NASA Technical Memorandum 85840

The Planning and Control of NASA Programs and Resources

JULY 1983

25th Anniversary
1958-1983

NASA

NASA Technical Memorandum 85840

The Planning and Control of NASA Programs and Resources

Prepared by
NASA Office of Management
Management Support Office

National Aeronautics
and Space Administration

**Scientific and Technical
Information Branch**

1983

TABLE OF CONTENTS

SECTION I

INTRODUCTION

This document summarizes the major management systems used to plan and control NASA programs and resources and how they are integrated into the Agency's general management approach in carrying out its mission. Recognizing the scope and complexity of the systems described, the document broadly describes how the various systems, General, Program, Institutional, Functional and Resources, come together in a single management approach within the basic organizational structure of the Agency. This overview will be reviewed periodically to assure that the approach described is current. In this regard, it can be used at all management levels to obtain a good picture of the Agency's total management approach.

An appendix is included which lists documents that contain more detailed descriptions of the various processes and techniques involved in the Agency's major management systems.

SECTION II

GENERAL MANAGEMENT

o Principal Objectives of the Agency Mission

NASA employs a structure of goals and objectives to plan, direct and control the use of its resources within the broad objectives of the Space Act. National aerospace goals, established by the President and the Congress, are directly reflected in the NASA structure of goals and objectives, its aerospace missions, and in the principal programs identified in its budget submission. The basic National aerospace goals are as follows:

- strengthen the security of the United States;
- maintain United States space leadership;
- obtain economic and scientific benefits through the exploitation of space;
- expand United States private sector investment and involvement in civil space and space related activities;
- promote international cooperative activities in the national interest, and
- cooperate with other nations in maintaining the freedom of space for activities which enhance the security and welfare of mankind.

In accordance with the provisions of the National Aeronautics and Space Act, the civil space program shall be conducted:

- to expand knowledge of the Earth, its environment, the solar system and the universe;
- to develop and promote selected civil applications of space technology;
- to preserve the United States leadership in critical aspects of space science, applications and technology; and
- to further United States domestic and foreign policy objectives.

o Roles of Key Officials

The ADMINISTRATOR is responsible under the National Aeronautics and Space Act to the President for the total management of NASA and all of its activities. He fulfills his responsibility by participating in all key decisions, and serving as the principal Agency spokesman in external relationships.

The DEPUTY ADMINISTRATOR is responsible under the National Aeronautics and Space Act for assisting the Administrator in the exercise of all of his responsibilities and for performing such duties as the Administrator may prescribe.

The ASSOCIATE DEPUTY ADMINISTRATOR works closely with the Administrator, Deputy Administrator and other key officials to assure overall coordination of NASA's external and internal affairs.

The ASSOCIATE ADMINISTRATOR FOR POLICY serves as a policy advisor to the Administrator and Deputy Administrator and participates in the activities of the National Security Council Senior Interagency Group on Space.

The CHIEF SCIENTIST is responsible for advising the Administrator on the technical content of the Agency's total program from the viewpoint of scientific objectives.

The CHIEF ENGINEER is responsible for advising the Administrator on questions regarding the conduct of development efforts and mission operations so as to insure a sound engineering basis with proper programmatic controls.

The ASSOCIATE ADMINISTRATOR/COMPTROLLER is responsible for the preparation of the agency budget, allocation and control of appropriations, financial accounting and reporting of all Agency funds.

The ASSOCIATE ADMINISTRATOR FOR EXTERNAL RELATIONS provides a focus for policy formulation and for the coordination and overview of NASA interactions with external organizations, both public and private (whether domestic or international), and with private individuals. Ensures that effective relationships are created and maintained for the accomplishment of Agency objectives.

The ASSOCIATE ADMINISTRATOR FOR MANAGEMENT provides a focus for Agencywide institutional management policy; provides support to NASA general management in the conduct of NASA programs and activities.

The ASSOCIATE ADMINISTRATORS FOR PROGRAMS provide for the planning, direction, execution and evaluation of specific parts of the overall NASA program as follows:

- Associate Administrator for Space Flight - All elements of the Space Transportation System, U.S. civil launch and flight activities, Spacelab planning and operations, integration of payloads with orbiters, and other operational support services.

- Associate Administrator for Space Science and Applications - Space science including astrophysics, solar terrestrial, planetary and life sciences. Applications including earth resources monitoring, communications, navigation and traffic control, ocean and atmospheric monitoring, space technology and technology utilization.

- Associate Administrator for Aeronautics and Space Technology - Aeronautics and space research and technology, energy technology and coordination of all other Agency research and technology programs.

- Associate Administrator for Space Tracking and Data Systems - Tracking, data acquisition and processing, and communications support to all NASA flight projects.

The INSPECTOR GENERAL is responsible under Public Law 95-452 for providing independent audits and investigations to (1) promote economy, efficiency, and effectiveness in the administration of NASA programs and operations and (2) detect and prevent fraud and abuse in NASA programs and operations.

The GENERAL COUNSEL provides legal advice and assistance to all organizational components of NASA.

The ASSISTANT ADMINISTRATOR FOR LEGISLATIVE AFFAIRS provides for the monitoring and coordination of all communications and relationships (both legislative and nonlegislative) between the NASA and the U.S. Congress.

The ASSISTANT ADMINISTRATOR FOR PROCUREMENT serves as the senior advisor to management on procurement and business matters and exercises specific procurement authorities delegated by the Administrator. He oversees the management of the total NASA procurement process.

The ASSISTANT ADMINISTRATOR FOR EQUAL OPPORTUNITY PROGRAMS advises and assists the Administrator and other senior management officials in establishing, maintaining and conducting programs to promote equal opportunity for employees and applicants for employment with NASA.

o Organizational Approach

The Agency's broad organizational approach is responsive to the mission responsibilities outlined in the Space Act.

The overall organizational structure characterizes a management style which assigns programs to Headquarters Program Offices according to their respective areas of technical overview and mission orientation. (For example, the Office of Space Science and Applications is assigned and manages that work which seeks to apply space and space derived technology to terrestrial needs and problems.) The Program Offices develop specific objectives and shape their individual management approach to meet their program responsibilities, recognizing the special characteristics and interfaces required of their respective efforts.

NASA maintains eight field centers and the Jet Propulsion Laboratory each of which is responsible for:

(1) the execution of assigned research and development projects and tasks consistent with its charter,

(2) the effective and efficient utilization of its assigned institutional resources.

The NASA organization chart, Figure 1, portrays the relationship between the Administrator, the Program Offices and the field centers.

