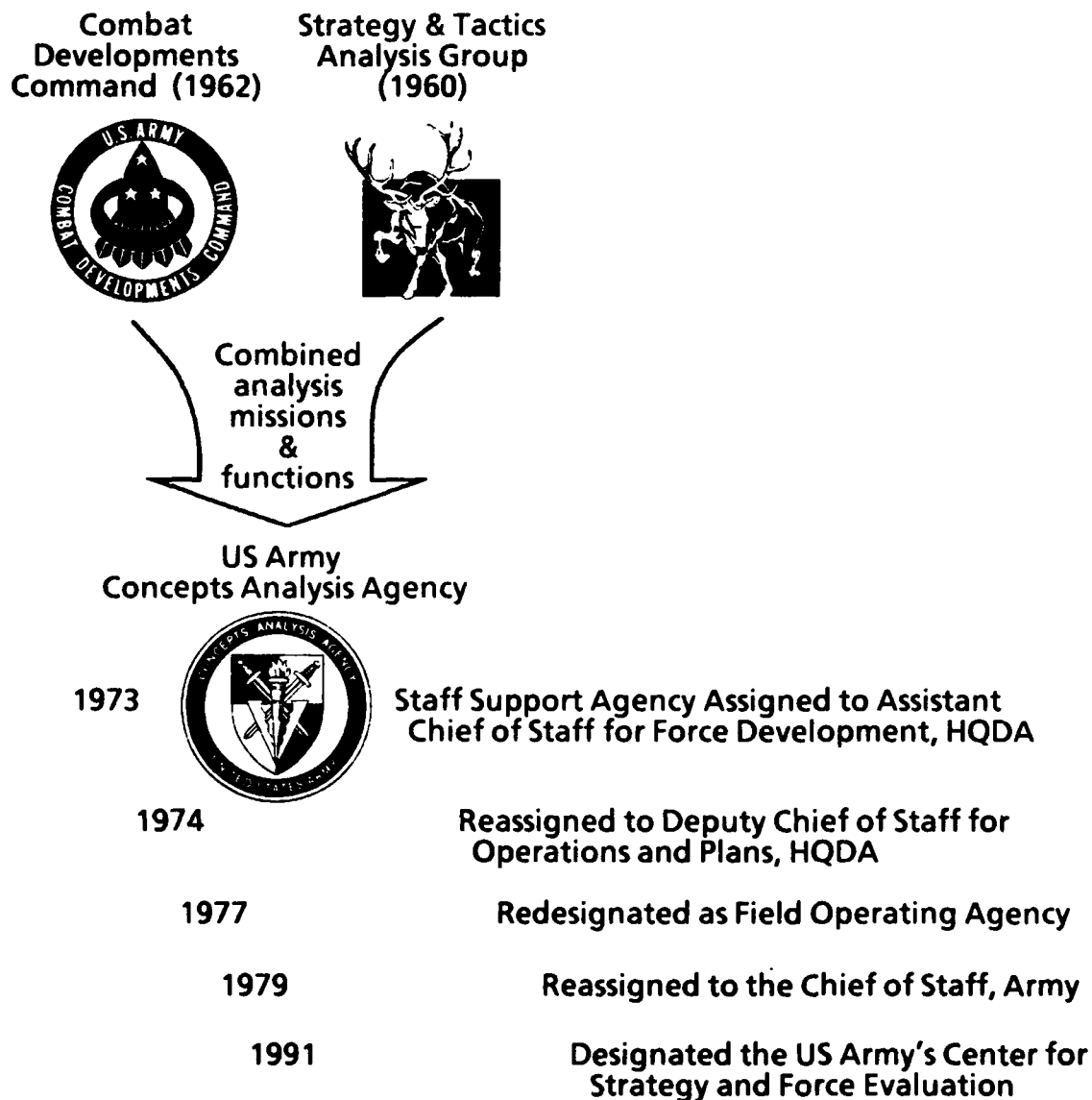


Figure 1-2. CAA History - 32 Years of Analysis Support to the Army

- **CAA Organization.**

- CAA has evolved over the years to its current organizational structure as a field operating agency (FOA) of Headquarters, Department of the Army (HQDA). While the primary role of CAA remains to support HQDA and Army leadership, its analytic activities have expanded to encompass a wide range of analytical services performed in support of virtually all Army elements, and occasionally other Department of Defense (DOD) and US government agencies.

- CAA's organization is comprised of the Office of the Director; five directorates -- Strategy and Plans, Force Systems, Force Evaluation, Research and Analysis Support, and Management Support; the Office for Operational Capability Assessments; and the Office for Data Management and Model Validation. CAA's organization is represented by Figure 1-3.

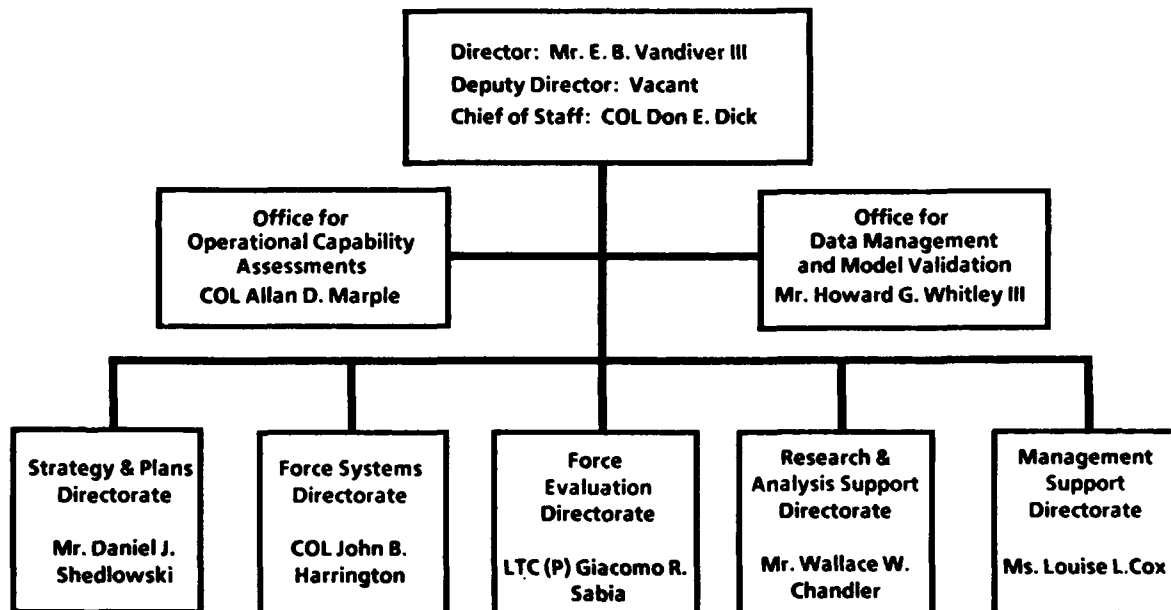


Figure 1-3. US Army Concepts Analysis Agency

- **Mission.**

- Within the overall Army analytical framework (Figure 1-4), CAA is designated as The US Army's Center for Strategy and Force Evaluation. CAA is assigned the primary mission of assessing strategies, strategic concepts, broad military options, resource allocation alternatives, and analyzing Army force-level capabilities and requirements in the context of joint and combined forces.

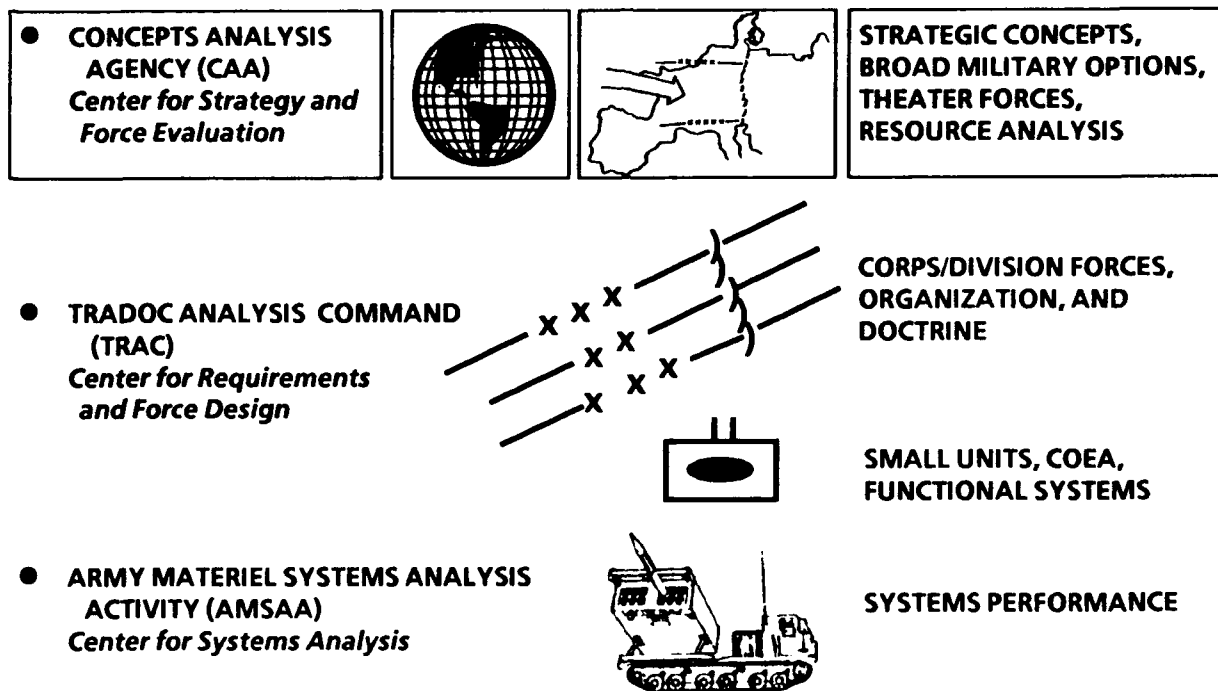


Figure 1-4. CAA's Mission Within the Army Analytical Framework

- The purposes of CAA analyses are to: assist the Chief of Staff, Army evaluate, plan, and execute the Army's strategic force mission; assess alternative resource applications; and determine requirements and establish objectives for joint and combined theater, regional, low-intensity, and contingency forces.

- CAA force analyses focus on integrating scenarios, operating concepts and objectives, unit and materiel performance characteristics, and the operating parameters of the regions for which forces are constituted. These analyses establish the framework for analyzing lower level operating forces and systems.

- CAA's analytical range extends from immediate issues to identifying and evaluating issues of the future.

• CAA's Analytical Products (Figure 1-5).

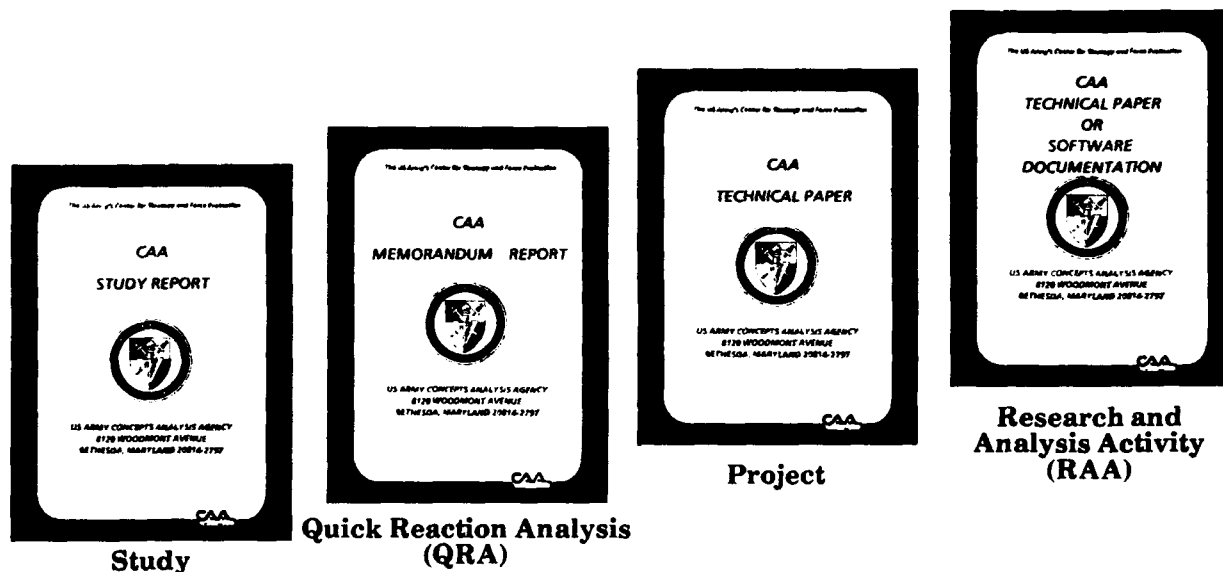


Figure 1-5. CAA's Primary Analytical Products

- CAA accomplishes its analysis support mission by producing analyses addressing a wide range of issues. Included at the upper end of the spectrum are analyses of global strategies, scenarios, and major theater-level and regional warfare studies. These assess requirements and capabilities of Army forces in a joint and combined forces context. Analyses at the lower end of the spectrum address issues such as low-intensity warfare, drug interdiction, and the value added of competing materiel acquisition programs.

- Studies and quick reaction analyses (QRA) are the primary products CAA delivers to sponsors. Historically, studies have been CAA's predominant method for meeting sponsors' analysis needs. These large-scale and sometimes protracted efforts were generally geared to addressing a broad range of complex issues within relatively stable global environments. But, in today's era of rapid change, there has been a burgeoning demand for quick reaction analyses. Today, CAA increasingly applies the results of complex studies in concert with analytical models and innovative methodologies to conduct rigorous QRA.

NOTE: CAA uses five major categories for defining work efforts. These categories and associated performance criteria are identified at Appendix A. Detailed definitions of each category are contained in Appendix B.

- CAA has kept pace with sponsors' increasing needs for responsive and incisive analyses through an expanding program of operationally and strategy oriented QRA efforts. Beginning in FY 88, the number of QRA which CAA performed increased annually through FY 91 and appears to have leveled off at the FY 91 level during FY 92. The annual mix of studies versus QRA which CAA now performs is about 1 to 3 (25 percent studies and 75 percent QRA).

- The graph on the left in Figure 1-6 illustrates the increasing number of analytical products CAA delivered to sponsors over the past 4 years. The graph on the right illustrates the reorientation of CAA analytical focus to meet increasing sponsor demands for QRA and the apparent stabilization in the mix of CAA analytical products (studies versus QRA). Since studies provide the foundation for most QRA, they are not expected to decline below the FY 90-92 level.

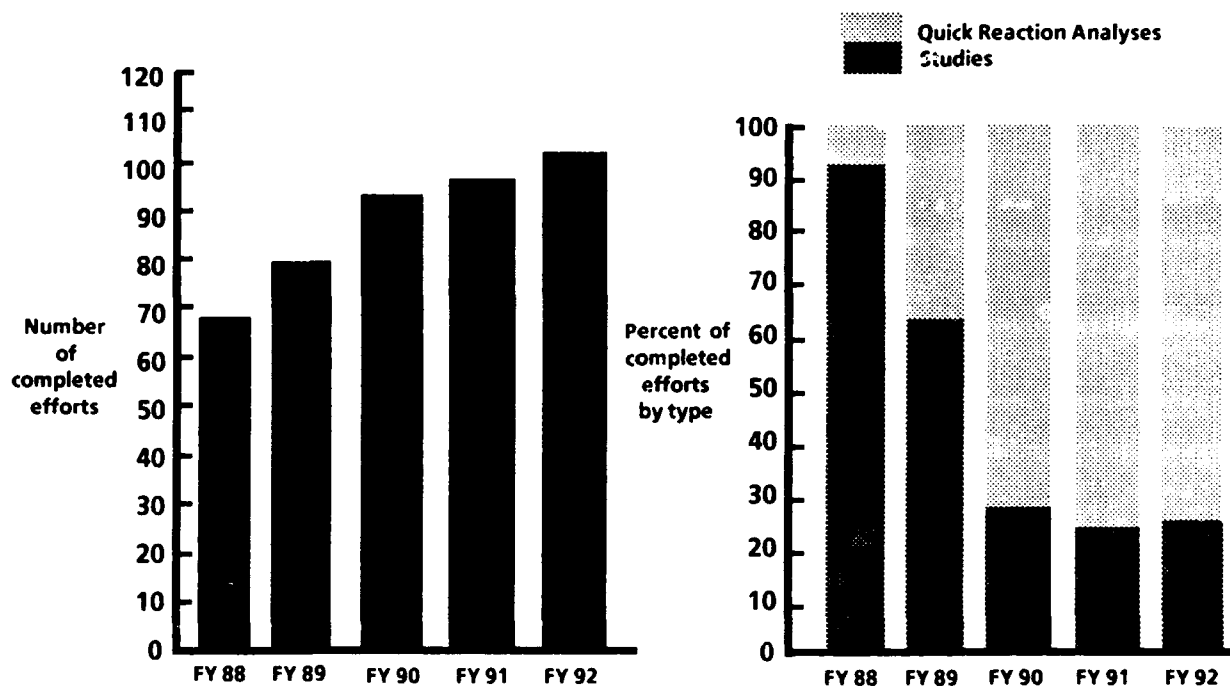


Figure 1-6. CAA Analytical Products Delivered to Sponsors

- Another large and equally important segment of CAA work which is not identified in Figure 1-6 involves developing and maintaining a wide variety of models and simulations, conducting research and analysis aimed at sustaining and promoting modern analytical capability, and performing special analytical projects. Declining resources have begun to significantly erode work in these important areas. The likely impacts of a prolonged curtailment in these areas are discussed in the TQM section below.

• **Sponsors.** CAA's primary mission is to provide analytical support to HQDA and Army leadership. Resources and priorities permitting, CAA analysis support is also provided to Major Army Commands (MACOMs), other Army activities, and occasionally other Department of Defense (DOD) and US government agencies. Figure 1-7 presents a breakout of CAA's FY 92 analysis support to Army sponsors. The "Other" category includes: the Secretary of the Army; Chief and Vice Chief of Staff, Army; Director of the Army Staff; the Deputy Under Secretary of the Army (Operations Research); the Deputy Chief of Staff for Logistics; the Deputy Chief of Staff for Personnel; Assistant Secretary of the Army for Manpower and Reserve Affairs; Director of Program Analysis and Evaluation; the Army Surgeon General; Chief of Engineers; and the Operational Test and Evaluation Command.

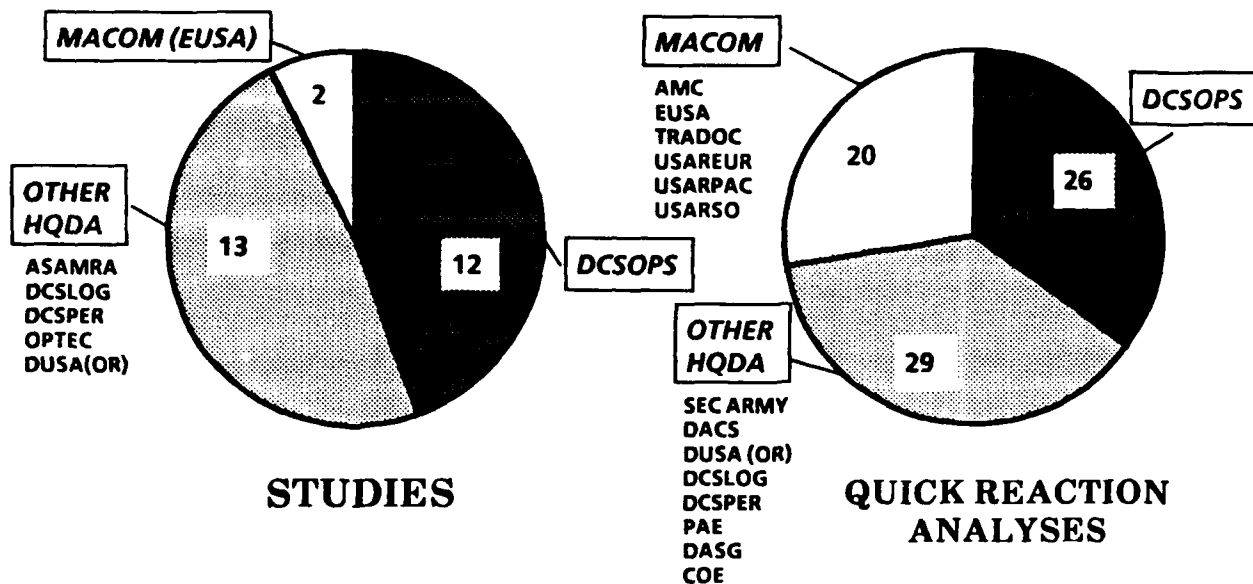


Figure 1-7. FY 92 Analytical Products - Proportion and Number of Work Units Delivered to Sponsors

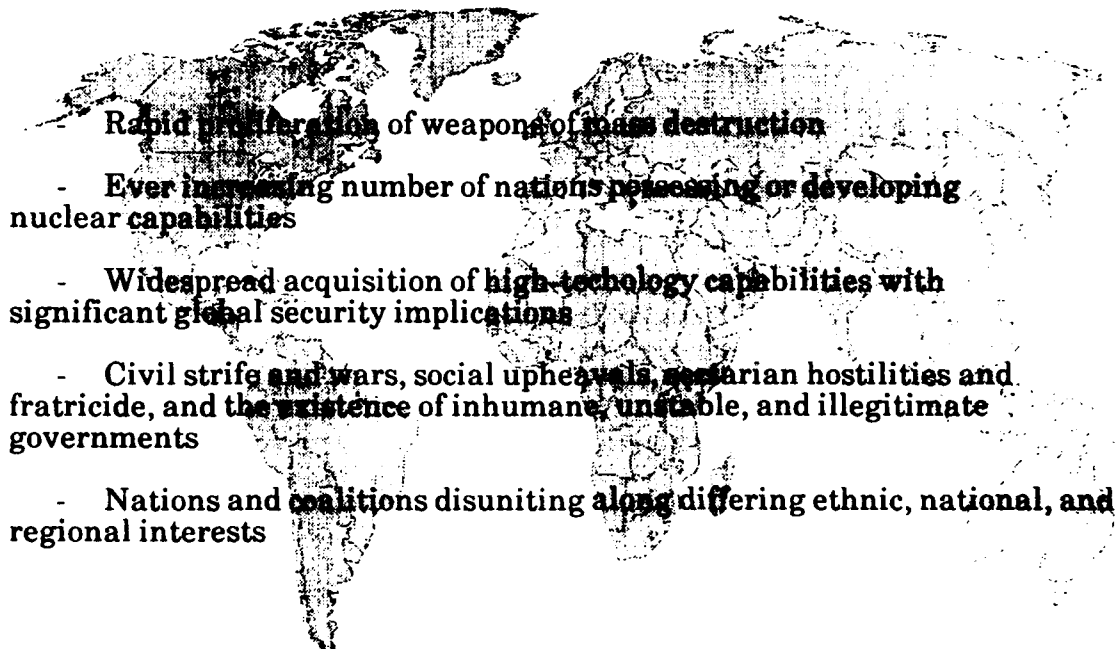
CAA PERSPECTIVE ON GLOBAL TRENDS

Planning the strategic posture of the future Army in the current dynamic, uncertain, and fundamentally altered environment poses difficult analytical challenges. At no time in recent history has there been such enormous social, economic, and military upheavals, wide-ranging opportunities, and the advent of so many new and ill-defined dangers. Today, forecasting and planning for the future involves a much higher degree of uncertainty and risk (Figure 1-8). Indeed, the planning scenarios themselves have become the key variables in examining a wide range of potential conflict situations.



Figure 1-8. Forecasting and Planning Involves a Higher Degree of Uncertainty and Risk

• While the immediacy of a holocaustic strategic threat has receded and the identity and complexion of the future threat may have blurred, threats have certainly not been eliminated. Although of a fundamentally different nature, the world remains a distinctly dangerous place with the potential for widespread aggression, rapidly escalating hostilities, terrorism, and other nontraditional threats such as that posed by the drug invasion. Assessing the nature and extent of this threat is made difficult by the large element of the unknown. Among the more serious trends contributing to these ill defined threats are:



• A Vision of Tomorrow.

The predominant view shared by most nations today is that the United States is the principal force for peace, stability, and progress. This view will continue into the 21st Century as the world continues adjusting to the forces of major geopolitical and economic change. As the victor of the Cold War, it can be expected that the United States will be urged to exercise increasing roles in nation building, peacekeeping, and world leadership within a slowly growing sphere of democratic nations. An indispensable element propelling this trend will continue to be a credible US deterrent and defense posture. Absence of a credible US deterrent can be expected to have a destabilizing effect in many areas throughout the world. The fundamental and complementary elements of this deterrent posture are a forward presence, crisis response, and reconstitution.

Despite the general trend toward democracy and peace, many important areas of the world are unstable, and the attendant unresolved issues have the potential for igniting major armed conflict. In any of these areas, the United States could be called upon to use force to preserve freedom and protect vital national interests. The basis for planning and preparing the Army's defense posture in this environment are the major regional scenarios set forth in the Defense Planning Guidance (DPG).

In the current transformed and volatile environment, the difficulties of evaluating the impacts of change, postulating a cohesive vision of the future, identifying and assessing issues and risks, predicting outcomes, and evolving perceptive strategies and plans are all greatly amplified. But the need to evaluate, plan, prepare, and, if necessary, respond, remains as important as ever. A large segment of CAA analyses continues to be directed to evaluating these complex issues and providing well-reasoned analysis for decisionmaking and planning. Selected CAA efforts in this area are highlighted in Chapter 2 of this report.

CAA continues evolving the planning and analytical approaches needed for evaluating the Army's future preparedness within a dramatically changed defense paradigm. As the Army and CAA continue the process of assessing the implications of this new defense environment, we are systematically examining the multitude of issues surrounding:

- Rebalanced National Security and National Military Strategies
- A refocused Army mission
- A resized force structure, and
- Redefined requirements for mobilization, deployment, and reconstitution.

• CAA analyses supporting strategy and planning have moved away from preparing for a superpower global war to downsizing and preparing to respond to regional contingencies. The major regional contingencies (MRC) set forth in Defense Planning Guidance now form the bedrock for planning the future Army. Applying the recently developed Army Strategic Force Architecture (ARSTAR) methodology to these scenarios, CAA has assessed force structure planning requirements for achieving the strategic and operational objectives of each MRC (Figure 1-9).

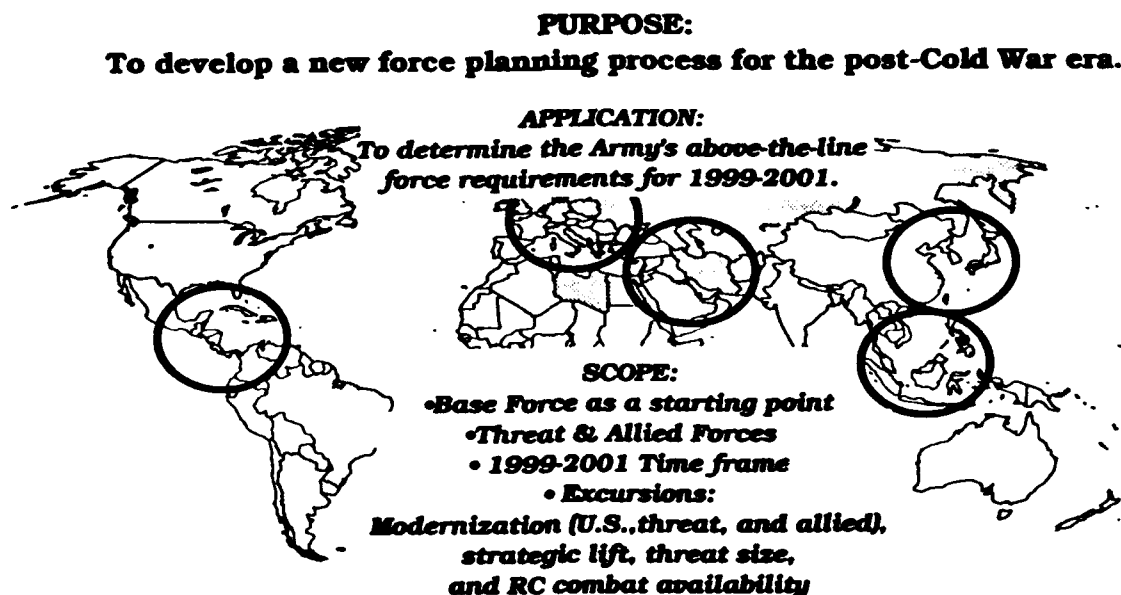


Figure 1-9. ARSTAR - A New Force Planning Process for the Post-Cold War Era

● The ARSTAR process evaluates the relative threat and risk associated with each regional scenario and combines the results of these analyses to derive uniform threat and risk factors for use in the Army force planning and programming processes (Figure 1-10).

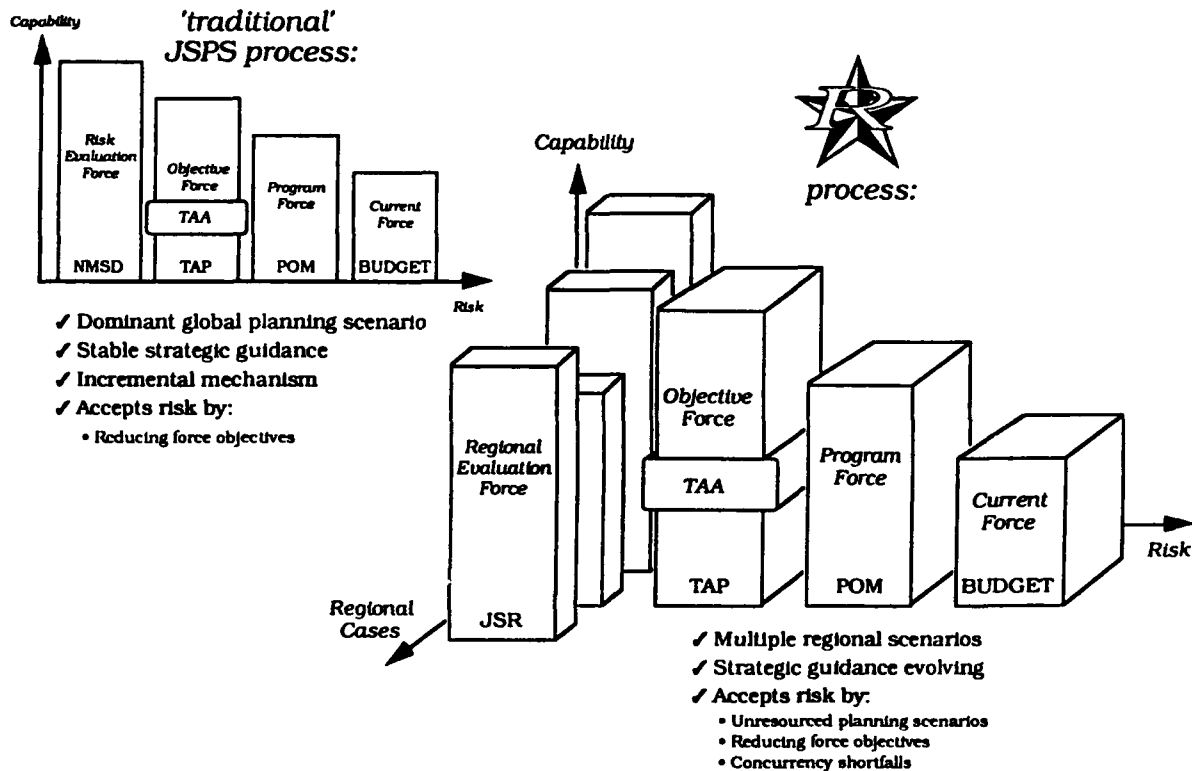


Figure 1-10. The ARSTAR Planning Process Calculates Force Structure Requirements Under a Combined Regional Risk Assessment

OVERVIEW - FY 92 CAA ANALYSIS PROGRAM

● **CAA's Goal.** The goal of CAA is to provide high quality, incisive, and timely analyses that promote a strategic Army, capable of decisive victory, that can mobilize and deploy wherever necessary to preserve freedom and protect interests vital to a Free World.

● **Major Thrusts of CAA's Analyses.** Throughout FY 92, CAA directed its main effort to defining and assessing the implications of the radical shift in the preexisting global security paradigm and translating these into discrete analysis for planning and decisionmaking. The CAA FY 92 work program clearly reflected the ongoing impacts of global change and the evolving National Military Strategy. At the core of CAA analyses were efforts aimed at evaluating the many challenges, concerns, and risks of downsizing and reconfiguring to achieve a more efficient and effective Army amidst a world transformed. The primary thrusts of these analyses were to-

- Promote maximizing Army combat potential in a downsized force
- Evaluate and identify actions most likely to foster preparedness, deterrence, peace, and stability
- Identify and evaluate potential and evolving security threats, issues, and risks
- Postulate potential and likely emerging global scenarios
- Evaluate and identify the best methods of preparing the Army to meet the challenges of a new threat environment
- Produce the wide range of analyses and planning data necessary for posturing the Army to support a redirected National Military Strategy
- Prepare for unexpected crisis.

● **CAA Program Responsiveness.** Some examples of analyses initiated or completed during FY 92 which reflect the sensitivity of CAA's analytical focus to global events and the ongoing major refocus in National Military Strategy are cited in Figure 1-11 below. As can be seen by these examples, CAA continued to be fully engaged in conducting the numerous studies, evaluations, and planning activities necessary for bringing about the Army's strategic reorienting process in a cogent and effective way. Most of these efforts, along with others, are discussed in more detail in Chapters 2 and 3 of this report. Some of the more notable ones are highlighted just below Figure 1-11.

