

135886

United States General Accounting Office

Fact Sheet for Congressional Requesters

GAO

May 1988

# COMPETITION

## Information on Federally Funded Research and Development Centers



135886

042226

GAO/NSIAD-88-116FS

---

---



United States  
General Accounting Office  
Washington, D.C. 20548

National Security and  
International Affairs Division

B-229144

May 24, 1988

The Honorable Sam Nunn  
Chairman, Committee on Armed Services  
United States Senate

The Honorable Les Aspin  
Chairman, Committee on Armed Services  
House of Representatives

This provides additional factual data that supplements our recent report<sup>1</sup> on the national defense role of Federally Funded Research and Development Centers (FFRDC). Our March 7, 1988, report addressed concerns about the nature and amount of work being done by these organizations. Your staffs asked us to compile official statements of mission, purpose, and general scope of effort of the 12 FFRDCs we discussed in our earlier report since this information was not available in a single source document. We are also providing information on how the Department of Defense (DOD) and the Department of Energy (DOE) oversee the operations of FFRDCs and how work is placed at the FFRDCs they sponsor.

FFRDCs are privately operated organizations primarily financed by the federal government on a relatively long-term basis. FFRDCs conduct (1) basic and applied research, (2) development, or (3) management of research or development at the request of the federal government. FFRDCs are administered as an organizational unit within a parent organization, or as a separately incorporated organization. FFRDCs are sponsored by government agencies that monitor overall use of the FFRDC. As of September 30, 1987, 5 government agencies sponsored 36 FFRDCs. DOD sponsored 10 centers and DOE sponsored 20.

In April 1984, the government established policies for the establishment, use, periodic review, and termination of the sponsorship of FFRDCs. The Office of Federal Procurement

---

<sup>1</sup>Competition: Issues on Establishing and Using Federally Funded Research and Development Centers (GAO/NSIAD-88-22, Mar. 7, 1988). This report was required by the fiscal year 1987 National Defense Authorization Act (10 U.S.C. 2367).

Policy issued these governmentwide policies as policy letter 84-1. Under the policy letter, a contract is the preferred instrument under which an FFRDC does work for its sponsor, but sponsoring agreements also may be used. As a "mandatory requirement," such contracts (and agreements) are to include a statement of purpose, mission, and general scope of effort that

"will be sufficiently descriptive so that work to be performed by the FFRDC can be determined to be within the purpose, mission and general scope of effort for which the FFRDC was established and differentiated from work which should be performed by a non-FFRDC."


In our March 7, 1988, report on FFRDCs, we found that the scope of research work carried out by FFRDCs was generally within the FFRDCs' mission statement.

The information we collected on the mission, oversight, and placement of work at 10 FFRDCs sponsored by DOD and 2 centers sponsored by DOE that perform work at DOD's request is contained in appendixes I through XII. The appendixes generally consist of verbatim mission statements from contracts between FFRDCs and their sponsors. Information related to oversight and placement of work at FFRDCs is based on documents provided by the FFRDCs and their sponsors, and discussions we had with FFRDC and agency officials.

- - - - -

We are sending copies of this fact sheet to other concerned congressional committees; the Secretaries of Defense, Army, Navy, and the Air Force; and the Director, Office of Management and Budget. Copies will be made available to others upon request.

If you need further information, please call me on 275-4587.

  
Michael E. Motley  
Associate Director

C o n t e n t s

	<u>Page</u>
LETTER	1
APPENDIX	
I	Center for Naval Analyses 5
II	Institute for Defense Analyses 8
III	Logistics Management Institute 11
IV	RAND/Arroyo Center 13
V	RAND/National Defense Research Institute 16
VI	RAND/Project Air Force 19
VII	Aerospace Corporation 22
VIII	The Mitre Corporation, C3I Division 25
IX	Software Engineering Institute 28
X	Lincoln Laboratory 32
XI	Lawrence Livermore National Laboratory 36
XII	Los Alamos National Laboratory 40
XIII	Locations of FFRDCS 42

ABBREVIATIONS

ASD(P&L)	Assistant Secretary of Defense (Production and Logistics)
CNA	Center for Naval Analyses
DOD	Department of Defense
DOE	Department of Energy
FFRDC	Federally Funded Research and Development Center
IDA	Institute for Defense Analyses
MIT	Massachusetts Institute of Technology

NDRI            National Defense Research Institute  
OSD            Office of the Secretary of Defense  
SDIO           Strategic Defense Initiative Organization  
SEI            Software Engineering Institute

CENTER FOR NAVAL ANALYSESPURPOSE, MISSION, AND GENERAL  
SCOPE OF EFFORT

The purpose, mission, and general scope of effort for the Center for Naval Analyses (CNA) as stated in Hudson Institute's<sup>1</sup> October 1, 1986, contract with the Department of the Navy is as follows:

"The CNO [Chief of Naval Operations'] Study Program<sup>2</sup> to be accomplished by CNA will be finalized prior to the start of each quarter by the Vice Chief of Naval Operations to establish priorities and to coordinate the CNA program with other Navy research. Studies will be selected for CNA based on importance to the Navy and on the requirements for an innovative and independent point of view. Studies to be accomplished by CNA will include studies of strategic and tactical warfare, logistics issues, support and manpower questions, and force development issues as they arise in the development of the Navy Program. The Operations Evaluation Group [OEG] of CNA will also provide operations analysts on-site at major Navy commands and assist the Fleet in analysis and evaluation of operations, exercises, and weapons systems.

"CNA will provide analyses, evaluation and technical support to assist the Fleet in the development of tactical procedures which will promote maximum combat readiness against an increasingly sophisticated threat. This effort supports the development and introduction of new or improved tactics for use by integrated forces; i.e., battle groups or forces which consist of multi-platform [air, surface, and sub-surface forces] resolution of the complexities involved in exploiting the diverse capabilities of the different platforms and systems in order to achieve a cohesive, tactically

---

<sup>1</sup>The Hudson Institute has managed CNA since October 1983.

<sup>2</sup>Study Program is updated every quarter by the CNA Quarterly Research Program. (See page 6.)

integrated force with maximum combat effectiveness and readiness.

"CNA support to the Marine Corps typically will include cost benefit analysis, weapons tests and evaluation, and doctrine/organization/tactics evaluation. In addition to analytic support to Headquarters, Marine Corps, CNA will continue to provide field representatives to Marine Corps Commanders as agreed to by CNA and the Marine Corps."