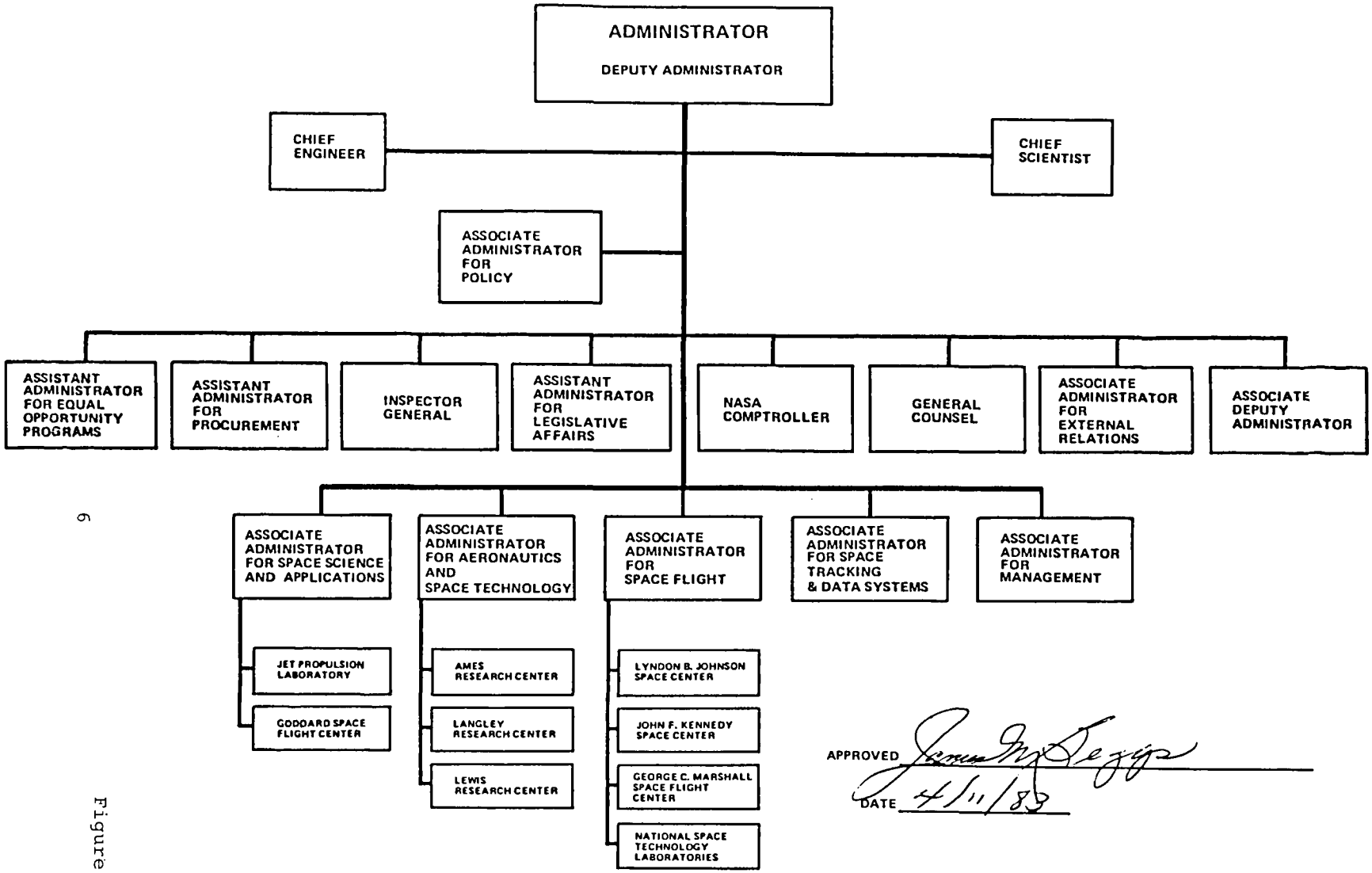

ADMINISTRATOR
DEPUTY ADMINISTRATOR
CHIEF ENGINEER
CHIEF SCIENTIST
ASSOCIATE ADMINISTRATOR FOR POLICY
ASSISTANT ADMINISTRATOR FOR EQUAL OPPORTUNITY PROGRAMS
ASSISTANT ADMINISTRATOR FOR PROCUREMENT
INSPECTOR GENERAL
ASSISTANT ADMINISTRATOR FOR LEGISLATIVE AFFAIRS
NASA COMPTROLLER
GENERAL COUNSEL
ASSOCIATE ADMINISTRATOR FOR EXTERNAL RELATIONS
ASSOCIATE DEPUTY ADMINISTRATOR
ASSOCIATE ADMINISTRATOR FOR SPACE SCIENCE AND APPLICATIONS
ASSOCIATE ADMINISTRATOR FOR AERONAUTICS AND SPACE TECHNOLOGY
ASSOCIATE ADMINISTRATOR FOR SPACE FLIGHT
ASSOCIATE ADMINISTRATOR FOR SPACE TRACKING & DATA SYSTEMS
ASSOCIATE ADMINISTRATOR FOR MANAGEMENT
JET PROPULSION LABORATORY
GODDARD SPACE FLIGHT CENTER
AMES RESEARCH CENTER
LANGLEY RESEARCH CENTER
LEWIS RESEARCH CENTER
LYNDON B. JOHNSON SPACE CENTER
JOHN F. KENNEDY SPACE CENTER
GEORGE C. MARSHALL SPACE FLIGHT CENTER
NATIONAL SPACE TECHNOLOGY LABORATORIES
APPROVED
DATE 4/11/83

Figure 1

SECTION III

PROGRAM MANAGEMENT

- Definition

  Program management is the process of planning for, directing, controlling, and evaluating the technical effort and resources utilized in fulfilling the objectives of approved NASA programs.

- Organization and Approach

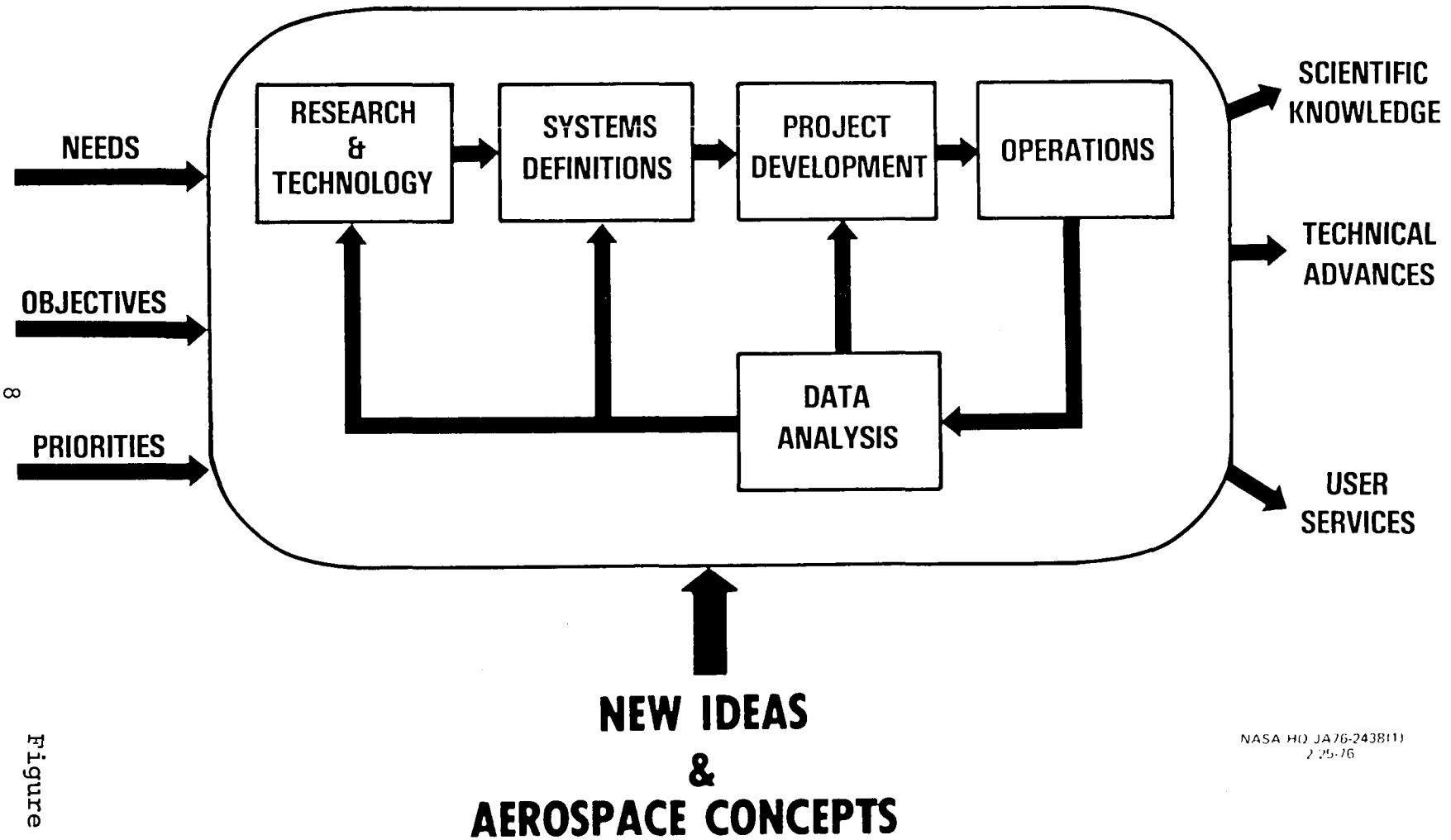
  The Agency's philosophy is that Headquarters is responsible for the general management of R&D programs and maintenance of NASA technical capability and institutional resources; that the centers are responsible for project management, management of individual research and technology tasks and the maintenance of the center's technical capability.

- Cycle of Research and Development Activities

  NASA R&D programs represent a continuum of activities ranging from research and technology efforts through operational programs (see Figure 2). These activities may be viewed as stages or steps in a process which begins with the flow of new ideas and aerospace concepts that ultimately will lead to the acquisition of scientific knowledge, technical advances or user services. To accomplish this transition process, all work undertaken by NASA goes through an evolutionary cycle of planning, approval, and control. Figure 3 depicts the overall process which begins with conceptual planning aimed at the development of Agency goals and objectives.

  Those ideas and concepts which look promising are subjected to more rigorous examination and detailed planning in order to define and select the best objectives, missions, and tasks to be performed. As selections are made and depending on the nature of the effort, the research or development activity is subjected to either the Research and Technology Objective and Plan (RTOP) process or the project planning process. Both research and technology activities and project activities employ individual documentation processes to secure final commitment to the effort described. Broad center and institutional considerations are incorporated in the planning process and are reflected in the documentation before final approval is granted.