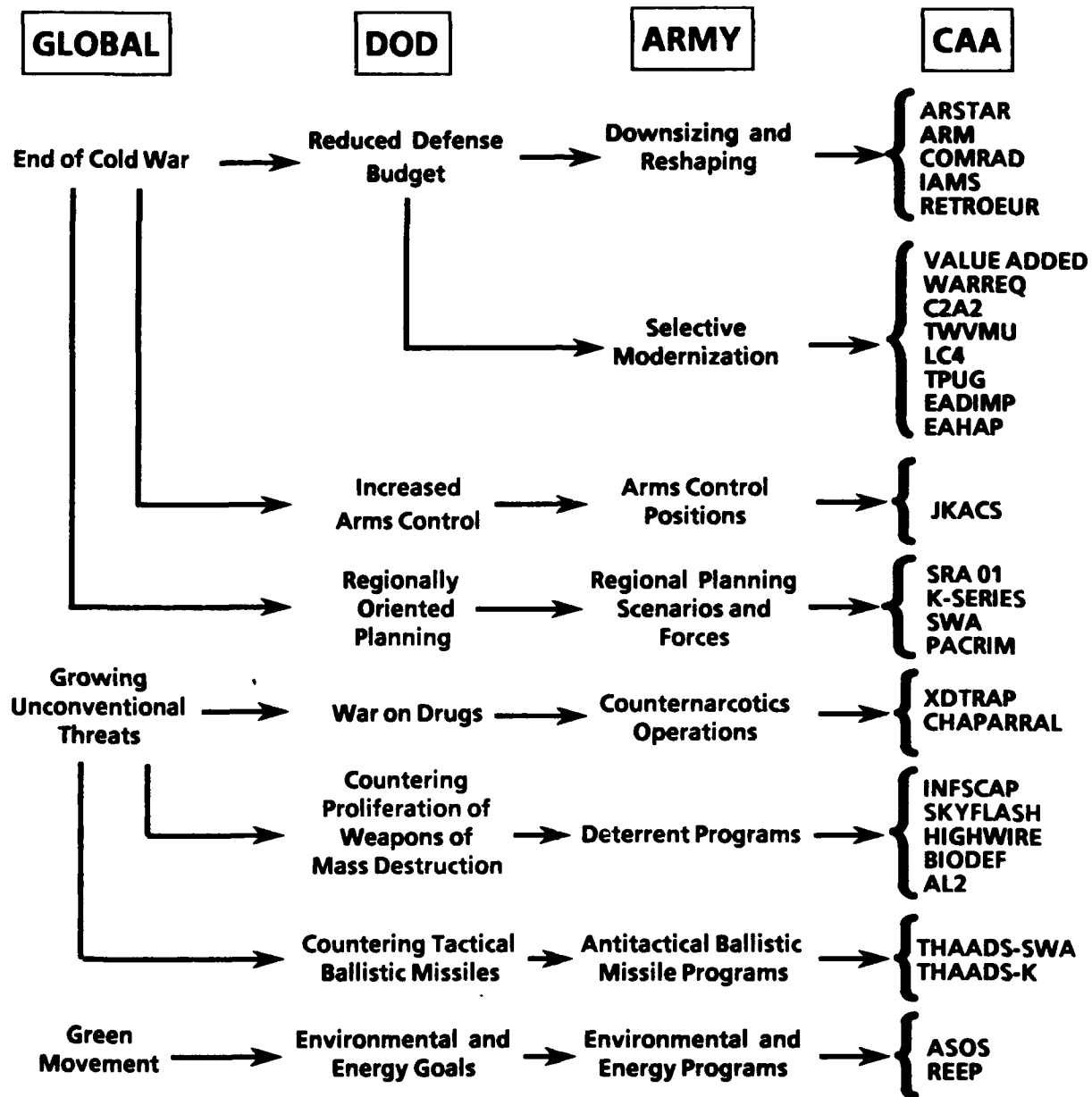


Figure 1-11. CAA Sensitivity to Change - Addressing the Army's Emerging Analysis Needs

- Army Strategic Force Architecture (ARSTAR) - Developed a new force planning process for the post-Cold War era.
- Active Component/Reserve Component Mix (ARM) - Ongoing assessment of alternative sizes and AC/RC mixes of major combat, combat support, and combat service support forces to meet current Defense Planning Guidance scenario requirements.

- **European Retrograde Analysis (RETROEUR)** - Ongoing evaluation of total costs and impacts of alternative Army materiel drawdown (retrograde) options in Europe.

- **Value Added Analysis (VAA)** - Developed and applied an analytical process for performing rigorous cross-mission modernization analysis.

- **Joint Korean Arms Control Study (JKACS)** - Developed and evaluated a range of candidate arms control proposals covering nuclear, chemical, biological, and conventional air and land forces in both operational and structural regimes.

- **CINCCFC Operation Plan (OPLAN) Analysis** - Developed comprehensive assessments of CINCCFC OPLANs for Korean theater and identified alternatives.

- **Counterdrug Transportation Analysis Program (XDTRAP)** - Developed and applied a quick response methodology and computer model for assessing the effects of alternative counterdrug actions.

● **Profile Of FY 92 CAA Analysis Program.**

- During FY 92, CAA produced a record total of 102 distinct analytical products for sponsors. This was an increase of 4 over last year's record level of 98 products delivered to sponsors. CAA also completed an additional 36 analytic efforts in direct or indirect support of these sponsored efforts. This accomplishment is notable since it occurred during a period of declining CAA manpower. This achievement is indicative of the capabilities of CAA's work force and the positive contribution of CAA's Total Quality Management (TQM) program to FY 92 productivity (see TQM section below).

- A summary of CAA's FY 92 work completions by analytic category and sponsor is provided at Table 1-1.

Table 1-1. CAA FY 92 Work Program Summary

Sponsor	No of studies	No of QRAs	No of projects	No of RAAs	Total
DCSOPS	12	26	3	N/A	41
DCSPER	1	4	0	N/A	5
DCSLOG	1	3	0	N/A	4
DUSA-OR	4	3	6	N/A	12
Other DA Staff	2	17	4	N/A	24
MACOM	3	20	2	N/A	24
Joint Service	0	0	1	N/A	1
Other DOD	0	0	0	N/A	0
Other sponsorship	4	2	1	19	27
Total	27	75	17	19	138

- Figure 1-12 profiles CAA professional staff year (PSY) utilization by analytic category.

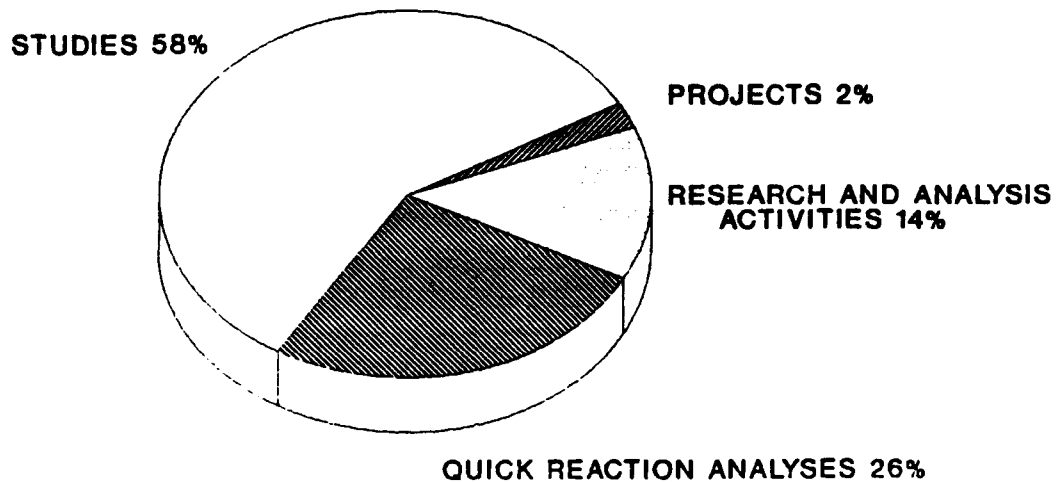


Figure 1-12. CAA PSY Utilization by Analytic Category

- CAA PSY used in performing studies and QRA during FY 92 is profiled by sponsor in Figure 1-13.

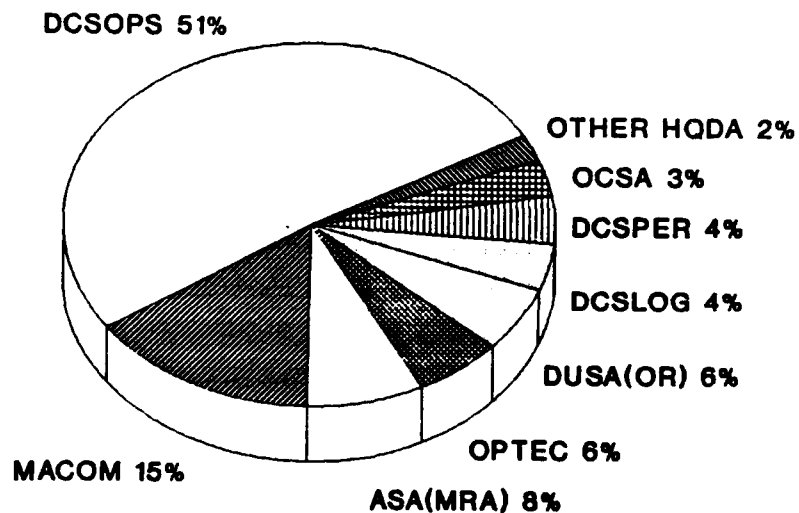


Figure 1-13. Sponsor Utilization Profile of CAA In-house PSY Used in Performing Studies and QRA During FY 92

- **Total Quality Management (TQM).**

- TQM played an important role in helping CAA fulfill sponsor needs while simultaneously coping with declining resources and reorienting CAA main focus on global change. During the past several years, CAA has increasingly emphasized TQM as an integral part of Agency operations. CAA's record performance this past fiscal year indicates that we again have experienced dividends from TQM investments.

- During FY 92, CAA delivered a total of 102 analytical products to sponsors (Table 1-2). While this represents a modest increase over the FY 91 level of 98 total products delivered, it is nonetheless impressive because of the FY 92 impacts of the civilian hire freeze and the voluntary and involuntary early retirement and separation programs for Army officers.

Table 1-2. Annual CAA Production (studies/QRA)

	FY 90	FY 91	FY 92
Studies	26	23	27
Quick reaction analyses (QRA)	67	75	75
Total	93	98	102

- In the analytical services arena, quantitative output measures alone are inadequate for gauging success. Quality and value added evaluations have more importance, for it is common knowledge that good analysis is generally indispensable to sound decisionmaking, and bad analysis can be disastrous.

- CAA emphasizes an aggressive quality management program which encompasses all analytical activities. This program consists of Analysis Review Boards, Product Review Boards, process reviews, peer reviews, in-progress reviews, and sponsor critiques. These are formal mechanisms necessary for ensuring product quality and continued interaction with sponsors throughout the study process. The more important TQM activity is a comprehensive program of continuous process improvement in which Process Action Teams (PATs) seek to improve all CAA technical and business processes.

- A portion of CAA work is devoted to developing, maintaining, and improving complex models and simulations, conducting research and analysis aimed at sustaining and promoting modern analytical capability, and developing professional staff expertise. Declining resources (Figure 1- 14) and the priority CAA places upon fulfilling sponsor analysis needs have curtailed work in some important developmental areas such as model development and improvement. The impact of a protracted work erosion in these areas vital to future CAA mission capabilities makes this unacceptable as a long-term solution. Some examples of ongoing CAA developmental work efforts which are considered vital for addressing future Army issues are cited below.

<u>Mission Area</u>	<u>Current Methodology</u>	<u>Developmental Methodology</u>
Mobilization	TM3	MOBCEM
Deployment	TRANSMO	GDAS
Warfighting	CEM FORCEM COSAGE CFAW CORBAN	STOCEM CTL5 NXG
Sustainment	FASTALS CALAPER PFM	FASTAUTO

- CAA has in place an effective TQM program, has undertaken prudent austerity measures, and now seeks to rebalance resource investments between near-term productivity and key developmental efforts necessary for sustaining future analytic capabilities. In view of the likelihood of continued manpower losses (Figure 1-14) and the need to sustain a robust development program, CAA anticipates a possible decline in the number of products which will be delivered to sponsors during FY 93.

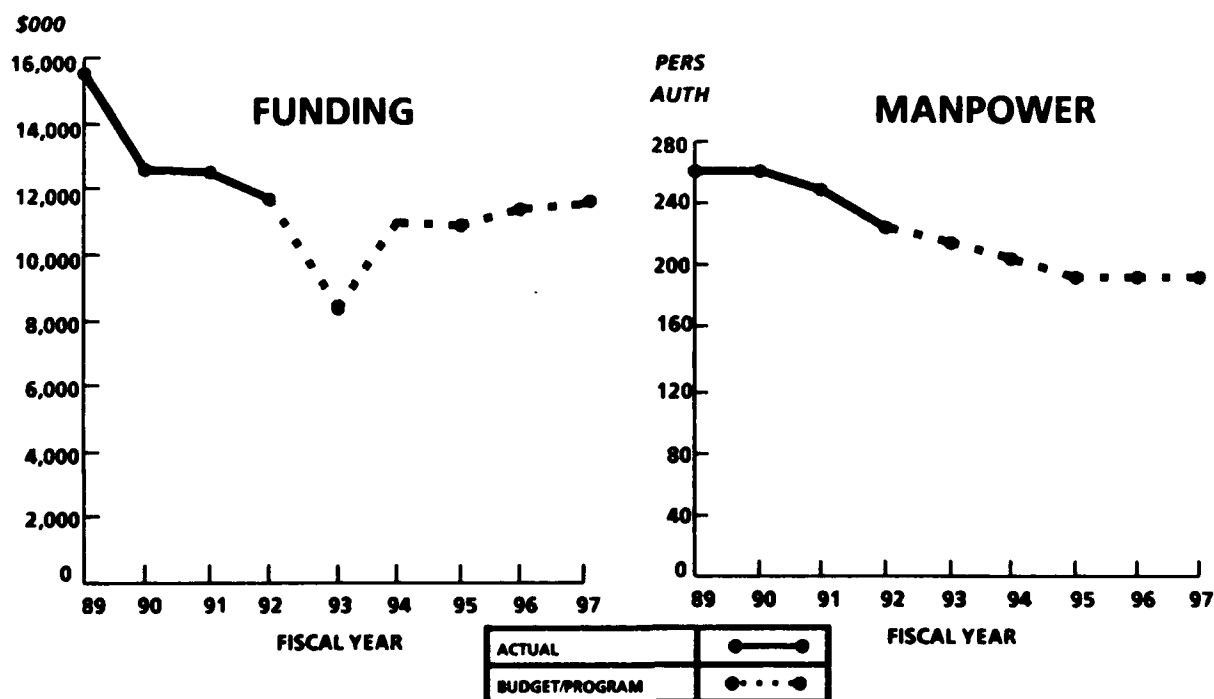


Figure 1-14. CAA Resource Trend

NEAR-TERM OBJECTIVES (1 TO 3 YEARS OUT)

● **Current Posture.** At the close of FY 92, CAA was fully engaged in conducting many of the studies, analyses, and planning activities required for transitioning to a leaner, more agile strategic force. Concurrently, CAA is continuing to evolve selected models, wargaming, and resource evaluation and trade-off methodologies, techniques, expertise, and other tools that will be needed for addressing tomorrow's issues. The continued resource decline, particularly in manpower, is beginning to constrain these important activities. Priority areas where CAA core analytical capabilities must be sustained are:

- Reorienting the force: analyses of threat, downsizing, retrograde, mobilization, and reconstitution issues
- Identifying and assessing emerging global security issues
- Economic analyses for Army personnel, materiel acquisition, and retrograde planning and programming
- Theater- and regional-level warfare analyses
- Operational and contingency planning assessments
- Analyses of joint and combined issues
- Arms control, disarmament, and force reduction assessments
- Special operations and low-intensity conflict analyses
- Assessments of nuclear, chemical, and biological warfare issues
- Quick reaction analyses of pressing issues
- Support to other national objectives and military operations (e.g., narcotics interdiction and disaster assistance)

● **Future Strategies and Objectives.** In the near-term, CAA will emphasize efforts aimed at:

- Maintaining the highest quality work force and productivity level possible within reduced staffing levels
- Developing scenarios which incorporate the political aspects of military operations
- Sustaining a balanced program of advancements in methodologies, techniques, modeling, and professional development activities that will promote future analysis capabilities

- Expanding theater-level analysis expertise to more fully encompass regional planning scenarios
- Refining and institutionalizing improved analysis support to the Army Planning, Programming, Budgeting, and Execution System
- Sustaining and reorienting capabilities for dynamic planning and combat analysis to areas impacted by the evolving National Military Strategy; continuing capabilities for responsive crisis and contingency analysis
- Evaluating mobilization, regional power projection, and reconstitution capabilities and requirements
- Maintaining a total quality management program
- Identifying promising avenues for achieving economies of operation through inter-Agency resource sharing
- Conducting research and development aimed at identifying and evaluating advanced analytical techniques and technologies for potential use.

SUMMARY

- Throughout FY 92, CAA remained fully engaged in conducting the numerous studies, evaluations, planning, and developmental activities necessitated by the global security transformation and the reorientation of the National Military Strategy. As the Army's leadership continues systematically addressing the countless changes and decisions emanating from these fundamental alterations, the need for and importance of quality, responsive analyses will be paramount.
- Many of the decisions made during this crucial transition period will undoubtedly have profound and long-lasting implications for the Army and the Nation. Decisions in the post-downsizing era will be no less critical to the Army's ability to respond effectively to future crises. For these reasons, we must now be looking carefully to ensure the robustness of the Army analysis infrastructure so that risks of downsizing may be minimized. A vital element in minimizing these risks will continue to be analyses that assist in mapping the way to the most efficient and effective Army for the future.
- This publication chronicles FY 92 CAA activities and analytical contributions to the Army. In view of the many challenges confronting CAA during FY 92, CAA achievements represent an impressive accomplishment when viewed collectively. Throughout FY 92, CAA effectively and responsively met the Army's most important analyses needs with high quality products. CAA increased output and productivity while simultaneously managing a significant decline in operating resources.

- As CAA continues to share in the difficult and painful process of downsizing, the increasing impacts of the continued decline in resources can be expected to result in fewer products being delivered to sponsors during FY 93. Next year CAA will confront a formidable challenge. That challenge is meeting the most important analysis needs of the Army while maintaining quality and preparing CAA capabilities to meet demands that will be presented by future Army analysis needs.

CHAPTER 2

ANALYTICAL EFFORTS OF SPECIAL INTEREST

SUPPORT TO ARMY STRATEGIC PLANNING

- **Army Strategic Force Architecture (ARSTAR) Study.**

- The Army Strategic Force Architecture (ARSTAR) Study undertook to fill the void in the force structure planning process resulting from the disintegration of the Warsaw Pact and the Soviet Union by developing a new force structure planning process for the post-Cold War era. The ARSTAR Study, which spanned a period of more than a year, involved detailed analysis of the Army force structure planning process. The ARSTAR Process that has been developed has emerged as the Army's force planning paradigm in the post-Cold War era. This process is divided into the four distinct stages of inquiry depicted in Figure 2-1 and described below.

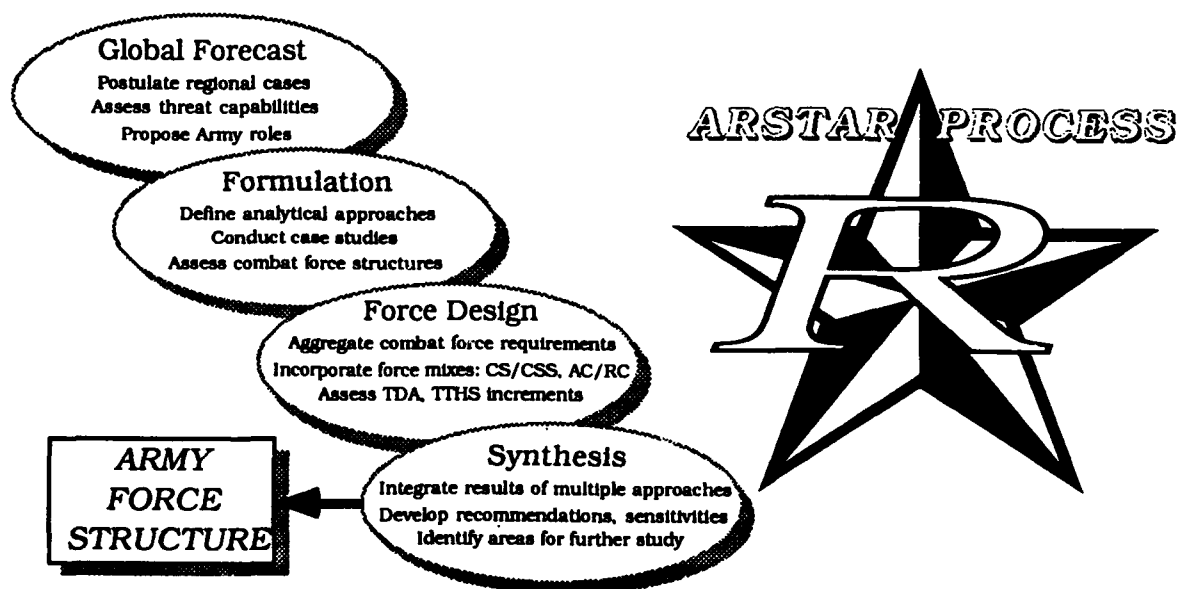


Figure 2-1. Army Strategic Force Architecture (ARSTAR) Process

- **Global Forecast:** the global forecasting stage identifies potential crisis areas and formulates regional cases based upon the prospective response from the United States and the appropriate level of that response on the force employment spectrum. Where appropriate, a dominant regional planning case is identified.

- **Formulation:** the formulation stage proceeds from the Global Forecast by applying static and dynamic analyses to assess the divisional force requirements associated with varying strategic objectives under the selected regional planning cases. The assessments for each case are integrated to develop a single recommended force for each objective considered.

- **Force Design:** the force design stage integrates the various regional force alternatives to derive a single cohesive divisional force structure using the priorities and objectives of the National Military Strategy. In addition, some resource requirements necessary to support and sustain the force are identified and estimated. These requirements include combat support units, combat service support units, general support forces, and the individuals account (transients, trainees, holdees, and students - TTHS).

- **Synthesis:** the synthesis stage examines sensitivities associated with the assessment assumptions and their effect on the derived force structure. Appropriate adjustments result in a final force structure recommendation.

- **Army Strategic Force Architecture 92 (ARSTAR 92).**

- The DCSOPS commissioned the ARSTAR 92 Study to adapt the ARSTAR process for use in examining the combat forces required to successfully achieve the strategic and operational objectives of each major regional conflict specified in the Defense Planning Guidance (May 1992).

- The ARSTAR methodology was used to determine the total force requirements for achieving the objectives established for each MRC scenario. Various excursions were conducted from the specified force structure for each scenario to determine the sensitivity of the campaign assessment to critical assumptions concerning strategic lift, threat size, modernization levels, and unit availability.

- The study also evaluated the definition of decisive victory in terms of time required to terminate conflict and casualties generated as the level of US force commitment changed. From the results of numerous campaign analyses, the requirements for decisive force were further defined and key insights highlighted.

- ARSTAR 92 serves as the basis for several other analytical efforts that concern unit component, forward-stationing, and prepositioning of equipment.

- **Active and Reserve Mix (ARM).**

- The ARM Study continues providing quality analytical support to Army Staff elements engaged in evaluating the results of the Congressionally directed Active Reserve Mix Study by the RAND Corporation. In-progress ARM study reviews continue to be presented to senior leadership within the Army, Joint Staff, and Office of the Secretary of Defense. The final ARM Study report will be published early in 1993.

- The Congressional mandate for the ARM Study is contained in the 1992 Defense Appropriations Act that requires an assessment of the structure and mix of the wide array of Active and Reserve force alternatives in two parts.

- Part one of the assessment requires an independent study of the problem (study led by the RAND Corporation, Figure 2-2). Part one is to be completed not later than 1 December 1992. For the second part of the study, the SECDEF is required to submit to Congress by 15 February 1993 an evaluation of the various force alternatives examined by the independent RAND study effort. The second part of the mandated assessment is being addressed by the CAA ARM Study.

The CAA ARM Study is providing integrated analytical support to the ARSTAF during all phases of the Congressionally mandated study effort. The CAA ARM Study has three objectives. First, the study aims to monitor and assess key aspects of the RAND study both to assist the RAND effort and provide a basis for rapid evaluation of RAND's force alternatives. Next, the study will provide an analytical assessment of the ability of the force alternatives to execute the National Military Strategy in the Defense Planning Guidance scenarios. Finally, the study will evaluate the costs and affordability of the alternative Active and Reserve mixes.

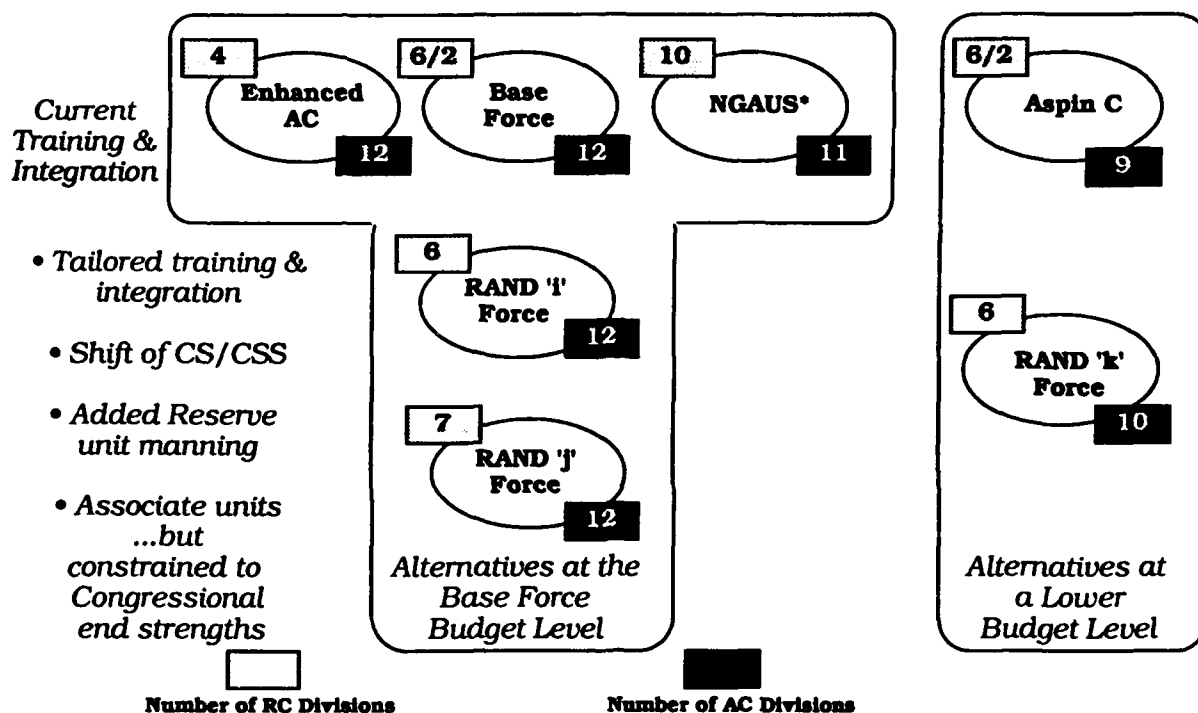


Figure 2-2. CAA ARM Study Evaluates the Effectiveness and Affordability of Army Force Structure Alternatives

• Dynamic Political/Military Analysis.

The dynamic world political environment is continuously opening new pathways to plausible alternative futures. Each possible future could exert considerable impact on Army strategy and force structure from both a global and regional perspective. During FY 92, CAA devoted considerable effort to illuminating and analyzing many of these emerging issues in workshops (Figure 2-3). Implications of key issues were further examined in detail during one or more political-military games conducted during FY 92. Careful assessment of these issues contributes measurably to Army planning activities and better prepares the Army for crises response operations. Selected workshops and gaming efforts and the interrelationships that often exist are highlighted directly below Figure 2-3. Some of the basic methodologies CAA uses to conduct dynamic political/military analysis are described at Appendix C.

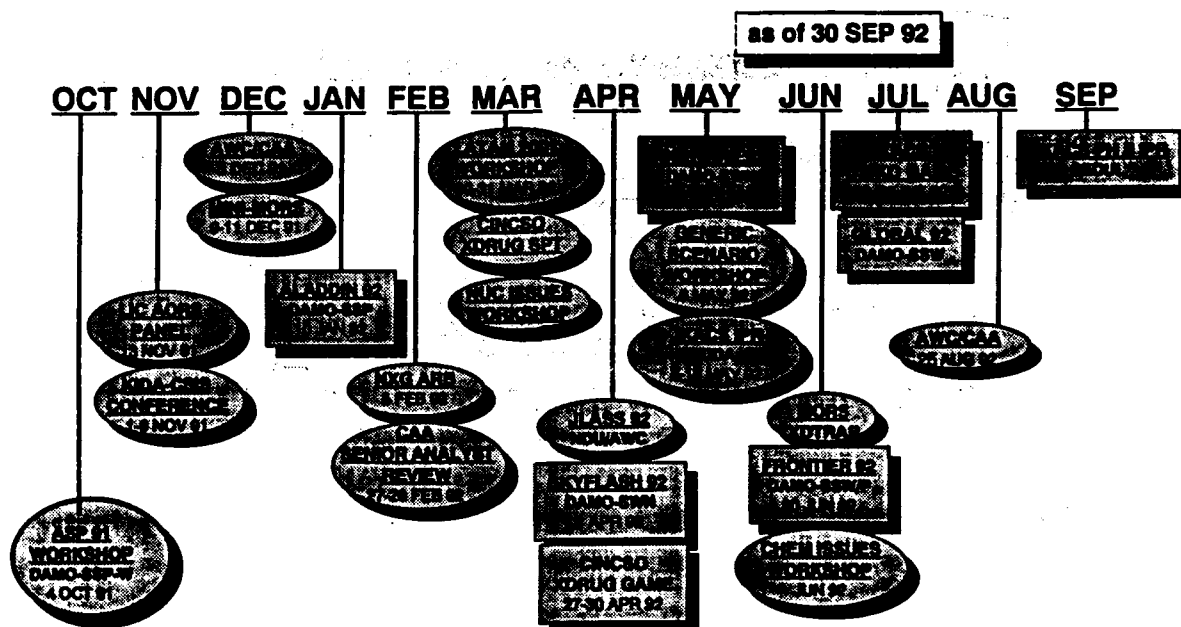


Figure 2-3. CAA Workshops and Gaming Activities - Identifying and Evaluating Emerging Global Issues

- Key global issues were identified in the Army Strategic Force Planning Workshop (Oct 91), Nuclear Issues Workshop (Mar), and Chemical Issues Workshop (Jun).

- SKYFLASH 92 (Apr), HIGH WIRE 92 (May), FRONTIER 92 (Jun), and GLOBAL 92 (Jul) examined the impact on the Army of selected global issues.

- The NUCLEAR ISSUES Workshop generated issues for comprehensive examination in SKYFLASH 92, which further defined generic circumstances under which a land commander may have need for nuclear weapons. The results of SKYFLASH 92 fed forward into HIGH WIRE 92 which focused on national decision and shaping issues.

- FRONTIER 92 examined political-military options for Army input to GLOBAL 92 and prepared Army gamers for Joint treatment of important issues.

- Cogent regional issues surfaced in the LATAM 2001 workshop (Mar) and the impacts of other regional issues were examined in ALADDIN 92 (Jan) and CINCOS COUNTERDRUG GAME (Apr). ALADDIN 92 analyzed issues in Southwest Asia.

- The CINCSO COUNTERDRUG GAME was conducted on-site at Hurlburt Field, Florida, to model drug production and distribution systems to exploit their most vulnerable segments.

- **Campaign Analysis of Defense Planning Guidance Scenarios.**

- For the first time in recent memory, Defense planning was not dominated by the "global war in Europe" scenario. Rather, the planning guidance to the services was to develop their programs around three major regional contingencies in three different parts of the world, two of which were completely new scenarios. As soon as the first draft of the planning guidance emerged, CAA began developing the new scenarios. Intelligence sources were queried, data were collected, preliminary analysis was performed, and the scenarios were modeled in detailed combat simulations. These scenarios have formed the basis for several CAA studies for the Army staff and have provided the theater context to several TRADOC studies as well. They will have a tremendous impact on the organization, equipment, and sustainability of the Army of the next several years.

- **Component Requirements and Authorization Determination Study (COMRAD).**

- For many years, CAA has been developing the Army requirement for support forces in a very detailed analytic process. However, the decision as to which of those required support forces were to be active duty and which were to be Reserve Component was not supported by any detailed analysis. It was rather derived by a negotiating process. This year CAA instituted a study called COMRAD to develop an analytical tool to aid the decisionmakers in this determination. This microcomputer-based decision aid will be applied for the first time in the Total Army Analysis 2001 process.

- **Mobilization and Deployment.**

- Army leadership has developed plans and priorities to reshape and reduce the Army of the 1990s and beyond while maintaining force readiness for a rapid response to any worldwide conflict. In planning for an Army which is CONUS-based with worldwide projection capability, mobilization and deployment have become critical, high-priority study issues.

- The mobilization community lacks an automated tool to evaluate mobilization capabilities and test procedures and policies to determine affects on the mobilization process. CAA missions include the requirement to evaluate the Army's operational capability to mobilize and deploy forces in support of joint and combined operations. The impending drawdown in Army forces and associated DOD budget reductions will impact the mobilization process.

- There are two model development efforts underway at CAA to be used in the analysis of these critical issues: The Mobilization Capabilities Evaluation Model (MOBCEM) and the Global Deployment Analysis System - Transportation Model (GDAS). These are evolutionary replacement models that capitalize on software/hardware advances and state-of-the-art modeling techniques that deal with the complexities of the deployment process. Both of these models are discussed in the Analytical Research and Methodology Development section of this chapter.

SUPPORT TO SPECIAL PROGRAMS

• Army Program Value Added Analysis 94-99 (VAA 94-99).

- The VAA 94-99 Study was jointly sponsored by the Director, Program Analysis and Evaluation (DPAE), and the Deputy Chief of Staff for Operations and Plans (DCSOPS) as a follow-on to the promising results achieved by the Army Program Value Added Analysis 90-97, Phase I study effort.

- The VAA 94-99 effort enhanced the analytical tradeoff methodology developed in Phase I and made available to DPAE and DCSOPS a comprehensive cost-benefit analysis methodology for use in developing a balanced and effective Army research, development, and acquisition (RDA) program.

- The Value Added Analysis concept employs a family of models within a hierarchical assessment framework for measuring alternative systems' contributions to warfighting. A mathematical optimization model is then used to simultaneously determine an alternative's cost-benefit and to identify an optimal mix of weapon systems for inclusion in the Army program or budget.

- The VAA 94-99 study results immediately generated several "spinoff" analyses supporting key, ongoing HQDA and Army leadership decisionmaking nodes. VAA methodology produced effectiveness scores for almost 50 major systems for use in reviewing and revising the Army's Long-Range Research, Development, and Acquisition Plan (LRRDAP). A series of three quick reaction analyses, conducted at key points in the LRRDAP review process, culminated in a VAA results briefing to the Chief of Staff of the Army (CSA) Offsite Review for the LRRDAP. Two additional QRA produced assessments of important modernization issues for decisionmaking use by the Army Select Committee (SELCOM) and the Secretary of the Army.

- VAA methodology provides the missing analytical dimension to the Army's Planning, Programming, Budgeting, and Execution System. The Army Staff now has available in a single set of models the capability to pull together and evaluate data, policy, and guidance quickly and accurately for use in developing a balanced Army RDA program.

- Figure 2- 4 is an overview of the complete VAA methodology with its eight modules.