#### NAVY OVERSIGHT OF CNA

The Assistant Secretary of the Navy (Research, Engineering, and Systems) is the Secretary of the Navy's representative to CNA. The Director of Navy Program Planning acts as a focal point for contacts with all commands relating to the activities of CNA. The Director is to provide advice and program guidance to the CNA president and is responsible to the Secretary of the Navy for the performance of work under the contract. A general officer acts as the Marine Corps representative to CNA and is to coordinate with the Director on Marine Corps matters relating to CNA.

The CNA Policy Council provides policy guidance to CNA. The Council, composed of senior Navy and Marine Corps officials and chaired by the Assistant Secretary of the Navy (Research, Engineering, and Systems), is to periodically review such matters as the quality of CNA's performance, CNA's budget and operating procedures, and proposed CNA studies.

#### PLACEMENT OF WORK AT CNA

Naval commands are to develop research requirements and present them to CNA on a continuous basis. CNA management, in turn, is to assess the feasibility of the proposed research. If CNA accepts the research project, it is included in the next proposed CNA Quarterly Research Program. If not accepted by CNA, the research sponsor may appeal to the Director of Navy Program Planning who decides if the project should be included in the proposed program.

The preliminary CNA Quarterly Research Program is reviewed by the CNA Research Program Coordinating Group, which consists of representatives from each Navy sponsor of CNA research. The Coordinating Group reviews the program in relation to requirements, priority of work, and completion dates. After the Navy and CNA management agree that the program reflects Navy



priorities and CNA capabilities, it is forwarded to the Director of Navy Program Planning for approval. CNA and the research sponsor will develop an analysis plan for each project listing the background, objectives, impact of the research, beginning and ending dates, and manpower allocation for the execution and oversight of approved projects CNA will undertake.

INSTITUTE FOR DEFENSE ANALYSESPURPOSE, MISSION, AND  
GENERAL SCOPE OF EFFORT

The Institute for Defense Analyses (IDA) prepared the following draft policy in 1988 for the conduct of research, studies, and analyses. The statement of purpose, mission, and general scope of effort in the draft policy is as follows:<sup>1</sup>

"IDA's primary function is to assist in problem solving by the Office of the Secretary of Defense (OSD), the Organization of the Joint Chiefs of Staff [OJCS], and Defense Agencies. It was established upon request of the Secretary of Defense, was incorporated in the State of Delaware in 1956 as an independent, not for profit corporation, and is governed by an independent self-perpetuating board of trustees. The purposes of the corporation are to promote the national security, the public welfare, and the advancement of scientific learning by making analyses, evaluations and reports, to include examination of the relative effectiveness of alternative measures, on matters of interest to the United States Government with primary orientation toward matters of national security.

"IDA will provide studies, analyses, computer software prototypes, analytical models, and other technical/analytical support useful for policy and program planning and management by its sponsors. Systems-engineering and technical-development oriented work will be undertaken by IDA when it is agreed that such work is in the national interest.

"IDA will perform no work for private industry or foreign governments. IDA may perform work for other Government agencies when approved by the primary sponsor."

---

<sup>1</sup>As of March 15, 1988, the Office of the Secretary of Defense was reviewing the draft policy. IDA's October 1, 1983, contract has limited information on the purpose, mission, and general scope of work. The contract defines the scope of IDA's work as "studies and analyses which have a direct relationship to specific military functions."

The above statement was based in part on the following mission statement in DOD's June 1985 Justification for Other Than Full and Open Competition:

"The supplies or services required to meet the agency's [DOD's] needs are: task order directed research and analyses which have a direct relationship to (1) development or application of scientific and technological analysis, (2) development and utilization of the science and technology of computing systems and software technology, (3) evaluation and related analyses of systems (that are in development or proposed) to project how they might perform, to compare their performance and cost with those of systems they will replace or alternative proposed systems, to recommend means to maximize system vulnerabilities, (4) assessments of strategic world-wide regional and local balances of power and stability, through analytical integration of operational, technical, industrial, economic, political and demographic factors, and (5) operational analyses and evaluations of systems, forces and military organizations in operational context and environments."

#### OSD OVERSIGHT OF IDA

OSD is to provide broad oversight of IDA. OSD is to insure that IDA programs, undertaken by major sponsoring offices, reflect issues that are in the national interest to resolve. The Under Secretary of Defense for Acquisition administers IDA work for OSD, the Joint Chiefs of Staff, defense agencies, and their components. The Director, DOD/IDA Management Office, acts as the point of contact for work to be undertaken at IDA. Quality control is to be provided by IDA management and the IDA Board of Trustees, and by various offices that place work with IDA.

#### PLACEMENT OF WORK AT IDA

An annual list of ongoing and proposed projects for the forthcoming fiscal year is compiled as a result of discussions between IDA and offices that sponsor work at IDA. The list includes ongoing projects that are expected to continue, new projects that the offices expect to ask IDA to undertake, and projects that IDA recommends as being of interest and importance to the sponsors' missions. This list is distributed to various components of OSD, the Joint Chief of Staff, and defense agencies

3 to 4 months before the start of the fiscal year for their review, comment, and discussion as to sponsorship and funding. The list is provisional, in that projects may be added as issues arise and assume high priority and projects may be deleted as having lower priority, lower interest for the sponsor, or having been overtaken by events, at any time during the fiscal year. Priorities for IDA and other contractor related studies are established at the Under Secretary of Defense level on the basis of fiscal criteria and urgency and importance of issues to be studied. For IDA projects, a decision on whether to proceed with proposed work is based on the needs of IDA's sponsors, whether the project is appropriate for assignment to IDA, and the availability of funds. After the Under Secretary establishes priorities, DOD and IDA officials prepare task orders for IDA projects. A DOD official certifies on the task order that the scope of the project is within IDA's mission, and that funds are available to perform the project. According to the Director of the DOD/IDA Management Office, because IDA's mission statement is quite broad, a project is nearly always relatable to its mission if the project is of a character that is appropriate for assignment to IDA. Thus, the Director noted, the essential criteria for starting a job at IDA are the anticipated availability of funds and if the work is appropriate for IDA.

LOGISTICS MANAGEMENT INSTITUTEPURPOSE, MISSION, AND  
GENERAL SCOPE OF EFFORT

The purpose, mission, and general scope of effort of the Logistics Management Institute, as stated in its March 31, 1985, contract, is as follows:

"Work set forth in task orders<sup>1</sup> pursuant to this contract shall include research, studies and analyses in the areas of logistics and weapons systems acquisition, to include research and analyses to: (1) reduce costs and increase the effectiveness of military procurement, material management, logistics and manpower support activities and other related areas; (2) formulate and recommend changes in DOD policy relating to acquisitions and support of weapons systems and other defense resources requirements; (3) develop mathematical models and other management tools for the evaluation of logistics and manpower plans and materiel requirements; and (4) appraise the material readiness of the Armed Forces."