NASA'S WORK FORMS A CONTINUUM OF ACTIVITES



NASA HQ JA76-243811
2-25-76

Figure 2

PLANNING AND CONTROL PROCESS

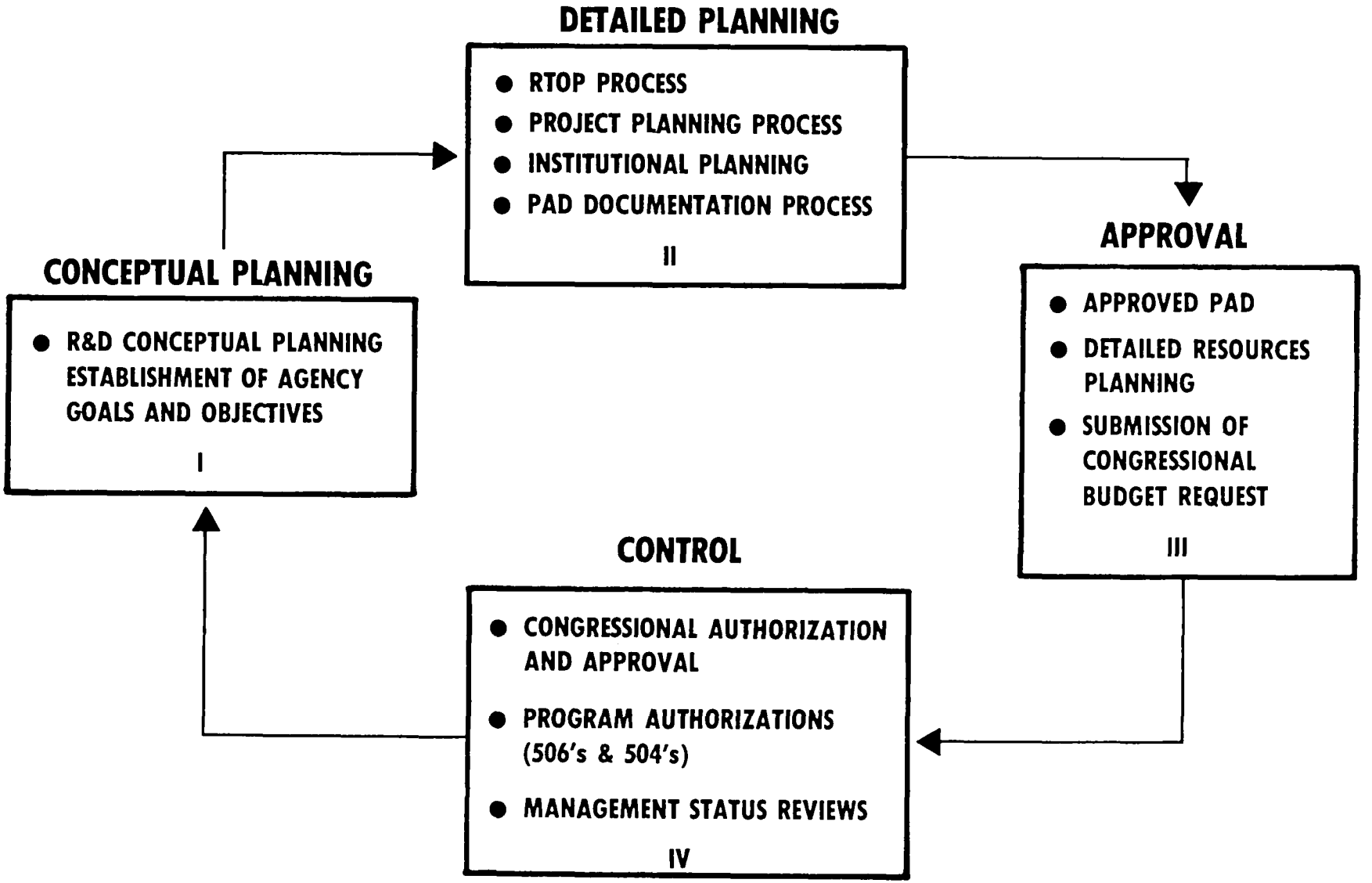


Figure 3

NASA HQ NS78-2963 (1)
7-25-78

After approval, funding for development projects and research and technology activities is implemented and controlled through the use of resources authority warrants issued from Headquarters to the centers for accomplishment of the work.

o R&D Planning

Conceptual Planning

The conceptual planning process begins by defining program goals and objectives. This is achieved through the maintenance of the integrated Agency long-range plan which undergoes continuous updating by the NASA Policy Review Committee. This focuses the conceptual planning effort across the entire NASA research, technology and development spectrum at Headquarters and integrates the Agency's program plans for the future. It provides the formal mechanism for continuing oversight of program planning activities.

To assist in the definition, there is a close relationship between NASA, industry, universities and other Government agencies and Congress. Advice on areas of emphasis and promising mission ideas is provided to NASA through various advisory groups such as the National Academy of Engineering, the National Academy of Sciences,, and the NASA Advisory Council and its Committees. Special studies such as the Outlook for Space and the Outlook for Aeronautics also provide a general frame of reference for examining the merits of new ideas. The process of conceptual planning culminates in the definition of program goals and objectives and the nomination of promising missions. This is an important part of planning because just as the upward flow of ideas and studies provides a stimulus to the formulation of broad program goals, the downward flow of goals and specific objectives provides the centers with the framework for more detailed planning. Centers, then, are provided with a clear set of program objectives, derived from a careful assessment of national needs and goals. Candidate missions, in turn, are carefully evaluated and ranked at Headquarters, before centers are asked to further refine them through the discipline of a detailed planning process.

Definition of R&D Efforts

Once conceptual planning is complete, the next step in the process is program definition and approval. Depending on the nature of work proposed, different approaches, levels of management control and planning techniques are employed. At one end of the spectrum is research and technology. Here, there is a need for innovation and risk. A careful description of the technical objective is essential but detailed definition of the work plan is

not needed or desirable. At the other end of the spectrum is project development and operations. Here, the larger scope of the effort requires a very systematic definition of tasks to be selected and establishment of milestone schedules for their accomplishment. Emphasis is placed on minimizing, or recognizing and planning for, risks through project definition and management techniques which provide a high degree of visibility and control.