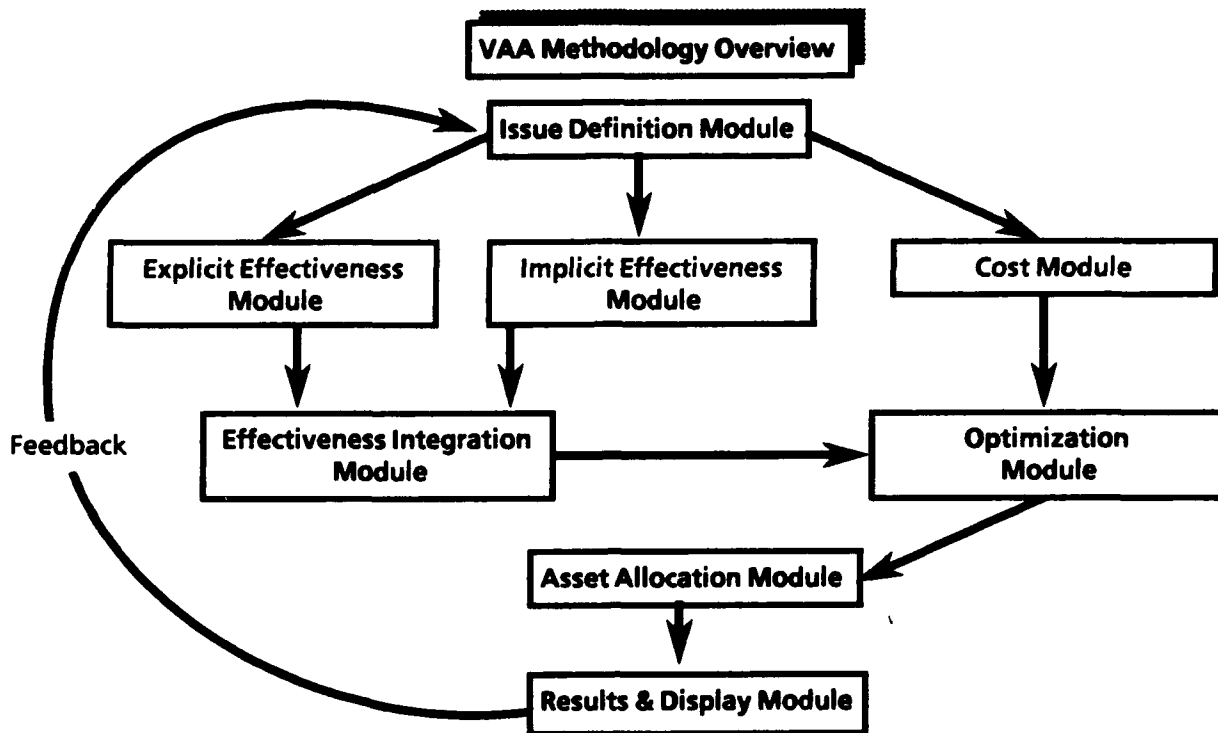


Figure 2- 4. The Eight Integrated Modules Comprising the "Standardized" VAA Methodology

- CAA Analysis Support to Planning in Korea.** Throughout FY 92, CAA continued its extensive analytical support to planning in Korea. CAA began the Korean Analysis Program in 1990 with the Regional Assessment of Combat Capability in Korea (RACCK) Study. The scope and number of CAA analyses progressively expanded into what is now a comprehensive suite of integrated Korean studies and analyses addressing many operational planning, theater-level warfare, and arms control issues. Figure 2-5 highlights two of the major areas addressed by CAA Korean studies and analyses, operational planning and arms control, that are discussed below.

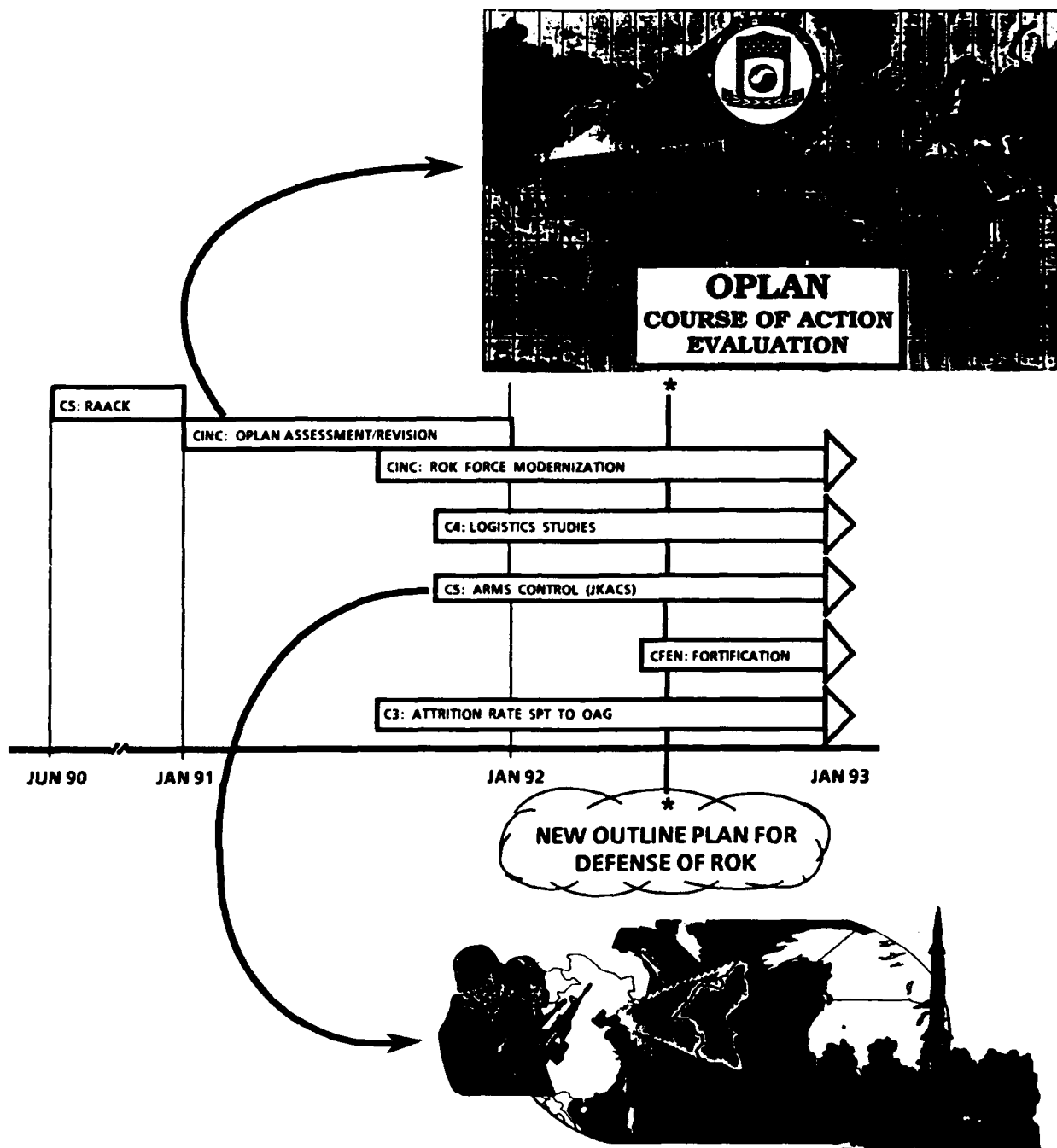


Figure 2-5. CAA's Extensive Analysis Support to Planning in Korea

- **CINCCFC Operation Plan (OPLAN) Analysis.** CINCCFC OPLAN Analysis was a series of eight quick reaction analyses accomplished as a subset of a larger suite of integrated studies and analyses begun by CAA in FY 90 in support of planning in Korea (Figure 2-5). Major areas of analysis included courses of action, mobility, force deployment sequencing, and sustainment. The individual analysis efforts which comprised this QRA series are summarized below.

Korean Operation Plan - 1991 (KOPLAN-91). KOPLAN-91 assessed proposed courses of action to assist in OPLAN revision.

Korean Warfighting Operation Plan - Mobility Assessment (KOWAP-MOB). KOWAP-MOB analysis reinforced previously identified force allocation mixes using current and/or projected lift.

Korean War Plan (KOWAP). KOWAP evaluated combat force sequencing alternatives to determine which best support CINCUNC/CFC warfighting intent in a 1991 planning scenario.

Combined Forces Command Sustainment Assessment (CFCS). CFCS evaluated the sustainment infrastructure available to support operation execution.

Combined Forces Command Sustainment Sustainability Phase II (CFCS II). CFCS II analyzed the impacts of increased warning time upon arrival of reinforcements and initial defense capabilities.

Combined Forces Command Sustainment Assessment Update (CFCS Update). CFCS Update reassessed the initial study of the sustainment infrastructure available to support operation execution.

Replacement Maintenance Policy Using Single Language for Alternative Modeling (RAM SLAM). RAM SLAM evaluated battlefield systems sustainability.

Replacement Maintenance Policy Using SLAM 2 (RAM SLAM 2). RAM SLAM 2 analyzed the sufficiency of four major end item war reserve requirements given a policy calling for replacing RAM failures when repair time would exceed 24 hours. This study revised RAM SLAM by analyzing not only M1 tanks and M2/M3 (IFVs/CFVs), but also looking at M109A2 howitzers and Multiple Launch Rocket Systems (MLRSs).

- Joint Korean Arms Control Study (JKACS)

JKACS is a joint, multiyear, phased analytical effort to develop a range of candidate arms control proposals and evaluate resulting arms control packages in terms of contribution to US and Republic of Korea (ROK) national security objectives. JKACS covers the full spectrum of arms control possibilities. Included are nuclear, chemical, biological, and conventional air and land forces, and both operational and structural measures and regimes. Results will be provided to national command authorities for arms control decisionmaking.

The Korean Institute for Defense Analysis (KIDA), CAA, and RAND Arroyo Center comprise the three legs of the JKACS analytical triad, with each agency leading a different study phase. KIDA began Phase I by leading a series of arms control seminars to survey past arms control proposals, forecast future regional and strategic environments, develop national objectives, and formulate alternative packages of arms control measures for further evaluation.

In Phase II, CAA conducted a series of synergistic political-military games to formulate and evaluate alternative arms control packages. The synergistic gaming process sharply defined the key issues, derived important insights, and focused upon solving problems associated with various negotiating strategies. A wide range of quantitative methodologies was used throughout the gaming series to augment the analytical process. Phase II final results will be presented in the Arms Control Evaluation (ACE) Report scheduled for submission to analytical senior national representatives and sponsors during March 1993.

- In Phase III, the ACE Report will provide a basis for RAND Arroyo's lead in finalizing negotiating strategies by August 93.

- Phase IV begins with the Defense Analysis Seminar (DAS) VII scheduled for September 1993 and will initiate dissemination of final JKACS results to the ROK and US national leadership.

- **Drug War.**

- The National counterdrug campaign has become increasingly focused against dynamic and innovative foes who have a demonstrated ability to change operations and techniques with little or no notice. Countering the drug traffickers requires anticipation of their methods, capabilities, and a better understanding of their dynamics. To support the war against drugs, CAA has adapted a number of off-the-shelf analytical tools to form a Counterdrug Analysis System (XDAS). XDAS is made up of three primary components: the Counterdrug Model (XDM), a modeling effort that focuses on the narcoindustry and ways to defeat it; Counterdrug Measures of Effectiveness (XDMOE), a study that pursues the development of realistic counterdrug measures of effectiveness; and several diverse gaming proposals to address a multiplicity of counterdrug support issues (Figure 2-6).

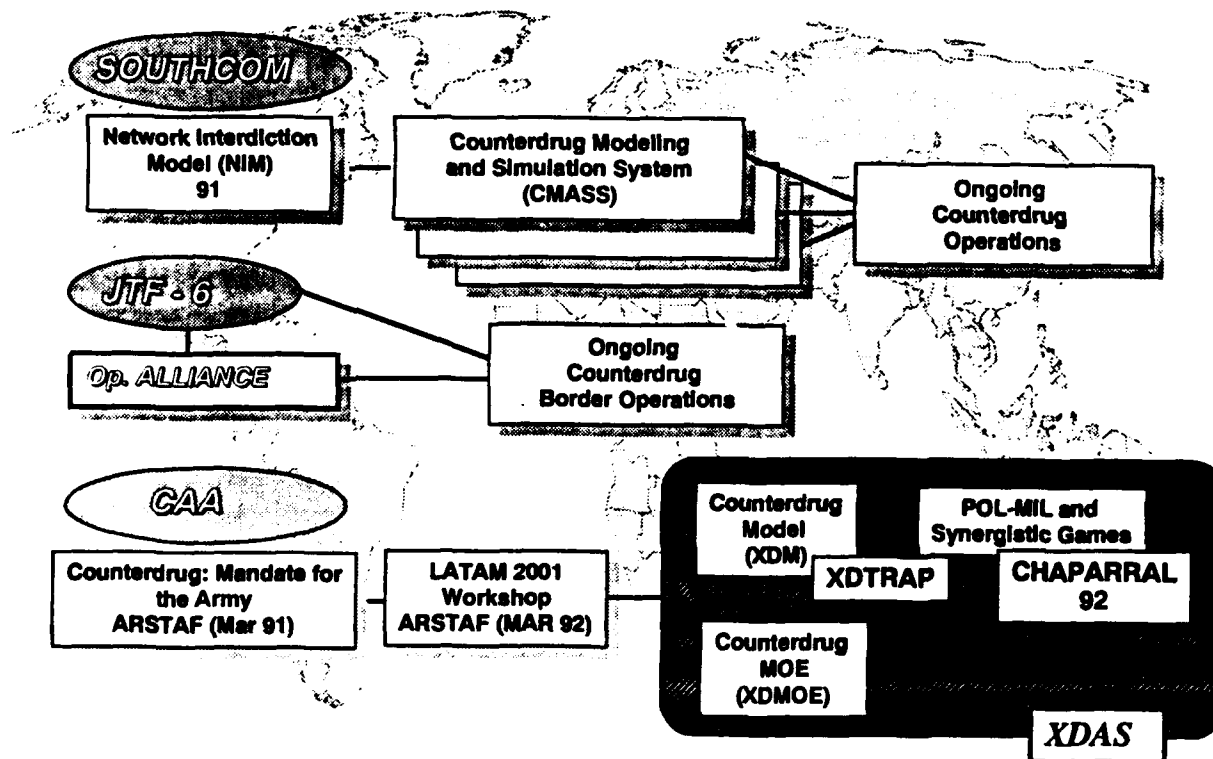


Figure 2-6. CAA Support to the Drug War

- The Counterdrug Model (XDM) proposes using discrete event dynamic simulation to develop models of the narcoindustry in South and Central America. The model would be used to dynamically represent the operational capabilities and business environment of the narcoindustry to identify and exploit viable vulnerabilities. One key feature of XDM would be the incorporation of network interdiction methodologies to evaluate proposals for integrating assorted high-tech assets to disrupt a complex and effective transportation network.

- The precursor to XDM was the Counterdrug Transportation Analysis Program (XDTRAP), a quick reaction analysis to support combined operations directed against narcotraffickers operating within the Chapare Valley of Bolivia. Analysis results were used extensively during SOUTHCOM's Counterdrug Modeling and Simulation System (CMASS) Game II to evaluate which counterdrug actions would be most effective.

- The XDTRAP model was used to provide estimates of the effects of *action-reaction* responses proposed by the host country support team and the narcotrafficker team. Model calculations identified expected disruptions in cocaine production and trafficking capability resulting from alternative interagency and combined interdiction and eradication operations. Direct application of model results impacted operational planning for selected counterdrug operations.

- The Counterdrug Measures of Effectiveness (XDMOE) Study is designed to investigate alternative measures of effectiveness that realistically and comprehensively assess the progress of counterdrug operations toward achieving decisive and attainable goals. The focus will be on comparing the reduction in trafficker profit versus the cost of US efforts.

- CAA is proposing several counterdrug gaming efforts that focus on the nature and extent of DOD activity in counterdrug programs for CINCSO, DAMO-ODD, and JTF-6. To date, sponsor interest in this area has centered on DOD and law enforcement agency cooperation before and during interagency counterdrug operations. In October 1992, CHAPARRAL 92, an operationally focused game fashioned for the Commander, JTF-6, was conducted to help develop interagency roles for information processing during large scale southwest border counterdrug operations.

● European Retrograde Analysis (RETROEUR)

- As a result of the Army's planned large-scale materiel reductions in Europe, the US Army Europe (USAREUR) staff developed proposals for two alternative materiel drawdown (retrograde) options. The baseline proposal, called STATUS QUO, planned for completion of all anticipated materiel retrograde actions by the end of FY 2002. An alternative proposal, called the ACCELERATED option, called for completion of the same retrograde actions by not later than FY 1995/6.

- During briefings to the Army Staff, USAREUR advocated adoption of the accelerated option based primarily on estimates of cost savings in USAREUR and the fact that this option best supported the schedule for Congressionally mandated drawdown of USAREUR troop levels. However, several issues such as to the *total* costs involved for both options, not just USAREUR costs, and questions as to possible adverse impacts on CONUS facilities and depots resulting from the accelerated option were unresolved. These and other issues led the Army Assistant Deputy Chief of Staff for Operations and Plans to request CAA analytical assistance.

- This CAA analytical effort quickly involved over 20 analysts working simultaneously on as many issues as possible. Centered around this intensive data/information gathering/ assimilation effort, CAA's analyses included: (1) comprehensive total cost estimates/ comparisons for the two alternatives; (2) independent calculation of USAREUR TR-0 materiel requirements; (3) identification and evaluation of the key issues in Class V and Class VII retrograde for both options; and (4) identification of the major associated ARSTAF decision requirements.

- The CAA RETROEUR analysis revealed: (1) very high, and perhaps not fundable, estimated up-front total costs for the accelerated option; (2) that many readiness and cost advantages would accrue to "pull prioritization" (or "call rearward") scheduling of retrograde materiel movements; and (3) more net benefits could be achieved by a hybrid of the two retrograde options which accelerated only non-Class V materiel.

- Results of this effort produced an emerging results in-process review (IPR) briefing for ARSTAF principals on 29 May 92 and a decision briefing for the VCSA on 4 Jun 92 (Figure 2-7). NOTE: the final ARSTAF decision was to "retrograde as fast as possible dependent upon availability of dollars, determination of total Army requirements, and the ability of CONUS to accept equipment and ammunition."

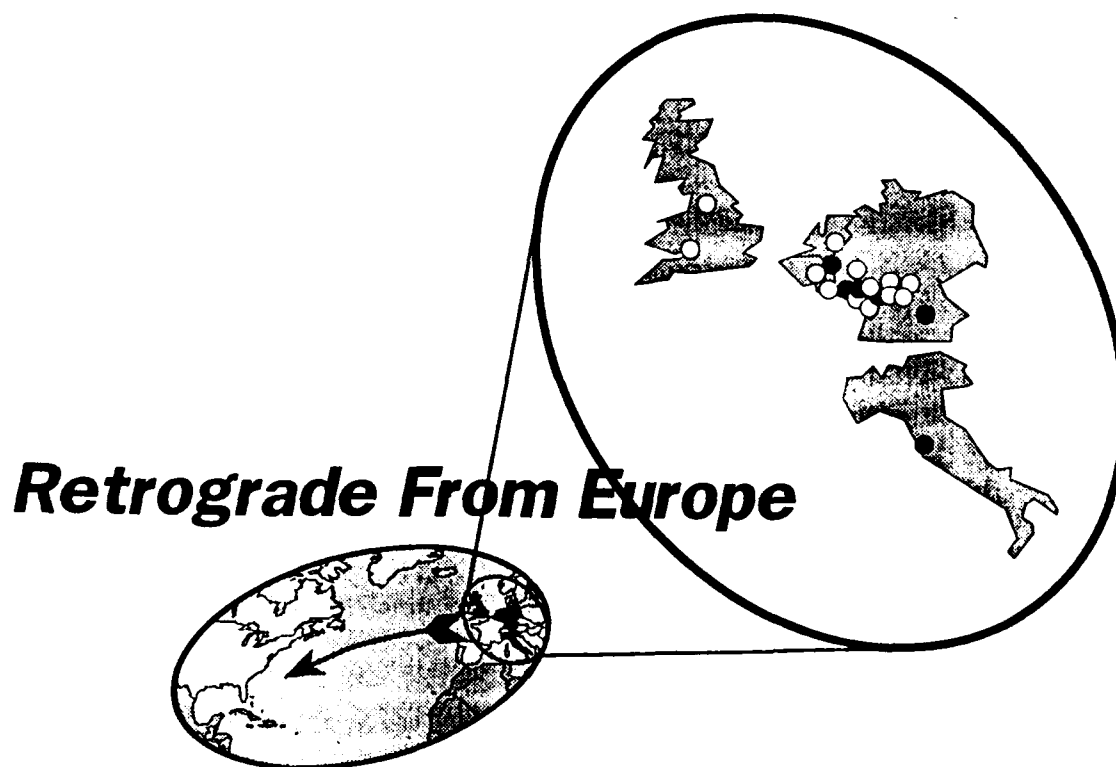


Figure 2-7. CAA European Retrograde Analysis (RETROEUR)

- **Army Support Options Study (ASOS).**

- The Army Support Options Study (ASOS) produced a methodology and automated data base for identifying and evaluating Army capabilities that can be used to support Federal and state government nonwarfighting missions.

- The basic approach used in this study was to first identify key domestic problem areas currently confronting the United States. The next step was to identify major Federal and state government nonwarfighting missions that address these problem areas and, in turn, identify principal Army missions and supporting capabilities/programs that relate to the Federal and state government missions. These relationships represented Army capabilities/programs that could potentially be applied toward resolving these problem areas.

- This methodology provides an analytical framework (Figure 2-8) for identifying, evaluating, and evolving nontraditional Army initiatives in support of Federal and state government nonwarfighting missions.

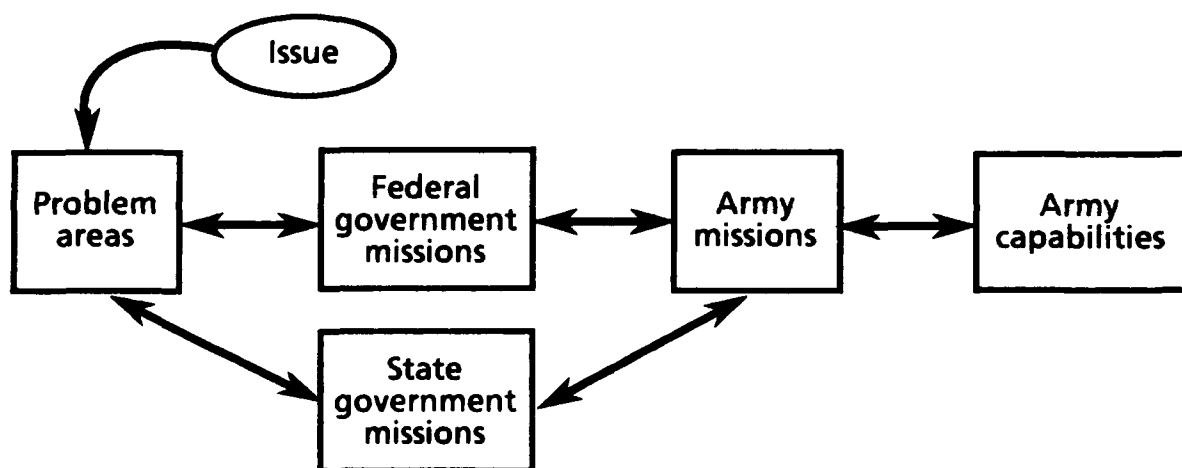


Figure 2-8. ASOS Methodology

- **Tank Propulsion Upgrade (TPUG).**

- The Tank Propulsion Upgrade (TPUG) quick reaction analysis developed and applied a methodology for analyzing the costs and benefits of retrofitting the Advanced Improved Propulsion System - Diesel (AIPS-D) and Advanced Improved Propulsion System - Turbine (AIPS-T) candidates versus retaining the current Automotive Gas Turbine (AGT-1500) propulsion system (Figure 2-9).

- Given a timely production schedule, the fixed costs of developing the AIPS could be shared with the heavy Armored System Modernization (ASM) program, making the economics more attractive. Findings indicated that the technical benefits of both candidate systems are measurably greater than the AGT-1500, especially regarding fuel economy, reliability, and volume. For example, substantial

fuel savings could accrue to the Army between FY 2000 and FY 2020 from either of the AIPS retrofit alternatives. This savings ranges from a low of about 41 million gallons (Force Package 1) to a high of about 259 million gallons (all Force Packages).

- Despite several proven advantages, the analysis indicated that it was not economical to retrofit the Abrams with either of the AIPS candidates.

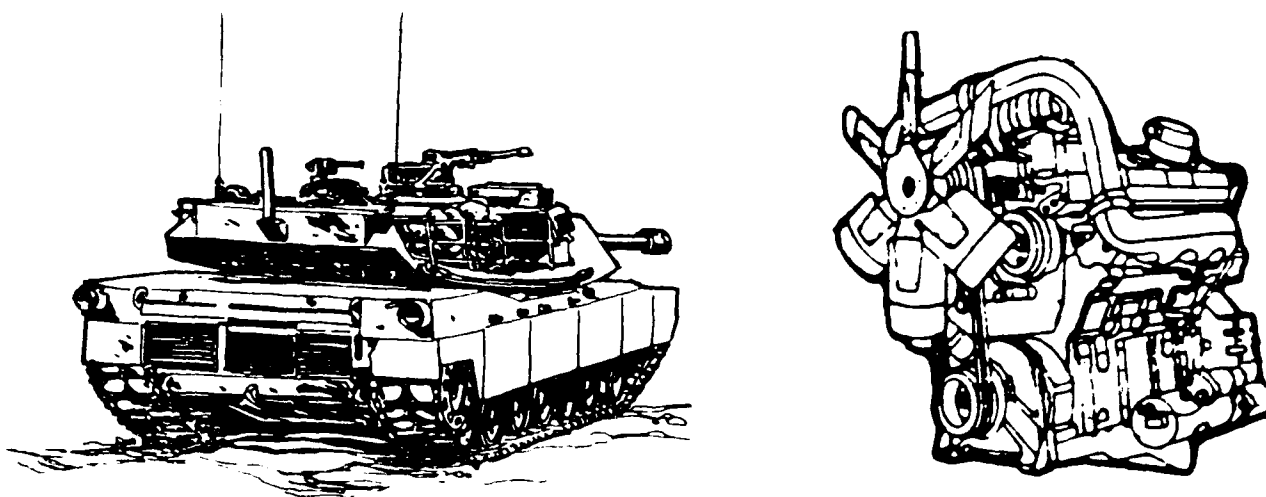


Figure 2-9. Tank Propulsion Upgrade - Costs versus Benefits

- **Economic Analysis of the DCSOPS Information Management Program (EADIMP)**

- EADIMP was a quick reaction analysis to evaluate ODCSOPS automation program proposals and support development of an FY 92 - FY 97 ODCSOPS management information system (MIS) budget submission.

- During the development and evaluation of the FY 92 Army MIS Budget, it became apparent to the ADCSOPS that the evaluation and decisionmaking process was impaired by a lack of analysis support. In response, the DCSOPS Technical Advisor requested CAA to develop the mechanisms and methodologies, and conduct the analysis, needed to provide a framework for developing the ODCSOPS automation program/budget.

- The analysis effort included automated survey of ODCSOPS general officers, senior civilians, and technical experts on their assessments of the spectrum of ODCSOPS processes and automation projects. The gathered information was incorporated into a series of capital budgeting methodologies that provided key insights into the cost-benefit implications of an alternative MIS investment strategy.

- EADIMP is a good example of one type of time-sensitive analysis support which CAA routinely provides to sponsors for decisionmaking and planning purposes (Figure 2-10).



Figure 2-10. EADIMP - Analysis for MIS Investment Strategy

- **Wartime Requirements, Fiscal Year 1999 (WARREQ-99).**

- The WARREQ-99 Study, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS, DAMO-FDL), determined projected wartime expenditures (PWE) for supply classes V (munitions) and VII (major end items) for three theaters in the FY 99 timeframe. PWE were developed for Europe, Southwest Asia, and Northeast Asia based on contingency operations outlined in the Defense Planning Guidance.

- PWE were used by ODCSOPS in the process to determine Program Objective Memorandum (POM) requirements for the outyear. Additional analysis was done to assess the impact of limiting consumption of munitions and equipment replacements to projected FY 99 war reserve levels. Analysis included extensive theater-level combat simulations and associated consumption analysis.

ANALYTICAL RESEARCH AND METHODOLOGY DEVELOPMENT

- **META Study.**

- The purpose of the META Study, sponsored by the Deputy Under Secretary of the Army for Operations Research, was to assess the applicability of meta-analysis methodology to specific Army issues (Figure 2-11). Meta-analysis is a controversial statistical methodology developed in the life sciences to combine the results of many independent studies and experiments addressing a common issue.

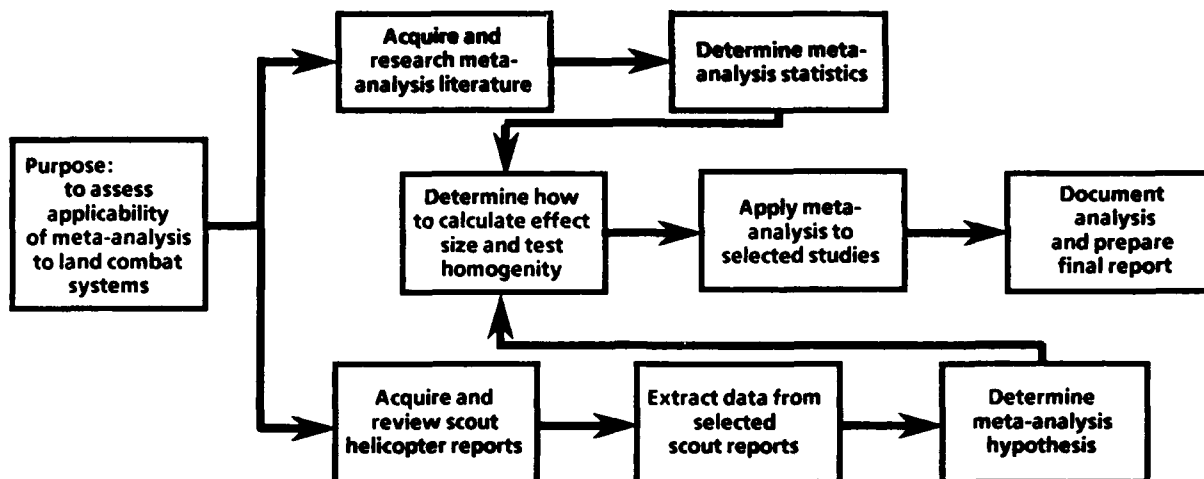


Figure 2-11. Methodology Used for Assessing Applicability of Meta-analysis to Land Combat Systems

- The problem of evaluating the utility of scout helicopters was chosen as the "exploration" case for use in this assessment because of the extensive studies and tests conducted on scout helicopters during the last three decades.

- The approach used was to: (1) develop a bibliography of reports available through Defense Technical Information Center (DTIC) and US Army Combat Development Experimentation Command (USACDEC); (2) evaluate these reports for data to include in a data base; (3) select a common hypothesis, and (4) test the common hypothesis using several meta-analytic methods detailed in the current statistical literature.

- The principal findings were: (1) that meta-analytic methods are not applicable for confirmatory analysis of data from studies of land combat issues because each of these studies typically addresses a different problem; and (2) these methodologies have potential as tools for exploratory data analysis.

- **Global Deployment Analysis System - Transportation Model (GDAS-TM).**

- CAA is engaged in developing, testing, and evaluating a contractor supported Global Deployment Analysis System (GDAS). GDAS represents the first stage of an entire ADP system which will evaluate the capabilities and requirements of the mobilization and deployment system of the Department of Defense. GDAS results will provide input to CAA combat models and support a wide array of other studies and analyses.

- The larger system of which the GDAS is a part will model the mobilization of US forces and the industrial base, the deployment of forces and supplies across an intertheater network, and the movement of such forces and supplies to the combat zone (Figure 2-12). GDAS -TM focuses on completion of a fully functional transportation model.

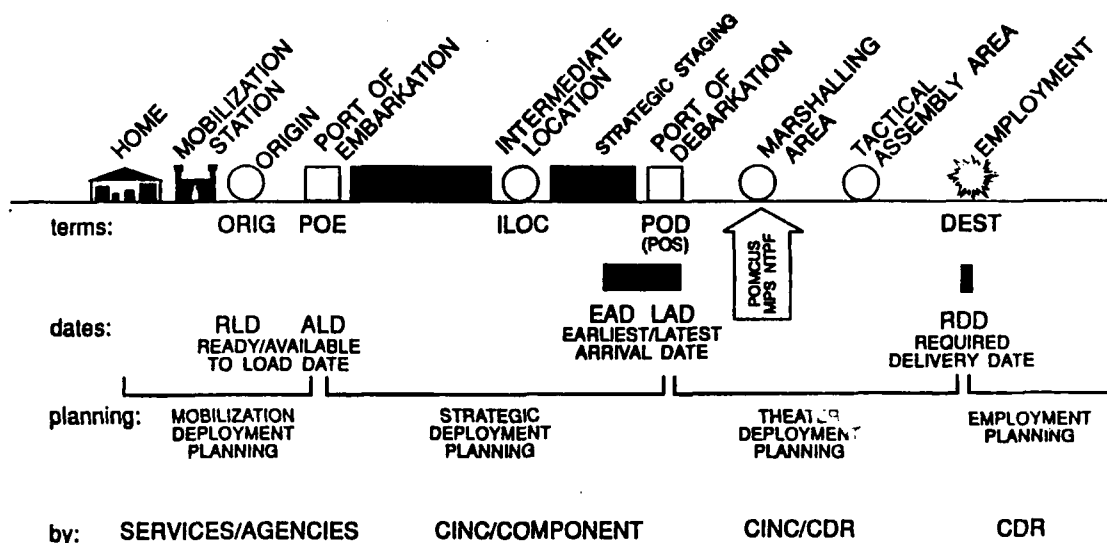


Figure 2-12. Broad Scope of Target GDAS Model

- Objectives of GDAS-TM development include logical and realistic simulation of strategic deployment incorporating state-of-the-art scheduling algorithms applicable to studies of strategic deployment issues (Figure 2-13). GDAS-TM features which are expected to have broad applicability include simulated deployment of balanced packages, special missions, maintenance of unit integrity, and analyst control over timeliness versus resource utilization as deployment objectives.

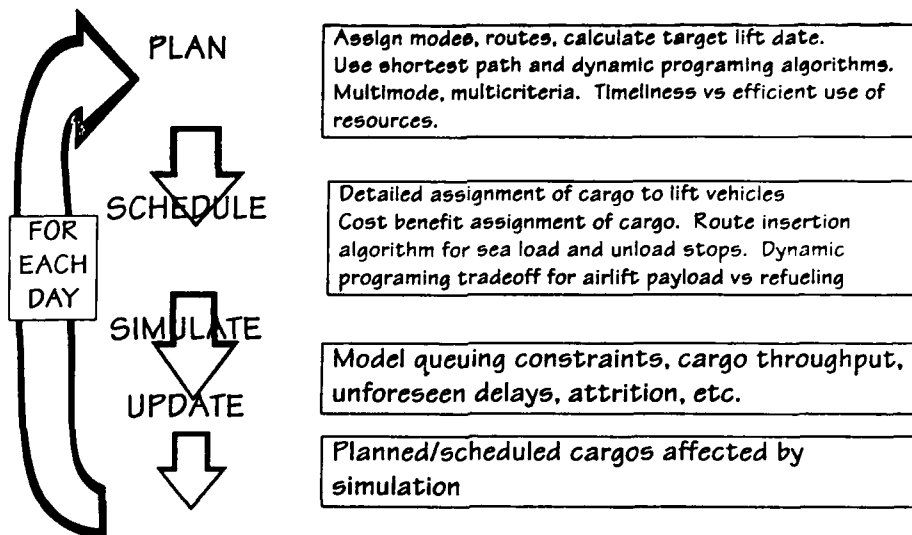


Figure 2-13. GDAS-TM Model Logic Overview

- The completion of GDAS-TM will result in more realistic simulations of strategic deployments; more detailed sensitivity analysis; increased capability to conduct a broader range of studies; improved ability to interpret and evaluate analysis results; and the ability to conduct studies and produce results much more rapidly. Base model testing is expected to be completed by 30 December 1992, with follow-on enhancements planned during FY 93.