OSD OVERSIGHT OF LOGISTICS  
MANAGEMENT INSTITUTE

The Assistant Secretary of Defense (Production and Logistics) (ASD(P&L)), is the primary user of the Logistics Management Institute and is responsible for its oversight. The Assistant Secretary is to provide policies and procedures to govern the mode of operations and to ensure reasonable controls are maintained on the level of effort and funding.

PLACEMENT OF WORK AT LOGISTICS  
MANAGEMENT INSTITUTE

Deputy Assistant Secretaries of Defense submit annual funding requests for research and studies they wish to undertake in the next fiscal year. They include requests for Logistics Management Institute services in these funding requests. The Deputy Assistant Secretaries of Defense then meet to establish an overall priority listing. They send this listing to the ASD(P&L)

---

<sup>1</sup>Task orders are described on page 12.

who approves studies for funding. Not all funds are allocated; a contingency fund is established for other priority requests during the year.

Logistics Management Institute officials and DOD sponsors are to discuss study requests in detail, and mutually agree on the work Logistics Management Institute will undertake. DOD and Logistics Management Institute officials develop task orders that specify the objective, background, scope, product to be delivered, estimated level of effort, and schedules for specific studies. DOD assigns project monitors to evaluate these studies. Both the president of the Logistics Management Institute and the ASD(P&L) have to approve these task orders.

RAND/ARROYO CENTERPURPOSE, MISSION, AND  
GENERAL SCOPE OF EFFORT

The purpose, mission, and general scope of effort for the Arroyo Center, as stated in the RAND Corporation's<sup>1</sup> March 9, 1986, contract, is as follows:

"The Contractor [RAND] shall provide the necessary personnel, materials, facilities, and other services to conduct policy oriented analyses for various elements of the Headquarters, Department of the Army and Army Major Commands.

"The broad objectives of the work to be performed under this contract are to (1) provide expert and independent interdisciplinary analytical research capabilities covering a broad range of relevant specialties, (2) enhance mechanisms for technology transfer among Department of the Army components, (3) further institutionalize capabilities for analysis and integration of Army issues that cut across the responsibilities of individual Department of the Army components, (4) recommend to the U.S. Army preferred methods, techniques and instrumentalities for the development and implementation of Army policies, and (5) integrate Department of Defense agencies.

"A wide range of activities is expected to be conducted in the following areas: (1) strategy, (2) force design and structure, (3) force operations, (4) readiness and support infrastructure, (5) applied science and technology applications, (6) methodological

---

<sup>1</sup>The contract is between RAND and DOD. Arroyo Center, an FFRDC sponsored by the Army, is one of five research divisions of the RAND Corporation. RAND is a nonprofit corporation engaged in research and analyses of matters affecting national security and public welfare. Three of RAND's research divisions are designated as FFRDCs--Arroyo Center, National Defense Research Institute (see pp. 16-18), and Project Air Force (see pp. 19-21). RAND vice presidents manage the FFRDCs and RAND's research departments provide support for individual research projects.

development, (7) manpower, training, and performance, (8) threat assessment, and (9) Army policies and doctrine."

ARMY OVERSIGHT  
OF ARROYO CENTER

The Army's Arroyo Center Policy Committee provides guidance and oversight of Arroyo's operations. The Assistant Secretary of the Army (Research, Development and Acquisition) and the Army Vice Chief of Staff co-chair the policy committee. Other members include the Army Deputy Chief of Staff for Operations and Plans, and the commanding generals of the Army Training and Doctrine Command and the Army Material Command. The Arroyo Committee establishes overall objectives, provides guidance on Army needs, interests, and priorities; reviews and approves the annual Arroyo program in the context of overall Army goals; and reviews and approves proposed research projects. Army Regulation 5-21, issued in August 1986, provides Army policy for the operation of the Arroyo Center.

PLACEMENT OF WORK  
AT ARROYO CENTER

Army officials and Arroyo Center management can recommend projects to be included in Arroyo's annual program. The Arroyo Center prepares the annual program and submits it to the Arroyo Committee for approval. The program includes on-going, proposed, and potential projects. The approval of the annual plan is a continuing process between Army officials and Arroyo Center management.

Army Regulation 5-21 contains the following general criteria for determining whether work should be assigned to Arroyo:

- possession of unique expertise,
- ability to conduct long-term analyses not available from contractors,
- access to proprietary and restricted information,
- objectivity, and
- ability to provide a quick response.

Either a general officer or Senior Executive Service civilian are to sponsor projects. Each sponsor is responsible for the



structure of the study and reviewing the interim and final products.

RAND/NATIONAL DEFENSE RESEARCH INSTITUTEPURPOSE, MISSION, AND  
GENERAL SCOPE OF EFFORT

The purpose, mission, and general scope of effort of the National Defense Research Institute (NDRI), as stated in the RAND Corporation's<sup>1</sup> January 14, 1985, contract, is as follows:

"The Contractor [RAND] shall provide the necessary personnel, materials, facilities and other services to conduct programs of study, analysis and research for the various elements of the Office of the Secretary of Defense, by the Organization of the Joint Chiefs of Staff, by the Defense Advanced Research Projects Agency, and by other Defense Agencies. The broad objectives of the work to be performed under this contract are to (1) provide expert and independent interdisciplinary research capabilities covering a broad range of relevant specialties, (2) enhance mechanisms for technology transfer among OSD components, (3) further institutionalize capabilities for analysis and integration of defense issues that cut across the responsibilities of individual DOD components, and (4) recommend to the U.S. Army preferred methods, techniques and instrumentalities for the development and implementation of Army policies.<sup>2</sup>

"A wide range of research, studies and analyses are expected to be conducted in eleven areas: (1) applied science and technology; (2) defense manpower research; (3) information processing systems; (4) international economic policy as it relates to defense policy; (5) international security and defense policy; (6) readiness and support systems; (7) security and subnational conflict; (8) strategy assessment;

---

<sup>1</sup>The contract is between RAND and DOD. NDRI, an OSD-sponsored FFRDC, is one of five research divisions of the RAND Corporation. (See footnote 1, page 13.)

<sup>2</sup>The NDRI contract has references to the Army because the Army-sponsored FFRDC, Arroyo Center, was included as a separate line item. A new separate contract for the Arroyo Center was established in March 1986.