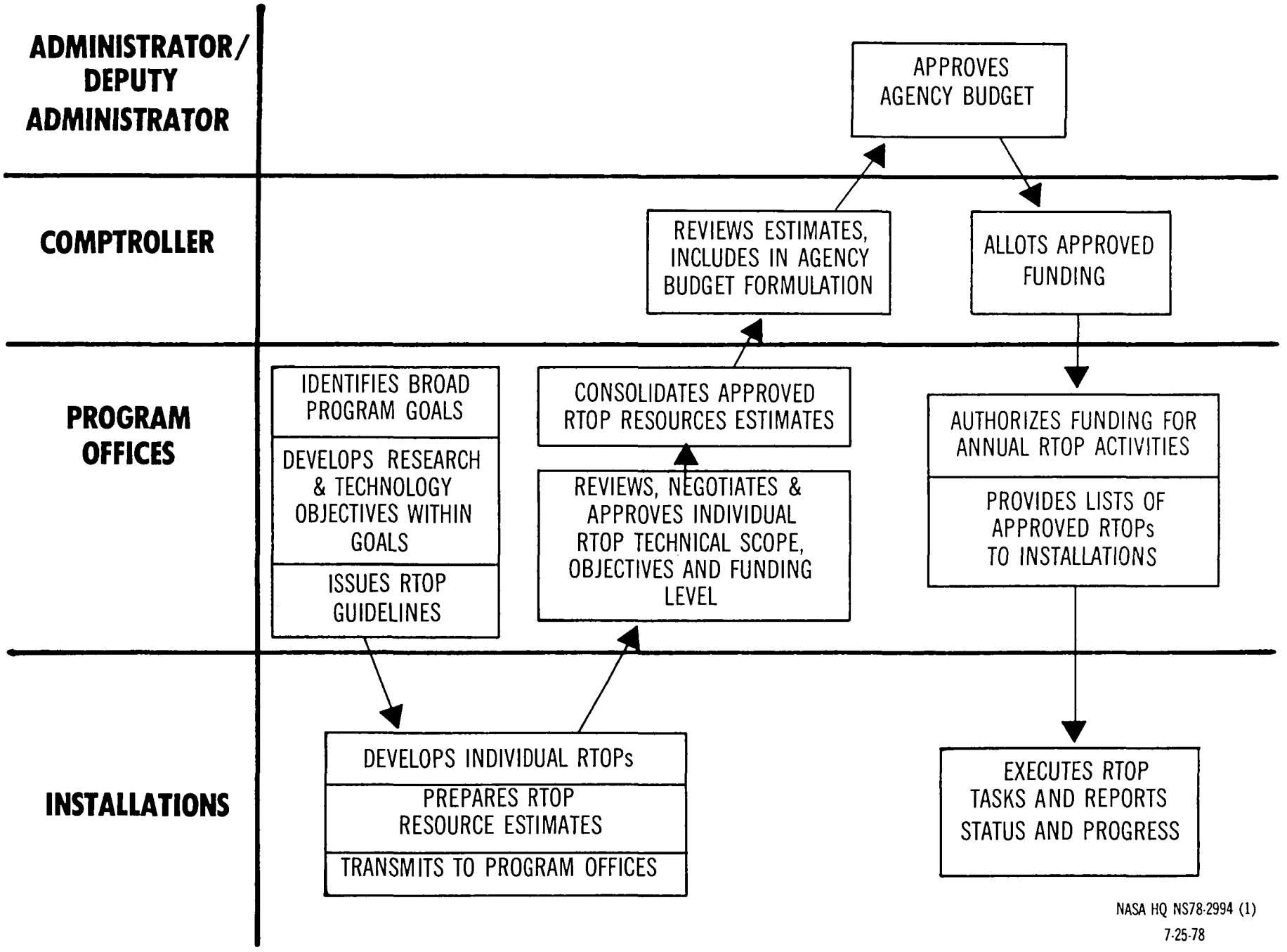
RTOP Process

To manage research and technology activities, the Research and Technology Objective and Plan (RTOP) process is used. The RTOP process covers all those activities that have as their objective the acquisition of specific knowledge, information, techniques, data, systems, etc., that will provide a capability for future experiments, developments, applications, etc., in broad support of Agency goals. Included in this category are fundamental research, discipline technology, systems technology, experimental programs, systems studies, payload definition activities, etc. All Program Offices and all centers have some research and technology activities. The programmatic approach and center response vary according to future research needs and mission orientation. The principal Headquarters focus for this effort is the Office of Aeronautics and Space Technology (OAST).

The overall Research and Technology Objective and Plan (RTOP) process begins with a definition of need and opportunity as part of conceptual planning. This is a joint Headquarters and center responsibility with inputs from advisory groups and the user community. It is followed by succeedingly lower levels of detailed planning identifying specific objectives, measurable targets, and individual research tasks. These tasks are reviewed and consolidated through a series of negotiations which form the basis of a joint Program Office/center commitment to broad technology objectives and resource levels.

Before final RTOP approval is granted, OAST, on behalf of the Deputy Administrator, reviews all research and technology work in accordance with NASA Management Issuance 7100.12. This issuance establishes a single RTOP system for all Program Offices to avoid unwarranted duplication and to assure that research and technology resources are committed to efforts which have been defined in terms of a national importance and Agency priorities. Abstracts of approved RTOPs are published annually in a comprehensive "RTOP Summary Report" by OAST. (A chart depicting the overall review process is shown in Figure 4.)

RTOP APPROVAL PROCESS



NASA HQ NS78-2994 (1)
7-25-78

Figure 4

Project Planning

At the other end of the spectrum are all those activities that have as their objective the explanation of space or the demonstration, or reduction to practice, of those aerospace concepts which have been systematically selected and developed to meet national needs and the mission and goals of NASA. These activities generally involve large projects requiring the development of aerospace hardware and/or ground and flight equipment. Large groupings of research or software efforts such as the National Climate Program may also require the rigor of project planning to gain management insight into complex systems efforts.

Generally, these large projects are the result of project study efforts completed before their emergence as candidate Agency projects.

Using the body of knowledge developed from the research and technology process and past development programs, potentially interesting aerospace concepts and ideas are investigated in a very limited way by field centers to determine broad feasibility.

Those concepts which appear promising are subjected to an initial study effort. The purpose of this effort is to develop a framework on which sound judgements relating to technical feasibility, scientific value, and relationship to national needs can be examined. The studies, which are designed to investigate cost, schedule and viable technical alternatives, etc., are usually conducted by in-house center manpower following approval by the concerned Headquarters Program Office.

Those missions which still look feasible are examined through a more intensive study effort, usually with contractor participation. Analysis is deepened to define systems and subsystems in sufficient depth to minimize the associated risk and explore various management and technical alternatives in accordance with Program Office criteria and direction.

Project planning then is concerned with the evolution and selection of worthy Research and Development candidate projects in an orderly and efficient manner. Planning and implementation of selected candidate projects evolves through a series of logical steps from concept through definition, design, development, operations, and data analysis. Management of projects and associated resources is definitized in the project planning document through the project planning process. This process provides for an orderly and progressive buildup of knowledge covering all aspects of the project over its life cycle to a point where management has sufficient information to support its decisions on project implementation and execution.

Figure 5 depicts the process by which Research and Development project selections are approved.

o The Project Plan

A recommendation to commit the Agency to a project is accompanied by a Project Plan, to be approved by the advocating Program Office. Guidelines for preparing project plans have been developed in NASA Handbook 7120.2. It prescribes the methodology, scope and considerations for preparing project plans. Some of the elements briefly stated are as follows:

- Project Objective - provides outline of project objectives and their relationship to the basic NASA program needs, missions and goals;

- Related Studies and Activities - summarization of previously conducted studies or related activities and their results;

- Technical Plan - a summary of the technical aspects of the project;

- A Management Approach - describing responsibilities for managing various elements of the project including the relationship and contributions of in-house and out-of-house sources;

- A Procurement Approach - Summary of major acquisitions required for the project. Emphasis is on outlining the approach for procuring major project elements of R&D, hardware, software and other support described in the Technial Plan, using OMB Circular A-109 procedural guidelines and NMI 7100.14A for major systems acquisition where applicable;

- A Project Schedule - Providing the logical sequence of events for the project including clearly defined milestones and a proposed time phasing;

- A Resources Plan - Describing total project costs, including in-house costs, manpower requirements, facility and equipment needs;

- A Mechanism for Management Control - Identifying controlled items and milestones for management review.

The Project Plan then, is a detailed implementation plan which provides information and the basis for program decisions. When approved, it represents an agreement between Headquarters Program Offices and the centers on how the project will be accomplished and the level of

PROJECT APPROVAL AND IMPLEMENTATION CYCLE

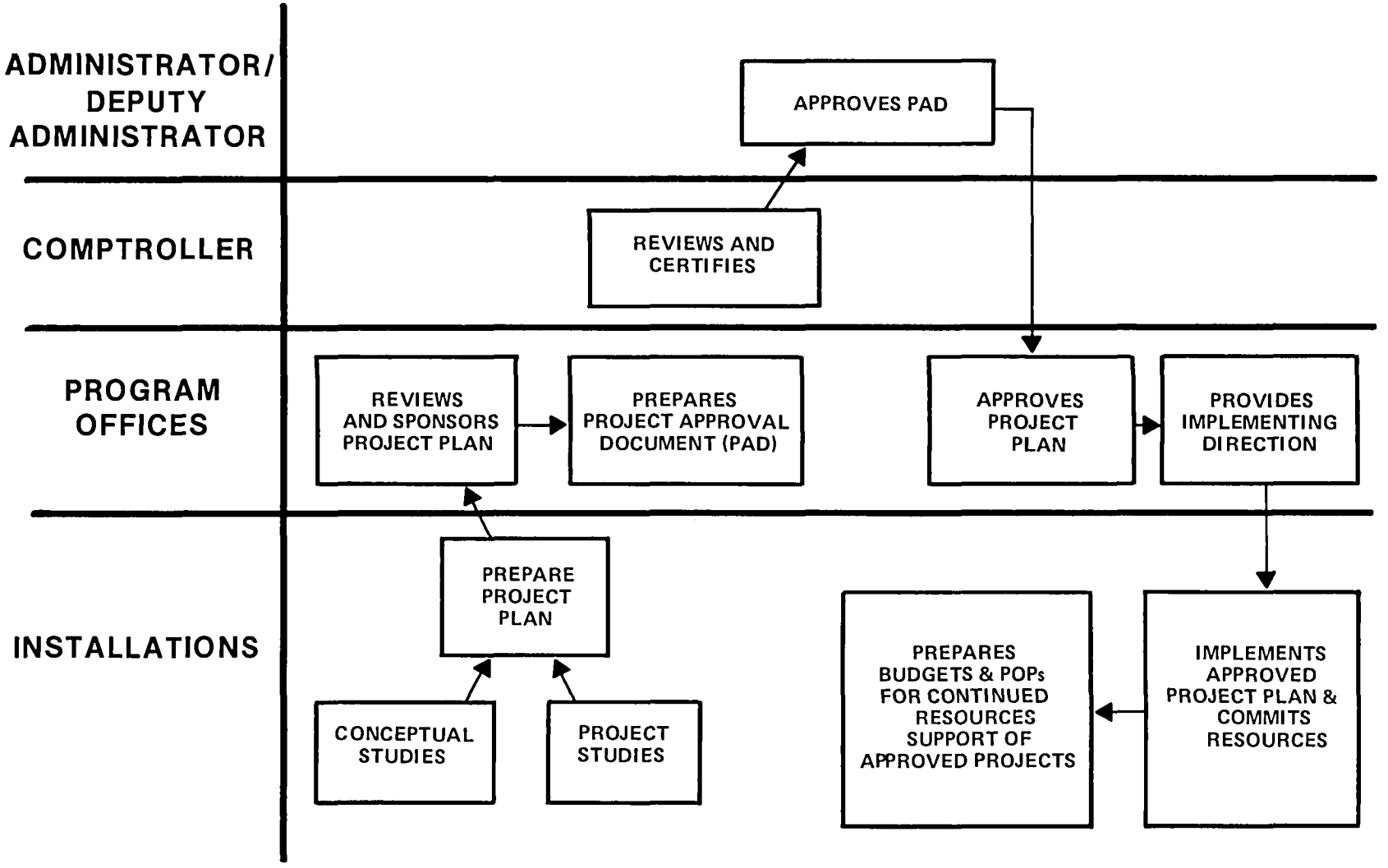


Figure 5

resources required. Assuming necessary clearances and authorization by Congress, an approved Project Plan is required for major projects and some research activities prior to their implementation.