- **Mobilization Capabilities Evaluation Model (MOBCEM).**

- CAA is currently developing, with contractor support, a MOBCEM baseline model which will provide the capability to analyze current and projected US Army mobilization capabilities and policy scenarios in an automated environment. This effort addresses only the mobilization process, but the system will be designed explicitly to interface directly with other simulations and systems to assess the impact of mobilization on alternative Army forces' capability to deploy, fight, and sustain. The baseline model will represent the basic functions that will allow for mobilization analysis (Figure 2-14).

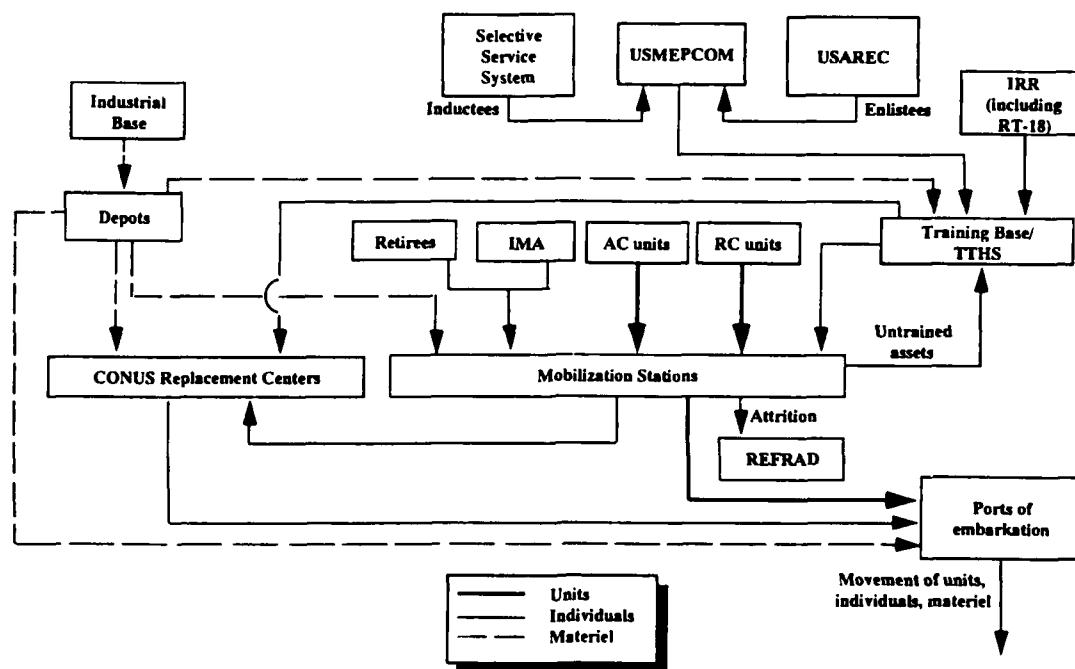


Figure 2-14. MOBCEM - Models the Army's Mobilization System

- MOBCEM's primary objective is to simulate the operation of the Army mobilization system in accordance with guidance in the Army Mobilization and Operations Planning and Execution System (AMOPES). Other objectives are to: obtain results in support of analysis of the effects of changes in policies, procedures, and resources; and provide mobilization data needed in conjunction with theater campaign analyses.

- The baseline model is scheduled to be completed by May 1993. Subject to favorable testing and evaluation results, CAA anticipates expanding the baseline model into a fully detailed one at a later date.

- **Stochastic Concepts Evaluation Model (STOCCEM).**

- The Concepts Evaluation Model (CEM) is a computer simulation model of ground and air warfare operations that is used by CAA to conduct analyses of the capabilities and requirements of forces engaged in warfare at theater level. The

CEM has been applied to campaign analyses for numerous scenarios since the early 1970s, including Central Europe, Korea, Iran, Northern Europe, and Iraq theaters of operation. The standard CEM is deterministic, yielding a single outcome for any situation simulated.

- Modern supercomputers have now reduced CEM execution time to a level that makes multiple replications of the CEM feasible. This project involved developing a stochastic version of the CEM that provides users the option of treating certain CEM processes, including commanders' decisions, the assessment of combat attrition, the disposition of casualties and of combat-damaged vehicles, and the movement of engaged forces, as stochastic (based on statistical distributions) rather than deterministic (based on expected values).

- This analysis examined which stochastic processes most influenced the variability among replications of one simulated campaign and showed that the deterministic CEM simulation of this campaign is consistent with the STOCEM simulation results. This analysis also demonstrated that only 10 STOCEM replications are required to obtain useful confidence intervals for the outcome measures of this campaign simulation, and estimated the costs in computer resources of using the STOCEM. Finally, this effort included the development of automated STOCEM postprocessors to display STOCEM results graphically and to report the results of multiple STOCEM replications in standard CEM formats for use by computer routines that read CEM reports. The basic STOCEM analytical system is depicted by Figure 2-15.

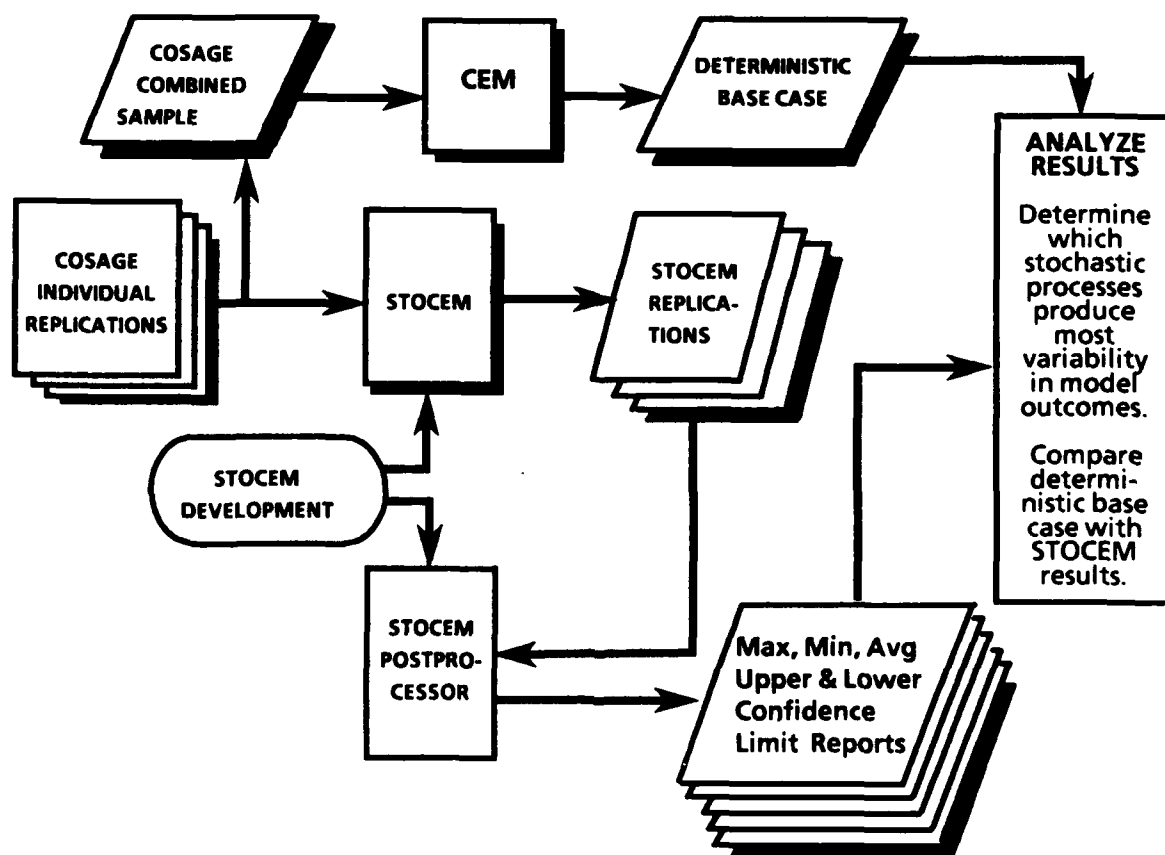


Figure 2-15. The STOCEM Analytical System

INTERNATIONAL MILITARY OPERATIONS RESEARCH ACTIVITIES, FOREIGN VISITORS, CONFERENCES AND PROFESSIONAL SOCIETIES, REVIEWS, AND AWARDS

• General.

- CAA engages in a host of activities involving the national and international exchange of professional information and techniques; the professional development of analysts; the promotion of research and development efforts in the field of military OR; and the application of advanced technologies. Collectively, these efforts help maintain the expertise and essential analytical perspective important for understanding and analyzing current issues. Some of the more notable of these activities are identified in this section.

- Selected CAA analyses are periodically subjected to reviews by panels of analytical experts convened for the purpose of recognizing analytical excellence and awarding designated prizes. Occasionally, CAA analyses are reviewed for the purposes of evaluating adherence to professional standards and identifying areas where improvements in methodologies may be possible. This section identifies reviews of CAA analyses for prizes, awards, and sufficiency in meeting professional standards and summarizes individual performance awards.

• International Military Operations Research Activities.

- Conducted planning activities for ROK/US Defense Analysis Seminar VII - Mr. E. B. Vandiver III (Director, CAA) and Mr. Howard G. Whitley III (Special Assistant for Model Validation).

- Organized and attended the Third US/French Model Validation Seminar - Mr. E. B. Vandiver III and Mr. Howard G. Whitley III.

- Participated in UK during Combined US/UK Program Review - Mr. Howard G. Whitley III.

- Attended and presented five papers at the 20th Quadripartite Working Group on Army Operational Research (QWG/AOR) - Mr. Howard G. Whitley III.

- Chaired QWG/AOR Information Exchange Group on Historical Data Analysis (IEG/HDA) - Mr. Howard G. Whitley III; charter reconfirmed at 20th QWG/AOR.

- Organized and chaired special session on Validation and Verification at Army Operations Research Symposium XXX - Mr. Howard G. Whitley III and Dr. Robert L. Helmbold.

- Initiated planning and organizing activities for Army Operations Research Symposium XXXI (to be held during Nov 92) - Mr. E. B. Vandiver III, Mr. Robert W. Barrett, COL Joseph E. Stull, and Ms. Rose A. Brown.

- Participated as Assistant Technical Project Officer on US/UK Information Exchange Agreement - Mr. E. B. Vandiver III.

- Participated as Assistant Technical Project Officer on US/French and US/Netherlands Data Exchange Programs - Mr. Howard G. Whitley III.

• **Foreign Visitors and Dignitaries.**

- **Republic of Korea**

LTG (Ret) Song, Sun-Young, President, Korea Institute for Defense Analyses

MG Bae, Moon-Han, Deputy Chief of Staff for Planning and Management, ROK Army Staff

BG Shin, Arm, ROK Army, Assistant Chief of Staff, ROK-US Combined Forces Command

COL Kim, Jong-Yul, PhD, Defense Research and Development Attache, Embassy of Korea

Dr. Chung, Sun-Koo, Senior Research Fellow, Korea Institute for Defense Analyses

*Dr. Lee, Seong-Beak, Senior Researcher, Korea Institute for Defense Analyses

Dr. Won, En-Sang, Senior Researcher, Korea Institute for Defense Analyses

Dr. Kim, Kyoung-Soo, Senior Researcher, Korea Institute for Defense Analyses

Dr. Cha, Young-Koo, Director, Policy Planning, Korea Institute for Defense Analyses

Dr. Nam, Man-Kwon, Director, Arms Control Research Center, Korea Institute for Defense Analyses

Dr. Oh, Kwan-Chi, Senior Research Fellow, Korea Institute for Defense Analyses

Dr. Park, Ju-Hyun, Senior Researcher, Korea Institute for Defense Analyses

Dr. Moon, Kwang-Keun, Senior Researcher, Korea Institute for Defense Analyses

*Dr. Chang, Ki-Duck, Director, Resource Management, Korea Institute for Defense Analyses

LTC Cha, Jin-Seob, Systems Analyst, Planning and Management Directorate, ROK Army Staff

***Mr. Chang, Hong-Ki, Senior Researcher, Korea Institute for Defense Analyses**

*** These visitors were temporarily stationed for duty at CAA to develop an understanding of the CAA force analysis process and other analytical techniques employed at CAA that would be applicable to ROK modernization analyses underway at KIDA.**

- New Zealand

Dr. Cathryn Downes, Senior Research Officer, Research Management Analysis Group, Office of the Chief of Defence Force

Lt Col Gary Corkin, Assistant Military Attache, Embassy of New Zealand

- United Kingdom

Dr. John Bartlett, Senior Advisor, Strategic Studies, Chemical and Biological Defence Establishment

Dr. Peter Biggans, Head, Nuclear, Biological and Chemical Office, Science Land, Ministry of Defence

Mr. Steven McCarthy, Head, Net Assessment, Ministry of Defence

Mr. Jonathon Moore, Senior Research Officer, Net Assessment, Ministry of Defence

• Conferences and Professional Societies.

- AORS XXX; 12-14 Nov 91; Ft. Lee, VA - CAA made the following presentations:

<u>Topic</u>	<u>Presenter(s)</u>
Global Force Allocation Model (GLOFAM)	Mr. Duane T. Schilling
Strategic Deployment Review Study (STRADER)	CPT Elizabeth A. Vance
Modeling of Air/Land Battle and AirLand Battle Future	MAJ W. Ted Farmer/CPT(P) Michael V. Kelly
Rates of Advance in Land Combat Operations	Dr. Robert L. Helmbold
Stochastic Concepts Evaluation Model (STOCER)	Dr. Ralph E. Johnson/Mr. William T. Allison
Regional Assessment of Combat Capability - Korea (RACCK)	COL Joseph E. Stull
Army Strategic Force Architecture (ARSTAR)	MAJ John S. Regan

- 60th MORS Symposium; 23-25 June 1992; Naval Postgraduate School, Monterey, California. Three CAA-sponsored papers were presented, and three CAA personnel attended this annual conference. The papers and presenters were:

<u>Topic</u>	<u>Presenter(s)</u>
A Method for Analyzing Strategic Mobility Alternatives	MAJ James R. Wood
Analysis of Counterdrug Interdiction Operations	MAJ James R. Wood
An Approximate Algorithm for Incorporating Learning Curve Costs in Acquisition Strategy Optimization	LTC Andrew G. Loerch

NOTE: the latter two papers listed above were nominated for the Barchi Prize for best paper in their respective working groups. At the time of this publication, selections for the Barchi Prize had not been announced.

- **Election of MORS Officers.** At the 60th MORS Symposium held during 23-25 June 1992, Mr. E. B. Vandiver III was installed as the newly elected MORS President to serve until the convening of the 61th MORS in 1993.

- **CAA Management Planning Conferences.**

22 October 1991. Key issues addressed were the increasing impacts of Selective Early Retirement Boards (SERB), the civilian hiring freeze, low ODP support, and budget constraints upon current and future Agency operations. The Director's plan focuses the Agency on the Army's most important issues and emphasizes sustaining analytical productivity and quality through a vigorous TQM program.

22 April 1992. The conference examined the future outlook for the Agency's personnel, budget, organizational structure, ADP environment, TQM program, data base requirements, and the verification, validation, and accreditation of models. The Director initiated an effort to explore the concept of operating a reimbursable work program (RWP) within the Agency. The objective of a RWP would be to partially offset the impacts of the continued decline in Agency resources by sustaining a limited level of analytical capability for supporting priority needs of non-HQDA Army elements.

● **Reviews and Awards.**

- **Army Study Highlights, Volume XII (ASH).** The following CAA study was recognized for excellence and published in ASH Vol XII:

<u>Study Title</u>	<u>Study Director</u>
POMCUS Unit Siting Alternatives	Mr. J. Theodore Ahrens

- **Army Study Highlights, Volume XIII (ASH).** In recognition of excellence, CAA nominated the studies listed below for publication in Army Study Highlights, Volume XIII. Announcement of selections is scheduled for November 1992.

<u>Study Title</u>	<u>Study Director</u>
Army Program Value Added Analysis 94-99	LTC Robert R. Koury
Counterdrug Transportation Analysis Program	MAJ James R. Wood
Stochastic Concepts Evaluation Model - Phase II	Dr. Ralph E. Johnson
Army Strategic Force Architecture	LTC H. Dorn Crawford

- **Dr. Wilbur B. Payne Memorial Award - 1991.** CAA was recognized for responsive analytical support to Operations DESERT SHIELD and DESERT STORM by a special award of the Dr. Wilbur B. Payne Memorial Award for Excellence in Analysis. CAA participants in this extensive, award winning series of analytical efforts were:

COL Arthur E. Parker III	CPT Michael Rizzio
LTC Linda L. Hampton	Mr. Ronald B. Bonniwell
LTC James O. Kievit	Mr. Hugh W. Jones
LTC Charles D. Shelton	Mr. Stanley H. Miller
MAJ Jeffrey A. Appleget	Mr. Neal W. Siegel
MAJ Daniel J. Russell	Mr. R. Glenn Stockton
MAJ Dee Wells	Mr. John M. Tucker, Jr.
CPT David B. Knudson	

- **Dr. Wilbur B. Payne Memorial Award - 1992.** The below listed CAA studies were nominated to receive the Wilbur B. Payne Memorial Award for 1992 in the indicated categories. Announcement of award recipients was pending on the date of this publication.

<u>Individual Award</u>	<u>Group Award</u>
Counterdrug Transportation Analysis Program (XDTRAP)	Army Strategic Force Architecture (ARSTAR) Stochastic Concepts Evaluation Model (STOCER) Value Added Analysis

- **Study Directors' Luncheon.** CAA held this annual luncheon on 19 November 1991 to honor individuals who served as study directors for studies and other analytical efforts completed during FY 91. The guest speaker was Mr. Clayton J. Thomas, Chief Scientist, Office of the Assistant Chief of Staff (Studies and Analyses), US Air Force. Certificates of Achievement were awarded to individuals who had directed a total of 85 studies and quick reaction analyses; Certificates of Accomplishment were awarded to individuals who had directed 32 projects and research and analysis activities. These 117 awards were presented to a total of 67 individuals.

- **The Director's Award for Excellence.** The 19th Annual Dinner Dance, held on 21 March 1992, was the venue chosen for presenting The Director's Award for Excellence. The Director hosted this annual event where he presented the Director's Award for Excellence to the following individuals:

<u>Recipient</u>	<u>Category</u>
Mr. Charles D. Thurston	Individual Support Award
CPT Elizabeth Vance	Individual Analyst Award
Korean Theater Analysis Team	Team Award
COL Arthur E. Parker III	Team Leader
LTC Charles Shelton	Team Member
Lt Col Keith M. Lange, USAF	"
MAJ Eli T. S. Alford	"
MAJ David B. Knudson	"
MAJ Daniel J. Russell	"
CPT Thomas I. Pratt	"
CPT Michael Rizzio	"
Mr. Charles A. Bruce	"
Mr. Robert E. McConnell, Jr.	"
Ms. Karyl M. Paradise	"
Value Added Analyst Team	Team Award
COL John B. Harrington	Asst. Director, Force Systems
Mr. Steven B. Siegel	Chief, Resource Analysis Div.
LTC Robert R. Koury	Team Leader
LTC James Richmann	Team Member
LTC Rodney K. Stuart	"
LTC Andrew G. Loerch	"
MAJ George Broadnax	"
MAJ Robert Clayton	"
MAJ Gregory A. Post	"
CPT William F. Mann III	"
CPT Stephen E. McGuire	"
CPT Patrick M. Williams	"
Mr. Joe S. Gordon	"
Ms. Ola C. Berry	"
Mr. Daniel A. Citrenbaum	"
Mr. Karsten G. Engelmann	"
Mr. R. Gary Poulos	"
Mr. Ronald P. Reale	"
Ms. Linda A. Coblenz	"
Ms. Linda C. LaBarbara	"
Mr. Duane E. Gory	"

- **Individual Performance Awards.** CAA leadership emphasizes recognizing and promoting excellence in individual performance. The following number of awards for individual performance were made in the indicated categories:

<u>Civilian</u>						<u>Military</u>				
QSI	PA	SA	GM	SES	TOT	LOM	MSM	ARCOM	AAM	TOT
15	33	3	12	1	64	10	18	2	1	31

- Peer Review Of a CAA Study.

- The DUSA(OR) periodically selects a study completed by a major Army analytical activity for comprehensive review by a specially convened panel of expert study peers. During FY 92, the DUSA(OR) selected CAA's Accessions Forecasting for Dynamic Force Structures (DYNAFOR) Study, directed by Mr. George (Skip) Peery, for review.

- CAA received the HQDA DCSPER study directive for DYNAFOR on 25 March 1991. Two months later, CAA delivered the results of the DYNAFOR Study to the sponsor. Results assisted HQDA in answering Congressional inquiries concerning accessions during force downsizing.

- The peer review panel findings summarized the DYNAFOR Study as "an excellent effort for which the Study Director should be commended for his work." The panel cited the potential created by the DYNAFOR Study as a springboard for conducting future analysis.

CHAPTER 3

SUMMARIES OF FY 92 CAA ANALYTICAL EFFORTS

FY 92 CAA STUDIES

Army Integrated Mobilization Study 99-I (AIMS 99-I)

The report includes campaign results and requirements for the European Fiscal Year (FY) 1999 and Major Regional Contingency - East (MRC-E)/ Major Regional Contingency - West (MRC-W) (FY 99) scenarios. Requirements were needed for forces, personnel, equipment, ammunition and fuel. The report also included work completed by the Material Requirements Team (FER/S) for replacement factors, consumption rates, add-on noncombat factors, and nonmodeled system data. POC for further information is LTC Thomas G.F. Loggie, US Army Concepts Analysis Agency, DSN 295-1581.

Analysis of Army Reserve Components Clothing Replacement Process (ARC)

The ARC Study responds to recommendations made by the General Accounting Office (GAO) in a recent report (June 1991). The Concepts Analysis Agency was tasked by the Army ODCSLOG (DALO-TST) at the direction of the Secretary of the Army (Installation, Logistics and Environment) to address the costs and related operational and administrative issues connected with the conversion of the current issue-in-kind (IIK) system for clothing replacement for the Army reserve components to the clothing replacement allowance (CRA) system used by the active Army. The CAA study results fail to verify the cost benefits of conversion cited in the GAO report when significant cost elements not included in the GAO cost model are included. The elimination of National Guard IIK clothing issue points would require Guard units to use nearby military clothing sales stores, including 25 on Air Force bases. Alternately, clothing issues could be made using only Army stores, but 14 state Guards are at extended distances (2 plus days of one-way travel) from these stores. On balance, considering the readiness of units, clothing cost accountability, service to soldier and reserve recruitment/retention, the conversion to the CRA does not produce cost savings and the CRA advantages are significantly offset by the CRA disadvantages. The POC for further information is Mr. James Connelly, US Army Concepts Analysis Agency, DSN 295-0450.

Army Strategic Force Architecture (ARSTAR)

The Army Strategic Force Architecture study was commissioned by the War Plans Division of Army's Deputy Chief of Staff for Operations in August of 1990. The study's objective was to fill the void in force planning that resulted from the disintegration of the Warsaw Pact and the decreased Soviet threat. The ARSTAR

process that resulted from the study has emerged as the force planning paradigm for the Army in the post Cold War era. The key features of the ARSTAR construct are its regional orientation, its multidimensional approach, its integration mechanism, and the transparent nature of its results. The regional orientation of the process recognizes the decline in the dominant European case while considering the evolving risks and challenges in other regions of the world. The multidimensional approach aims to reduce uncertainty by taking several different approaches to the problem which may expose aspects of force planning that any single approach may miss. The integration mechanism deliberately resolves or reports competing implications while orienting on a single cohesive output. Finally, ARSTAR's transparent nature quickly exposes key decisionmaking variables and assumptions while examining a range of outcomes paralleling varying risks and objectives.

The ARSTAR planning process can be separated into four distinct stages of inquiry. Stage one of the process requires that the National Military Strategy be understood in detail so that it can shape and guide the ARSTAR process. Next, political-military analysis of potential crisis areas in each geographic region must characterize the prospective response from the United States and the appropriate level of that response on the force employment spectrum. Where appropriate, a dominant regional planning case is identified. Next, the force design modeling phase examines the regional planning cases using both static and dynamic analysis to assess force requirements associated with varying strategic objectives. The different assessments for each case are then synthesized into a recommended force for each objective considered. The results of the force design stage are then integrated using the priorities and objectives of the National Military Strategy in the force structure synthesis stage. In addition, functional block requirements which are not directly related to divisional structure such as TDA units are identified and estimated so that the Army is complete. The POC for further information is CPT Robert L. Steinrauf, US Army Concepts Analysis Agency, DSN 295-1526.

Army Support Options Study (ASOS)

The ASOS report, sponsored by the Assistant Secretary of the Army for Manpower and Reserve Affairs (ASAMRA) and the Assistant Secretary of the Army for Financial Management (ASAFM), developed an analytical framework and data base system from which potential Army initiatives, in support of Federal and State government nonwarfighting missions that address particular issues associated with major US domestic problems, could be developed and evaluated. Based upon discussions with the sponsors, it was decided that initiatives would not be developed and evaluated as part of the study. Consequently, the data base was made "user friendly" and was provided to the sponsors to use as needed. Principal findings of the study are: (1) for Federal, State government nonwarfighting missions classified into a particular problem area, a similar Army mission could be found; (2) numerous major Army nonwarfighting missions and capabilities/programs exist that currently support Federal, State government nonwarfighting missions; (3) it does not appear that new Army missions need be established to support the nonwarfighting Federal, State government missions identified in the study report; and, (4) the ASOS data base system should be regarded as a "moving train" because Federal, State, and Army missions and Army capabilities/programs will likely change over time. The data base would also change if the scope were changed; if international problems were considered, then the data base would need to be expanded. The POC for further information is Mr. Steven B. Siegel, US Army Concepts Analysis Agency, DSN 295-5289.

Command and Control Acquisition Alternative Study (C2A2)

The C2A2 study, sponsored by the office of the Assistant Deputy Chief of Staff for Operations and Plans - Force Development (ODCSOPS), HQDA developed a methodology for determining the relative effectiveness of command and control (C2) systems. The analysis demonstrated that the effectiveness of C2 systems can be viewed as a function of two different sets of criteria: explicit criteria (how well a C2 system performs its operational missions of processing and disseminating information) and implicit criteria (a series of nonoperational factors dealing with the system's acquisition and programmatics). It was further demonstrated that these two categories of criteria can be defined through 12 specific effectiveness criteria, the importance of which can be measured through a series of surveys, and that the effectiveness of C2 systems can be derived by assessing how well the systems meet each of these criteria. The POC for further information is Mr. Andrew Kourkoutis, US Army Concepts Analysis Agency, DSN 295-1684.

Conventional Arms Reduction Game - Optimized (CARG-O)

The CARG-O Research and Analysis Activity, sponsored by Chief, Conflict Analysis Center (CAC), incorporates historical insights from conventional arms reduction games and studies into a computer enhanced process. This process is designed to provide orientation and insight into the complexities involved in conducting arms control negotiations; and documents the process. The Conventional Arms Reduction Game (CARG) was originally adapted from a nuclear arms control simulation in 1988. The methodology was validated during PEACEGAME, an arms control simulation game later in that same year; and was utilized in MORNING CALM 90, a political-military game for CINC USFK which examined US requirements for future arms reduction negotiations on the Korean peninsula. The CARG methodology was enhanced through the use of Excel 3.0 and Adobe Illustrator on a MacIntosh system and applied to arms control negotiations in the Joint Korean Arms Control Study (JKACS), Phase II, conducted at CAA from 13 to 24 July 1992. The documentation provides sufficient information to understand the CARG-O methodology and the capability to adapt the game to any conventional arms reduction scenario. The POC for further information is LTC John M. Haetinger, US Army Concepts Analysis Agency, DSN 295-1647.

Combat Analysis Sustainability Model Verification and Validation (CASMO-VAL)

The CASMO-VAL Study was jointly sponsored by the director of the US Army Concepts Analysis Agency, Mr. E. B. Vandiver III, and the Chief Scientist of the US Army Operational Test and Evaluation Command (OPTEC). The CASMO Verification and Validation Study was divided into two parts, Phase I and Phase II. The Phase I Study was conducted to build the data bases for the combat activity and shotline data and to verify four preprocessor models. The CASMO-VER Study Report was published in January 1991. In Phase II, a data base for the M1A1 Abrams tank system was built. The CASMO Main Model was verified and validated through input/output validation and sensitivity analysis. The POC for further information is Dr. Dong Kim, US Army Concepts Analysis Agency, DSN 295-1652.

Component Requirements and Authorization Determination (COMRAD)

The COMRAD Study, sponsored by the ASA (M&RA) and ODCSOPS (DAMO-FD), HQDA, develops, tests, and demonstrates a methodology for resourcing force structure by component (AC and RC). The study examined the total Army (active and reserve) Table of Organization and Equipment (TO&E) structure organized to achieve operational requirements. It developed a force structure resourcing methodology around the time phased force requirements produced by the Support Requirements Analysis (SRA). Key factors which impact on resourcing decisions were incorporated into the methodology. The principal finding of the study was that a simple, flexible and easy-to-use methodology could be developed which reasonably accounted for current resourcing factors and produced a recommended allocation of force structure requirements between the active and reserve components. The COMRAD methodology is being incorporated into the TAA 01 analysis to provide a useful tool during the resourcing phases of the TAA process. The POC for further information is LTC Francis T. Julia, US Army Concepts Analysis Agency, DSN 295-0578.

Concurrent Theater Level Simulation (CTLS-91)

CTLS development, sponsored by DUSA(OR), and supported by the Army Simulation Technology Program (SIMTECH), has been the Army's largest single SIMTECH effort. CTLS work with the Jet Propulsion Laboratory (JPL) pioneered the application of several evolving technologies: object-oriented representation; asynchronous, Time Warp-based approaches to concurrent modeling of vast ensembles of highly heterogeneous (with respect to kind, location, activity, and time) battlefield objects, and computation on a variety of high performance single and multiprocessing computing platforms. CTLS-91 proved the applicability of flexible C2 plans and maneuver network representation within the CTLS modeling framework through successful reconstruction of much of the Desert Storm campaign. During 1992, the successful research-heavy collaboration between JPL and CAA ended, and a new phase emphasizing CTLS extensions, implementation, and user interfaces began with the Army High Performance Computing Research Center. The POC for further information is Mr. John Shepherd, US Army Concepts Analysis Agency, DSN 295-1643.

Chemical Unit Requirements (CURE)

The purpose of the CURE Study, sponsored by Deputy Chief of Staff for Operations and Plans (DCSOPS, DAMO-SWC), Headquarters, Department of the Army (HQDA), was to determine the NBC defense company requirements for the Southwest Asia and Northeast Asia theaters. The study used linear programming optimization to determine the minimum NBC company requirements for each theater. Simulation results from the CHEMCAS (Chemical Casualty Assessment) model and CEM (Concepts Evaluation Model) are incorporated into the linear programming inputs. The study findings include the TOE type, component, and the required arrival time for each NBC defense company. The POC for further information is Mr. Robert W. Barrett, US Army Concepts Analysis Agency, DSN 295-1655.

Enhanced Casualty Estimation Planning (E-CEP)

CAA was directed by the DAPE-MP to provide for development of an improved and simplified casualty estimation and stratification system to assist the office of the Deputy Chief of Staff, Personnel (DAPE-MO) and US Army Concepts Analysis Agency (CAA) in providing casualty estimation consistency in force planning. The E-CEP analysis concludes that the Army method of estimating personnel casualties and replacement requirements, an adaptation of methodologies used at CAA to determine support force structure, continues to be reasonable. The divisional casualty factor, used to transition from combat to division casualties, is updated. Enhancements are made to develop divisional stratification factors based on campaign simulation analyses. The methodology for estimating replacements is modified to identify requirements at the echelon level. Provisions have been made to identify the gender assuming threat TOE files can identify the gender of the MOS of the soldier authorized to fill it. The POC for further information is Mr. Stanley Miller, US Army Concepts Analysis Agency, DSN 295-5264.

Nuclear Weapons Political Issues Political-Military Game (HIGHWIRE 92)

HIGHWIRE 92 supported the Army Operational Requirements for Nuclear Fire Support Study (AORNFS). AORNFS was sponsored by the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Space and Special Weapons Directorate, Nuclear Division (DAMO-SWN). The AORNFS study was conducted in two phases. The first, SKYFLASH 92, identified circumstances under which a land component commander might have need for theater nuclear weapons (TNW). HIGHWIRE 92, the second phase, was a political-military game that examined the issues surrounding National Command Authority level decisions on whether to support or not support the use of nuclear weapons in the circumstances identified in SKYFLASH 92. Results are as follows: 1) the US would attempt to build an international coalition to deter potential nuclear use via UN-backed, economic, and political sanctions; and 2) the impact that US nuclear use would have on relationships with other nations (friend or foe) and the signal sent to other states possessing or contemplating acquisition of nuclear weapons would be major issues in the national nuclear decision process. The POC for further information is Mr. John A. DePalma, US Army Concepts Analysis Agency, DSN 295-1646.

Integrated Army Mobilization Study - Phase II (IAMS II)

The Integrated Army Mobilization Study - Phase II (IAMS II), an update from the IAMS Phase I study (CAA-MR-91-81, study director LTC Loggie, FE), provides analytical insights concerning new assumptions for unit arrival times, warning times, and threat size. The study sponsor was the Operations Readiness and Mobilization Directorate, Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army. The study objective was to determine if estimated requirements generated in IAMS Phase I remain a reasonable base, given the changing world environment. Results indicate that requirements for combat in Southwest Asia change from IAMS I results, while requirements for Northeast Asia remain relatively consistent. The POC for this study is CPT Thomas Pratt, US Army Concepts Analysis Agency, ATTN: CSCA-OC, DSN 295-1592/1588.