(9) threat assessment; (10) operations and analyses and (11) Army policies."

#### OSD OVERSIGHT OF NDRI

In order to provide guidance and oversight of NDRI operations, OSD established a Defense Advisory Group. The Under Secretary of Defense for Acquisition chairs the Advisory Group which includes other senior DOD officials. The Advisory Group establishes multiyear objectives and guidelines; provides information on OSD research needs, interests, and priorities on issues that cut across the responsibilities of individual sponsors; provides guidance on funding levels for NDRI; and is supposed to periodically evaluate the overall NDRI research efforts.

#### PLACEMENT OF WORK AT NDRI

NDRI presents an annual research plan to the Advisory Group for review. This plan identifies projects completed in the prior year, along with continuing and new projects. The Advisory Group's emphasis appears to be on the allocation of funds among the various OSD components that use NDRI.

Members of the Advisory Group as well as Assistant Secretaries of Defense and DOD agency heads sponsor and approve the projects. The sponsoring office is responsible for developing and approving, with RAND management, statements of work for proposed research projects. The sponsoring office is also responsible for monitoring and reviewing the status, quality, and usefulness of research projects under its cognizance.

According to RAND, NDRI's research efforts should meet the following criteria:

- The issue is significant and reasonable.
- The issue fits the sponsor's interest, mission, or functions.
- The issue provides opportunities for innovation and research capital building, building on past RAND research, and synergy with current RAND research.
- Qualified research staff is available.
- The issue involves access to sensitive government or proprietary data and information.
- The issue is affordable.

RAND and OSD officials told us that the initiation and approval of projects are the result of discussions between RAND and OSD personnel, or are specific requests from a sponsoring office. RAND usually prepares formal project proposals and submits them to a sponsoring office for approval and subsequent review by the Advisory Group.

RAND/PROJECT AIR FORCEPURPOSE, MISSION, AND  
GENERAL SCOPE OF EFFORT

The purpose, mission, and general scope of effort for Project Air Force, as stated in the RAND Corporation's<sup>1</sup> October 1, 1985, contract, is as follows:

"The contractor [RAND] shall accomplish effort together with all related services, facilities, supplies and materials needed to perform a program of study and research on the broad subject of Aerospace Power with the object of recommending to the United States Air Force preferred methods, techniques, and instrumentalities for the development and employment of Aerospace Power."

Additional statements reflecting the purpose, mission, and general scope of effort as shown in U.S. Air Force Regulation 20-9 of August 24, 1987, are as follows:

"PAF [Project Air Force] represents a continuing investment by the Air Force in objective research and analysis. To preserve this objectivity, [RAND] management is given maximum freedom to propose new research projects and to carry out the research program approved by the Air Force Advisory Group [AFAG] and [RAND] management. To aid objectivity in designing and conducting research and to promote quality research by exposing research products to widespread peer review, broad distribution of PAF [Project Air Force] research results is encouraged.

"PAF [Project Air Force] will maintain both a technical and nontechnical capability in a broad range of matters of concern to the Air Force. This should include the ability to address, through formal studies and analyses, a variety of potential problems affecting Air Force missions and organization, including threats, strategy, tactics, operations, technology, and resource management.

---

<sup>1</sup>The contract is between RAND and the Air Force. Project Air Force is an Air Force-sponsored FFRDC. (See footnote 1, page 13.)

"PAF [Project Air Force] resources will be directed to high-priority, long-term needs of the Air Force. The research should stress major policy and managerial problems of concern to sponsoring Air Force agencies. The goals of PAF [Project Air Force] will be achieved through adherence to the policies and priorities established by the AFAG [Air Force Advisory Group] and by having a general officer or Senior Executive Service [SES] civilian sponsor for each project undertaken."

#### AIR FORCE OVERSIGHT OF PROJECT AIR FORCE

The Air Force Advisory Group is to provide guidance to and oversight of Project Air Force's operations. Air Force Regulation 20-9 provides the policy for conducting Project Air Force.

The Advisory Group, chaired by the Air Force Vice Chief of Staff, and composed of 14 senior Air Force officials, establishes policy and priorities for Project Air Force operations. The Advisory Group provides Project Air Force with (1) broad supervisory and policy guidelines, (2) information concerning Air Force needs, and (3) review and approval of the Project Air Force annual research plan.

Project Air Force's resources are intended to be directed to the high priority, long-term needs of the Air Force. The research is to respond to major policy and managerial issues put forth by Air Force sponsors. The Advisory Group assigns priorities each year to these mid- to long-term issues and they guide Project Air Force in developing its annual research plan.

#### PLACEMENT OF WORK AT PROJECT AIR FORCE

Project Air Force presents an annual research plan to the Advisory Group for review and approval. This plan contains continuing and proposed new projects along with their relationship to the Advisory Group guidance on priority research issues.

Research projects are classified, according to Air Force policy, into three categories, depending on the state of development. The categories are:

- Concept formulation: Exploratory research, project development, methodological development, and other research support activities. Project Air Force is permitted to devote up to 10 percent of the annual budget for concept formulation.
- Direct assistance: Short-term research requests typically not exceeding 6 months in duration and two staff members.
- Formal projects: Projects that evolve from Advisory Group guidance on mid- to long-term policy and technical issues.

According to Air Force policy, direct assistance and formal projects are supposed to have an Air Force Headquarters or Major Command general officer or Senior Executive Service civilian sponsor before the proposal is submitted to the Advisory Group for review and approval. The project proposal is to contain a statement of work that includes a description of the research, a statement of purposes and objectives, the anticipated milestones, an estimated level of effort, the anticipated benefits, the study methodology, and an overview that indicates how the project affects the overall Project Air Force research program. Each sponsor provides guidance, approves research objectives, and oversees the research. The sponsor appoints an action officer to be the focal point for administrative matters and staff duties related to the project.

According to RAND, it uses the following criteria in determining whether a project should be included in the annual research plan:

- appropriateness of work to the role of Project Air Force,
- a strong and explicit relationship to the Advisory Group's list of priority issues,
- the need for a balanced agenda of projects that build on past work and anticipate future issues,
- Project Air Force's research skills given the other resources available to the Air Force, and
- effective use of the limited (but generally stable) resources available to Project Air Force.

Initiation and approval of individual projects is an ongoing process involving frequent informal discussions between Project Air Force and Air Force officials until a formal project proposal is submitted.