- o The Project/Program Approval Document

  The Project/Program Approval Document (PAD) is the instrument used to record the authorization of approved projects. It is updated annually to reflect major programmatic changes. A summary specification document, the PAD outlines the technical plan, number of launches, project costs, and key milestones for management reviews. It is considered to be a contract between the Administrator and the cognizant Program Associate Administrator on the content, schedule, controls and resources required for implementing each project.

- o Management Review of Programs and Activities

  There are several mechanisms through which programmatic, institutional and resource matters are brought to senior managers for attention. Among these are a number of regular forums which have been established for Agency level coordination of important subjects, periodic review of progress and decision making.

  The principal forum conducted by NASA management to promote more effective communications and aid the decision making process is the General Management Status Review (GMSR).

  The purpose of the GMSR is to provide the opportunity on a regular, monthly basis for the heads of major Headquarters Offices to report to senior NASA management the status of programs and activities for which they are responsible. The basic thrust requires regular reporting on selected critical activities within each office. While the emphasis is on reporting significant accomplishments or problems, status reporting is also required monthly on all major activities. For other less critical activities reporting is on an exception basis.

  In addition, there are the Administrator's weekly staff meetings during which any subject may be discussed and bi-weekly meetings held by the Administrator and Deputy Administrator for policy review.

SECTION IV

INSTITUTIONAL MANAGEMENT

o Definition

Institutional management includes all those activities and resources involved in the development, utilization and maintenance of the NASA in-house technical capability in an effective and efficient manner.

o Organization and Approach

The Administrator and Deputy Administrator are responsible for the general direction of institutional management. The Associate Administrator for Management serves as the principal advisor to the Administrator and Deputy Administrator on matters pertaining to the planning, execution, and evaluation of Agencywide institutional management activities. Technical program direction for R&D work assigned to the centers is provided directly to them by the Headquarters Program Offices. Program direction for facilities budgeting and operations is provided directly to the centers from the Office of Management.

This approach to institutional management assures the nation that human resources, organizational capability and superior technical facilities are available to perform the nation's aerospace tasks of the present and the future. Successful operation of this approach requires a continuous, coordinated interaction among the Program Offices, Staff Offices, the Office of Management and the field centers.

o Management Authorities

Program Offices and Staff Offices are responsible for providing substantive planning and management guidance to the centers, describing the kind, manner and quality of work to be performed. However, a number of specific key institutional management authorities involving integration of programmatic and functional concerns are exercised by the Administrator and Deputy Administrator. These include:

- Approval of the institutional budget and operating plans;
- Assignment of major project responsibilities to the centers;
- Approval of all executive-level personnel appointments;

- Selection of contractors in certain major procurements for both hardware and support contract effort;

- Approval of all major facility acquisitions to be proposed to the OMB and the Congress;

- Approval of all major changes to the NASA and field center organizations.

o Office of Management's Role

The focus for institutional management policy is the Associate Administrator for Management. In his role as principal advisor to the Administrator on institutional matters, he supports the Administrator and Deputy Administrator in planning for and implementing the assignment of roles, missions and programs to NASA field centers. These are established after careful evaluation of such considerations as areas of proven technical excellence, unique capabilities to perform specialized work, and an appropriate balance of the agency's workload to assure optimum utilization of resources.

The Office of Management's role then, is one of providing support to the Administrator and Deputy Administrator for Agencywide institutional management policy and one of providing functional management support to the Headquarters Program Offices in the areas of personnel, equipment and ADP.

o Personnel Management

The management of personnel is, of course, one of the most important aspects of institutional management. Direction is provided to centers through the NASA Personnel Management Program.

This includes policies and procedures relating to position management, hiring practices, equal opportunity, work force adjustment actions, position classification, and an aggressive training and management development program.

Along this line, the Agency has implemented career development programs for training and retraining of employees with particular emphasis on the preparation of promising junior employees for more senior positions.

In addition, specific attention is devoted to the identification and preparation of people who demonstrate the potential to move into executive positions. In conjunction

with this, all executive personnel actions proposed by the centers and the heads of Headquarters Offices are reviewed by the Associate Administrator for Management and approved by the Deputy Administrator.

o Facilities Management

Definition

Facilities management is that process concerned with the acquisition, operation, utilization and maintenance of facilities in support of agency programs.

Facilities Planning Process

The planning mechanism for the Construction of Facilities is well defined. All new construction of, and major improvements to, technical facilities must be separately justified and advocated by each Program Office, based on program content. Proposed efforts appropriate to the role of the center are separately validated for cost, need and relative urgency of the proposed project; based on planned usage, availability of existing in-house and out-of-house facilities and the overall condition of existing facilities.

To ensure that institutional needs are also considered, center submissions for those projects which are essential to the Agency's continued institutional vitality are advocated to support the agency's overall mission. A fundamental building block in the process is the center Facility Master Plan which reflects the center roles and provides the overview of future major facility needs for each center.

Facilities Operation

The Center Director is responsible for operation, maintenance, and effective utilization of his center's facilities. Operating plans are developed on the basis of estimated usage, with key inputs being project plans, negotiated RTOPs, task assignments, scheduled maintenance, general condition of the facility and manpower availability. Actual operations are controlled by the Center Director, project manager, facility managers, and other operating officials who monitor the progress of their task assignments, and the condition of facilities, rescheduling work according to established priorities. Technical facility utilization reviews occur both as an integral part of the center Program Operating Plan (POP) formulation and review process and as separate "dedicated" utilization analyses. The center POP related reviews ensure a periodic validation of facility operations in terms of programmatic requirements

and resource levels, while other utilization considerations such as scheduling, maintenance and repair, and rehabilitation are part of continuing center management assessment.

Headquarters level review and evaluation is provided by the Director of Facilities Engineering through center reports on building space utilization as prescribed in NASA Management Issuance 7234.1, and through specially conducted studies related to facility and equipment management and utilization, automatic data processing, launch vehicles, wind tunnels, etc.

- Equipment Management

Definition

NASA has two broad categories of equipment: special purpose equipment in support of specific programs and projects, and general purpose equipment in support of multi-program mission and institutional efforts.

Effective Utilization and Control

NASA has developed and implemented an agencywide Equipment Visibility System to insure effective reutilization of equipment. The system identifies each high value ($1,000 or more) equipment item, its use, its cost, its location, and condition. Through the Equipment Visibility System, centers must screen new equipment requirements against agencywide inactive assets. Items unassigned and inactive for specified periods are identified for disposal.

Property records are maintained and equipment is managed in accordance with NASA Equipment Management Manual, NHB 4200.1. Centers are responsible for maintenance and control of their equipment, with actual management assigned to appropriate organization units. Top management attention is focused on this area through a system of scheduled walk-throughs routinely performed by high level officers of the centers, and through regular inspections by functional and management audit teams.

- Automatic Data Processing Management

The Director of Facilities Engineering and Computer Management, NASA Headquarters, maintains management cognizance over Agencywide ADP operations and serves as the technical consultant to NASA general management for matters relating to ADP. He establishes general procedures and policies to achieve the most economic acquisition and utilization of ADP resources consistent with program and

project requirements. Comprehensive guidance is provided to field installations on the acquisition, use, evaluation and review of ADP resources. Headquarters and field installation ADP practices are continually reviewed to insure that ADP policies reflect good management practices.

- Institutional Communications

With the exception of the dialogue attendant to the budget process, communicating important institutional information and decisions concerning agency commitments of a non-program nature is less structured than other Agency systems. Functional offices receive reports which are responsive to the management of their respective disciplines. In addition, special reviews and presentations are prescribed by NASA Management Issuances requiring review of center activities by appropriate functional offices (e.g., procurement awards over $5.0 million). An important recurring discipline is also provided through regularly scheduled Administrator's staff meetings and Center Directors' meetings. These are designed to keep senior level officials apprised of critical program changes and requirements of the institutional base.