Interservice Nuclear Fire Support Capabilities (INFSCAP)

The INFSCAP Study, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans, Headquarters, Department of the Army, identifies the capabilities of theater (nonstrategic) nuclear weapons and delivery systems available from the other services to support an Army land component commander and provides an assessment of the overall responsiveness of each system. The study also summarizes current Army doctrine for fire planning, coordination, and command and control. The study methodology used was literature search and review, and direct data collection from the US Air Force and US Navy. The major finding of the study is identification of the weapons systems available from sister services, their capabilities, and total stockpile quantities. The study also provides current US Air Force and US Navy recommended nonstrategic nuclear force proposals. Because specific theater plans were not assessed, command and control procedures are not fully addressed. The study recommends that the other service recommended force proposals and command and control procedures be further assessed in specific theater studies. The POC for further information is LTC Kenneth L. Martin, US Army Concepts Analysis Agency, DSN 295-1296/1655.

Korean Operation Plan - 1991 (KOPLAN-91)

KOPLAN, sponsored by Commander in Chief, United Nations Command and ROK/US Combined Forces Command (CINCUNC/CFC), provides an assessment of proposed courses of action for CINCUNC/CFC Operation Plan (OPLAN) 5027 to assist in OPLAN revision. Study purpose was to determine operational and supportability sufficiency of CFC courses of action (COA) in a 1991 planning scenario. The basic approaches used in this study were: (1) identify which North Korean (nK) attack option would pose greatest risk to CFC; (2) reduce CFC COAs to those most feasible; assess feasible COAs campaigned against the previously identified nK attack option and determine which COA offers the greatest opportunity for success; (3) conduct intratheater mobility assessments on feasible COAs to determine logistical supportability; (4) recommend one COA that best supports CINCUNC/CFC warfighting intent. Of the four COAs, two were feasible and could achieve CINCUNC/CFC warfighting intent; however, one of the two could incur supportability risks. The POC for further information is MAJ David B. Knudson, US Army Concepts Analysis Agency, DSN 295-1592.

Application of Meta-Analysis (META)

The META Technical Paper, sponsored by the Deputy Under Secretary of the Army for Operations Research, was to assess the applicability of meta-analysis to specific Army issues. The problem of evaluating the scout helicopter utility was chosen as the case for the assessment because of the extensive study of the scout during the last three decades. The approach was (1) to develop a bibliography of reports available through Defense Technical Information Center (DTIC) and US Army Combat Development Experimentation Command (USACDEC), (2) to evaluate these reports for data to include in a data base, (3) select a common hypothesis, and (4) test the common hypothesis using several meta-analytic methods detailed in the current statistical literature. The principal finding was that meta-analytic methods are not applicable for confirmatory analysis of data from studies of land combat issues that exhibit the characteristics of the scout helicopter data. Principal among these characteristics is that each study addresses a different problem. The POC for further

information is Mr. Carl B. Bates, US Army Concepts Analysis Agency, DSN 295-0163.

Review of the Calculation of Ammunition, Petroleum, and Equipment Requirements (CALAPER) Input Factors (RCIF)

The RCIF Study, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS) (DAMO-FDL), provided a review and update of the input data and factors used in the US Army Concepts Analysis Agency's process for computing projected combat consumption and attrition of munitions, major items of equipment, and fuel based on a simulated theater-level conflict. These consumption estimates are periodically provided to the Headquarters, Department of the Army (HQDA) Staff to assist in Program Objective Memorandum (POM) development, operational planning, and other specified studies. The review was accomplished through a series of liaison visits to selected major Army commands (MACOMs) and US Army Training and Doctrine Command (TRADOC) schools and centers. Updated material was consolidated into the RCIF Study Report and has been used in recently conducted studies such as the Wartime Requirements, FY 1999 (WARREQ 99) Study. The POC for further information is Mr. Frank O. Gould, US Army Concepts Analysis Agency, DSN 295-5261.

Republic of Korea - Extended Air Defense (ROK-EAD)

ROK-EAD is a research and analysis activity (RAA) that was requested by the Director, US Army Concepts Analysis Agency. The RAA examined the potential capability of theater ground air defense assets to defend against a North Korean mass tactical ballistic missile (TBM) attack. The COMO Integrated Air Defense (IAD) Model was used to simulate the effectiveness of ground air defense assets currently located in South Korea, and then the potential improvement in performance if PATRIOT (the current PAC-2 and also the Preplanned Product Improvement (P3I) systems) and the Theater High Altitude Air Defense Systems (THAADs) were added to the theater. The POC for further information is Ms. Renee G. Carlucci or Ms. Pamela J. Roberts, US Army Concepts Analysis Agency, DSN 295-5292.

Nuclear Weapons Requirements Political-Military Game (SKYFLASH 92)

SKYFLASH 92 supported the Army Operational Requirements for Nuclear Fire Support Study (AORNFS). AORNFS was sponsored by the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Space and Special Weapons Directorate, Nuclear Division (DAMO-SWN). It was conducted in two phases. The first, SKYFLASH 92, was a political - military game to identify operational circumstances under which a land component commander might have need for theater nuclear weapons. SKYFLASH looked at selected high-risk regional scenarios from the land component and CINC perspective. All scenarios were set in year 2000. The game addressed three broad issues: crisis planning, deployment and theater combat. The circumstances under which TNW might be used included: overwhelming conventional enemy force, enemy use of nuclear weapons, and enemy use of Weapons of Mass Destruction (WMD). The operational situations identified in SKYFLASH served as

input to the HIGH WIRE 92 Study. The POC for further information is Mr. John A. DePalma, US Army Concepts Analysis Agency, DSN 295-1646.

Strategic Mobility Alternatives (SMA)

The SMA Study, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), develops strategic mobility alternatives and compares their effectiveness in a theater-level conflict. Each of the mobility alternatives improves the deployment capability of a CONUS-based contingency force of up to five Army divisions, over a documented baseline force, and a given MRC-E planning scenario. Analysis is presented that compares the current projected capability against prepositioning alternatives that include both afloat and ashore options, and alternatives that augment the existing Ready Reserve Fleet (RRF) with new, large medium speed roll on/roll off (RO/RO) ships. The study supplements the traditional deployment analysis with a combat effectiveness analysis that presents the capability of each alternative across a theater-level scenario spectrum. The report also presents a deployment analysis of the US Army mobility plan, a strategic mobility alternative that meets future mobility requirements as envisioned by the Strategic Mobility Division of the Deputy Chief of Staff for Logistics. The POC for further information is MAJ J. Ralph Wood, US Army Concepts Analysis Agency, DSN 295-5301.

Stochastic Concepts Evaluation Model - Phase II (STOCCEM 2)

The STOCCEM 2 Study, sponsored by the Director, US Army Concepts Analysis Agency (CAA), makes the Stochastic Concepts Evaluation Model (STOCCEM) a useful tool for analysis by improving the representation of stochastic processes in the STOCCEM and by automating the execution of STOCCEM replications and the generation of reports and graphic displays from STOCCEM replications. A Plackett-Burman experimental design of STOCCEM runs, using an Iraq scenario, is executed and analyzed to identify particular stochastic processes of the STOCCEM that cause the most variability among outcomes of STOCCEM replications. A statistical analysis of results demonstrates that results of the deterministic base simulation do not differ significantly from the distribution of stochastic results and that fewer than 10 STOCCEM replications are required to produce 90 percent confidence intervals of reasonable size for all the outcome measures examined for this scenario, but these findings do not necessarily extend to STOCCEM simulations of other situations. The POC for further information is Dr. Ralph Johnson, US Army Concepts Analysis Agency, DSN 295-1593.

Tactical Combat Samples and Linkage to TACWAR (TAC LINK)

The TAC LINK study, sponsored by the C3, Combined Forces Command, Korea, documents the production of tactical combat samples for use in TACWAR. These combat samples provide an audit trail for the following TACWAR inputs: operational probability of kill, operational rates of fire, and allocation of fires for each type of weapon or equipment. This study examines US and Republic of Korea forces deployed against a North Korean threat in the 1993 time frame. Simulated combat was fought using US and South Korean platoons arrayed against North Korean companies in fifteen specific postures including ground on ground and air on ground

combat scenarios. The POC for further information is CPT(P) Robert S. Elias, US Army Concepts Analysis Agency, DSN 295-5255.

Concurrent Processing and Time Warp Development (TW-91)

Time Warp research, sponsored by the DUSA(OR), and supported by the Army Simulation Technology Program (SIMTECH), pursued a radical approach to achieving high performance on parallel computers. The multiyear project was completed by the Jet Propulsion Laboratory (JPL) in March 1992. TWOS research pioneered application of Time Warp to asynchronous parallel processing for large scale military simulation. Following early, small-scale demonstration of up to 35-fold speed-up relative to single processor performance, less speed-up was attained for much larger, more complex Concurrent Theater Level Simulation (CTLS) versions. In their 1991-2 forms, TWOS and CTLS yielded 4- to 8-fold speedups with fair assurance, but future higher performance remains problematic. The Army decided to suspend further TWOS development pending accumulation of additional performance experience and establishment of a broader support base. TWOS and TWOS-like approaches remain promising; the current TWOS works reliably; but it is clear that more research and development are needed to achieve an easily and widely applicable system. Given the clearly bottleneck-susceptible methods being applied by several developers in the distributed interactive simulation (DIS) environment, a multi-service (or even national) TWOS initiative is appropriate. The POC for further information is Mr. John Shepherd, US Army Concepts Analysis Agency, DSN 295-1643.

Army Program Value Added Analysis 94-99 Phase II (VAA 94-99)

VAA 94-99 is a study sponsored by the Director, Program Analysis and Evaluation (DAPE) and the Deputy Chief of Staff for Operations and Plans (DCSOPS). The purpose of this study was to: (1) enhance the analytical tradeoff methodology developed in Army Program Value Added Analysis 90-97 Phase I study; and (2) provide DPAE and DCSOPS with an analytical capability that would assist in the development of a balanced and effective Army research, development, and acquisition (RDA) program through the use of a comprehensive cost-benefit analysis methodology. The principal findings of the study are: (1) VAA study framework as developed in the VAA Phase I study was shown to be useful in evaluating Program Objective Memorandum (POM) issues; (2) the use of an experimental design and a response surface methodology was found to be an effective means to determine system contribution to combat results; (3) the Life Cycle Cost Model is a useful tool for providing action officers with detailed cost estimates for candidate procurement programs; (4) the development of a mixed integer programming formulation that allowed consideration of cost quantity relationships and handles fixed production costs and research, development, test, and evaluation (RDTE) explicitly was shown to be an extremely effective method of cost-benefit analysis; and (5) additional research is required to find an improved method of effectiveness integration to replace the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS). The POC for further information is LTC Andrew G. Loerch, US Army Concepts Analysis Agency, DSN 295-1546.

Value Added Linear Optimization of Resources (VALOR)

Each year, the US Army procures billions of dollars worth of weapons and equipment so that its worldwide mission of defense can be accomplished. The process of deciding what equipment to procure, in what quantities, and in what timeframes to best respond to the threat posed by potential adversaries, is extremely complex, requiring extensive analysis. Two techniques commonly used in this analysis are mathematical programming and cost estimation. Although they are related through constraints on available funds for procurement, the use of nonlinear cost learning curves, which more accurately represent system costs as a function of quantity produced, has not been incorporated into the mathematical programming formulations that compute the quantities of items to be procured. As a result, the solutions obtained could be either suboptimal or even infeasible with respect to budgetary limitations. This paper presents a responsive, mixed integer linear programming formulation that uses a piecewise linear approximation of the learning curve costs for a more accurate portrayal of budgetary constraints. In addition, implementation issues are discussed, and performance results are given. The POC for further information is LTC Andrew Loerch, US Army Concepts Analysis Agency, DSN 295-1546.

A Structured Approach to Large-Scale Battlefield Simulation (VECCEM Phases I & II)

The VECCEM research project, sponsored by the DUSA(OR), and supported by the Army Model Improvement Program (AMIP) and Simulation Technology Program (SIMTECH) addresses the application of modern programming techniques to improve the performance of large-scale combat simulations. Through the completion of Phase I and Phase II, Dr. Patrick Burns and Mike Brewer, both of Colorado State University, fully vectorized the direct fire portion of ATCAL for each engagement with CAA's CEM. Burns and Brewer also implemented a vectorized Batchers sort in CEM. The new sort runs at nearly 30 MFLOPs - 30 times faster than CEM's original unvectorized sort. The original ATCAL and sort routines consumed the majority of CPU resources in CEM. Burns and Brewer embedded their engagement-by-engagement and sort vectorizations within CEM VI and VII. Tests for CEM VI produced slightly more than a threefold speedup; tests with CEM VII yielded a bit more than twofold speedup. Burns and Brewer delivered the Phase II version to CAA analysts who began bringing the vectorized CEM VII on line. The POC for further information is Mr. Gerald E. Cooper, US Army Concepts Analysis Agency, DSN 295-0529.

Wartime Requirements, Fiscal Year 1999 (WARREQ-99)

The WARREQ-99 study, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), (DAMO-FDL), determined projected wartime expenditures (PWE) for supply classes V (munitions) and VII (major end items) for three theaters in the FY99 timeframe. PWE were developed for Europe, Southwest Asia, and Northeast Asia based on contingency operations outlined in the Defense Planning Guidance. PWE were used by ODCSOPS in the process to determine Program Objective Memorandum (POM) requirements for the outyear. Additional analysis was done to assess the impact of limiting consumption of munitions and equipment replacements to projected FY99 war reserve levels. Analysis included extensive theater-level combat simulations and associated consumption analysis. The POC for further information is MAJ William H. Danzeisen III, US Army Concepts Analysis Agency, DSN 295-1666.

FY 92 CAA QUICK REACTION ANALYSES

Army Availability Factor (AAF)

The AAF QRA, sponsored by the US Army Force Integration Support Agency, provides a framework for future revalidation of the Army Availability Factor. The Army must periodically update or revalidate this factor which is used to determine manpower requirements in Tables of Distribution and Allowances (TDA) organizations. The factor was last updated in 1983. Included within the revalidation framework is a comparison of the most recent efforts of the Army and Air Force, a determination of appropriate nonavailable time categories, and data source identification. Also included are recommended analytical methods for revalidating the AAF. The POC for further information is Ms. Patti L. Rennekamp, US Army Concepts Analysis Agency, DSN 295-1082, or commercial (301) 295-1082.

Army College Fund Allocation Analysis (ACFAA)

The Army College Fund (ACF) program, initiated in 1981, is a key tool for Army recruiting managers. By targeting ACF at critical Military Occupational Specialties (MOSSs), managers can attract high caliber applicants to those skills. The ACFAA analysis attempted to examine patterns and trends in ACF authorization over the years and to contrast these with actual recruiting results. The objective was to gain insight into program management in years past and to identify approaches to improved program management for the future. Because of difficulty in quantifying historical recruiting results, these objectives were only partially realized. It was observed during the analysis that the ACF over time has remained more or less stable in scope, that many combat arms specialties receive continuous program support, and that specialties receiving ACF are likely to be eligible for the Enlistment Bonus (EB) as well. The POC for further information is Mr. George Peery, US Army Concepts Analysis Agency, DSN 295-1609 or commercial (301) 295-1609.

Army Integrated Mobilization Study II - Medical (AIMS II-M)

AIMS II-M, sponsored by the Office of the Surgeon General (OTSG), DASG-HCO-F examined the impact on medical force structure requirements of varying evacuation policies and disease/nonbattle injury (DNBI) rates for combat and noncombat periods for the MRC-E and MRC-W scenarios. The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to determine the medical force structure requirements. The analysis found that the scenario dependent mix of combat and noncombat periods greatly influenced the impact of changing the noncombat period DNBI rates and changes in the evacuation policy produce slightly higher reductions than changing the DNBI rates during combat periods. The results of the QRA were provided to the sponsor on 3 April 1992. The

POC for further information is LTC Linda L. Hampton, US Army Concepts Analysis Agency, DSN 295-5269.

Aircraft Resource Allocation Options (AIR OPTIONS)

The AIR OPTIONS quick reaction analysis, sponsored by the Office of the Deputy Chief of Staff for Logistics (ODCSLOG), Headquarters Department of the Army (HQDA), examines the concept of meeting the Army's helicopter Flying Hour Program requirements with a reduced number of operating aircraft. This would be accomplished by storing a percentage of the operating fleet while operating non-stored aircraft at a higher flying hour-per-month rate. Aircraft would be rotated periodically through a storage cycle. Stored aircraft would be available to support wartime or unforeseen peacetime requirements. Analysis results point to reduced maintenance costs achieved by operating aircraft in a more efficient flying hour range. For the assumptions employed, the analysis also shows that a storage program would improve fleet operational availability and reduce overall fleet cost if economical storage policies are adopted. The POC for further information is Mr. George Peery, US Army Concepts Analysis Agency, DSN 295-1609.

ALADDIN 92

The ALADDIN 92 political-military game was sponsored by the Assistant Deputy Chief of Staff for Intelligence (ADCSINT). The purpose of the game was to gain insights from DESERT STORM, the dissolution of the Union of Soviet Socialist Republics (USSR), and other geopolitical events from the US and potential US adversaries' perspectives. The game objectives were to provide the sponsor and the senior Army leadership insights and to postulate future adversary strategies and actions that could be used against the US or our allies. Three regional areas were examined: Middle East, Pacific Region, and Latin America. The most important lesson learned was the increased motivation by all nations to acquire weapons of mass destruction. The POC for further information contact Ms. Julia A. Fuller, US Army Concepts Analysis Agency, DSN 295-4715.

ARSTAR Capabilities Analysis-1 (ARSTAR CA-1)

ARSTAR CA-1, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans, DAMO-SSW, evaluates how successful various force structures are in accomplishing the national security objectives for each of the Major Regional Conflicts in the Illustrative Planning Scenarios of the Defense Planning Guidance. The analysis compares the success of alternative force structures to the success of the Base Force. Additional issues evaluated were modifications of the current Prepositioning of Materiel Configured to Units Sets (POMCUS) and force apportionment. The results of this QRA were provided to the sponsor on 7 July 1992. The POC for further information is CPT Robert L. Steinrauf, US Army Concepts Analysis Agency, DSN 295-1526.

Army Strategic Force Planning Workshop (ASFPW)

ASFPW, sponsored by DAMO-SSP and DAMO-SSW, was devoted solely to strategic force planning. The foci of the workshop were the National Military Strategy (NMS)

and its impact on the Army. The workshop consisted of three working sessions: plenary briefings; separate team discussions; and team briefings to a senior council. The Directorate of Strategy, Plans, and Policy, Office of the Deputy Chief of Staff, Operations and Plans and experts from US Army Pacific, US Army South, Forces Command, and Training and Doctrine Command participated in the workshop. Attendees were assigned to teams, and each team was requested to identify the capabilities required to execute the NMS, discuss a framework for future force structure changes, and provide input for future force planning decisions. The workshop facilitated an exchange of ideas and perspectives and revealed many common themes. The most important are the necessity to define military support to Peacetime Engagement (PE), establishment of a mechanism to allocate PE resources, and the generation of new approaches to planning in an uncertain and changing strategic environment. The POC for further information Ms. Julia A. Fuller, US Army Concepts Analysis Agency, DSN 295-4715.

Analytic Support to the Field Test of the Automated Core Document (ACD) System (AUTOCORE)

CAA participated with PERSCOM in the field test of the Automated Core Document (ACD) system at 12 Civilian Personnel Offices within continental United States (CONUS). The ACD system is used to prepare composite (core) document for civilian positions within the Army. The results of the test, as evaluated by CAA, indicate substantial savings in documentation time (2 hours vs 16 hours) using the system. In addition, system users favored the automated process over the traditional (manual) process 2:1. The test results will be used as part of SAG recommendations to senior Army management considering use of the ACD system Army-wide. The POC for further information is Mr. James Connelly, US Army Concepts Analysis Agency, DSN 295-0450.

Base Force Analysis (B-FASS)

The purpose of the B-FASS, sponsored by the Vice Chief of Staff of the Army, was to conduct an independent assessment of a Vector Research Incorporated (VRI) Army Base Force Reduction briefing given to the Chief of Staff of the Army and the Secretary of the Army in February 1992. Results of this analysis determined that CAA is in general agreement with VRI observations. The POC for further information is MAJ David B. Knudson, US Army Concepts Analysis Agency, DSN 295-1592.

Base Force Reductions and Modernization Alternatives (BASFORMA)

BASFORMA, sponsored by the Vice Chief of Staff of the Army (DACS-ZA), examined Base Force Alternatives with or without constant dollars and where the capability of the force structure alternatives is measured against that of the Base Force. The POC for further information is MAJ David B. Knudson, US Army Concepts Analysis Agency, DSN 295-1592.

Biological Defense Analysis (BIODEF)

The sponsor for the Bio Defense QRA is DAMO-SWC. The purpose of the Bio Defense QRA is to evaluate several alternatives for defense against BW weapons. A spreadsheet based probabilistic model was used for the analysis, which included a Monte Carlo simulation. The POC for further information is Mr. Robert W. Barrett, US Army Concepts Analysis Agency, DSN 295-1655.

Comparison of Army Logistics Support to Other Services (CALOG SOS)

CALOG SOS, sponsored by the Office of the Deputy Chief of Staff for Logistics (ODCSLOG), DALO-PLP, assessed and compared the impact on CS/CSS force structure of providing support to Air Force, Marine Corps, and Navy operations based on Total Army Analysis-1999 (TAA-99), and implementation of the CINCs' stated support requirements. The three TAA-99 planning scenarios examined were: Global Conflict Europe (GCE), Major Regional Contingency-East (MRC-E), and Major Regional Contingency-West (MRC-W). The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to determine the CS/CSS force structure requirements. The analysis of TAA-99 support levels in GCE found that only 1 percent of force structure was driven by support to the other services. The CINCs' current other service support requirements for Europe were not evaluated due to the lack of a viable scenario at the time this analysis was undertaken. Support to the other services in TAA-99 MRC-E increased Army force structure requirements by over 20,000 spaces (10 percent), whereas the CINC support requests increased requirements by over 57,000 spaces (24 percent). The requirement to provide for the supply and transportation of bulk fuel was the greatest generator of force structure, requiring 45 percent of the support to other services in MRC-E. TAA-99 levels of support to the other services in MRC-W required almost 6,000 spaces (4 percent) above the Army's force structure requirement. In order to meet the CINCs' stated support requirement, an additional 14,500 spaces (9 percent) above the Army-only requirement for support were required, with the requirement to supply and transport bulk fuel again the greatest generator of force structure, accounting for 29 percent of support to other services. For all of the scenarios examined, the following functional areas were impacted: engineer, medical, quartermaster, maintenance, and transportation. The results of this QRA were provided to the sponsor on 9 March 1992. The POC for further information is Ms. Patricia A. Murphy, US Army Concepts Analysis Agency, DSN 295-5267.

Contingency Corps-Armored Systems Modernization (CCASM)

The CCASM Study, sponsored by the Director of Requirements, Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), analyzes the contributions of the Armored Systems Modernization (ASM) program systems to a US Army contingency corps. This Quick Reaction Analysis (QRA) was conducted using a modified Major Regional Contingency-East (MRC-E) Scenario. It evaluated the impact of new systems on a contingency corps' survivability, lethality, and ability to prevent a modernized threat force from securing its objectives. To examine these effects the Concepts Analysis Agency (CAA) employed the mid-level resolution, corps-level model, Corps Battle Analyzer (CORBAN). Two main cases were examined, one without and one with the new systems. Although the results are classified, it was

found that the ASM systems did improve the force's lethality, survivability, and ability to prevent a modernized threat force from securing its objectives. The POC for further information is Mr. Karsten Engelmann, US Army Concepts Analysis Agency, DSN 295-1027.

Combined Forces Command Sustainment Assessment (CFCS)

CFCS is a study of sustainment infrastructure available to support execution of CFC OPLAN 5027 (Variant). Study scope includes COMMZ transportation network capability, ROKA supply consumption and WRSA levels, and US CS/CSS force deployment schedules in the first 30 days of an FY 92 conflict. The POC for further information is MAJ David Knudson, US Army Concepts Analysis Agency, DSN 295-1592.

Combined Forces Command Sustainability Phase II (CFCS II)

CFCS Phase II analyzed the affected increased warning time speeds had on arrival of reinforcements thereby strengthening initial defense. Although this causes a greater demand for certain munitions and increases transportation requirements, existing transportation network is capable of sustaining these increased theater operational requirements. The POC for further information is MAJ David Knudson, US Army Concepts Analysis Agency, DSN 295-1592.

Combined Forces Command Sustainability - Update (CFCS-UP)

The CFCS Update is an updated study of sustainment infrastructure available to support execution of CFC OPLAN 5027 (Variant). The study scope includes COMMZ transportation network capability, ROKA supply consumption and WRSA levels, and US CS/CSS force deployment schedules in the first 30 days of a FY 92 conflict. The POC for further information is MAJ David Knudson, US Army Concepts Analysis Agency, DSN 295-1592.

Chemical Warhead Impact on Desert Storm (CHEMSTORM)

The purpose of the CHEMSTORM QRA, sponsored by ODCSOPS (DAMO-FDM), was to answer the hypothetical question: "What if chemical warheads had been employed by the Iraqis during the Persian Gulf War?" The objective of the study was to estimate the number of casualties which would have been expected had the SCUD missiles, launched during the war at targets in Israel and Saudi Arabia, all reached their intended targets, and carried chemical warheads in the absence of an anti-TBM defense such as the PATRIOT. Potential casualties from these limited attacks were estimated based on predicted lethalties and dispersal patterns of US-made agents (persistent and nonpersistent nerve and mustard) similar to agents available to the Iraqis, on the population densities of targeted areas. An excursion was also run to estimate casualties resulting from full-scale chemical attacks on the same targets. The POC for further information is MAJ Robert Fleitz, US Army Concepts Analysis Agency, DSN 295-5300.

Comanche Impact Analysis (CIA)

The CIA QRA, sponsored by the ODCSOPS, assessed the impact that changes to the RAH-66, Comanche's, proposed fielding would have on the Army's helicopter force. The RAH-66 is the only follow-on scout or attack helicopter system scheduled to be fielded. The QRA showed that without the Comanche, the Army has no way of replacing any of the scout or attack helicopters that it loses, each year, due to attrition and age. Delaying the fielding of the RAH-66 results in a period of diminished capability (from FY 98 through FY 12) and increased risk. The POC for further information is Mr. Andrew Kourkoutis, US Army Concepts Analysis Agency, DSN 295-1684.

Contingency Corps Unit Movement Data (CONCOR-UMD)

This analysis was conducted at the request of the Joint Strategic Deployment Training Center, US Army Transportation School. The school needed a training scenario to support the newly developed Joint Strategic Deployment Planning Course. The training scenario required a transportationally feasible time phased notional list, associated notional strategic lift, and all pertinent mobilization and deployment information. The study developed the forced required, at UIC level of detail, for a single major regional conflict, and developed a coherent deployment schedule for these units, to include the lift requirements by air and sea for each of the units and the resultant deployment estimates. This notional deployment became the initial case study used in the Joint Strategic Deployment Planning Course. The POC for further information is Mr. Franklin McKie, US Army Concepts Analysis Agency, DSN 295-1699.

Combat Samples for Air Force Studies and Analyses Agency (COSAA)

The COSAA Quick Reaction Analysis, sponsored by Department of the Army, Office of the Deputy Under Secretary for Operations Research (DUSA-OR), was to assist USAF Studies and Analyses Agency (AFSAA) in determining whether combat samples, generated by CAA for their use, should include fixed wing aircraft. COSAA was a comparative analysis of the performance of major weapon systems with and without TACAIR included in the combat samples. Results of this analysis revealed that Blue kills more Red targets with TACAIR. Conversely, without TACAIR, Blue loses more equipment. Study products provided to AFSAA are killer/victim scoreboards resulting from this analysis and the memorandum report documenting this QRA. The POC for further information is Ms. Rose A. Brown, US Army Concepts Analysis Agency, DSN 295-1627.

Cost Model Input Calculations (COSMIC)

The purpose of the COSMIC QRA, sponsored by the Director, Program Analysis and Evaluation (PAE), Acquisition Support Program Analysis Division (ASPAD), is to estimate changes in weapon systems costs that could result from changes in procurement activities. A regression analysis was developed which considered costs and quantities of weapon systems which may be funded in the 94-99 Program Objective Memorandum (POM); and the Cost-Quantity Model (CQM) was

documented. The sponsor was provided with software for deriving the cost-quantity curves; the CQM with documentation; and the CQM input cost-quantity data for weapon systems. The POC for further information is Mr. Joel Gordon, US Army Concepts Analysis Agency, DSN 295-1684.

Disease and Nonbattle Injury Rates - 2001 (DNBI 2001)

DNBI 2001, sponsored by the Office of The Surgeon General (OTSG), DASG-HCO-F examined the impact on medical force structure requirements for the TAA-99 MRC-E and MRC-W scenarios with the disease and nonbattle injury (DNBI) rates recommended by OTSG's Disease and Nonbattle Injury Subject Matter Expert Panel. The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to determine the medical force structure requirements. The analysis found that the recommended rates reduced personnel requirements in MRC-E (32.2 percent), slightly increased personnel requirements in MRC-W (0.8 percent) and reduced the combined personnel requirement by 17.1 percent. The results of this QRA were provided to the sponsors on 14 May 1992. The POC for further information is LTC Linda L. Hampton, US Army Concepts Analysis Agency, DSN 295-5269.

Defense of Korea (DOK)

DOK, sponsored by the Vice Chief of Staff of the Army, was a briefing which was prepared to answer questions concerning force deployment issues in the defense of the Republic of Korea. The POC for further information is CPT Thomas I. Pratt, US Army Concepts Analysis Agency, DSN 295-1592.

DESERT STORM - Suppression of Enemy Air Defenses (DS-SEAD)

DS-SEAD provides documentation of the tactics used by the allied air forces to destroy the Iraqi air defense system in the initial air attack on Iraq on 17 January 1991 in the war to liberate Kuwait. The purpose of this work was to provide information for planning similar air operations to be used in wargaming and computer simulations at CAA. The Iraqis had built a formidable integrated air defense system, and the ability of the allied air forces to overcome it was a major achievement. The major factors contributing to the allies success were good intelligence, careful planning, effective use of available assets, and competent execution of the attack plan. New technologies/techniques contributing were the use of low observable weapons, computer simulation of attack plans, and the ability to control the attack in real time by airborne command posts. The POC for further information is Mr. Matthew Ogorzalek, US Army Concepts Analysis Agency, DSN 295-5300.

Deployment-TRADOC Common Teaching Scenario - Southwest Asia (DTCTS-SWA)

The DTCTS-SWA Quick Reaction Analysis, sponsored by the US Army Command and General Staff College (USACGSC), Center for Army Tactics, provides deployment estimate for the order of battle developed for the TRADOC Common Teaching Scenario for Southwest Asia (TCTS-SWA). This product will be used by USACGSC in developing the deployment section of the TCTS-SWA. The POC for further

information is Mr. Franklin McKie, US Army Concepts Analysis Agency, DSN 295-1699.

Economic Analysis of the DCSOPS Information Management Program (EADIMP)

EADIMP is a quick reaction analysis requested by the Technical Advisor to the Deputy Chief of Staff for Operations and Plans (DCSOPS). By the end of February 1992, DCSOPS had completed three cycles of presentation and evaluation of a proposed fiscal year 1992 management information system (MIS) budget, non-acceptable to Assistant Deputy Chief of Staff for Operations and Plans (ADCSOPS). The DCSOPS Technical Advisor requested that the US Army Concepts Analysis Agency (CAA) conduct an analysis, develop mechanisms and methodologies to assist the ODCSOPS in the development of their automation budget and program, and brief the results to the ADCSOPS within a 1-month period. The analysis effort included automated surveys of ODCSOPS general officers, senior civilians, and technical experts on their assessments of the spectrum of ODCSOPS processes and automation projects. The gathered information was incorporated into a series of capital budgeting methodologies providing insight into cost-benefit repercussions of the deletion/inclusion of the collective projects. The POC for further information is MAJ Robert Clayton, US Army Concepts Analysis Agency, DSN 295-5291.

Evaluation of Elected Voluntary Alternate DESCOM Discipline (EVADED)

The EVADED Quick Reaction Analysis, sponsored by the Army ODCSPER (DAPE-CPL), evaluated the effectiveness of a recently completed 2-year trial of a Depot System Command (DESCOM) policy for dealing with depot employees who are absent from duty without official leave (AWOL). The policy is identified as Elected Voluntary Alternate DESCOM Discipline (EVADED). It offers to waive the usual penalty of suspension without pay if the employee elects to sign a formal agreement admitting to the offense and promising no further misconduct in the future. If the employee declines the agreement, the usual suspension without pay is imposed. About 3/4 of the affected DESCOM employees accepted the EVADED offer. The evaluation found savings in depot productivity due to the waiver of the suspension and a reduction in costs of administering the AWOL offenses. The POC for further information is Mr. James Connelly, US Army Concepts Analysis Agency, DSN 295-0450.

Fast Total Army Equipment Distribution Program (FASTAEDP)

The FASTAEDP Quick Reaction Analysis, sponsored by the Army Program Analysis and Evaluation Directorate (PAED), determined feasible approaches that could be used by Army PAE personnel to quickly estimate the effect on total force equipment distribution of late changes (decrements) to the original Program Objective Memorandum (POM) force structure. The recommended estimation procedures utilize either the Force Builder REORG module or the Status Projection System. First, equipment is redistributed from decremented UICs to the remaining UICs to improve their respective equipment on-hand unit readiness at current modernization levels. Remaining "excess" major equipment levels are then examined by LIN to determine the approximate potential for unit modernization

upgrades in the full SACS-LOGSACS-TAEDP process. The POC for further information is Mr. Howard E. Whitehead, US Army Concepts Analysis Agency, DSN 295-1105.

Force Structure and Modernization Tradeoff Analysis - Inputs (FOSMODTOS-IN)

FOSMODTOS-IN was a quick reaction analysis to determine the type [by standard requirement code (SRC)] and quantity of combat support and combat service support (CS/CSS) units providing 'dedicated support' to a single 'representative' light infantry division (LID) or heavy division (HD). This information will serve as an input to an analysis of Army combat capabilities associated with different alternatives for downsizing the Active Army combined with different modernization investment levels. The QRA required evaluation of 28 functional CS/CSS areas in each to the three major Total Army Analysis - 1999 theater planning scenarios. Analysis revealed that a LID requires dedicated support from 77 units (56 SRCs) regardless of theater, and from an additional 9-39 theater specific units (9-27 SRCs); a HD requires dedicated support from 111 units (65 SRCs) regardless of theater, and from an additional 24-62 theater specific units (20-39 SRCs). The POC for further information is LTC James O. Kievit, US Army Concepts Analysis Agency, DSN 295-5270.

Global Wargame FY 1992 (FRONTIER 92)

The US Army Concepts Analysis Agency and the Strategy, Plans, and Policy Directorate, ODCSOPS, co-sponsored FRONTIER 92, a 1-day political-military game (30 June 92), which examined the hot Army areas of interest for Army input into the Naval War College's GLOBAL 92 Wargame (GLOBAL 92), Newport, RI (13-31 July 1992). FRONTIER 92 prepared Army gamers to represent the Army at GLOBAL 92. FRONTIER 92 was organized to reflect the GLOBAL 92 gaming structure. Four teams represented the regional commands--CINCPAC, CINCEUR/ CINCCENT, and CINCSOUTH/CINCLANT. FRONTIER 92 began with a series of information briefings which oriented gamers on the purpose of FRONTIER 92 and GLOBAL 92, followed by team discussions and final team briefings to a Senior Council. Issues developed included the evolution of the Unified Command Plan, Army's role in power projection through crisis response and forward projection, and the importance of Army defensive capability through ballistic missile defense system. An Army Strategic Force Planning (ASP 92) Workshop and a Strategic Crisis Action Game 92 will be held October 92 and December 92, respectively, and will be devoted to strategic force planning. The POC for further information is Ms. Julia A. Fuller, US Army Concepts Analysis Agency, DSN 295-4715.