AEROSPACE CORPORATIONPURPOSE, MISSION, AND  
GENERAL SCOPE OF EFFORT

The purpose, mission, and general scope of effort of the Aerospace Corporation,<sup>1</sup> as stated in its October 1, 1985, contract, is as follows:

"The mission of the Aerospace Corporation is to aid the United States Air Force in applying the full resources of modern science and technology to achieve continuing advances in military space and space related systems which are basic to national security; to provide the Air Force space efforts with an organization which is objective, possesses high technical competence, and is characterized by permanence and stability; to provide a vital link between the Air Force and the scientific and industrial organizations in the country with a capability and an interest in the space field; and, through its unique role, to help to insure that the full technical resources of the nation are properly applied, and that the potential advances in the space field are realized in the shortest possible time.

"The Aerospace Corporation performs, under overall Air Force direction, advanced systems analysis and planning; research, experimentation, systems engineering and integration; recommends technical direction and provides general technical supervision in the complete field of Air Force space systems; and works closely with the Air Force in long range planning, systems analyses and systems comparison studies, including technical, cost, and schedule assessments. It is intended that it will review ideas and concepts generated throughout industry and Government, and help insure the proper integration between military requirements, technical capability and fiscal constraints. This detailed analysis, together with appropriate supporting experimentation, will provide the soundest possible basis for the initial engineering specifications of a system, including the

---

<sup>1</sup>Aerospace Corporation is a nonprofit corporation, established in 1960, at the request of the Air Force, to perform systems engineering for ballistic missiles and military space systems.



subsystem requirements, specifications, interactions and interfaces. This initial systems engineering work will provide the basis for Requests for Proposals to the industry.

"After a development program has been initiated, the Aerospace Corporation, by virtue of its technical capabilities and its relationship with the Air Force, will support the Air Force, through technical review, monitoring and steering, consistent with the economical and timely accomplishment of program and mission objectives. The Aerospace Corporation will insure that technical deficiencies and weaknesses are isolated; and that the impact of new data, new developments and modified requirements on total systems concepts, technical performance, cost, and schedule is properly assessed, and that appropriate changes are promptly introduced."

#### AIR FORCE OVERSIGHT OF AEROSPACE

The Air Force's Space Division<sup>2</sup> is responsible for oversight of Aerospace's operations, and is the focal point for all Aerospace matters. In this oversight role, the Space Division is to (1) negotiate, award, and administer the Air Force contract with Aerospace, (2) provide policies and procedures between Aerospace and the Air Force, (3) review and ensure the propriety of work placed with Aerospace, (4) review and recommend Aerospace manpower allocations, (5) coordinate and resolve inter-program matters involving Aerospace, and (6) conduct periodic contract administration surveillance to ensure the proper use of Aerospace resources.

#### PLACEMENT OF WORK AT AEROSPACE

Twice annually, as part of its budget planning process, Space Division reviews Air Force and DOD organizations' requests requiring Aerospace support. These requests are to include

---

<sup>2</sup>The Space Division is a division of the Air Force's System Command. The mission of the Space Division is to plan and manage the acquisition of military space systems together with their ancillary equipment, launch sites, and facilities for on-site testing, command, and control.

(1) the justification and need for Aerospace support and (2) the identification and projected number of needed Aerospace technical staff and the associated costs. Requests for Aerospace support are to include justifications for 11 criteria described in Space Division Regulation 800-8. The following criteria are to be used in determining whether work should be assigned to Aerospace:

- project-related designs, hardware, or approach should be free of bias;
- DOD planning and intelligence information should be freely available;
- industry proposals and proprietary information should be freely available; and
- a continuity of effort should be maintained.

The program offices and Aerospace will jointly prepare a Technical Objectives and Plans document, which outlines Aerospace's responsibilities, the tasks it is to perform, and the level of effort required.

THE MITRE CORPORATION, C<sup>3</sup>I DIVISIONPURPOSE, MISSION, AND  
GENERAL SCOPE OF EFFORT

The purpose, mission, and general scope of effort for the MITRE Corporation's C<sup>3</sup>I Division, as stated in MITRE's<sup>1</sup> October 1985 contract, is as follows:

"The primary mission of The MITRE Corporation . . . is to provide general systems engineering, engineering support and system integration support to the Air Force and to assist ESD [Electronic Systems Division]<sup>2</sup> in applying the whole spectrum of science and technology to the continuing advancement of military electronic systems. In performing this function, The MITRE Corporation will be a vital link between the Air Force and the scientific and engineering community, with the objective of providing the soundest technical basis for the conception, analysis, selection, design and evaluation of Information and Communications Systems. The Corporation, through its unique role, will exploit all pertinent resources to insure the maximum degree of accomplishment of known military requirements, and to provide a basis for the conception of the new requirements as improved capabilities are projected from new technical knowledge."

Additional statements reflecting the purpose, mission, and general scope of effort as shown in Electronic Systems Division Regulation 80-1 of May 25, 1983, are as follows:

"The MITRE Corporation is an independent not-for-profit corporation formed in 1958 to perform scientific and engineering services in the field of command, control and communications, and intelligence systems to enhance the security of the United States or to otherwise

---

<sup>1</sup>The contract is between MITRE and the Air Force. The C<sup>3</sup>I [Command, Control, Communications, and Intelligence] Division of The MITRE Corporation is designated as an FFRDC under the sponsorship of the Air Force.

<sup>2</sup>The Electronic Systems Division of the Air Force Systems Command serves as the focal point for MITRE support.

further the public interest. The sponsor of the C<sup>3</sup>I Division of The MITRE Corporation is the United States Air Force through the Electronic Systems Division [ESD], which contractually establishes and controls support provided to designated Air Force and other Government agency programs. . . .

". . . the Air Force contract with The MITRE Corporation provides both definitive guidance and flexibility through division of the contract Statement of Work [. . .] into functional categories of effort corresponding to the overall support requirements of ESD and other Government agencies. General descriptions of the type of work required in support of each area are provided, and projects are established within these functional work areas based on the required levels of effort. . . .

". . . This attachment [to regulation 80-1] provides guidelines regarding the roles assigned to the C<sup>3</sup>I Division of the MITRE Corporation in providing technical and scientific support to DOD programs. Such [MITRE's C<sup>3</sup>I Division] support encompasses the following major areas:

- "System acquisition.
- "System research and planning.
- "Research and experimentation.
- "Source selection participation.
- "Administrative support."

#### AIR FORCE OVERSIGHT OF MITRE C<sup>3</sup>I DIVISION

The Air Force Systems Command's Electronic Systems Division, through its Directorate for [FFRDC] Support, negotiates and administers the contract with The MITRE Corporation for work at its C<sup>3</sup>I Division. The Directorate reports directly to the Electronic Systems Division's Senior Technical Director, who gives final approval to work assigned to the C<sup>3</sup>I Division. MITRE's overall program is also briefed annually to the Assistant Secretary of the Air Force for Acquisitions.