SECTION V

FUNCTIONAL MANAGEMENT

- Definition

  Functional management is defined in NMI 1240.1 as the centralized professional leadership, coordination, monitoring and evaluation of Agencywide activities in a given technical or administrative functional area to assure effective, efficient and economical performance. It involves highly trained, specialized professionals in Headquarters and in counterpart organizations at each major installation.

- Organization and Approach

  Functional management was formally established as an operating concept within NASA following the reorganization of November 1961. It was established as a fourth major element of NASA management in addition to "general management", "program management" and "institutional management."

  Agency functional managers generally follow the principle of decentralized management. In coordination with the program offices having institutional responsibilities, they set broad administrative policy, requirements and standards essential to effective and efficient functional performance but avoid levying detailed procedures and constraints on NASA field installations. This approach recognizes that, within broad guidance from Headquarters, field installation management can usually develop functional systems and procedures which are more responsive to unique on-site operational requirements than those developed centrally at Headquarters for uniform agencywide application. This flexibility in management approach: (1) Encourages the innovation and initiative at the operational level which is vital to dynamic responsive functional performance; (2) Also recognizes that certain functions e.g., those requiring strict regulatory or statutory compliance like financial management and procurement, will require closer management from Headquarters than those requiring broad adherence to agency policy and standards for effective performance.

- Examples

  The following examples are in addition to those described in Section V, Institutional Management.

Procurement

The Assistant Administrator for Procurement, NASA Headquarters, has established a survey program to assess for NASA Management:

- The quality, effectiveness, and efficiency of NASA procurement.
- The adequacy of NASA policies and regulations in application at the field level.
- Achievement of uniformity among installations in application of NASA policies and regulations.
- Suggested action on problem areas encountered by field procurement activities.

Financial Management

The Director of Financial Management, NASA Headquarters, in maintaining a comprehensive and effective financial management program, provides policy guidance and functional supervision in the financial management area involving:

- Technical advice and assistance on financial management problems.
- Recommendations regarding organization and the allocation of personnel, funds, and other resources within the financial management area.
- Advising on the selection of key financial management personnel of field installations.
- Evaluating the performance of financial management functions throughout NASA and apprising both field installations and appropriate elements of Headquarters management of the general status of work in the financial management area.

LISTING OF FUNCTIONAL MANAGEMENT AREAS

- PROCUREMENT
- SAFETY, R&QA
- OCCUPATIONAL MEDICINE
- PERSONNEL
- COMMUNICATIONS
- AUTOMATIC DATA PROCESSING
- FINANCIAL MANAGEMENT
- FACILITIES MANAGEMENT
- SECURITY
- UNIVERSITY AFFAIRS
- PUBLIC AFFAIRS
- TRANSPORTATION
- EQUAL OPPORTUNITY
- EQUIPMENT AND SUPPLY
- INDUSTRIAL RELATIONS
- MANAGEMENT INFORMATION SYSTEMS
- SCIENTIFIC AND TECHNICAL INFORMATION SYSTEMS
- AIRCRAFT

NASA HQ NS78-2964 (1)
Rev. 2-9-79

Figure 6

SECTION VI

RESOURCES MANAGEMENT

- General Definition

  Agency resources consist of dollars, manpower, facilities and equipment. Resource planning and control is that process which the agency uses to determine, allocate and control resources required to perform program tasks and maintain the agency institutional base.

- Organization and Approach

  The framework for resource planning and financial management is the Agencywide Coding Structure which is keyed to the overall goals, objectives and project structure of the agency. The underlying philosophy is that resources are allocated against program and institutional objectives.

  Responsibility for completion of the tasks relating to these objectives is assigned to line managers with authority to utilize the resources allocated.

- The Budget Process

  Appropriations

  The principal and most visible resource process is that associated with planning and estimating dollar requirements or the budget. The NASA budget is organized under three separate appropriations from Congress:

  - Research and Development - for activities in direct support of the Agency's R&D program.

  - Construction of Facilities - for new and modified facilities required in support of the Agency program.

  - Research and Program Management - for salaries, and travel of civil service employees in support of Agency programs; and for the cost of operations and maintenance of general facilities and equipment.

  Budget Cycle

  The budget process encompasses the entire spectrum of NASA activities. It is complex and dynamic, essentially integrating and unifying all other management processes. It utilizes, as a planning base, up to five years of

resource data from the latest approved implementation documents. These consist of approved RTOP's, approved project plans and program and institutional guidelines describing the nature of tasks to be performed. In addition, the multi-year charcteristic of the budget cycle requires extremely close coordination with field centers, Headquarters Offices, Office of Management and Budget, and Congress, as illustrated in Figure 7.

Budget Activities

In the broad sense, the budget process consists of three major activities:

- The review and assessment of program plans and their subsequent accomplishment as an integral part of the decision and budget process;

- The means by which major program and institutional elements are evolved, defined, documented and matched to program and institutional requirements and then approved and controlled throughout the life cycle of the program effort;

- The annual development of a budget request, and the progression of that request through various reviews for ultimate inclusion in the President's budget and subsequent submission to Congress.

NASA Comptroller and the Budget Call

The NASA Comptroller is responsible for the overall compilation of the budget and provides primary point of contact with the OMB. Working through the Program Offices and field centers, he establishes the overall funding levels required to support Agency programs; these are submitted to the Administrator for approval.

Beginning 18 months prior to the start of a fiscal year the NASA Comptroller issues a detailed annual budget call, identifying specific policies and guidelines to be observed during the preparation process. These guidelines are deepened with each succeeding step as they flow from Program Offices to centers providing specific programmatic, institutional and project instructions to be used in the development of the grass roots estimates. Once developed, the grass roots estimates go through a series of reviews at key decision points, e.g., the Center Director and the Program Offices, and provide the basis for a budget submission to the Comptroller. Principal documents developed from this process are the center and Headquarters Program