Global Excursion of Transportation Allocation Rules SRA-99 (GETAR-99)

GETAR-99 is sponsored by the US Army Transportation School (ATSP-CDO). The sponsor is in the process of recomputing the capability statements in truck unit TOEs using a 90 percent availability factor vis-a-vis the 75 percent factor traditionally used. This change may influence future allocation rules used in the Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model to generate support force requirements. This QRA addresses only medium truck companies. FASTALS excursions with allocation rules reflecting the 90 percent

availability factor are compared to the SRA-99 base case results using the following scenarios: General Conflict Europe (GCE), Major Regional Conflict - East (MRC-E), and Major Regional Conflict - West (MRC-W). Results of this analysis will be used to analyze the impact of changing the TOE availability factor. The POC for further information is MAJ Barry V. Brassard, US Army Concepts Analysis Agency, DSN 295-5270.

Heavy Infantry Division Analysis of Soldier Support System Cost Study (HDASSCS)

The HDASSCS QRA, sponsored by Natick RDE Center, identifies the support force requirements for a heavy infantry division (HD) in a generic campaign. The methodology used was to determine the support requirements necessary in the Ground Combat Europe, Major Regional Contingency - East, and Major Regional Contingency - West scenario campaigns using the SRA-99 data files. Base Case support requirements lists by SRC were created for each campaign. Changes were made to force structure in each campaign and excursion support requirements lists were created. The lists were compared and analyzed and a common support requirements list was generated. Theater-specific lists were also produced. The major finding of the analysis determined that a single HD needs to be supported by a common EAD structure of 11,270 personnel in 101 separate unit types (SRC) regardless of theater campaign. There exist additional personnel and unique force structure requirements within specific theaters. The POC for further information is LTC Francis T. Julia, Jr., US Army Concepts Analysis Agency, DSN 295-0578.

HELLFIRE versus LONGBOW (HELL vs. LONG)

The HELL vs. LONG QRA, written for the Technical Advisor to the DCSOPS, compares the HELLFIRE antiarmor missile to the LONGBOW fire and forget antiarmor missile. The AH-64 APACHE helicopter is used as the firing platform in both the European and Southwest Asia scenarios. CAA-computed system exchange ratios and loss exchange ratios are compared to the analysis as portrayed in two TRAC studies; APACHE Procurements Strategy Analysis and also to LONGBOW Cost and Operational Effectiveness Analysis. The QRA documents the simulation models used and the comparative results obtained. The POC for further information is Mr. Hugh W. Jones, US Army Concepts Analysis Agency, DSN 295-5251.

Investment Programs of the Army: Economic and Modernization Analysis (IPAEMA)

IPAEMA is a quick reaction analysis sponsored by the Deputy Chief of Staff for Operations and Plans (DCSOPS) - Force Development (FD). The Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS) was working on modifications to the Program Objective Memorandum 1994-99 (POM). The following issues arose for which analytical support was needed in the decisionmaking process. Is the Army Tactical Missile System Block II (ATACMS II) with Brilliant Anti-armor Technology (BAT) submunitions more cost effective than the Tri-Service Standoff Attack Missile (TSSAM) with BAT submunitions? How should the helicopter program be structured with respect to the AH-64 Apache with Longbow (LB) and the RAH-66 Comanche? How does the procurement of the advanced field artillery system (AFAS) and the future armored resupply vehicle - artillery (FARV-A) affect the

recommended system mix? What is the cost-effectiveness of the following command and control (C2) systems as alternatives: Army Data Distribution System (ADDS), Advanced Field Artillery Tactical Data System (AFATDS), All-Source Analysis System (ASAS), Combat Service Support Control System (CSSCS), Forward Area Air Defense Command and Control (FAAD C2), and Maneuver Control System (MCS)? The purpose of the QRA was to perform a Value Added Analysis (VAA) to compare the above modernization alternatives, to recommend a system mix for each alternative, and to evaluate the combat effectiveness for each alternative. The following were the observations when only the POM systems were considered for procurement. The most effective force results from a forced procurement of AH-64 w/LB vice ATACMS II, and with Comanche not recommended. AH-64 w/LB appears to be more cost effective than Comanche. ATACMS II with BAT submunitions seems to be more cost-effective than TSSAM with BAT submunitions. When AFAS and FARV-A are not considered for procurement, then the Comanche is recommended. The lack of AFAS and FARV-A in a procurement package improves the force effectiveness in the Contingency scenario, whereas force effectiveness is reduced in the Stressful scenario. The following were the observations when the C2 systems were considered for procurement. In the case where both the POM and C2 systems were considered for procurement, all considered C2 systems except CSSCS were recommended vice Comanche. When AH-64 w/LB was forced to be procured, with the POM and C2 systems under consideration, AH-64 w/LB and all of the C2 systems were recommended vice Comanche. In the forced procurement of ATACMS II, multiple launch rocket system sense and destroy armor (MLRS SADARM) was identified as the billpayer along with Comanche. In addition to ATACMS II's procurement, all of the C2 systems were recommended. In the forced procurement of Comanche, the following systems were identified as the billpayers: AFAS, FARV-A, MLRS SADARM, advanced antitank weapon system-medium (AAWS-M), and family of medium tactical vehicles 2.5 ton (FMTV 2.5). In addition to these billpayers, ASAS was not recommended for procurement. The POC for further information is LTC Andrew G. Loerch, US Army Concepts Analysis Agency, DSN 295-1546.

Initial Requirements Analysis for MRC-W Scenario (IRAFORMS)

IRAFORMS, sponsored by the Office of the Deputy Chief of Staff for Logistics, DALO-TSM, provides an estimate of Army unit and nonunit movement requirements for a deployment to Northeast Asia using the January 1992, draft Defense Planning Guidance (DPG) as a basis for a campaign analysis and FY 99 allocation rules as the basis for support requirements. This analysis compares movement requirements results from the Mobility Requirements Study (MRS) to the results of this study. The requirement for US Army CS/CSS support personnel increased by 16 percent in IRAFORMS. The increase is driven by the requirement to increase support to the other services. Unit equipment increased from 625,000 STON to 766,000 STON (23 percent) due to an increase in the forces deployed. Class VII movement requirements increased in IRAFORMS from 280,000 STON to 1,187,000, the result of a higher planning factor than that used in MRS. Movement requirements for ammunition decreased based on a smaller and different mix of forces in IRAFORMS. Total Army movement requirements in IRAFORMS increased by 80 percent from that in MRS. The results of this QRA were provided to the sponsor on 10 July 1992. The POC for further information is Major Winifred E. Turner, US Army Concepts Analysis Agency, DSN 295-5270.

Knowledge of Time Slippage (KNOTS)

KNOTS measures the cost of delaying closure of a second heavy division by four days. The cost was measured in terms of the relative difference in MIE and personnel losses between the two closure profiles in the MRC-E scenario. The Navy proposal does not appear to have a significant impact on US major system losses in the three MRC-E cases examined. The POC for further information is MAJ David B. Knudson, US Army Concepts Analysis Agency, DSN 295-1592.

Korean War Plan (KOWAP)

KOWAP, sponsored by Commander in Chief, United Nations Command and ROK/US Combined Forces Command (CINCUNC/CFC), provides an operational capabilities assessment of US Army force apportioned to USCINCPAC in JSCP CY 93-95 for OPLAN 5027. Study purpose was to recommend a combat force sequence that best supports CINCUNC/CFC warfighting intent in a 1991 planning scenario. The basic approaches used in this study were: (1) establish three potential deployment sequences for JSCP forces; (2) determine a force arrival schedule for each option; (3) determine campaign results estimates for each option measured by north Korean major weapon system losses, US major weapon system losses and campaign duration; (4) compare options to each other and to a base case of CINC-required forces arriving in accordance with the Army strategic mobility position; (5) recommend one option as preferred force deployment sequence. Analysis resulted in recommendation of an option offering a quicker successful campaign termination with lower US losses than other options. The POC for further information is MAJ David B. Knudson, US Army Concepts Analysis Agency, DSN 295-1592.

Korean Warfighting Operations Plan - Mobility Assessment (KOWAP-MOB)

KOWAP-MOB analysis reinforced previously identified force allocation mixes using current and/or projected lift. Results indicate campaign sensitivity to transportation asset availability and selected force structure alternatives. Quick reaction analysis results were presented to CINCUNC/CFC in September 1991. The POC for further information is Ms. Karyl M. Paradise, US Army Concepts Analysis Agency, DSN 295-1588.

Light Contingency Corps Capability (LC3)

The LC3 Study, sponsored by the Deputy Under Secretary of the Army (Operations Research) and the Office of the Deputy Chief of Staff, Operations and Plans, ODCSOPS, HQDA, analyzes the contribution of various capability packages to the ability of the 82d Airborne Division and other first-to-deploy elements of the XVIII Airborne Corps to defend themselves against a numerically superior heavy and modernized threat. Using the CORBAN Model, a Middle East major contingency scenario was run with a six-division heavy Red force attacking a small, light, Blue force. In several iterations, the Blue force was reinforced with various capability packages which can be categorized as packages containing current systems, those containing programmed systems, and those containing systems that were deleted from the POM. Some runs contained the initially deploying USMC forces and some did not. Although the results are classified, suffice to say that the light forces need

deep strike support along with barriers to successfully defend against a numerically superior heavy force. The POC for further information is LTC Rodney K. Stuart, US Army Concepts Analysis Agency, DSN 295-1643.

Light Contingency Corps Capability Continued (LC4)

The LC4 Study, sponsored by the Deputy Under Secretary of the Army (Operations Research) and the Office of the Deputy Chief of Staff, Operations and Plans (ODCSOPS), HQDA, analyzes the contribution of various capability packages to the ability of the 82d Airborne Division and other first-to-deploy elements of the XVIII Airborne Corps to defend themselves against a numerically superior, armor-heavy modernized threat. To examine these effects the Concepts Analysis Agency (CAA) employed the mid-level resolution, corps-level model, Corps Battle Analyzer (CORBAN). The quick reaction analysis was conducted using a modified Major Regional Contingency-East (MRC-E) Scenario. The threat was then modernized by increasing the quantity of modern direct-fire systems, while decreasing the quantity of less modern direct-fire systems. This QRA is a continuation of the Light Contingency Corps Capability (LC3) QRA. After examining the result from LC3, the Assistant Deputy Chief of Staff, Operations and Plans (ADCSOPS), asked CAA to examine, using the LC3 scenario, the effects of the TSSAM missile and deep fire WAM mines. The ADCSOPS also wanted CAA to include in the Blue force the US Marine units that would be in theater at that time. Although the results are classified, it was found that light forces are in need of a supporting deep strike capability. The POC for further information is Mr. Karsten Engelmann, US Army Concepts Analysis Agency, DSN 295-1027.

Light Infantry Division Analysis of Soldier Support System Cost Study (LIDASSCS)

The LIDASSCS quick reaction analysis, sponsored by Natick RDE Center, identifies the support force requirements for a light infantry division (LID) in a generic campaign. The methodology used was to determine the support requirements necessary in the Ground Combat Europe, Major Regional Contingencies: East and West, and Lesser Regional Contingency scenario campaigns using the SRA-99 data files. Base case support requirements lists by standard requirement code (SRC) were created for each campaign. Changes were made to force structure in each campaign, and excursion support requirements lists were created. The lists were compared and analyzed, and a common support requirements list was generated. Theater-specific lists were also produced. The major finding of the analysis determined that a single LID needs to be supported by a common echelon above division (EAD) structure of 10,941 personnel in 103 separate unit types (SRC), regardless of theater campaign. There exist additional personnel and unique force structure requirements within specific theaters. The POC for further information is LTC Francis T. Julia, Jr., US Army Concepts Analysis Agency, DSN 295-0578.

Medical Evacuation 2001 (MEDEVAC 2001)

MEDEVAC 2001, sponsored by the Office of The Surgeon General (OTSG) (DASG-HCO-F), examined the impact on medical force structure requirements for the Major Regional Contingency-East (MRC-E) and Major Regional Contingency-West (MRC-W) scenarios of Total Army Analysis - 1999 (TAA-99) and Disease and Nonbattle

Injury (DNBI 2001) Memorandum Report (CAA-MR-92-38) with the evacuation policy used in the Joint Chiefs of Staff (JCS) Joint Operation Planning and Execution System (JOPS) data, Volume 1, Annex Q (Medical). The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to determine the medical force structure requirements. The analysis found that the recommended evacuation policy reduced personnel requirements in TAA-99 by 11.3 percent in MRC-E, 10.4 percent in MRC-W, and reduced the combined personnel requirements by 11.0 percent. Additionally, the analysis found that the combination of the recommended evacuation policy and the DNBI 2001 rates reduced the TAA-99 personnel requirements by 35.8 percent in MRC-E, 6.1 percent in MRC-W, and reduced the combined personnel requirements by 22.7 percent. The results of this quick reaction analysis were provided to the sponsor on 16 June 1992. The POC for further information is LTC Linda Lee Hampton, US Army Concepts Analysis Agency, DSN 295-5269.

Military Police Excursion, TAA-99 (MP-EXC99)

MP-EXC99, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), determined Military Police requirements and their impact in the three major theaters based on changes in employment/force structure proposed by the US Army Military Police School and the Combined Arms Center. This quick reaction analysis was accomplished by applying allocation rule changes which reflected the proposed employment/force structure changes. The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to provide a time-phased troop deployment list which includes combat, combat support, and combat service support forces. The results of this QRA were provided to the sponsor and were used for planning purposes during a force structure workshop conducted at the US Army Military Police School on 5 and 6 November 1991. The POC for further information is MAJ Lee Colbert, US Army Concepts Analysis Agency, DSN 295-5269.

Major Regional Contingency Casualty Replacement Requirements Report, FY 97 (MRC-CASREP-97)

MRC-CASREP-97 was sponsored by the Total Army Personnel Command (TAPC-MOP). The TAPC was tasked to provide a complete list of postmobilization training base output requirements (PMTBOR) to the Office of the Deputy Chief of Staff for Personnel (ODCSPER) in support of two combined major regional contingencies (MRC)--MRC-East and MRC-West--of the Integrated Army Mobilization Study (IAMS). Required for this task was a projection of worldwide net casualty replacement requirements. The Army expands to over 900,000 personnel to support the IAMS MRC scenarios. The deployed combat forces build to about 506,000 personnel in the S-day through S + 180 time period being investigated. A peak worldwide requirement for approximately 39,250 replacement personnel is identified at the end of the S + 80 timeframe. Hospital-admitted personnel (both wounded in action (WIA) and disease and nonbattle injury (DNBI)) returning to duty over the S + 90 through D + 180 timeframe exceed casualties during this period by 6,870 personnel. These 6,870 personnel would result in an overfill to the worldwide Army population between S + 90 and S + 180. Recognizing these returns to duty, the total required replacements could be reduced by 6,870 to 32,380 personnel. The POC for

further information is Mr. Stanley Miller, Force Evaluation Directorate, US Army Concepts Analysis Agency, DSN 295-5264.

Mobility Requirement Study - Southwest Asia, POMCUS Excursion (MRSSWA-POMEX)

MRSSWA-POMEX, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS) (DAMO-SSW), Headquarters, Department of the Army (HQDA) determines nondivisional combat support /combat service support requirements necessary to support a mechanized division and an armored cavalry regiment in separate scenarios. This analysis is an excursion on the Congressionally Mandated Mobility Study, Southwest Asia Case A scenario. This QRA, conducted by Forces Evaluation Directorate, US Army Concepts Analysis Agency, specifically determined force totals for each functional area based on the combat unit list and deployment schedule provided by ODCSOPS. The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to provide a time-phased troop deployment list which includes combat, combat support, and combat service support forces. The results of this QRA were provided to DAMO-SSW. The POC for further information is MAJ Lee Colbert, US Army Concepts Analysis Agency, DSN 295-5269.

Mobilization Stationing Study - Transportation Data Bases (MSS-TDB)

This quick reaction analysis was conducted at the request of the US Army Engineering Strategic Studies Center (ESSC), in support of their Mobilization Stationing Study. The effort was designed to develop, at UIC level of detail, a time-phased force deployment list to support two concurrent major regional conflicts. The data base needed to include all available information concerning unit stationing, mobilization and deployment in one coherent record. The data bases then served as input to follow on modeling at ESSC to determine options in future stationing for ODCSOPS. The POC for further information is CPT Elizabeth A. Vance, US Army Concepts Analysis Agency, DSN 295-0027.

POMCUSITE System Capability Expansion (POMCAPE)

The Chief, US Army Europe (USAREUR) Office of the Deputy Chief of Staff for Logistics (ODCSLOG) War Reserve Office (AEAGD-WP) requested a determination of the overall projected fill of POMCUS storage sites and a listing of equipment overages and shortfalls using a proposed USAREUR POMCUS (prepositioned materiel configured to unit sets) trooplist (the USAREUR POMCUS Authorization Document input) and the current (August 1991) USAREUR POMCUS property book. The POC is Mr. J. Theodore Ahrens, US Army Concepts Analysis Agency, DSN 295-1056.

POMCUSITE Capability Expansion Siting Model Enhancement (POMCAPE SME)

The POMCAPE SME was a QRA sponsored by the U.S. Army Europe (USAREUR) Office of the Deputy Chief of Staff for Logistics (ODCSLOG) War Reserve Office. The purpose of the QRA was to modify the allocation module of the POMCUS Siting

Alternatives (POMCUSITE) Study at the US Army Concepts Analysis Agency to enable user-specified assignment of POMCUS (Prepositioned Materiel Configured to Unit Sets) unit sets and projects to user-specified storage sites. The basic methodological approach was to modify the logic of the SITING Allocation Model, used in POMCUSITE, to allow user-designated allocations in a comprehensive way and to test that logic. The required logic was built, incorporated into the SITING Model, tested, and documented. The CAA POC is Mr. Walter J. Bauman, US Army Concepts Analysis Agency, (301) 295-0308 or DSN 295-0308.

Evaluation of POM 1994-1999 (POMEVAL 94-99)

POMEVAL, sponsored by the Director, Program Analysis and Evaluation (DAPE), is an assessment of the 1994-1999 Program Objective Memorandum (POM) and its impact on the Army's warfighting capability. The analysis focused on Defense Planning Guidance scenarios in Europe and Southwest Asia. The assessment shows the improved combat performance that will result from the Army's programmed modernization and procurement plans. The POC for further information is MAJ James Treharne, US Army Concepts Analysis Agency, DSN 295-6993

Replacement Maintenance Policy Using SLAM (RAM SLAM)

Replacement Maintenance Policy Using SLAM (RAM SLAM) is a quick reaction analysis (QRA) supporting C-4, Combined Forces Command (CFC), Republic of Korea. In February 1992, the US Army Concepts Analysis Agency (CAA) conducted a QRA for Commander in Chief, CFC (CINC, CFC) to determine the sustainability of his operation plan (OPLAN). RAM SLAM was done in response to specific questions raised by C-4, CFC, concerning the effects of theater war reserves of different maintenance policies. The POC for this QRA is CPT Thomas Pratt, US Army Concepts Analysis Agency, DSN 295-1592/1588.

Replacement Maintenance Policy Using SLAM - II (RAM SLAM 2)

RAM SLAM 2 analyzed the sufficiency of four major end item war reserve requirements given a policy calling for replacing RAM failures any time repair time would exceed 24 hours. This study revises RAM SLAM by analyzing not only M1 tanks and M2/M3 IFV/CFVs, but also looking at M109A2 howitzers and MLRSs. In addition, MMH and MTTR figures were provided by the C-4, CFC. The POC for this QRA is MAJ David Knudson, US Army Concepts Analysis Agency, DSN 295-1592/1592.

Reserve Component Stationing Study (RCSTAS)

RCSTAS, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), was a quick reaction analysis. The purpose of the QRA was to determine the feasibility of conducting a study to address the training facilities requirements for Reserve Component units and the proximity of units to the facilities. The results of the QRA were that a study was feasible. A study scope was developed and presented. Four unique concepts were developed and presented that would satisfy the proposed scope and a set of assumptions proposed that would satisfy the concepts. Issues relevant to

a study were also identified. The POC for further information is MAJ Robert Clayton, US Army Concepts Analysis Agency, DSN 295-0211.

Retrograde-Europe (RETRO-EUR)

The RETRO-EUR Quick Reaction Analysis, sponsored by the Army ADCSOPS, provided a rapid evaluation of two alternative USAREUR staff-developed proposals for materiel drawdown (retrograde) from Europe. Analysis included cost estimates/comparisons, independent calculation of USAREUR materiel requirements, identification/evaluation of key issues in Class V/VII retrograde, and identification of major associated ARSTAF decision requirements. The POC for further information is Mr. Howard E. Whitehead, US Army Concepts Analysis Agency, DSN 295-1105.

ROK Modernization (ROKMOD)

The purpose of ROKMOD, sponsored by the Commander in Chief, United Nations Command and Republic of Korea (ROK)/US Combined Forces Command (CINCUNC/CFC), was to determine which combination of US weapon systems offers the highest payoff for ROK maneuver forces in the calendar year (CY) 2000 time period. The Concepts Evaluation Model (CEM) was used to determine campaign results for each modernization alternative as measured by nK major weapon system losses, South Korean major weapon systems losses, campaign duration, and force exchange ratios (FER). The POC for further information is MAJ David Knudson, US Army Concepts Analysis Agency, DSN 295-1592.

ROK Modernization Sustainability (ROK-MODS)

ROK-MODS, sponsored by the Commander in Chief, United Nations Command and Republic of Korea (ROK)/US Combined Forces Command (CINCCFC), was a follow-on to ROKMOD. The CINCCFC requested an assessment of war reserve requirements be conducted for the preferred modernization alternative - \$5 billion program. The POC for further information is CPT Thomas I. Pratt, US Army Concepts Analysis Agency, DSN 295-1592.

Support Area Wheel Vehicle Vulnerability Assessment (SAWVAS)

The SAWVAS Quick Reaction Analysis, sponsored by the Office of the Deputy Chief of Staff for Logistics, United Nations Command, ROK/US Combined Forces Command (UNC/CFC), analyzes the impact of North Korean indirect fire on US tactical wheel vehicles based in brigade support areas (BSA). Specifically, SAWVAS provides an estimate of the daily requirement for theater reserve stocks (TRS) in critical wheel vehicles. The analysis is based on campaign results obtained with the Combat Sample Generator (COSAGE). The POC for this QRA is CPT Thomas Pratt, US Army Concepts Analysis Agency, DSN 295-1592.

Support to Conventional Systems Committee - Munitions (SCSC-M)

The analysis provides a vehicle for transmitting requested computer listings from the AIMS 99, Phase I combat simulations through DAMO-FDL for use by SCSC-M. These data for European and for MRC(W) scenarios provide targets killed by US and allied weapon systems, US Army weapon systems attrition, and observed probability of kill values from AIMS 99, Phase I combat simulations. The POC for further information is Mr. Charles A. Bruce, US Army Concepts Analysis Agency, DSN 295-5276.

Army Nuclear Fire Support Synergistic Game (ST BARBARA 91)

ST BARBARA was a synergistic game conducted to support the Army Nuclear Fire Support - Future (ANFS-F) Study. ST BARBARA employed the concept of gaming integration, the real-time, synchronous combination of the political-military (pol-mil) assessment and the conflict assessment provided by a combat simulation model. ANFS-F was sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), to examine US Army requirements for future organic nuclear capability. ST BARBARA assessed the operational and deterrence requirement for nuclear fire support; evaluated all Services' nuclear systems and advanced conventional munitions (ACM) alternatives to meet operational and deterrence requirements; and identified desired operational capability of future Army nuclear weapons systems to meet operational and deterrence requirements. The key insights produced from the game were: early deployment of nuclear weapons to the theater signals resolve, and redeployment is viewed as producing more deterrent effect than in-country deployment; US nuclear response is tempered by the geographical location of the conflict; US nuclear employment plans need to be integrated with coalition organization; political means are preferred over military means to achieve change; and nuclear weapons must be survivable, flexible, responsive, with effective command and control. The POC for further information is Mr. John A. DePalma, US Army Concepts Analysis Agency, DSN 295-1646.

Southwest Asia 2000 (SWA 2000)

The SWA 2000 analysis, sponsored by the Strategy, Plans and Policy Directorate, Deputy Chief of Staff for Operations and Plans (DCSOPS), Headquarters, Department of the Army (HQDA) (DAMO-SSP), developed scenarios for Southwest Asia through the year 2000. This analysis generated scenarios by synthesizing interviews with regional experts into the FACTIONS Model. This model quantified the subjective comments into forecasts for several specific issues. These forecasts were used to develop the future scenario. The same methodology was used in the NATO 2000 Study published in 1990. The major findings of this quick reaction analysis show that there are no probable future scenarios in Southwest Asia that would involve US military action. The POC for further information is CPT Eric T. Holmes, US Army Concepts Analysis Agency, DSN 295-1580.

Political-Military Game TARO 91 (TARO 91)

The Commander, US Army Pacific (USARPAC), requested that the US Army Concepts Analysis Agency (CAA) conduct a political-military game to examine implications for the roles for US Army in the Pacific in the context of the Nunn-Warner reductions. The Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), cosponsored the game. The game, held at Fort Shafter, Hawaii, from 23-25 September 1991, included all the principal members of the USARPAC Staff, key action officers from the HQDA Staff, and Mr. Richard Halloran, Director of Special Projects, East-West Center, Hawaii, and former news correspondent in Japan (1962-1976). The final report documents the results of the game. The POC for further information is LTC Jeffrey A. Paulus, Strategy and Plans Directorate, US Army Concepts Analysis Agency, DSN 295-1680.

Tae Kwon Do, FY 90 (TD90)

Tae Kwon Do 90 was sponsored by the Commander in Chief, US Forces, Korea, (CINC, USFK) and the Commanding General, Eighth US Army. The objective of the game was to provide the CINC, USFK with an initial assessment of the current operation plan (OPLAN) and to identify those areas of the OPLAN that need further scrutiny. The principal issues addressed were the impacts of the North Korean artillery and the focused Republic of Korea (ROK)/US air power. The game did identify issues requiring further analysis by both a high-resolution model and for future pol-mil games, i.e., the RACCK Study campaign analysis using the Concepts Evaluation Model and the follow-on pol-mil games - PILSONG. The POC for further information is Ms. Julia A. Fuller, US Army Concepts Analysis Agency, DSN 295-4715.

Theater High Altitude Air Defense System-Southwest Asia (THAAD-SWA)

The THAAD-SWA analysis was to determine the potential ability of a THAAD system to defend theater air space from tactical ballistic missiles, (TBM). The scope of the study involved (1) replicating the DESERT STORM PATRIOT air defense of selected point targets in Saudi Arabia, (2) determining the potential performance of an improved PATRIOT system, and (3) comparing the performance of a baseline THAAD system versus, and in conjunction with, the various PATRIOT options. Red forces were those Iraqi SCUD strikes against Saudi Arabia and Bahrain where complete flight and engagement data was recorded. The basic approach was to replicate the known results with the COMO Air Defense Model and then evaluate various planned modernizations and system combinations specified by the sponsor. The POC is Ms. Pamela Roberts, US Army Concepts Analysis Agency, DSN 295-1652.

Tank Propulsion Upgrade (TPUG)

The Tank Propulsion Upgrade (TPUG) Quick Reaction Analysis, sponsored by the Office of the Chief of Staff, develop and applied a methodology to analyze the costs and benefits of retrofitting the Advanced Improved Propulsion System - Diesel (AIPS-D) and Advanced Improved Propulsion System - Turbine (AIPS-T) candidates

versus retaining the current Automotive Gas Turbine (AGT-1500) propulsion system. The principal finding of TPUG was that it is not economical to retrofit the Abrams with either of the AIPS candidates. Although the fixed costs of developing the AIPS could be shared (thereby reduced on a per unit basis) with heavy Armored System Modernization (ASM) systems, if they are produced in a timely manner, it was found that the technical benefits of both candidate systems are measurably greater than the AGT-1500; especially regarding fuel economy reliability, and volume. For example substantial fuel savings could accrue to the Army between FY 2000 and FY 2020 from either AIPS retrofit; ranging from a low of about 41 million gallons (Force Package 1) to a high of about 259 million gallons (all Force Packages). The POC for further information is COL John B. Harrington, US Army Concepts Analysis Agency, DSN 295-1608.

The Restructured European Theater of Operations Air Defense Plus (TRETOAD +)

The TRETOAD + Quick Reaction Analysis was requested by MG Carney, Director, Army Program Analysis and Evaluation. The purpose of the QRA was to assist in assessing the value added by air defense artillery (ADA), existing and proposed for the US inventory, on the conduct of the ground war. To accomplish this, the COMO Model was used to improve the Corps Battle Analyzer (CORBAN) ADA system representation and operation. In the CORBAN Model, ADA unit representation was improved, and the ADA firing and availability rates were changed. The representation of enemy air flights was also improved. The POC for further information is Ms. Pamela J. Roberts, US Army Concepts Analysis Agency, DSN 295-5292.

Tank Sight (TS)

The Tank Sight QRA was requested and sponsored by COL(P) Paul J. Kern, Director of Requirements, Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS). The QRA was conducted to assist in determining if improving the M1A1's tank sight range and probability of acquisition capability will increase M1A1's lethality at longer ranges and improve tank survivability. Thirty-six deterministic simulation runs were conducted, using the Corps Battle Analyzer (CORBAN) Model, to assess the effects of range and acquisition improvements on the lethality and survivability of the M1A1 main tank sight. The measures of effectiveness were: (1) to assess the effects on the lethality and survivability of the M1A1 were the M1A1's system effectiveness ratio (SER), and (2) the number of M1A1s surviving after 12 hours of combat, respectively. Finally, a statistical analysis was conducted to determine if the hypothesized relationships existed in the data. The POC for further information is CPT Stephen McGuire, US Army Concepts Analysis Agency, DSN 295-1027.

Tactical Wheeled Vehicle Modernization Update-92 (TU-92)

The TU-92 Quick Reaction Analysis, sponsored by the Office of the Assistant Deputy Chief of Staff for Operations and Plans, Force Development (DAMO-FD), conducted an acquisition analysis of the DCSOPS tactical wheeled modernization strategy to determine the quantities of tactical wheeled vehicles that would be procured, service-life-extended, maintained, and retired to meet modernization

requirements and force structure goals. The approach used was to model the production, extension of useful life, and eventual retirement of the tactical wheeled vehicles as a mathematical optimization problem. A 20-year planning horizon was used, with the current year (FY 1993), and the first 15 years, reflecting procurement and budget dollars from the POM and the last four years (FY 2009-2012) based upon an average annual budget. There were three principal findings: (1) The relatively high commercial utility cargo vehicle (CUCV) attrition rate (averaging 3 percent annually), coupled with a 12-year gap between production runs, causes the fleet to fall below its minimum authorized level of force structure during the period from (FY 2006-2010); (2) The procurement scheme for the light medium tactical vehicle (LMTV) does not keep pace with the rate of attrition for the fleet, during the period from FY 2002 to FY 2009, causing the strength to drop below 100 percent of its authorized level of force structure; and (3) The lack of any follow-on heavy commercial transportation systems (line haul tractors) results in a steady annual decline in the size of the fleet due to attrition (averaging one percent). There may be potential for a service life extension program (SLEP) in this mission area -- possibly to the M915. The POC for further information is Mr. Andrew Kourkoutis, US Army Concepts Analysis Agency, DSN 295-1684.

Unmanned Aerial Vehicle to Replace Older Helicopters (UAV-ROH)

The UAV-ROH QRA, sponsored by DAPE-MG, determined whether replacing obsolete scout/attack helicopters in the US Army inventory with UAVs would result in cost savings and improved warfighting capabilities. The QRA methodology used a Southwest Asia scenario to obtain data on helicopter force structure and flying hours for an Army Corps. The various tasks assigned to helicopters that could also be performed by UAVs were identified and the operating costs for each to do these tasks were calculated. It was found that the type of UAVs currently being procured by the Army are meant to perform only a part of the many scouting/attack tasks that helicopters can do, but the UAVs could do those tasks at less cost than helicopters. The UAVs would actually be more suitable for some of these tasks than helicopters are, but UAVs are unlikely to be able to perform all the tasks performed by manned helicopters. The POC for further information is Mr. Matthew Ogorzalek, US Army Concepts Analysis Agency, DSN 295-5300.

VAA: Analysis of Modernization Alternatives at Various Research, Development, and Acquisition (RDA) Total Obligational Authority (TOA) Levels (VAA: AMAVRTL)

The VAA: AMAVRTL Quick Reaction Analysis was requested by the Director, Program Analysis and Evaluation (DPAE). Three alternative RDA TOA streams were being considered. An analysis was required to determine the relative combat effectiveness of the force modernization to these levels. In addition, the maximum combat effectiveness of the force with unconstrained modernization was determined. The purpose of the QRA was to perform a Value Added Analysis to determine recommended systems mixes at the three given TOA levels and to ascertain the force effectiveness of these systems mixes. Also, ascertain the force effectiveness of a "Low Risk" force that is completely modernized. Additionally, these results were presented to the Executive Select Committee (SELCOM). The POC for further information is LTC Andrew G. Loerch, US Army Concepts Analysis Agency, DSN 295-1546.

**Value Added Analysis: Chief of Staff Army Offsite Review
(VAA: CSAOR)**

The VAA: CSAOR Quick Reaction Analysis was requested by the Assistant Deputy Chief of Staff for Operations and Plans, Force Development Division (ADCSOPS-FD) and the Director, Program Analysis and Evaluation (DPAE). The Chief of Staff Army Offsite Review is a culmination of the Long-Range Research, Development, and Acquisition Plan (LRRDAP) process. During the review, decisions are made regarding the modernization of systems over the following 15-year period. VAA is needed to gain insights into cost/benefit relations and tradeoffs involving key modernization programs. The purpose of this QRA was to perform a Value Added Analysis on the VAA Phase II systems list at \$10.7 B, \$11.2 B, and \$11.7 B research, development, and acquisition (RDA) total obligational authority (TOA) levels to identify a mix of modernization programs for each level and to compare these results with the LRRDAP 3.1 recommendations. Additionally, a series of excursions were performed examining trade-offs that result from forced buys of a variety of programs. The POC for further information is LTC Andrew G. Loerch, US Army Concepts Analysis Agency, DSN 295-1546.