PLACEMENT OF WORK  
AT MITRE'S C<sup>3</sup>I DIVISION

Because of the nature of their work, C<sup>3</sup>I Division projects are generally long term, extending over several years, with relatively few new project starts. Individual project offices annually establish the requirements for C<sup>3</sup>I Division support.

Electronic Systems Division Regulation 80-1 establishes procedures intended to insure that DOD work undertaken by MITRE does not exceed funding levels, and that such work is appropriate for MITRE. According to the regulation, formulation of the C<sup>3</sup>I Division program is to be a four-phase process, generally beginning in October and concluding by the following August.

In phase I, the Electronic Systems Division makes an initial request for estimated needs for C<sup>3</sup>I Division support from Air Force and other potential sponsors. Phase II is essentially a verification and update of the phase I estimates. Part of the detail required in this phase includes justification for MITRE support. Phase III occurs in April, and consists of Electronic Systems Division's and MITRE's internal reviews of the division's requirements. During phase IV, the Electronic Systems Division and MITRE will establish the research program within available staffing and funding ceilings for the next fiscal year.

SOFTWARE ENGINEERING INSTITUTEPURPOSE, MISSION, AND  
GENERAL SCOPE OF EFFORT

The purpose, mission, and general scope of effort for the Software Engineering Institute (SEI), as stated in its charter, and as an attachment to the December 18, 1984, Carnegie-Mellon University<sup>1</sup> contract, is as follows:

"The Software Engineering Institute shall provide the means to bring the ablest professional minds and the most effective technology to bear on rapid improvement of the quality of operational software in mission-critical computer systems. The Institute shall accelerate the reduction to practice of modern software engineering techniques and methods, and shall promulgate use of modern techniques and methods throughout the mission-critical systems community. The Institute shall establish standards of excellence for software engineering practice.

"In the pursuit of this mission, the Institute shall conduct specific programs and efforts in the areas of technology transition, support to DOD components, research, and education. Research and development functions carried out by the Institute in these areas shall be as follows:

Technology Transition. Software technology transition refers to the process of planning, organizing, directing, executing, and supporting activities to effect the embodiment of software technology in product form, insertion, and dissemination of emerging software technology with respect to the development and evolution of mission-critical computer systems. The Institute shall (1) identify opportunities for software technology transition; (2) assess the potential of software technology that could aid the development and evolution of mission-critical software; (3) engineer such technology for use (in concert with DOD components); and (4) demonstrate, disseminate, and

---

<sup>1</sup>The contract is between Carnegie-Mellon and the Air Force. SEI, an Air Force-sponsored FFRDC, is a division of Carnegie-Mellon University, a nonprofit educational corporation.

encourage use of such technology products throughout the mission-critical software community. . . .

"Support. The SEI shall provide direct engineering support to Service and Defense Agency sponsors with respect to the function of technology transition and shall also provide technical and managerial advice and problem solving support to sponsors with respect to defense software projects.

"Research. The SEI shall conduct goal-directed research in areas judged to be of most essential need and of highest potential payoff with respect to its overall mission.

"Education. The SEI shall develop and conduct courses and seminars with respect to the evolving state of the art and practice in software engineering for mission-critical computer systems as well as the results of its activities in technology transition. It shall also influence software engineering curricula development throughout the education community.

"The SEI shall devote approximately 60 percent of its effort to technology transition, 20 percent to support, 10 percent to research, and 10 percent to education."

#### AIR FORCE OVERSIGHT OF SEI

The Air Force Systems Command negotiates and administers the contract with Carnegie-Mellon University for work at SEI. According to SEI's charter, a Joint Advisory Committee provides overall policy and program guidance to the management of SEI. The Joint Advisory Committee is chaired by the Commander of the Air Force Systems Command, and consists of joint logistic commanders and executives of OSD and DOD.

#### PLACEMENT OF WORK AT SEI

According to SEI's Director, program planning is done on an annual basis, and the program plan for fiscal year 1988 was the first pilot test of a more formalized process to justify new project starts for SEI's annual program plan. The program plan for fiscal year 1988 cites four criteria for selecting projects. A project

-- must address an important problem relevant to the needs of the critical computer resource community,

- must be appropriate to SEI's expertise and resources,
- should increase the body of knowledge about software engineering, and
- should provide results that are ready for relatively quick dissemination to the user community.

According to the Director, SEI commences work on its proposed program plan in the December to January time frame, identifying the overall work plan and 5-year projections of its major programs or areas of work. SEI begins by preparing a strategic plan to identify where it perceives software technology is progressing and what SEI's long-range role should be. This plan also provides criteria by which to evaluate potential new program starts.

The Director also told us that SEI staff can propose projects in response to the strategic plan. Project proposals should summarize the projects purpose, available resources, and general approach. The initiator is responsible for obtaining an SEI technical staff member for the proposed project and presenting proposals to a peer review group. Based on the peer group's recommendations, the Director may authorize time to prepare a feasibility report. This report is an expansion of the original proposal and addresses elements of risk, expected pay offs, deliverables, target customers, and a summary of current work in the area. The appropriate SEI program manager reviews the feasibility report and then defends it before the peer review group and the SEI Director. If the proposal passes these reviews, the Director gives authorization to prepare a project plan. This plan details how the overall effort will be undertaken over a 1- to 5-year period, identifies specific resources needed, including costs, and establishes milestones for the project.

The proposed program plan for the next fiscal year is a consolidation of ongoing programs and new starts identified in the process described above. According to Air Force officials, SEI presents its entire program plan for the next fiscal year in April to a technical panel of the Joint Advisory Committee. This panel performs a technical evaluation of all projects--ongoing as well as proposed--for that fiscal year. The panel makes overall recommendations to the Joint Advisory Committee, which reviews and approves the overall work plan.



The SEI Director told us that projects undertaken as direct engineering support, which are not in the program plan, can be funded in two ways. First, the SEI staff itself can identify a specific technology problem area and find a sponsor for the proposed work. Second, program managers can go directly to the Electronic Systems Division with requests for SEI assistance. SEI would then do an accelerated feasibility study to decide whether or not to undertake the effort.