THE NASA BUDGET CYCLE

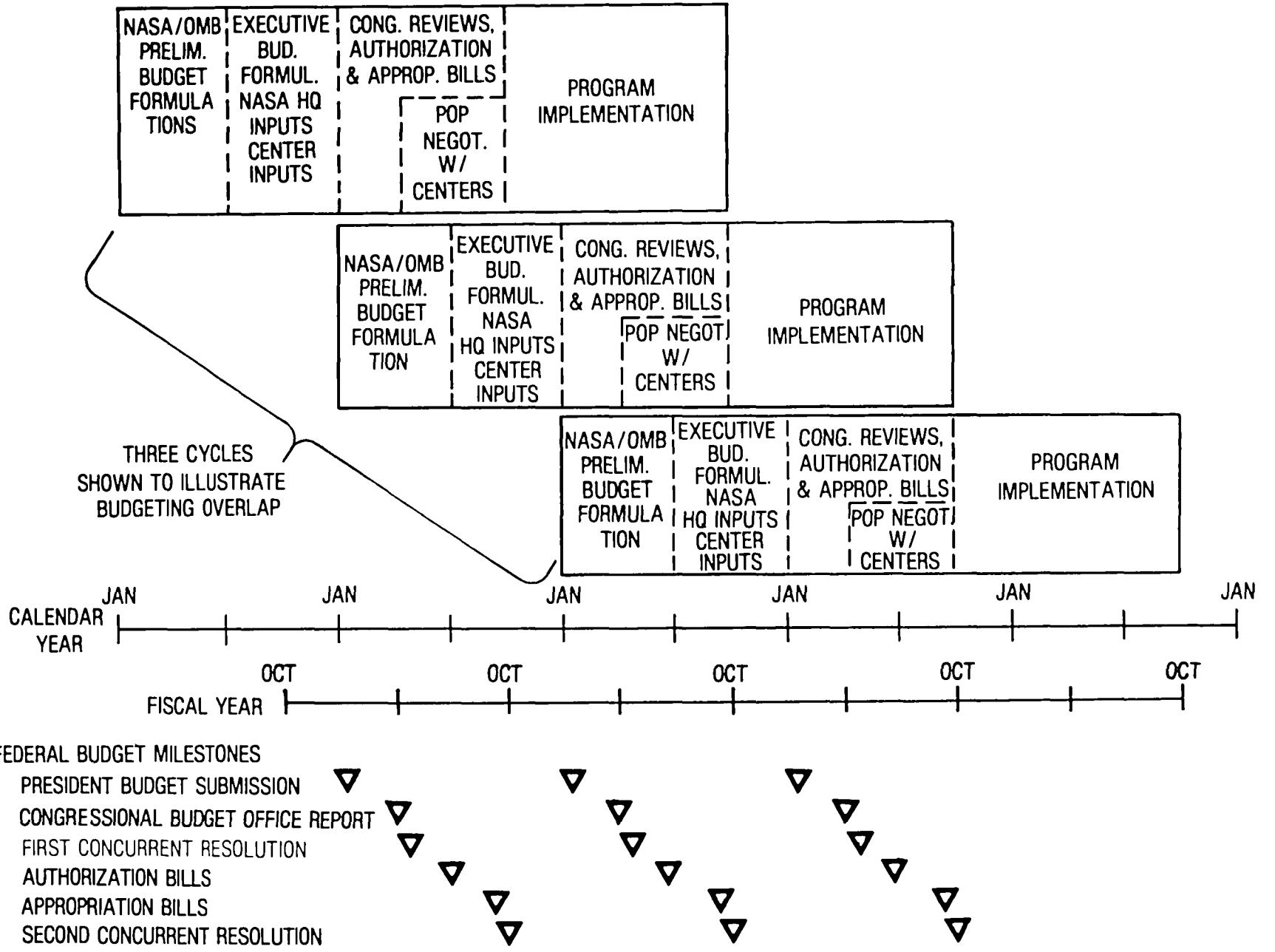


Figure 7

NASA HQ NS78-3137 (1)
Rev. 11 6 78

Operating Plans which serve as a baseline to measure budget performance. An overview of the process is shown in Figure 8.

- Funding Approval and Control

Once budgets have been approved, NASA controls the flow of funds through three authority documents. These are the Resource Authority Warrants; the NASA Form 506 Green and White which grant program authority; and the NASA Form 504, which provides allotment or obligation authority. The first two documents are issued in accordance with the program, projects and activities reflected in the Agencywide coding Structure and the latest approved budget. Allotment authority is provided at a more summary level within total funding availability.

Resource authorities continue to flow downward with smaller allocations being made against measurable sub-objectives, projects and tasks in accordance with Program Office and field center instructions until available at the operating unit. Figure 9 provides a diagram of the process.

- Budgeting for Manpower

Definition

One of the more vital assets of the agency is its human resources or manpower. Generally speaking, manpower includes all personnel (civil service and contractor) associated with the Space and Aeronautics Programs. For purposes of NASA institutional and resource planning, however, manpower includes only civil service, and manyear equivalents of support service contractors who perform on-site tasks. The latter fall into four broad classes of effort: Administrative Services, Technical Services, Facility Services and Direct Engineering Support.

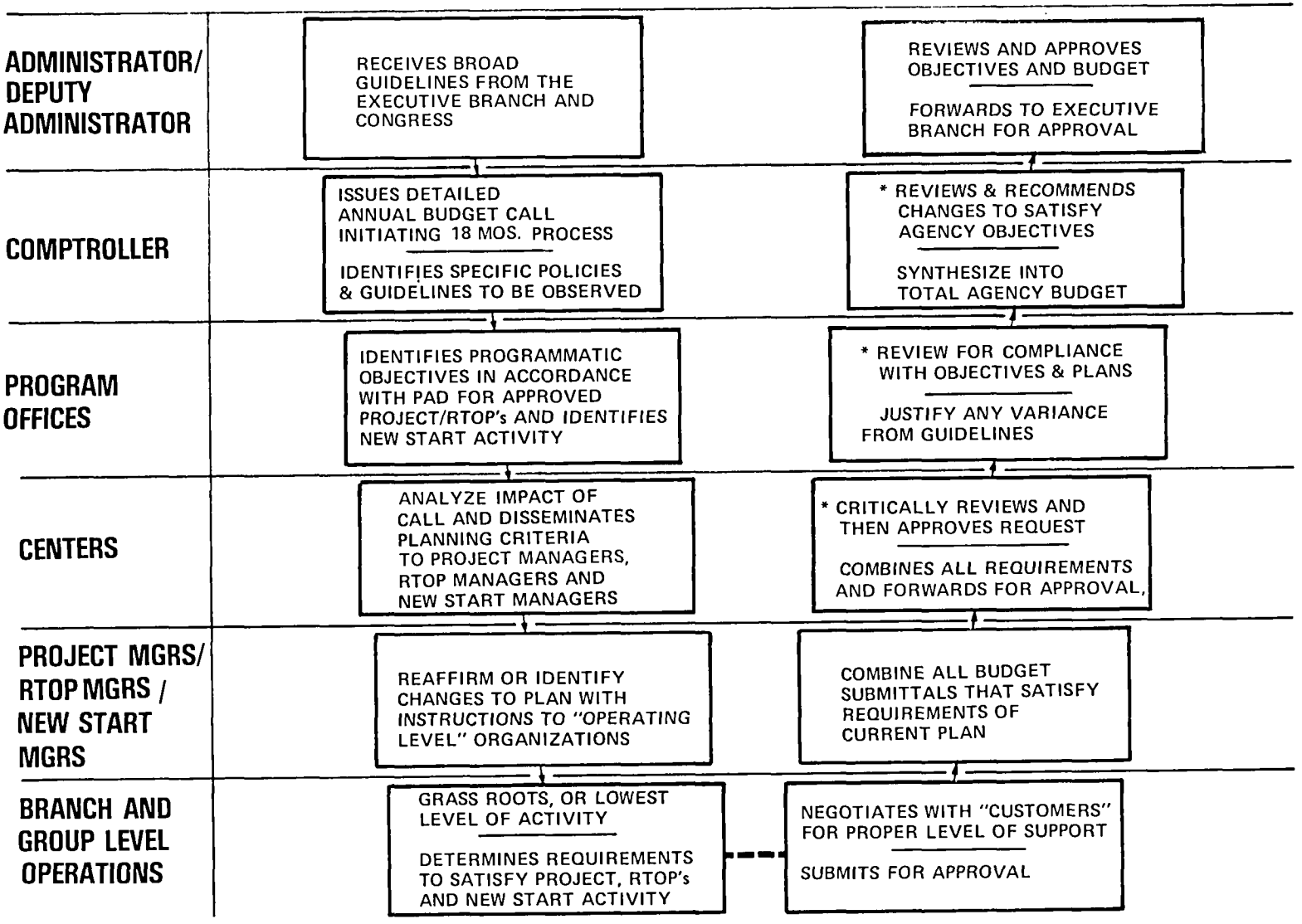
Funding

The cost of NASA civil service manpower program (i.e., salaries, training and benefits) is included in the Research and Program Management (R&PM) budget, while the cost of support service contractor manyears of effort is included in either the Research and Development (R&D) budget or the R&PM budget, depending on whether the task is in support of R&D programs or the institutional base.

Manpower Planning Process

The same hierarchy of goals and objectives used to formulate the Research and Development programs and related institutional goals and objectives, are used as the baseline for manpower planning.