Value Added Analysis: Long-Range Research, Development, and Acquisition Plan (LRRDAP) Analysis Planning Session (VAA: LAPS)

The VAA: LAPS Quick Reaction Analysis was requested by the Assistant Deputy Chief of Staff for Operations and Plans (ADCSOPS) (DAMO-FD) and the Director, Program Analysis and Evaluation (DPAE). The arrival of the Long-Range Army Materiel Requirements Plan (LRAMRP) from the US Army Training and Doctrine Command (TRADOC) was the initiation of the LRRDAP process in preparation for the building of the Program Objective Memorandum (POM). TRADOC's input needed to be examined in view of executability with respect to production capabilities and budget limitations. The purpose of the QRA was to review the LRAMRP and LRRDAP 1.5 files for data reconciliation in preparation for a Value Added Analysis of the LRRDAP. The POC for further information is LTC Andrew G. Loerch, US Army Concepts Analysis Agency, DSN 295-1546.

Value Added Analysis: Long-Range Research, Development, and Acquisition Plan (LRRDAP) General Officer Review Support (VAA: LGORS)

The VAA: LGORS Quick Reaction Analysis was requested by the Assistant Deputy Chief of Staff for Operations and Plans, Force Development Division (ADCSOPS-FD) and the Director, Program Analysis and Evaluation (DPAE). During the conduct of the LRRDAP review several issues arose concerning tradeoffs between modernization systems. These tradeoffs needed to be analyzed with respect to effectiveness of the force and the executability of the proposed mixes. The purpose of the QRA was to conduct a series of tradeoffs to support the LRRDAP review process resulting in a set of recommendations for the Chief of Staff of the Army. The POC for further information is LTC Andrew G. Loerch, US Army Concepts Analysis Agency, DSN 295-1546.

Value Added Analysis: Secretary of the Army Modernization Questions (VAA: SAMQ)

The VAA: SAMQ Quick Reaction Analysis was requested by the Secretary of the Army. Following a briefing of the results of the Analysis of Modernization Alternatives at various research, development, and acquisition (RDA) total obligational authority (TOA) levels to include a low risk option (AMAVRTL) QRA, the Secretary of the Army tasked the US Army Concepts Analysis Agency (CAA) to analyze several other modernization tradeoff issues. The purpose of the QRA was to perform a Value Added Analysis to compare several modernization alternatives and recommend a system mix for each alternative. Additionally, for each resulting system mix, a combat effectiveness was determined. The POC for further information is LTC Andrew G. Loerch, US Army Concepts Analysis Agency, DSN 295-1546.

Value Added Analysis: Economic Analysis of Tradeoffs in Structure and Modernization (VAA: EATSM)

VAA: EATSM, requested by the Program Analysis and Evaluation Directorate (PAED), evaluated the tradeoff between modernization and Active Component force structure as measured in terms of force effectiveness and dollars. The POC for further information is LTC Andrew G. Loerch, US Army Concepts Analysis Agency, DSN 295-1546.

Worldwide Casualty Replacement Requirements Report, FY 97 (WW-CASREP-97)

WW-CASREP-97 was sponsored by the Total Army Personnel Command (TAPC-MOP). The Deputy Chief of Staff for Personnel (DCSPER) tasked TAPC-MOP to provide a set of postmobilization training base output requirements (PMTBOR), given the European (GCE) scenario of the Integrated Army Mobilization Study. TAPC tasked the US Army Concepts Analysis Agency (CAA) to estimate this personnel replacement requirement using its Wartime Manpower Planning System (WARMAPS) software package. A peak worldwide requirement for approximately 210,600 replacement personnel is identified at the M + 150 timeframe. Hospital-admitted personnel (both wounded in action (WIA) and disease and nonbattle injury (DNBI)) returning to duty during the M + 160 through M + 210 timeframe exceed casualties by 9,500 personnel. Recognizing these returns to duty, the total required replacements could be reduced by 9,500 to 201,100 personnel. The POC for further information is Mr. Stanley Miller, Force Evaluation Directorate, US Army Concepts Analysis Agency, DSN 295-5264.

Counterdrug Transportation Requirements Analysis Program (XDTRAP)

The Counterdrug Transportation Requirements Analysis Program (XDTRAP) is a macro model of the production and transportation capabilities of narco traffickers within the Chapare Valley of Bolivia. It was developed to lend analytical support during the Counterdrug Modeling and Wargaming (CDMWG) Initiative Phase II held at Hurlburt Field, FL, 27-30 April 1992. The program was used to provide estimates of the effects of *action-reaction* responses proposed by the host country support team and the narco trafficker team during the game. Analysis was provided to team members of the expected disruptions in cocaine production and trafficking capability resulting from interagency operations. The POC for further information is MAJ J. Ralph Wood, US Army Concepts Analysis Agency, DSN 295-5301.

OTHER FY 92 CAA ANALYTICAL EFFORTS

ATVAL Recommendations: Brigade Samples in Theater (ARBSIT)

ARBSIT, an internal Concepts Analysis Agency study, examines the feasibility of constructing brigade level combat samples instead of the currently used division level combat samples for use in the theater-level model. This analysis was in response to a recommendation of the Attrition Calibration (ATCAL) Evaluation Phase I - Direct Fire (ATVAL Phase I) Study which was done to determine the limitations of ATCAL. One limitation was the inability of ATCAL to extrapolate for force size. ARBSIT examined constructing smaller sized combat samples to eliminate or reduce the effects of this limitation and determined that reasonable results are possible from this process, but with limitations. Further study is required to determine if these limitations can be overcome. The POC for further information is LTC Jeanette M. Harris, US Army Concepts Analysis Agency, DSN 295-6993.

Attrition Calibration (ATCAL) Evaluation Phase II - Indirect Fire (ATVAL II)

The ATVAL II Study, sponsored by the Director, US Army Concepts Analysis Agency was performed to learn more about the indirect fire algorithms in the Attrition Calibration (ATCAL) model. The scope of the study involved two main focuses, both of which centered on artillery issues. The first was research oriented and involved examining results of other models and recording historical trends. The second phase took data resulting from this phase and compared this data to artillery results generated by using the ATCAL process. The Army Integrated Mobilization Study, Fiscal Year 1999 (FY 99) Combat Sample Generator (COSAGE) boards were used as the base case. This study is the first formal documentation of the strengths and weaknesses of indirect fire portrayal in ATCAL. The study also suggests some alternative methodologies to improve the current ATCAL algorithm. The POC for further information is Mr. Neal W. Siegel, US Army Concepts Analysis Agency, DSN 295-5268.

ATCAL Phase II, Simscript II.5 (ATCAL P2SIM)

The ATCAL P2SIM analysis, sponsored by the US Air Force Studies and Analyses Agency (SAA), verifies that the current SAA ATCAL methodology embedded in the TAC THUNDER model is correctly implemented. The SAA ATCAL attrition methodology was based on the ATCAL in the Concepts Evaluation Model (CEM) circa 1985, but had never been verified. The methodology employed was to review the program logic, develop TAC THUNDER ATCAL module (ATCAL P2SIM) for testing purposes and compare the SAA ATCAL results to the CAA ATCAL standard. Test results revealed that SAA target importance values were not being updated correctly, resulting in very high indirect fire expenditures. Modifications were

incorporated to correct this problem. Additionally, a killer/victim scoreboard display of losses and expenditures was incorporated into the module for future analyses and a SIMSCRIPT portable module of the ATCAL methodology was provided for offline testing and analyses. The POC for further information is Ms. Rose A. Brown, US Army Concepts Analysis Agency, DSN 295-1627.

Benchmark for Artillery Munitions Consumption (BAMC)

The BAMC Study, sponsored by the Director, US Army Concepts Analysis Agency, examines artillery expenditure rates for the 105mm, 155mm, and 203mm howitzer systems from the Analysis of Historical Artillery Expenditures (AHAER) data base and develops a set of benchmarks based on this historical data. The data encompasses World War II (WWII), Korean, and Vietnam wars (1944-1970). The POC for further information is Mr. Arthur Williams, US Army Concepts Analysis Agency, DSN 295-1654.

Enhancements to Calculation of Ammunition, Petroleum, and Equipment Rates (E-CALAPER) Process Review

The CALAPER process review, presented to the Director of the US Army Concepts Analysis Agency, in mid-1991, provided a detailed description of the process for computing wartime consumption of munitions, petroleum, and equipment, and provided recommendations for improvement. The CALAPER process review was developed during the Enhancements to CALAPER (E-CALAPER) Research and Analysis Activity (RAA). The Memorandum Report documents the process, insights, and recommendations presented and concludes the E-CALAPER RAA effort. The POC for further information is Mr. David E. Williams, US Army Concepts Analysis Agency, DSN 295-1696.

Impacts of Force Structure (FY 99) Changes on Casualty Generation Report (CAS-IMPACTS 99)

CAS-IMPACTS 99 was a CAA-sponsored assessment of the impacts that the support force structure changes recommended at the June 1991 Force Structure Conference (FSC) II had on casualty and replacement requirements estimation. Results from base case SRA-99 analyses are compared to similar results based on post-FSC II support force guidance. The force structure conference guidance had little impact on theater-level personnel replacement requirements. The requirement for support population in the GCE (EUR) scenario decreased by approximately 1 percent. The requirement for support population in the MRC-W (NEA) scenario increased by almost 1 percent. The requirement for support population in the MRC-E (SWA) scenario decreased by approximately 5 percent. There were delays in support forces arriving in their respective theaters of planned deployment, but these delays were limited to a single period (a 10-day time interval). The POC for further information is Mr. Stanley Miller, US Army Concepts Analysis Agency, DSN 295-5264.

Casualty Estimation Process Review (CASPRO)

CASPRO was an internal estimation process review with emphasis on the sources of input data used by the various models and the passing of casualty data between the models. The review found that the process is reasonable, but as with most processes, there are areas which require improvement. The recommendations included reviewing casualty results throughout the process for each study, the blue force casualty variability, casualty breakdown and developing a formal process for documenting data inputs. The POC for further information is LTC Lee Hampton, US Army Concepts Analysis Agency, DSN 295-5269.

FASTALS Sensitivity with Small Scenario-Minor Rules (FSSS-MR)

FSSS-MR was an internal QRA to examine the sensitivity of minus rules in the FASTALS Model when a brigade or division is added or subtracted to a small scenario (one corps or less). This analysis included the evaluation of adding units used in minus rules to the station list, and to determine if there is a greater sensitivity with brigade or division size adjustments. The analysis revealed that the addition of the units to the station list had no impact on the final requirements and that there was no difference in sensitivity in adding or subtracting a brigade or division. The recommendation was made not to add units used in minus rules to the station list. The POC for further information is LTC Linda L. Hampton, US Army Concepts Analysis Agency, DSN 295-5269.

Korea - Tactical Ballistic Missile Defense (K-TBMD)

The purposes of K-TBMD were to design a theater high altitude area defense (THAAD)/PATRIOT antitactical ballistic missile (ATBM) theater defense of South Korea; and determine the point at which such defense would become overwhelmed, or saturated, by incoming missiles. The study did not include corps and below air defenses, Blue air forces, or threat systems other than those known to be available to North Korea. The supporting computer runs were made using the COMO Integrated Air Defense Model. The optimum defense design was determined to be that number of fire units in the proper locations which limited the "leakage" of TBMs reaching their targets to levels allowed by the High Altitude Theater Missile Defense Operational Requirements Document. The number of TBMs was then increased until those levels were exceeded, indicating the defense had been "saturated." The POC for further information is MAJ Robert J. Fleitz, US Army Concepts Analysis Agency, DSN 295-5300.

Foundations of the General Theory of Volley Fire (VOLLEY FIRE)

The purpose of this research was to develop and document a general theory whose systematic application greatly aids in solution to volley fire problems, which have arisen frequently in applied military operations research work. The principal findings are that in simple cases, the theory leads directly to elegant formulas for the expectation and variance of the number of survivors. In more complicated situations, it provides algorithms useful for numerical calculations. The POC for further information is Dr. Robert Helmbold, US Army Concepts Analysis Agency, DSN 295-5278.

CHAPTER 4

TECHNOLOGY RESEARCH AND ANALYSIS SUPPORT

TECHNOLOGY RESEARCH

- **General.** CAA's Advanced Research Projects Office (ARPO) has a threefold mission: to identify and evaluate advanced technologies and methodologies for potential applicability to the CAA mission; to provide consultation on advanced technology subjects and methods; and to develop and execute an applied research program. During FY 92, ARPO pursued a variety of exploratory and developmental efforts to apply new and emerging technology to CAA's study, analysis, and QRA processes. The major projects and activities are summarized below.

- **A Structured Approach to Large-scale Battle Simulation (VECCEM).** Professor Patrick Burns and Mr. Michael Brewer of Colorado State University continued their work on restructuring the Concepts Evaluation Model (CEM) to increase the speed of CEM on Cray computers. They embedded their earlier engagement-by-engagement vectorization of ATCAL Phase II within CEM VI and VII. Tests for CEM VI produced slightly more than a threefold speedup; tests with CEM VII yielded a bit more than twofold speedup. Toward the end of the year, CAA analysts began bringing the vectorized CEM VII on line, and the Burns/Brewer team began work to extend vectorization across many engagements.

- **Object-oriented Data Base Development.** Work continued toward the goal of improving the usability of standard Army force files in support of CAA modeling and analyses. As a result, we have made good progress in using LISP-based prototypes to generate scrubbed force data. Effort has been devoted to tailoring the data to support a wider range of CAA models and analyses, and to making the system accessible by more analysts from more computer platforms.

- **CODAB Generalization.** Work completed in the current year greatly assisted CAA's users of the CORBAN combat simulation in building extensive libraries of CORBAN results to be used as a basis for checking new cases. The approach has been generalized to produce similar archiving, retrieval, and analysis for sets of COSAGE results. From the start, software development has been based on Common LISP to, among other things, make the CODAB approach portable among Symbolics, Sun SPARC, IBM RISC, and even high-end Macintosh platforms. A port from Symbolics to Sun was successful with porting to the other computers planned for early in FY 93.

- **A Differential Geometric Approach to Problems in Combat Analysis (DIFFGEO).** Professor Peter F. Stiller of Texas A&M University completed his Phase I examination on the applicability of modern geometric and algebraic methods to several combat modeling problem areas. His final report addresses aggregation, covariant aspects of general deterministic Lanchester attrition, covariant

formulation of general stochastic Lanchester attrition, FEBA position and movement, and mathematical issues in ATCAL.

- **Preservation of Statistical Properties of Data Among and Across Military Models and Simulations.** As an outgrowth of the 1991 Workshop on Artificial Intelligence and Simulation in Modeling Complex Systems, CAA began discussions with Dr. Y.C. Ho (Harvard) and Dr. Wubei Gong (University of Massachusetts-Amherst) on efficient ways to transfer data for division level combat simulation samples into the context of theater level modeling in either deterministic or stochastic mode. Drs. Ho and Gong expect to begin in FY 93. In the meantime, CAA has begun to compile, in a structured form, large amounts of combat sample data from COSAGE simulations of the WWII Ardennes campaign. Bivariate and multivariate analyses were performed.

The POC for further information about topics addressed in this section is Mr. Gerald Cooper, US Army Concepts Analysis Agency, DSN 295-0529.

METHODOLOGY IMPROVEMENT

- **General.** CAA uses a wide variety of simulations, models, and special purpose ADP systems to accomplish its study program. These tools, often referred to collectively as models, range from simple spreadsheets and data processing systems to complex simulations of theater combat and support operations. The following paragraphs describe the major accomplishments over the past year of our continuing program of methodology development and enhancement.

- **Concurrent Theater-level Simulation (CTLS).** This theater combat model development effort continued with the addition of close air support, expanded command and control, and design of an input/output object. CAA now has full responsibility for model development. As part of the transition of responsibility from Jet Propulsion Laboratory to CAA at the end of FY 92, there was extensive testing and emphasis on documentation. Briefings were presented on the inner workings and operation of the model in preparation for initial implementation and planned future applications of CTLS.

- **Concepts Evaluation Model (CEM).** Major work was accomplished in several areas:

- Statistical distributions for computing rates of advance were added to the stochastic version of the model. Results of testing and sensitivity analysis using a Kuwait scenario were published in a technical paper and presented at the Army Operations Research Symposium (AORS). Stochastic simulations of the 1944 Ardennes scenario were conducted as part of the model validation effort.

- CEM was also modified to permit introduction of the effects of nonmodeled weapons (e.g., nuclear) during the course of a conventional simulation. Additional modifications were made to permit the general support artillery to enter the theater

after the division maneuver forces and to improve the reporting of casualties -- both divisional and nondivisional combatants. The algorithm to estimate the quantity of abandoned equipment was revised to account for the capability of the losing unit to recover damaged vehicles as well as the rate of enemy advance.

- **Force Evaluation Model (FORCEM).** Modifications were made to simplify input data preparation and improve model efficiency. Since the model was used primarily for chemical warfare scenarios, emphasis of most of the modeling work was in this area. Integrated warfare (IW) enhancements incorporated into the current model covered such areas as wide-area smoke, IW reconnaissance, decontamination, and IW fire planning. These enhancements were verified using an experimental design requiring 32 simulations.

- **Combat Sample Generator (COSAGE).** The Air Force JMEM algorithm for bomb effects was incorporated into the model and work was completed on the assessment of collateral damage from precision guided munitions. The model (and associated processors such as RALPH and COSCON) was installed on the IBM RS-6000 computer which provides a more rapid turnaround for scenario development. The user's manual covering model logic, and input and output requirements was revised.

- **Corps Battle Analyzer (CORBAN).** Modeling effort was focused on support to the Value Added Analysis (VAA) study. Improvements were made to provide the user with appropriate control over scenario parameters which had previously been embedded in the model code. Command procedures to execute the model and archive appropriate outputs were created. Modifications were also made to capture more attrition information for postprocessing analysis.

- **Calculation of Ammunition, Petroleum, and Equipment Rates (CALAPER).** Documentation of the input and output files for the major programs of this process was completed in draft form. The interfaces between the programs and between the various ADP systems (UNISYS, Cray) were made more efficient. In addition to the CALAPER system which computes requirements at the detailed munition/weapon system/equipment level, a new process called Quick Computation (QuickComp) produces more aggregated requirements at the CEM equipment level. Features added to QuickComp this year include: incorporation of munition weights in order to compute and provide to FASTALS the gross tonnage required; and a method to compute stockage level requirements at ammunition supply and transfer points.

- **Transportation Model (TRANSMO).** Model enhancements were completed in the following areas: representation of air traffic scheduling; representation of the effects of canal operations and closings; treatment of multiple compartments on ships; overland transport in theater; and increased emphasis on balanced force closures. The user's manual was extensively revised.

- **Contingency Force Analysis Wargame (CFAW).** Procedures for managing the data for this interactive wargame were improved and will provide for better archiving scenario data and model code. The ability to use Sun workstations as replacements for the aging Ramtek graphic stations was investigated. More work will be required to actually implement any substitution.

- **Command and Control (C²) Modeling.** The graphical user interface was improved to provide the ability to display the maneuver network from different perspectives. This increases user acceptance and improves verification of the input data. Prototype models of corps-level defensive and offensive planning processes were developed. Prototype models of the tactical decision and intelligence fusion processes were also developed, using neural network software.

- **Combat Analysis Sustainability Model (CASMO).** The verification of the CASMO design and code, and the sensitivity tests using a divisional logistics and combat data base were completed. As part of this effort, numerous input preprocessors and report postprocessors were created.

- **Next Generation Wargame (NXG).** A contract was awarded for this replacement for CFAW and the design phase was completed.

- **Global Force Allocation Model (GLOFAM).** This model, which is a macro-level tool to assist in force structuring in a multiple theater environment, was enhanced to strengthen the linkage to CEM and provide a more accurate portrayal of the dynamics involved in transporting units to theater.

- **Synergistic Gaming.** The methodology for combining political-military gaming with combat simulation results was refined. This method, which can be used iteratively to reflect a series of decisions over time, permits the impacts of the Pol-Mil gaming decisions to be assessed in simulated combat results.

The POC for further information about topics addressed in this section is Ms. Patricia M. Fleming, US Army Concepts Analysis Agency, DSN 295-0141.

STATISTICAL ANALYSIS SUPPORT

- The CAA mathematical statisticians provided Agencywide support in the areas of experimental design and statistical analysis in addition to performing specific studies of a statistical nature. Significant effort was expended on the Meta-Analysis Study, described in Chapter 3. In addition, a variety of studies were supported with experimental design and analysis. Examples of such work are the analysis and recommendations on appropriate distributions for STOCCEM and extensive experimental designs and analysis for such studies as STOCCEM, NUCHEM, and Value Added Analysis.

The POC for further information about this topic is Mr. Carl B. Bates, US Army Concepts Analysis Agency, DSN 295-0163.

AUTOMATION SUPPORT

● The Agency goal is a hardware and software environment which supports a full-range of automation needs and in which each user has access to the hardware and software best suited for accomplishing the work at hand. To this end, CAA maintains a network of microcomputers, workstations, file servers, minicomputers, a mainframe, and connectivity to the Army's Supercomputer Network.

- Maintaining and developing an automation network which is responsive to CAA's extensive needs is a continuous process. While our ability to achieve the Agency's goal of optimal support continued to be constrained by fund availability, selected improvements were possible. These included the following acquisition actions accomplished this past year:

<u>Qty</u>	<u>Acquisition</u>
1	- IBM RS-6000 Model 550 RISC machine
3	- IBM RS-6000 Model 560 RISC machines
35	- 80386 processor upgrades for remaining Zenith Z-248 microcomputers
11	- Macintosh SE computers
2	- Apple Macintosh Powerbook computers (Model 170 and 145)
16	- upgrades to 68030 processors for all Mac SE computers
3	- QMS 100 color printers

- CAA acquired and installed extensive upgrades to software. In addition, we increased network interoperability through the addition of Novell Netware for microcomputers (in test phase) and extension of TCP/IP compatibility for UNIX systems.

- As technology advances occur at ever-increasing rates and costs for hardware continue a downward spiral, opportunities to seek alternative solutions to computing at CAA are being exploited. The principle challenge is to implement distributed workgroup processing on UNIX machines and microcomputers while maintaining the capability to accommodate the largest problems on larger machines. Concurrently, we must maintain and improve our ability to protect and retrieve the massive amounts of data needed for, and generated by, the simulation models.

The POC for further information about topics addressed in this section is Mr. David A. Hurd, US Army Concepts Analysis Agency, DSN 295-0514.

CHAPTER 5

MISSION AND MANAGEMENT SUPPORT

ORGANIZATION AND PERSONNEL

- **Organization/TDA.**

- **Structure.** CAA maintained its overall organizational structure of five directorates and two special staff offices (reference Chapter 1, Figure 1-1)

- **TDA.** CAA's current TDA was received in July 1992 with an effective date of 2 May 1992. This TDA reflected the Agency's share of the QUICKSILVER cuts (18 civilian positions effective 1 October 1991) and additional downsizing cuts of 20 civilian positions.

- **Hiring Freeze.** The HQDA hiring freeze remained in effect throughout FY 92 and was tightened to allow hiring of only one civilian from outside Department of Army for every four leaving Department of Defense.

- **Personnel Strength.** FY 92 personnel end strengths by quarter were as follows:

CIVILIAN

<u>Quarter</u>	<u>Authorized</u>	<u>Assigned</u>
1	161	152
2	161	151
3	141	149
4	141	148
Average	151	150

MILITARY

<u>Quarter</u>	<u>Authorized</u>				<u>Assigned</u>			
	<u>Off</u>	<u>WO</u>	<u>Enl</u>	<u>Tot</u>	<u>Off</u>	<u>WO</u>	<u>Enl</u>	<u>Tot</u>
1	83	0	1	84	78	1	6	85
2	83	0	1	84	77	1	4	82
3	83	0	1	84	76	1	3	80
4	83	0	1	84	56	1	1	58
Average	83	0	1	84	72	1	3	76

COOPERATIVE EDUCATION PROGRAM

<u>Quarter</u>	<u>Assigned</u>
1	10
2	9
3	6
4	4
Average	7

FY 92 CAA OPERATING BUDGET

● A summary of the Agency's FY 92 budget execution by major expense category is provided below. The Agency's direct funding obligation rate was 98.3%.

<u>Budget Category</u>	<u>Obligations (\$ 000)</u>	
	<u>Direct Funding (Recurring)</u>	<u>External (Nonrecurring)</u>
Payroll	\$9,136.7	
Maintenance	1,279.1	
Security	318.2	
Supplies	253.7	
Communications	200.0	
Equipment	139.9	
Travel	96.6	62.0
Training	75.4	
Study support	66.0	
Leases	53.2	
Reproduction	39.7	
Services	30.3	
Facilities Improvement	20.7	
Software Development	0.0	\$836.5
TOTALS	\$11,709.5	\$898.5

● CAA's annual funding program was adequate although sufficient funds were not made available until the second quarter of the fiscal year. An additional \$800K was allocated in January which allowed the Agency to continue normal operations through the end of the FY. In addition to CAA's annual recurring operating budget, additional nonrecurring funds were received as follows: \$811.5K direct fund cite from MISMA to support software development; \$25.0K via FAD from HQDA to support CAA hosting the 21st AORS; and a \$62.0K direct fund cite from EUSA for CAA travel in support of the CINC. Continued CAA budget reductions have eroded discretionary activities to the point where CAA's budget is almost totally dedicated to meeting nondiscretionary obligations for payroll and maintenance.

SECURITY

- **Orientation and Training.** The CAA Security Office conducted the following activities: Agency security procedures presentations were made to two CAA Newcomers' Orientation classes; the annual NATO security access briefing; and FY 92 SAEDA briefings to all Agency personnel.

- **Inspections.**

- The annual NATO security inspection was conducted by the Office of the US Central Registry, NATO, during Nov 91, and no major discrepancies were noted.

- The biannual inspection of JCS documents by the CAA Security Office during Jul 92 revealed no discrepancies.

- The annual TOP SECRET inventory was conducted during Jun 92 by the TOP SECRET Control Officer and an individual from the Office of the Special Assistant for Model Validation, Intelligence Services Division. A complete accounting was made of all TOP SECRET documents held by the Agency.

LOGISTICS

- **Building Renovations.**

- The seventh floor elevator lobby was renovated to include installation of wall coverings and plexiglass-covered CAA murals to enhance the area that visitors see when they enter the Agency.

- A Purchase Order was signed to remove all of the RF shielded doors for the computer room areas and replace them with solid wood doors. Since the RF shielded doors are no longer needed, this action will save the Agency approximately \$14K in annual maintenance costs.

- The exposed sprinkler piping in the Rugby building was painted white to blend in with the ceiling.

- A computer system was installed by the Building Manager to control the heating and cooling system. This has helped in maintaining a constant temperature in all Agency space.

- **Equipment.** New conference tables were ordered and installed in Room 919. New tables were also ordered for Room 830 and tables and chairs were ordered for FE and SP conference areas.

CONTRACTS

- **Awards.** Major contract efforts awarded in FY 92 were:
 - A multiyear UNISYS Software, Analysts, and Training contract.
 - A multiyear Sun Maintenance contract.
 - Purchase of four RISC machines for the Agency.
 - Value Added Analysis (VAA) expansion for further development on the METAPHOR computer.

PUBLICATIONS, GRAPHICS, AND REPRODUCTION

- **Equipment and Facilities.** No equipment changes occurred during the fiscal year. Action was initiated to enhance productivity by adding two Macintosh computers to the Publication Support Branch (PSB) inventory so that documents drafted on that equipment can be worked by PSB personnel.

- **PSB Organization and Functions.**

- As mandated by DMRD-998, operational control of CAA's Reproduction Center transferred to the Defense Printing Service (DPS) during April 1992. The Xerox 9900 was placed under the control DPS as of 6 April 1992. DPS now performs reproduction work for the Agency on a reimbursable job basis. Under the terms of CAA's agreement with DPS, the Lease to Ownership Plan payments for the Xerox 9900 are now paid by DPS and the physical location of the transferred facility will remain within CAA pending future evaluation of usage data.

- The PSB was reorganized into one consolidated office which provides keyboarding, data conversion, editorial, and graphic arts support to the Agency. New functions include a CAA Printing Control Officer who coordinates with the Defense Printing Service to obtain reproduction support for the Agency and the addition of an audio-visual capability.

● **Publications.** During the year, the Branch assisted in the preparation, publication, and dissemination of 28 major Agency documents and 61 quick reaction analyses (memorandum reports). Other Branch projects included preparation of special displays for the MORS Symposium, Human Dignity Council, Federal Women's Program, AUSA, Black History Month, Holocaust - Days of Remembrance, and numerous other CAA functions.

CHAPTER 6
ANALYTICAL EFFORTS COMPLETED DURING THE PERIOD
FY 88 THROUGH FY 92

This chapter contains a title listing of all analytical efforts completed by CAA during the period FY 88 through FY 92. Contact CAA (ATTN: MSP-M) if information is needed for CAA analytical efforts completed prior to FY 88.

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ANALYTICAL EFFORTS COMPLETED DURING THE PERIOD FY 88 THROUGH FY 92

- FY 92 STUDIES AND CONTRACTS

ACRONYM	TITLE	SPONSOR
AIMS 99-I	Army Integrated Mobilization Study-99, Phase I	DCSOPS
ARC	Analysis of Army Reserve Component Clothing Replacement Process	DCSLOG
ARSTAR	Army Strategic Force Architecture	DCSOPS
ASOS	Army Support Options Study	ASAMRA
C2A2	Command & Control Acquisition Alternative Study	DCSOPS
CARG-O	Conventional Arms Reduction Game - Optimized	CAA
CASMO-VAL	Combat Analysis Sustainability Model Verification and Validation	OPTEC
COMRAD	Component Requirements & Authorization Determination	ASAMRA
CTLS-91	Concurrent Theater Level Simulation	DUSA-OR
CURE	Chemical Unit Requirements	DCSOPS
E-CEP	Enhanced Casualty Estimation Planning	DCSPER
HIGHWIRE 92	Nuclear Weapons Political Issues Political-Military Game	DCSOPS
IAMS II	Integrated Army Mobilization Study - Phase II	DCSOPS/ DCSLOG
INFSCAP	Interservice Nuclear Fire Support Capabilities	DCSOPS
KOPLAN-91	Korean Operation Plan-1991	EUSA
META	Application of Meta-Analysis	DUSA-OR
RCIF	Review of the Calculation of Ammunition, Petroleum, and Equipment Requirements (CALAPER) Input Factors	DCSOPS
ROK-EAD	Republic of Korea - Extended Air Defense	CAA
SKYFLASH 92	Nuclear Weapons Requirements Political-Military Game	DCSOPS
SMA	Strategic Mobility Alternatives	DCSOPS
STOCEN 2	Stochastic Concepts Evaluation Model - Phase II	CAA
TAC LINK	Tactical Combat Samples and Linkage to TACWAR	EUSA
TW-91	Concurrent Processing and Time Warp Development	DUSA-OR
VAA 94-99	Army Program Value Added Analysis 94-99 - Phase II	DCSOPS
VALOR	Value Added Linear Optimization of Resources	CAA
VECCEM	A Structured Approach to Large-Scale Battlefield Simulation	DUSA-OR
PHASES I&II		
WARREQ 99	Wartime Requirements, Fiscal Year 99	DCSOPS

- FY 92 QUICK REACTION ANALYSES

AAF	Army Availability Factor	USAFISA
ACFAA	Army College Fund Allocation Analysis	DCSPER
AIMS II-M	Army Integrated Mobilization Study II - Medical	DASG
AIR OPTIONS	Aircraft Resource Allocation Options	DCSLOG
ALADDIN 92	ALADDIN 92	ADCSINT
ARSTAR CA-1	ARSTAR Capabilities Analysis-1	DCSOPS
ASFPW	Army Strategic Force Planning Workshop	DCSOPS
AUTOCORE	Analytic Support to the Field Test of the Automated Core Document (ACD) System	DCSPER
B-FASS	Base Force Analysis	VCSA
BASFORMA	Base Force Reductions and Modernization Alternatives	VCSA
BIODEF	Biological Defense Analysis	DCSOPS
CALOG SOS	Comparison of Army Logistics Support to Other Services	DCSLOG
CCASM	Contingency Corps-Armored Systems Modernization	DCSOPS
CFCS	Combined Forces Command Sustainment Assessment	EUSA
CFCS II	Combined Forces Command Sustainability Phase II	EUSA
CFCS-UP	Combined Forces Command Sustainability-Update	EUSA
CHEMSTORM	Chemical Warhead Impact on Desert Storm	DCSOPS
CIA	Comanche Impact Analysis	DCSOPS
CONCOR-UMD	Contingency Corps Unit Movement Data	TRADOC
COSAA	Combat Samples for the Air Force Studies and Analyses Agency	DUSA-OR
COSMIC	Cost Model Input Calculations	PAE
DNBI 2001	Disease and Nonbattle Injury Rates-2001	DASG
DOK	Defense of Korea	VCSA
DS-SEAD	DESERT STORM-Suppression of Enemy Air Defense	DUSA-OR
DTCTS-SWA	Deployment-TRADOC Common Teaching Scenario - Southwest Asia	TRADOC
EADIMP	Economic Analysis of the DCSOPS Information Management Program	DCSOPS
EVADED	Evaluation of Elected Voluntary Alternate DESCOM Discipline	DCSPER
FASTAEDP	Fast Total Army Equipment Distribution Program	PAE
FOSMODTOS-IN	Force Structure and Modernization Tradeoff Analysis - Inputs	DCSOPS
FRONTIER 92	Global Wargame FY 1992	DCSOPS
GETAR-99	Global Excursion of Transportation Allocation Rules, SRA-99	TRADOC
HDASSCS	Heavy Infantry Division Analysis of Soldier Support System Cost Study	AMC
HELL vs LONG	HELLFIRE versus LONGBOW	DCSOPS
IPAEMA	Investment Programs of the Army: Economic and Modernization Analysis	DCSOPS
IRAFORMS	Initial Requirements Analysis for MRC-W Scenario	DCSLOG
KNOTS	Knowledge of Time Slippage	DCSOPS
KOWAP	Korean War Plan	EUSA