LINCOLN LABORATORYPURPOSE, MISSION, AND  
GENERAL SCOPE OF EFFORT

The purpose, mission, and general scope of effort for Lincoln Laboratory, as stated in the Massachusetts Institute of Technology's<sup>1</sup> (MIT) December 23, 1985, contract, modification with the Air Force is as follows:

". . .The mission of the contractor [Lincoln Laboratory] is to carry out a program of research and development pertinent to national defense with particular emphasis on advanced electronics. In the pursuit of this mission, the contractor [Lincoln Laboratory] shall:

"Exert maximum effort toward the evolution and demonstration of the feasibility of advanced system concepts and technology in selected national defense areas.

"Conduct specific programs of research and development in these areas, including the building of necessary components, together with a vigorous continuing program of technology research and development in the fields appropriate to its mission.

"Produce, or have produced, initial models of Laboratory-developed equipment suitable for field demonstration and test by appropriate military services or agencies, and furnish necessary procurement information and consultation regarding such equipment.

"Provide technical advice and consultation in areas of its demonstrated competence to the military services and other Defense and government agencies.

". . .The contractor [Lincoln Laboratory] programs will extend from fundamental investigations in science through the development of new and advanced technologies to the integration of these technologies into new or existing complex systems. Technical work

---

<sup>1</sup>The contract is between MIT and the Air Force. MIT manages Lincoln Laboratory.

areas include radar and optical sensors, measurements, and systems; satellite communications; signal design and processing; lasers; solid-state devices; digital technology, circuitry, and data systems; tactical and strategic systems and countermeasures; and air traffic control systems. The programs shall be grouped under the major mission areas of Strategic Offense and Defense, Military Satellite Communications, Space Surveillance, High Energy Laser Technology, Surface and Air Surveillance and Advanced Electronics."

#### AIR FORCE OVERSIGHT OF LINCOLN LABORATORY

The Electronic Systems Division of the Air Force Systems Command negotiates and administers the contract with MIT for work at Lincoln Laboratory. Such work primarily includes projects sponsored by the Air Force, Army, Navy, Defense Advanced Research Projects Agency, and the Federal Aviation Administration.

A Joint Advisory Committee provides overall policy and program guidance to Lincoln Laboratory management. The Committee, chaired by the Commander of the Air Force Systems Command, comprises senior officials from the Air Force, Army, Navy, and Defense Advanced Research Projects Agency.

#### PLACEMENT OF WORK AT LINCOLN LABORATORY

Program planning for work placed at Lincoln Laboratory is to be done on an annual basis. According to the DOD plan for administration of Lincoln Laboratory, the laboratory can undertake programs as long as they are within its mission, broad Joint Advisory Committee policy and program guidance, and DOD funding levels. According to the Lincoln Laboratory Director, new starts are infrequent in a laboratory environment.

The Lincoln Laboratory Director told us that the following criteria are generally applied to a proposed new start. The proposed project

- must be in the general field of electronics,
- must involve the advancement of research or technology,
- must fit within the traditional fields of expertise at Lincoln Laboratory,

- must fit within at least one of Lincoln Laboratory's mission areas, and
- should be DOD-sponsored and approved. If the request is for non-defense work, it goes to the Joint Advisory Committee for approval.

According to the Lincoln Laboratory Director, developing the annual work plan is an evolutionary process, beginning in the December to January time frame, when Lincoln Laboratory begins to work on the proposed program plan. This plan identifies the overall work plan and budget proposed for the next fiscal year together with 5-year projections of the laboratory's major programs.

According to DOD's administrative plan for Lincoln Laboratory, an executive group of the Joint Advisory Committee reviews and evaluates the proposed research program and provides recommendations to the Committee on:

- the proper balance between Lincoln Laboratory's major programs and related technology-base efforts;
- the appropriateness of proposed new and reoriented programs;
- the issues raised by Lincoln Laboratory concerning operations, programs, funds, and other matters; and
- the broad policy or program changes to enhance the overall value of Lincoln's program to DOD.

According to DOD's administrative plan, the Joint Advisory Committee is responsible for:

- ensuring that Lincoln's operations and programs are consistent with its charter and DOD policy;
- reviewing current programs for relevancy, progress, priorities, balance, and coordination;
- reviewing and approving proposed programs;
- ensuring program and budget planning are consistent with established goals; and
- advising and assisting Lincoln Laboratory in its relationship with the federal government.

The Joint Advisory Committee's program plan can be modified throughout the year. The Electronic Systems Division of the Air Force Systems Command can approve small program modifications if they are less than 1 percent of Lincoln's total work program for DOD. The Air Force Systems Command can approve modifications involving 1 to 5 percent of the work, but the Joint Committee must approve modifications exceeding 5 percent.

LAWRENCE LIVERMORE NATIONAL LABORATORYPURPOSE, MISSION, AND  
GENERAL SCOPE OF EFFORT

The purpose, mission, and general scope of effort for the Lawrence Livermore National Laboratory,<sup>1</sup> as stated in a September 18, 1987, modification to the contract with DOE, is as follows:

"NATURE AND SCOPE OF PROGRAM. Work under this contract will, in general, comprise research, development, and educational activities related to the nuclear sciences and the use of energy in mutually selected military and peaceful applications, and such other related activities as the parties may agree upon from time to time, including operations both at the Laboratory and at such other sites as have been or may be agreed upon by the parties hereto either within or without the continental limits of the United States. . . ."

DOE OVERSIGHT OF  
LAWRENCE LIVERMORE

Lawrence Livermore undertakes research for DOD with DOE's approval. The DOE San Francisco Operations Office is primarily responsible for managing Lawrence Livermore administrative functions, including whether Livermore undertakes work for others.

PLACEMENT OF DOD-SPONSORED  
WORK AT LAWRENCE LIVERMORE

DOE Order 4300.2A, revised in December 1986, establishes DOE policy and procedures for authorizing and administering work for others to be performed under DOE contracts. This order is intended to:

---

<sup>1</sup>The University of California has a contract with DOE to operate Lawrence Livermore. The University also operates Los Alamos National Laboratory under a separate contract with DOE. (See app. XII.) DOE procedures allow Lawrence Livermore and Los Alamos to undertake research for DOD. (See pp. 40 and 41.)

- provide assistance to other federal agencies, state and local governments, and to accomplish goals that are not obtainable by other organizations;
- provide access to highly specialized or unique facilities, services, or technical expertise; and
- increase the transfer of technology from DOE's facilities to industry.

According to the DOE order, work for others can only be undertaken when it is determined that the work

- is consistent with and complimentary to DOE's and the laboratory's mission;
- would not adversely affect execution of assigned Laboratory programs;
- would not place the facility in direct competition with the domestic, private, or public sector; and
- would not create a potentially detrimental future burden on commitment of DOE resources.