KOWAP-MOB	Korean Warfighting Operations Plan - Mobility Assessment	EUSA
LC3	Light Contingency Corps Capability	DUSA-OR
LC4	Light Contingency Corps Capability Continued	DUSA-OR
LIDASSCS	Light Infantry Division Analysis of Soldier Support System Cost Study	AMC
MEDEVAC 2001	Medical Evacuation 2001	DASG
MP EXC 99	Military Police Excursion, TAA-99	DCSOPS
MRC-CASREP-97	Major Regional Contingency Casualty Replacement Requirements Report	DCSPER
MRSSWA-POMEX	Mobility Requirement Study - Southwest Asia, POMCUS Excursion	DCSOPS
MSS-TDB	Mobilization Stationing Study - Transportation Data Bases	ChOE
POMCAPE	POMCUSITE System Capability Expansion	USAREUR
POMCAPE SME	POMCUSITE Capability Expansion Siting Model Enhancement	USAREUR
POMEVAL 94-99	Evaluation of POM 1994-1999	PAE
RAM SLAM	Replacement Maintenance Using SLAM	EUSA
RAM SLAM 2	Replacement Maintenance Using SLAM - II	EUSA
RCSTAS	Reserve Component Stationing Study	DCSOPS
RETRO-EUR	Retrograde-Europe	DCSOPS
ROKMOD	ROK Modernization	EUSA
ROK-MODS	ROK Modernization Sustainability	EUSA
SAWVAS	Support Area Wheel Vehicle Vulnerability Assessment	EUSA
SCSC-M	Support to Conventional Systems Committee - Munitions	DCSOPS
ST BARBARA 91	Army Nuclear Fire Support Synergistic Game	DCSOPS
SWA 2000	Southwest Asia 2000	DCSOPS
TARO 91	Political-Military Game TARO 91	USARPAC
TD90	Tae Kwon Do, FY 90	EUSA
THAADS-SWA	Theater High Altitude Air Defense System - Southwest Asia	DCSOPS
TPUG	Tank Propulsion Upgrade	DACS
TRETOAD +	The Restructured European Theater of Operations Air Defense Plus	PAE
TS	Tank Sight	DCSOPS
TU-92	Tactical Wheeled Vehicle Modernization Update - 92	DCSOPS
UAV-ROH	Unmanned Aerial Vehicle to Replace Older Helicopters	PAE
VAA: AMAVRTL	Value Added Analysis: Analysis of Modernization Alternatives at Various Research, Development, and Acquisition (RDA) Total Obligational Authority Levels	PAE
VAA: CSAOR	Value Added Analysis: Chief of Staff Army Offsite Review	DCSOPS
VAA: LAPS	Value Added Analysis: Long-Range Research, Development, and Acquisition Plan (LRRDAP) Analysis Planning Session	DCSOPS
VAA: LGORS	Value Added Analysis: Long-Range Research Development, and Acquisition Plan (LRRDAP) General Officer Review Support	DCSOPS

VAA: SAMQ	Value Added Analysis: Secretary of the Army Modernization Questions	SEC ARMY
VAA:EATSM	Value Added Analysis: Economic Analysis of Tradeoffs in Structure & Modernization	PAED
WW-CASREP-97	Worldwide Casualty Replacement Requirements Report, FY 97	PERSCOM
XDTRAP	Counterdrug Transportation Requirements Analysis Program	USARSO

- FY 92 OTHER PUBLICATIONS

ARBSIT	ATVAL Recommendations: Brigade Samples in Theater	CAA
ATVAL II	Attrition Calibration (ATCAL) Evaluation Phase II - Indirect Fire	CAA
ATCAL P2SIM	ATCAL Phase II, Simscript II.5	USAF-SAA
BAMC	Benchmark for Artillery Munitions Consumption	CAA
E-CALAPER	Enhancements to Calculation of Ammunition, Petroleum, and Equipment Rates Process Review	CAA
CAS-IMPACTS 99	Impacts of Force Structure (FY 99) Changes on Casualty Generation Report	CAA
CASPRO	Casualty Estimation Process Review	CAA
FSSS-MR	FASTALS Sensitivity with Small Scenario - Minor Rules	CAA
K-TBMD	Korea - Tactical Ballistic Missile Defense	CAA
VOLLEY FIRE	Foundations of the General Theory of Volley Fire	CAA

- FY 91 STUDIES AND CONTRACTS

A2D2P2	Anti-Armor Defense Data, Phase II	CAA
ARIM	Army Resource Integration and Management	DCSOPS
ATVAL	ATCAL Evaluation	CAA
CHEMPHASE	Chem Protection Hazard Assessment in Europe Study	DCSOPS
CMA	Counterdrug: Mandate for the Army	DCSOPS
DSSLL	Desert Shield Strategic Lessons Learned	DCSOPS
DYNAFOR	Accessions Forecasting for Dynamic Force Structures	DCSPER
EMPDA	Enhanced Massively Parallel Deployment Analysis	DUSA-OR
ETRANS	European Transportation Requirements for Backhaul of Personnel/Cargo	DCSLOG
FES	Force Employment Study	DCSOPS
FASTAUTO	FASTALS Automation Contract	CAA
IMAM	Information Management Modernization Study	DISC4
IV&V FORCEM C2	IV&V FORCEM C2 Module	CAA
IV&V GDAS II	IV&V Global Deployment Analysis System, Phase II	CAA
IWAS-EC	Initial Wartime Army Support - Effectiveness & Capability	DCSLOG
LRAMRP	Long Range Army Materiel Requirements Plan Study	TRADOC
MARTEP	Maritime Terminal Evaluation Program	DCSLOG

NATO 2000V OMNIBUS-91F POMCUSITE PROBATIONS	NATO 2000 Appendix Operational Readiness Study FY 91 (FORCEM) POMCUS Unit Siting Alternatives Study Probabilistic Foundations for a Fully Stochastic Theater-Level Ground Combat Simulation	DCSOPS DCSOPS USAREUR CAA
RACCK RACCK-CALAPER	Regional Assessment Combat Capability - Korea Regional Assessment Combat Capability - Korea, Calculation of Ammo, Petroleum and Equipment	EUSA EUSA
RACCK-CHEM	Regional Assessment Combat Capability - Korea, Chemical Analysis	EUSA
RACCK-DA	Regional Assessment Combat Capability - Korea, Deployment Analysis	EUSA
RACCK-FASTALS	Regional Assessment Combat Capability-Korea - FASTALS	EUSA
SCALED II	Simple Combat Attrition Law Evaluation Data, Phase II	DUSA-OR
SOVA SRA-99 STRADER TACNUC TWVMU VALUE ADDED	Soviet Air Operation Analysis Study Support Force Requirements Analysis - 1999 Strategic Deployment Analysis Review Study Theater Analytic Nuclear Model Tactical Wheeled Vehicle Modernization Update Value Added Analysis 90-97	DCSOPS DCSOPS DCSLOG DCSOPS DCSOPS PAE

- FY 91 QUICK REACTION ANALYSES

AAMU AAMU-SR ALF-1 ARVIS-DA BA91 CADA VR	Army Aviation Modernization Update Army Aviation Modernization Update-Scout Relook Airlift Force Study Army Vision Deployment Analysis Political-Military Game BALBOA 91 CORBAN Air Defense Artillery Validation & Review	DCSOPS DCSOPS VCSA DCSLOG USARSO PAE
CASIO	Chemical Attacks Against Contingency Staging Areas	DCSOPS
CMMS II-CO	Congressionally Mandated Mob Study II-CINC Options	DCSLOG
CMMS-NATO CMMS-NEA CMMS-SWA CMMS2-AMD	Congressionally Mandated Mobility Study, NATO Congressionally Mandated Mobility Study, NEA Congressionally Mandated Mobility Study, SWA Congressionally Mandated Mobility Study 2, Army Mobility Data	DCSOPS DCSOPS DCSOPS DCSOPS
CORCFE COSWA-AF-MEA	CORBAN Centralized Forces Europe COSWA-Alternative Forces - Munition & Equipment Analysis	PAE DCSOPS
COSWA-AIM COSWA-ALT COSWA-DCAS	COSWA - Air Interdiction Maneuver COSWA - Alternative Contingencies COSWA - Division Casualty Stratification Analysis	DCSOPS DCSOPS DCSPER
COSWA-RAN COSWA-RES COSWA-SPT COSWA-STK	COSWA - Requirements Analysis COSWA - Residual Force Requirements COSWA - Supportability Analysis COSWA - Stockage	DCSOPS DCSLOG DCSOPS DCSOPS

COSWA-STK-MEA	COSWA - Stockage - Munitions & Equipment Analysis	DCSOPS
COSWA-SUM	COSWA - Summary	DCSOPS
COSWA-SUM-UP	COSWA - Summary Update	DCSOPS
COSWA-SUMFOR	COSWA - Summary FORSCOM	DCSOPS
COSWA-SUPAN	COSWA - Support Analysis	DCSOPS
COSWA-XAIR	COSWA - Extended Air Operations	DCSOPS
COVARA	Cost Variability Analysis	USASAC
CPOST	Post-CFE Posture Assessment	DCSOPS
CRISK	CFE Circumvention Risk Assessment	DCSOPS
DAIRICOWS	Detailed Analysis/Invest. of Resource Items & Costs of Weapon Systems	DCSOPS
DESERT RAMP	Desert Ramp (There is no summary for this)	DCSOPS
DSAD-FROG	Desert Shield Air Defense - Free Rocket Over Gound	DCSOPS
DSAD-PS	Desert Storm Air Defense - Patriot Stockage	DCSOPS
DSAW-ATEMS	Desert Shield Air Warfare - ATACMS Employment	DCSOPS
DSAW-EAD	Desert Shield Air Warfare - Extended Air Defense Analysis	DCSOPS
DSAW-IUD	Desert Shield Air Warfare - Israeli Urban Defense	DCSOPS
DSCA I	Desert Storm - Campaign Analysis I	DCSOPS
DSCA II	Desert Storm - Campaign Analysis II	DCSOPS
DSCA III	Desert Storm - Campaign Analysis III	DCSOPS
DSCA IV	Desert Storm - Campaign Analysis IV	DCSOPS
DSCA V	Desert Storm - Campaign Analysis V	DCSOPS
DSLL	Desert Shield Lessons Learned	DCSOPS
ETTRANS-FOS	European Transportation - Roundout Support	DCSLOG
FLOATPOM	Floating POMCUS Analysis	DCSLOG
FOD-FDAT	Forward Deployed Force Alternative	VCSA
FOMOSA	Force Modernization Sensitivity Analysis	DCSOPS
FORR-MAN	Force Regeneration/Reconstitution - Mobility Analysis	DCSOPS
GE-TAR	Global Excursion of Transportation Allocation Rule	TRADOC
HARMS	HIMAD Anti-Radiation Missile Survivability Analysis	DCSOPS
HO-91	Political-Military Game Horizon 91	EUSA
HOBOCOBA	Homeward Bound Cost-Benefit Analysis	DCSOPS
IFC-AMA	Improved Force Closure - Army Mobility Analysis	DCSOPS
IFCA-FAS	Improved Force Capability Support Analysis	DCSOPS
KOWAP-DA	Korean War Plans - Deployment Analysis	EUSA
MA91	MAGELLAN 91	DCSOPS
MARCFAC	MARC Availability Factors	USAFISA
MOD-U	Modernization Update, 1980-1990	DCSOPS
MPM-CAS	Medical Planning Module - Casualties	DCSOPS
MRC-E-C	Mobility Requirements - Major Regional Conflict, East, Case C	DCSOPS
MRC-EAST	Mobility Requirements Study - Major Regional Conflict, East, Case B	DCSOPS
MRC-WEST	Mobility Requirements Study - Major Regional Conflict, West, Case C	DCSOPS
MRSSWA-DEX	Mobility Requirement Study - Southwest Asia, Case D	DCSLOG
NRISK-90	Non-Negotiated Reduction Risk Assessment 1990	DCSOPS
NSO	National Guard Structure Options	DCSOPS

PERSYST	Civilian Personnel Classification System	DCSPER
PS90	Political-Military Game PilSong 90	EUSA
PS90-II	Political-Military Game PilSong 90-II	EUSA
SDOP	Secretary of Defense Option	DCSOPS
SIGINT STORM	Vulnerability of SIGINT Vehicles Within the Context of Operation Desert Storm	ISC
STIR-FRI	Stinger Threat-based Inventory Requirement - Fast Reaction Investigation	DCSOPS
TA91	Japan/Pacific TARO Political Military Game	USARPAC
TAFES-II	Total Army Force Evolution Study II	DCSOPS
TAFES II-MA	Total Army Force Evolution Study II - Mobility Analysis	DCSOPS
VCSA-CLV	VCSA Controlled Munition Assessment	DCSOPS

- FY 90 STUDIES AND CONTRACTS

A2D2	Anti-Armor Defense Data	DUSA-OR
AFPDA, FY 93-99	Army Force Planning Data and Assumptions, FY 1993 - 1999	DCSOPS
ALBF-DA	AirLand Battle Future - Deployment Analysis	TRADOC
ALENO	Alternate Enlistment Options	DCSPER
ASM-EA	Armored Systems Modernization - Economic Analysis	DCSOPS
ASM-SUSOPS	Armored Systems Modernization - Multicorps Sustained Operations Analysis	DCSOPS
CASMO VER I	Combat Analysis Sustainability Model Verification I	CAA
CTLS AIR	CTLS Air Model	SIMTECH
CTLS-90	Concurrent Theater-Level Simulation, 1990	DUSA-OR
FOCUS 85-94	Force Comparison US vs Soviet 1985-1994	DCSOPS
FORCE 90/97	Force Evaluation, FY 90/97	DCSOPS
FORCEM/SUN	Interactive FORCEM on SUN	DUSA-OR
FUTEUR	Future Army, Europe	DCSOPS
GABY	Generic Application Blackboard Yoking	DUSA-OR
GDAS I	Global Deployment Analysis System, Phase I	CAA
GDAS IV&V	Global Deployment Analysis System, Phase I IV&V	CAA
GOLAN	Wargame Golan Heights '73	CAA
HOKKAIDO 90	Wargame Hokkaido FY 90	USARJ
JMNA-AMR 90	Joint Military Net Assessment - Army Mobility Requirement Study, FY 90	DCSOPS
MOBCEM-FD	Mobilization Capabilities Evaluation Model - Functional Description	DCSOPS
NATO 2000	NATO 2000	DCSOPS
NoREDs	Nonreduction Measures	DCSOPS
NTWRE-91	Near-Term Wartime Requirements, Europe, FY 91	DCSOPS
OMNIBUS-91E*	US Army Operational Readiness Analysis Study - FY 91 Europe	DCSOPS
OMNIBUS-91K*	US Army Operational Readiness Analysis Study - FY 91 (NEA)	DCSOPS
OMNIBUS-91M*	US Army Operational Readiness Analysis Study - FY 91 (SWA)	DCSOPS

OMNICHEM	US Army Operational Readiness Chemical Analysis	DCSOPS
P2RAM	Peer Review Process & Accreditation of Models	DUSA-OR
PFCA	Program Force Capability Assessment	DCSOPS
POMCANAL	POMCUS Analysis	PAE
PREFOR	Preprocessor FORCEM	MISMA
PT89	Persian Tiger-89	TUSA
ROA	Rates of Advance in Historical Land Combat Operations	SEC ARMY
SOFRS-89	Special Operations Forces Requirements Study	DCSOPS
SWA-I	Wargame Southwest Asia I	TRADOC
TACNUC	Theater Nuclear	CAA
TW-90	Time Warp Operating System	DUSA-OR
WGASST	Wargaming and Political/Military Game Assistance	DCSOPS

- FY 90 QUICK REACTION ANALYSES

ALTFORS-MA	Alternate Forces - Mobility Analysis	DCSOPS
ASWAP	Analysis of Southwest Asia Ports	DCSLOG
CMEDREQ	CFE Medical Requirements	CSA
CONCOR-3	Contingency Corps - 3	DCSOPS
CONCOR-SWA	Contingency Corps - Southwest Asia	DCSOPS
CONFOR	Contingency Force Planning Issues	DCSLOG
CONSTANT-TGSM	Conventional Stability Assessment - Effects of Terminally Guided Submunitions	DCSOPS
CONSTANT-WARN	Conventional Stability Assessment - Warning Time	DCSOPS
COSWA	Contingency Operations - Southwest Asia	DCSOPS
COSWA-ALFOR	COSWA - Alternative Force	DCSOPS
COSWA-ALT	COSWA - Alternative Contingencies	DCSOPS
COSWA-BEEFS	COSWA - British, Egyptian, French, and Syrian	DCSOPS
COSWA-CAS	COSWA - Casualties	DCSOPS
COSWA-FASTALS	Contingency Operations SWA - FASTALS	DCSOPS
COSWA-REQ	Contingency Operations, Southwest Asia - Requirements	DCSOPS
DESCASS	Desert Shield Casualty Stratification	TAPC
DESCASS(R-1)	Desert Shield Casualty Stratification (Rev 1)	TAPC
DSAW-BLUE	Desert Shield Air Warfare Study	DCSOPS
DSAW-RED	Desert Shield Air Warfare Study	DCSOPS
ECBAS	Engineer Studies Center Bomber Assessment Study	ESC
ENACC	Enlisted Accessions Alternatives	DCSPER
EUFORSTAL	European Forward Stationed Alternatives	DCSOPS
FORANT	Future Force Alternative	DCSOPS
FUPAC	Future Army Forces Pacific	DCSOPS
HAWG	Hokkaido Air War Game	USARJ
I2A2	Improving Investigative and Audit Analysis	DAS
MEDSWA	Medical Southwest Asia	DASG
MILRISK	Military Risk Assessment	DCSOPS
MINI-TAA	Mini-Total Army Analysis	DCSOPS
MSAM	Medium Surface-to-air Missile Study	DCSOPS

NUCRED/I	Army Tactical Nuclear Weapons in a Reduced Force Environment, Phase I	DCSOPS
PLANNER-R&D	LOG PLANNER Extension to Include the Long-range Research, Development, and Acquisition Plan	DCSLOG
POMCANAL	POMCUS Analysis QRA	PAE
POMOP	Program Objective Memorandum Options	DCSOPS
PSS-EX	Personnel Service Support - Excursion	DCSOPS
PTADS	Persian Tiger Air Defense Study	DCSOPS
Q-FOCUS	Quick - Force Comparison US vs Soviet	OCSA-CAIG
Q-FORCE-91	QUICKSILVER - Force Evaluation 91	DCSOPS
QUICK RATES	Southwest Asia Rates Update	DCSOPS
QUICKSILVER-1	QUICKSILVER - 1	DCSOPS
QUICKSILVER-2	QUICKSILVER - 2	DCSOPS
RCOSWA	Requirements, Contingency Operations, Southwest Asia	DCSOPS
RECONCORPS	Reconstitution of a Contingency Corps	DCSOPS
REDPATH	Reduction Dynamics Assessment	DCSOPS
RE-FOCUS/CFE	Remodel Force Comparison US vs Soviet - CFE	DCSOPS
RE-FOCUS PLUS	Remodel Force Comparison US vs Soviet CFE Plus	DCSOPS
S-PTADS	Son of Persian Tiger Air Defense Study	DCSOPS
STAMKRAM	STARDUST Mobility/Firepower Kill Replacement Analysis	DCSOPS
STARDUST	STARDUST QRA	DCSOPS
STARMAN	STARDUST Mobility Analysis	DCSOPS
STRATANAL	Casualty Stratification Model (CSM) Analysis	TAPC
STRATDEF	STRAT Defender Validation Study	JCS
SWADAN	Southwest Asia Deployment Analysis	DCSLOG
SWADAN-CONOP	Southwest Asia Deployment Analysis, 1st Update	DCSLOG
SWADAN-FORMODE	Southwest Asia Deployment Analysis - 2d Update	DCSLOG
TAFES	Total Army Force Evolution Study	DCSOPS
TANK FLEET	Tank Fleet Analysis	DCSOPS
TANKRISK	Tank Fleet Risk Analysis	DCSOPS
TFRO	Total Force Roundout	DCSOPS
TIGER CLAW 90	TIGER CLAW 90 Wargame	DCSOPS
TIGER CLAW AD	TIGER CLAW 90 Air Defense Study	DCSOPS
TSADS	TIGER SWORD Air Defense Study	DCSOPS
TS 90	Wargame Tiger Sword '90	DCSOPS
TS-90 VARIANTS	Tiger Sword 90 Variants	DCSOPS
UCP	Unified Command Plan	DCSOPS
VER-STRAT	Verification of the Casualty Stratification Process	TAPC

- FY 89 STUDIES

ABAKUS	Analysis of Barrier System Alternatives - Korea	ESC
ALB-F	AirLand Battle (Heavy) - Future	TRADOC
ALOGFACTS	Analysis of Logistics Factors Study	DCSLOG
AMARQ	Alternative Methods of Ammunition Requirements Computations	DCSOPS
BREAKPOINT	Forced Changes of Combat Postures	HQDA

CASMARG-ASA	Close Air Support Mission Area Review Group	DCSOPS
CASMO II	Army Study Assessment	
	Combat Analysis Sustainability Model	OTEA
	Development Program, Ph II	
CHEMSCAN	Chemical Support Combat Analysis NATO	DCSOPS
CISE	Combat Identification Systems COMO Integrated	CAA
	Air Defense Model Evaluation Study	
CONSTANT	Conventional Stability Assessment	DCSOPS
DAMANS	CAA Data Management System	CAA
DFD	Design for Discard Study	AMC
EDCA	European Division Combat Analysis FY 91-96	DCSOPS
FIRE	Fire Fighting Task Force	CAA
FOMOA	Force Modernization Analyzer User Manual	DCSOPS
FORCE 88/89	Force Evaluation, 1988/1989	DCSOPS
FTF	FORCEM Task Force	AMIP
HAMMER 88	COMO HAMMER 88 Validation Study	CAA
HOKKAIDO II	Wargame HOKKAIDO II	USARJ
IADA	Integrated Air Defense Assessment Study	USAREUR
IFCS	Improved Force Closure Study	DCSOPS
JAPORS	JSCP CS/CSS Apportionment Study	DCSOPS
JMNA 88/89	Joint Military Net Assessment, Army Mobility	DCSLOG
	Analysis, 88-89	
LATAM I	Wargame Latin America Theater I	TRADOC
LITL DECK	Limited Input Theater-level Deck	CAA
LOG PLANNER	Logistics Force Planner Assistant Study	DCSLOG
MICAF-PROCIP	Measuring Improved Capabilities of Army	CAA
	Forces-Process Improvement	
NG LOG	National Guard Logistics Study	NGB
NUX-97/II	Analysis of Nuclear Expenditures for	DCSOPS
	FY 97/Phase II	
OMNI-89E FORCEM	Operational Readiness Study FY 89 Europe	CAA
	FORCEM	
OMNIBUS-91DA	Operational Readiness Study-91 Deployment	DCSOPS
	Analysis	
PFCA-DA	Program Force Capability Analysis -	DCSOPS
	Deployment Analysis	
POL FACTS	Petroleum, Oils, and Lubricants Factors Analysis	DCSLOG
RETRO II	Retrograde Transportation Study II	DCSLOG
SAC II	Sensitivity Analysis COSAGE II	CAA
SATA	Small Arms Threat to Aircraft Study	DCSOPS
SCAN	Support-Combat Analysis NATO	DCSOPS
SCAN DA	Support-Combat Analysis NATO - Deployment	DCSOPS
	Analysis	
SRA-96	Support Force Requirements Analysis, FY 92-96	DCSOPS
TAME	Target Acquisition Methodology Enhancement	CAA
TRIPM	Transportation Improvement Program - Models	DCSLOG
TRIPP	Transportation Improvement Program - Planning	DCSLOG
TROMSO II	Wargame TROMSO II	DCSOPS
TWELVE	Tactical Wheeled Vehicle Modernization	DCSOPS
	Planning Study	
VICIMP	Vector-In-Commander (VIC) Implementation	CAA
	Study	

- FY 89 QUICK REACTION ANALYSES

ALTFORS/MRFS	Alternative Force 1	DCSOPS
AMSAA QRA	Chemical Defense Equipment Consumption Rates	AMSAA
AVECAS	Identify Average Division Casualty Rates	PERSCOM
BDECAS	Information for Developing Brigade Casualties	7TH ARMY
CHEMQRA	Special Chemical Analysis for BG Eggleston	DCSOPS
CML SCH QRA	Chemical School QRA	USACMLS
CONCOR-I	Contingency Corps - Contingency Corps Active Force Capability	DCSOPS
CONCOR II	Contingency Corps II - Contingency Corps Active Force Capability	DCSOPS
CONSTANT DEMO	Exercise CONSTANT DEMO Support	USAF
CONSTANT-M + 10	Constrained Deployment Assessment	DCSOPS
CONSTANT-EUR	Assessment of USAREUR-defined Conventional Force Reduction	USAREUR
CONSTANT-UK	US Proposal Assessment	DCSOPS
CONSTANT-UNI	Soviet Unilateral Reduction Assessment	DCSOPS
CR/CZ CAS	Corps Rear & COMMZ Casualty Rates Study	DCSLOG
CSM-II SPT	Casualty Stratification Model II Support Project	TRADOC
E-TBMD SUP	European - Tactical Ballistic Missile Defense Study Supplement	DUSA-OR
EPW-EX	Enemy Prisoner of War - Excursion	CAA
FRIQM	Force Reduction Impact on Quartermaster Units	DCSOPS
IFCS	Improved Force Closure Study	DCSOPS
Longbow	Longbow QRA	DCSOPS
MAC	Manprint Advanced Concept Book	DCSPER
MORIMOC II	Chair Symposium on Modeling Humans in Combat	DUSA-OR
NOCS	NATO ORSA Cell Support	
OSD(P&L) Paper	Review of OSD Paper on "The Consideration of Logistics Factors in Munitions Requirement Determination"	OSD
PRESBUD	President's Budget - Force Structure Alternative	DCSOPS
QRACC	QRA Contingency Corps	DCSOPS
QRARED	QRA - NATO Reductions	DCSOPS
RAND QRA	QRA for RAND Corporation	DCSOPS
ROAR	Reporting of Aviation Readiness	DCSOPS

- FY 88 STUDIES

4M	Mix of Major Materiel and Munitions	SARDA
AAMTOR	Army Aviation Modernization Tradeoff Requirements	DCSOPS
AFPDA 89-98	Army Force Planning Data and Assumptions 89-98	DCSOPS
AMARQ	Alternative Methods for Ammunition Requirements Computations	DCSOPS
ARAMSS	Army Aeroscout Mix Sustainability Study	OTEA
BENCHMARKS	Historical Characteristics of Combat for Wargames	CAA
CAC	Conventional Arms Control Study	DCSOPS
CALAPER	System to Calculate Ammunition, Petroleum, and Equipment Rates	CAA
CAMP	Computer Assisted Match Program	CAA

CASMO I	Combat Analysis Sustainability Model Study - Phase I - Model Functional Design	OTEA/CAA
CATSUP	Co-op Analysis of the Simulated Process	CAA
CCCA-DEPLOY-MENT	Close Combat Capability Analysis - Deployment Analysis Results	TRADOC
CCCA-NUCLEAR	Close Combat Capability Analysis - Nuclear	TRADOC
CHEMSTAA	Chemical Stockpile Assessment in AFCENT Study	DCSOPS
COMO HAMMER	COMO HAMMER Validation Study	CAA
COMPMIM	COMP Model Implementation	DCSOPS
CSRS	Combat Support Ratio Study	DCSOPS
DOMINO	Political/Military Game Domino	DCSOPS
EDWAR	Electronic Documentation of Wargame Results	CAA
E-TBMD	European - Tactical Ballistic Missile Defense Study	DCSOPS
ERCRULES	Equipment Readiness Code Rule System	DCSOPS
FASTALS	FASTALS Model Upgrade	CAA
FDM-AMPLE	Force Design Model Enhancements - AMPLE	CAA
FDM-COSTING	Force Design Model Enhancements - Costing	CAA
FDM-GT	Force Design Model Enhancements - Game Theory	CAA
JAPAN-88	Japan Political-Military Wargame - 88	USARJ
JPAM-MA	Joint Program Assessment Memorandum Mobility Analysis	DCSLOG
MERCAD-EAD	Measuring Relative Capabilities of Army Forces - Echelon Above Division	DCSLOG
MICAF-87	Measuring Improved Capabilities of Army Forces 87	DCSOPS
MICRO-PFM	Microcomputer Patient Flow Model	DASG
MME-CDE	Modeling and Measuring Effects of Conventional Defense Enhancements	DCSOPS
MRFS-87	Mid-Range Force Study 1987	DCSOPS
MVC	MICAF Vector Comparison	CAA
NUX 97/1	Tactical Nuclear Weapons Requirements in 1997	DCSOPS
OMNI-89DA	OMNIBUS-89 Deployment Analysis	DCSOPS
OMNI-89FRCM	OMNIBUS-89 FORCEM	DCSOPS
P93E	Wartime Requirements Programing FY 93 Europe	DCSOPS
P93E-ADMR	Wartime Requirements Programing FY 93, Europe - Air Defense Munitions Requirements	DCSOPS
PERU	Prepositioned Equipment Rotational Units	DCSOPS
RETRO I	Wartime Retrograde of Damaged Materiel from a Theater	DCSLOG
SAC	Sensitivity Analysis of COSAGE	CAA
STARS	Strategic Transportation Analytical Requirements	DCSLOG
TARGEN	Target Generation: E5/E6 Enlisted Promotions	DCSPER
TMORR	Theater Model Requirements Review	CAA
TOP GUN	Wargame Top Gun	DCSOPS
TROMSO	Wargame TROMSO	DCSOPS
V-22 SAS	V-22 Self-deployment and Sustainment Alternative	TRADOC
VICFAM	VIC Familiarization Study	CAA
WARMAPS-90/94	Wartime Manpower Planning System, FY 90 & FY 94	DCSPER
WESTWIND	Wargame WESTWIND	WESTCOM

WESTWIND P/M

WESTWIND Political/Military Game

WESTCOM

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**10-IN-10
FURNVAL
RCDCS
RCFTM**

**10-IN-10
Furniture Model Validation
Reserve Component Deployment Capability Study
Reserve Component Force Tank Modernization**

**DCSOPS
VCSA
DCSOPS
DCSOPS**

APPENDIX A

ANNUAL STUDY, WORK, EVALUATION, AND REPORTING SYSTEM
(ANSWERS)

This appendix contains the CAA Annual Study, Work, Evaluation, and Reporting System (ANSWERS) matrix which identifies the five standard categories used for distinguishing CAA's major analytical work. The ANSWERS matrix identifies CAA's principal work categories and selected designation and performance criterion.

CAA Annual Study, Work, Evaluation, and Reporting System (Answers)

Category (type)	Sponsor	Mode	Authority	Tasker	Approval level		Analysis QA		Documentation		
					Sponsor	CAA	Sponsor	CAA	Product	QA	Approval
Study	External	In-house Contract	AR 5-5 AR 10-38	Study Directive	• HQDA Staff Agency Head • MACOM Cdr	Director	• GOSC • SAG • SAG • IPR	ARB	• Usually Study Report • Exceptions-- Dir approval	PRB	Dir, CAA
			AR 5-5 AR 5-14 AR 10-38	• Management Decision Memorandum • RFP	• AMC • SIMTECH • DOD/DA				(Notes)	COR	
Quick Reaction Analysis (QRA)	External	In-house	AR 10-38 (MOD)	Quick Reaction Request	HQDA Staff Agency (Dir/Div)	Director AD (Note c)	HQDA Staff Agency Dir/Div	ARB or Dir desk-side	Memorandum Report	Dep Dir AD	Dir, CAA
Project	External	In-house Contract	AR 10-38	Technical Directive	• AMC • SIMTECH • DOD/DA or Dir, CAA (On behalf of sponsor)	Director AD (Note c)	N/A	ARB	Technical Paper/ Report	PRB	Dir, CAA
			AR 5-5 AR 5-14 AR 10-38	• Management Decision Memorandum • RFP					(Notes)	COR	
Research and Analysis Activity	Internal	In-house Contract	AR 10-38	Directive	Dir, CAA	Dir > 4PSM AD ≤ 4PSM	N/A	Dep Dir AD	(Note b)	Dep Dir AD	Dir, CAA
			AR 10-38 AR 5-5 AR 5-14	• Management Decision Memorandum • RFP		Director		AD		AD	AD
CAA Management / Mission Support	Internal	In-house	AR 10-38	CAA FL 40	AD/DCh	AD/DCh	Dir/Div	AD/DCh	(Note e)	COR	Dir, CAA
									(Note b)	Dir/Div	AD/DCh

a Documentation for contracts will be as specified in the RFP. May be amended by negotiation between CAA and the contractor.

b Type product is determined by specified CAA approval authority.

c ADs have interim approval authority for QRA and Projects.

APPENDIX B

DEFINITIONS OF CAA WORK CATEGORIES

This appendix contains short descriptions of CAA's principal work categories.

- **Study** - A major in-house or contract effort which is externally sponsored by a HQDA or DOD staff element, MACOM, or other government agency. The analysis effort generally involves more than one-half of a professional staff year (PSY) and the duration usually exceeds 90 days (reference AR 5-5, AR 5-14, AR 10-38). A study directive is required for all in-house CAA study efforts (DA Pam 5-5). CAA documents the results of studies with a Study Report.

- **Quick Reaction Analysis (QRA)** - An operational or strategy oriented analysis of a pressing issue(s) conducted on a quick response basis. QRA are externally sponsored and performed in-house. The analysis effort is less than one-half a PSY and the duration is normally less than 6 months and frequently less than 30 days. CAA documents results of QRAs with a Memorandum Report.

- **Project** - An in-house or contract analytical support effort undertaken by CAA on behalf of an external sponsor. Projects include CAA analytical support activities such as model validation and verification, peer reviews of studies, and international analytic exchange programs. Projects can range from relatively low-cost, short-term efforts to major efforts equivalent in scope to a study. CAA generally documents results of projects with a Technical Paper.

- **Research and Analysis Activity (RAA)** - A CAA sponsored, in-house effort aimed at developing or improving analytical systems or techniques. Includes the development and modification of analytical models and data bases to support the conduct of studies, QRA, and projects. The product is determined by the tasking authority.

- **CAA Management/Mission Support (MMS)** - Selected work efforts supporting internal CAA program management. The product is determined by the tasking authority.

APPENDIX C

METHODS USED FOR IDENTIFYING EMERGING GLOBAL ISSUES

This appendix contains short descriptions of the basic methodologies CAA employs for identifying and assessing emerging global issues. CAA uses these methodologies to identify and assess issues and to set the framework for follow-on analysis using other analytical techniques and models. Frequently, as important implications of key issues evolve, they are examined in increasing detail through a process of successively more detailed examinations. This process provides key insights for Army planning activities, forms the basis for follow-on analyses, and better prepares the Army for crises response operations in the areas examined.

Workshops. CAA periodically convenes analytical workshops to examine areas of strife and geo-political, economic, and military change. Workshop membership is comprised of a carefully selected cross-section of subject matter experts and leaders who, together, possess the broad range of experiences, knowledges, and skills needed for effectively examining the subject. Workshops are structured and operated to explore the range of possible issues and identify those requiring further analysis using other techniques.

FACTIONS. FACTIONS is a methodology for forecasting the outcomes of political issues and debates. The methodology aids analysts in sharpening judgments, assessing alternate scenarios, and analyzing patterns of political interaction between competing groups. FACTIONS is composed of two predictive models. A "Voting Model" forecasts the outcome in terms of the proposal, or policy alternative that will be chosen by the groups. An "Expected Utility" model forecasts the pattern of interactions, and degree of conflict, between groups that are attempting to influence the outcome of a policy decision. CAA has used FACTIONS since 1987 and has modified the methodology for use in group processes for real time analytical support.

Synergistic Gaming. Synergistic Gaming is a dynamic, interactive process that integrates Political-Military decisions and combat simulation model results. The process is both synchronous and iterative. Political decisions made by teams of interest area experts influence battlefield actions. The impact of the actions is reflected in combat results as measured by a computer based combat simulation. Combat results are communicated to the Pol-Mil gamers, often precipitating new policies and decisions. The process is reiterated until game objectives are met. The products are key insights into the issues under examination.

Political Assessment Methodology (PAM). PAM employs subject matter experts to evaluate possible political outcomes in environments of competing policies and power blocks. PAM determines the range of possible outcomes and the most likely outcomes for political events by a process of power block weighting.