According to the DOE order, the responsible DOE contracting officer will certify these determinations before the initiation of work.

The DOE order also requires a written statement from the requesting agency that it has determined that the use of the DOE facility complies with the requirements of the Atomic Energy Act

of 1954,<sup>2</sup> the Economy Act of 1932,<sup>3</sup> and other applicable federal laws and regulations.

In addition, DOE and the Strategic Defense Initiative Organization (SDIO) recently signed a Memorandum of Understanding in which DOE agreed to undertake work for SDIO subject to

- the availability of appropriate manpower and resources,
- pertinent DOE orders and regulations, and
- the requirement to maintain the DOE facilities to effectively execute their primary mission.

The agreement with SDIO states that the DOE official responsible for the laboratory will review and approve the proposed work to insure compliance with the DOE policy.

Lawrence Livermore resource managers told us that projects are initiated by a combination of formal and informal processes. Initial project concepts are established by (1) personal contacts at meetings and conferences, (2) continuation of previous work, and (3) response to Broad Agency Announcements. Broad Agency Announcements are general in nature, identifying areas of research interest, including criteria for selecting proposals, and soliciting the participation of all offerors capable of satisfying the requester's needs.

Once an initial concept is established, informal discussions take place between the potential customer and Lawrence Livermore. Unwritten criteria are used to determine if the project should be started. Such criteria include whether projects

---

<sup>2</sup>Atomic Energy Act of 1954, as amended (42 USC 2051, 2052, and 2053), authorizes the conduct of research and development and training activities for non-DOE entities, provided that private facilities or laboratories are inadequate for that purpose. The act authorizes such charges as may be appropriate for the conduct of those activities.

<sup>3</sup>Economy Act of 1932, as amended (31 USC 1535), authorizes an agency to place orders for goods and services, subject to availability, with another government agency when the head of the ordering agency determines that it is in the best interest of the government to do so.



- fit within the mission of the laboratory,
- complement and contribute to the ongoing research of the laboratory,
- compete with the private sector, and
- involve a long-term commitment and the laboratory possesses a unique capability.

Associate directors within Lawrence Livermore establish the criteria and supervisors use them when reviewing project proposals.

After the informal process is complete, and a decision is made to proceed with the project, the proposal is subjected to a formal review process within Lawrence Livermore. This review is designed to insure that laboratory divisions do not undertake research unless it is a logical part of Lawrence Livermore's mission.

DOE personnel reviewing proposed projects rely on information provided by Lawrence Livermore and their own personal knowledge of a research field to determine whether the laboratory should undertake the proposed research.

LOS ALAMOS NATIONAL LABORATORYPURPOSE, MISSION, AND  
GENERAL SCOPE OF EFFORT

The purpose, mission, and general scope of effort for the Los Alamos National Laboratory,<sup>1</sup> as stated in a September 18, 1987, modification of its contract with DOE, is as follows:

"NATURE AND SCOPE OF PROGRAM. Work under this contract shall, in general, comprise research, development, and educational activities related to the nuclear sciences and the use of energy in mutually selected military and peaceful applications, engineering services, and such other activities as the parties may agree upon from time to time, including operations both at the Laboratory and at such other sites as have been or may be agreed upon by the parties hereto either within or without the continental limits of the United States."

DOE OVERSIGHT OF LOS ALAMOS

The Los Alamos National Laboratory is operated under a contract between DOE and the University of California. Los Alamos is considered to be part of DOE's weapon research complex and is managed by its Albuquerque Operations Office.

PLACEMENT OF DOD-SPONSORED  
WORK AT LOS ALAMOS

DOE Order 4300.2A establishes DOE policy and procedures for authorizing and administering work for others and is discussed on pages 36 and 37. This DOE order applies to DOD work undertaken at Los Alamos.

The DOE order also places responsibility to develop and implement procedures for the review, authorization, assignment, and control of non-DOE funded work requests with the heads of DOE field offices. The Albuquerque Operations Office issued ALO Order 4300.2A to implement DOE Order 4300.2A. The Albuquerque order does not contain the requirement for a written certification of noncompetition. A deputy director at the DOE Albuquerque office explained that the provision was not included because it is the project sponsor's (e.g. DOD) responsibility to make this kind of

---

<sup>1</sup>See footnote number 1, on page 36.

certification under the terms of the Economy Act. The deputy director said the Economy Act requires the head of an agency to determine whether needed goods or services cannot be provided as conveniently or cheaply by a commercial enterprise. It was the deputy director's opinion that as long as the sponsor complies with the Economy Act, it should not be the Albuquerque offices responsibility to certify in writing "after the fact." The deputy director explained that the Albuquerque office wants to comply with the Economy Act and believes DOE can ensure compliance once proper certification is received from the sponsor.

DOE's Reimbursable Programs Office, Energy Technologies Division, has the responsibility for placing most of the work for others at Los Alamos. The office reviews the request, and based on the data provided in the request and their own knowledge of Los Alamos's expertise, will make a decision on whether the work would be appropriate for Los Alamos.

As part of the proposal, Los Alamos is requested to state that the proposed work will not place the laboratory in direct competition with the private or public sector.

LOCATIONS OF FFRDCS

Center for Naval Analyses, Arlington, VA  
Institute for Defense Analyses, Arlington, VA  
Logistics Management Institute, Bethesda, MD  
RAND/Arroyo Center, Santa Monica, CA  
RAND/National Defense Research Institute,  
Santa Monica, CA  
RAND/Project Air Force, Santa Monica, CA  
Aerospace Corporation, El Segundo, CA  
The Mitre Corporation, C3I Division,  
Bedford, MA  
Software Engineering Institute,  
Pittsburgh, PA  
Lincoln Laboratory, Lexington, MA  
Lawrence Livermore National Laboratory,  
Livermore, CA  
Los Alamos National Laboratory,  
Los Alamos, NM

(396218)

---

Requests for copies of GAO publications should be sent to:

U.S. General Accounting Office  
Post Office Box 6015  
Gaithersburg, Maryland 20877

Telephone 202-275-6241

The first five copies of each publication are free. Additional copies are \$2.00 each.

There is a 25% discount on orders for 100 or more copies mailed to a single address.

Orders must be prepaid by cash or by check or money order made out to the Superintendent of Documents.

---

**United States  
General Accounting Office  
Washington, D.C. 20548**

**Official Business  
Penalty for Private Use \$300**

**First-Class Mail  
Postage & Fees Paid  
GAO  
Permit No. G100**

---