R&D BUDGET PROCESS



* KEY DECISION POINTS

NASA HQ JA 76-2448(1)
2-25-76

Figure 8

DISTRIBUTION OF APPROPRIATED R&D, CofF AND R&PM FUNDS

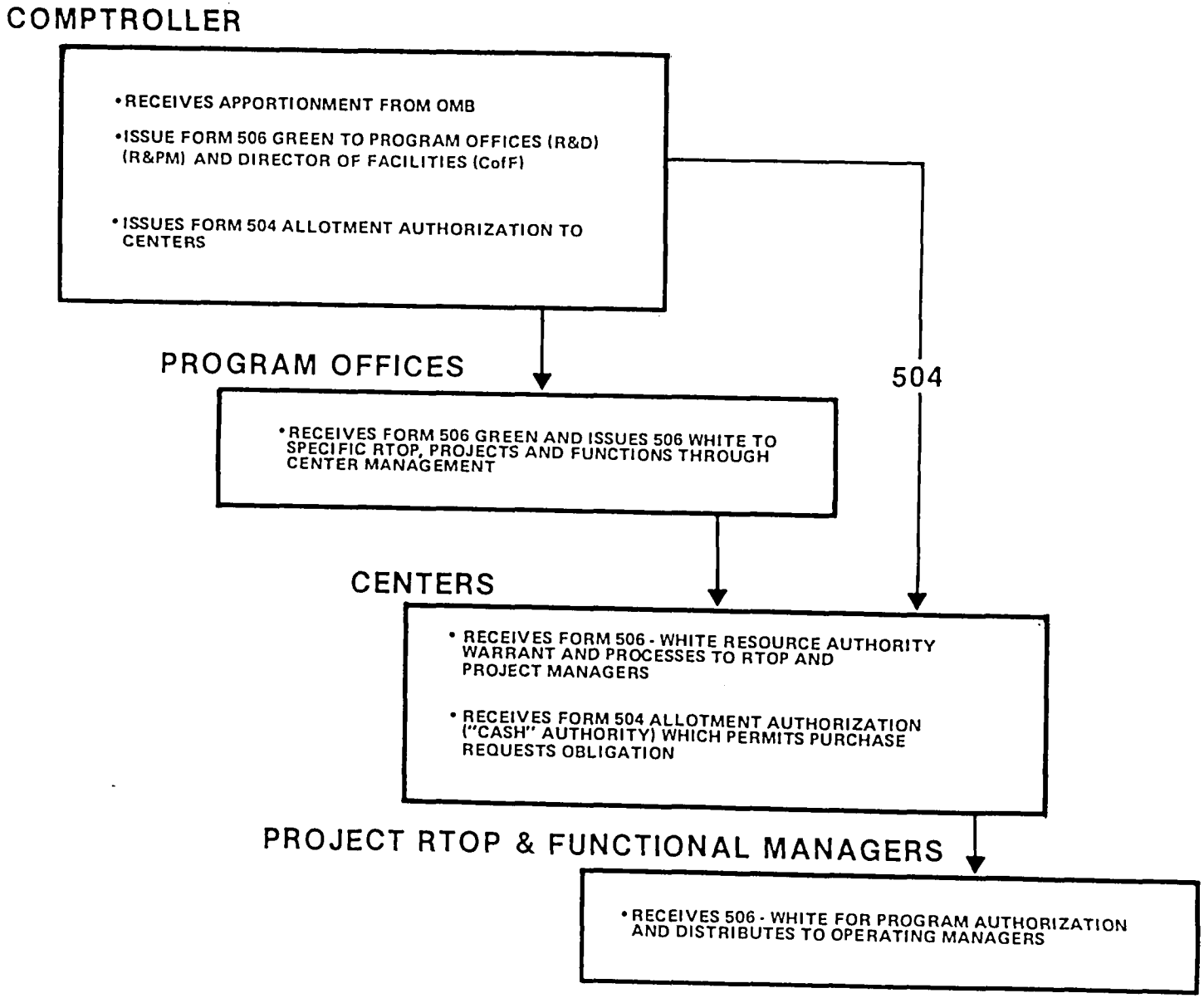


Figure 9

Centers begin the planning process with:

- Programmatic inputs from the Program Offices, including an approved Project Plan, which addresses project assignments, in-house/out-of-house tasks, technical approach, funding, etc.;

- Guidance with respect to center roles and missions, center personnel ceiling, skill mix, etc. to maintain the institutional base.

The centers use this guidance, together with an assessment of project status, to develop their overall planning strategy for manpower utilization. From these data, center grass root manpower estimates are developed at the Program/Project level on an "Analysis of In-House Manpower Requirements Form," reviewed by the Center Director and submitted to Headquarters. Each Program Office reviews proposed manpower requirements for redundancy and need, while the NASA Comptroller validates the overall reasonableness of center requirements within the framework of established roles and missions, and resource limitations. After assuring appropriate negotiations have taken place between Program Offices and centers, he then submits manpower requirements as part of the R&PM budget documentation.

o Manpower Approval and Control

The Administrator approves the various budgets, and the NASA Comptroller assigns manpower ceilings on the basis of what is necessary to meet authorized program and institutional objectives.

The Center Director assigns manpower ceilings and authorizes program tasks to operating units on the basis of approved organizational roles, responsibilities and programmatic agreements.

The Center Director, project managers and managers of operating units at the field centers monitor the progress of work assignments and resources used, responding to critical situations by transferring or reallocating manpower within existing allocations as required.

An important feature of the entire process is flexibility in the use of manpower to accomplish specific units of work. Controls are established which permit the redirection of manpower resources by center operating units for authorized work according to need and priority of task. An overview of the manpower approval process is included in Figure 10.

OVERVIEW OF THE MANPOWER APPROVAL PROCESS

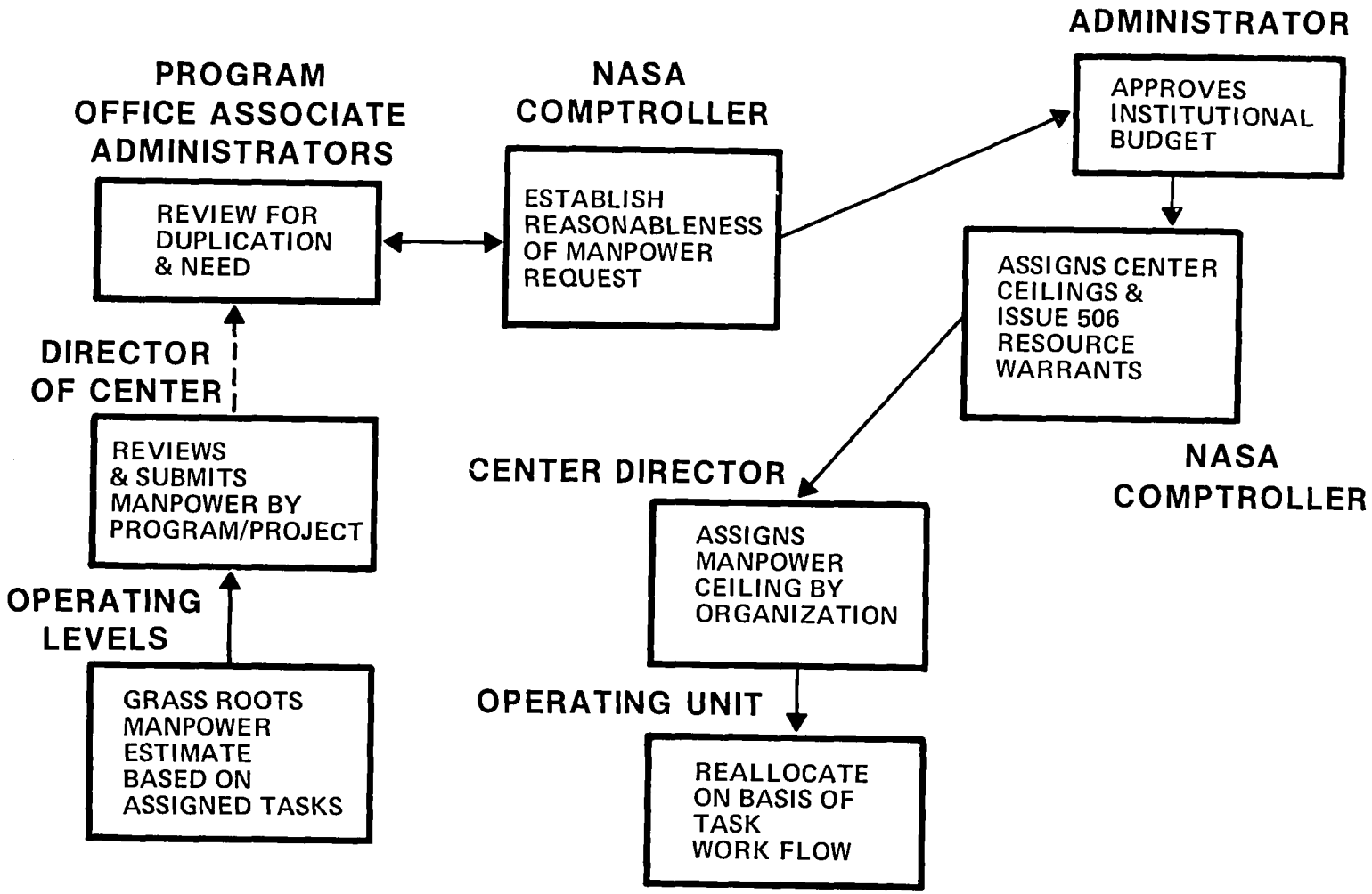


Figure 10

- Budgeting for Facilities

  Major facility projects are budgeted under the Construction of Facilities appropriation. The major projects (Construction in excess of $250,000 and Rehabilitation, Modification and Repair in excess of $500,000) are separately identified in The Congressional budget submission. Minor facility projects (Construction, Rehabilitation, and Modification and Repair over $75,000) are also separately identified by item in the Construction of Facilities Congressional budget submission except that requirements between $75,000 and $150,000 for rehabilitation, modification and repair are identified in total and supported by additional backup material. Routine facilities work on projects below the limits specified above and maintenance and operations of facilities are budgeted under the Research and Development or Research and Program Management appropriations depending on whether the facilities are generally used in support of research and development or institutional programs.

- C of F Approval and Control

  The approval and control process for construction of major facilities projects is similar to the process used for approving a new project. It too involves an evolutionary process of planning, and approval with key decision points being evidenced in the validation of requirements, approval of engineering design and detailed approval of the implementation plan by the Director of Facilities Engineering. Final approval is made by the Administrator or Deputy Administrator as part of the budget process with participation and recommendation from the Comptroller and the cognizant Program Offices.

- Budgeting for Equipment

  The cost of acquiring most special purpose and some multi-program general equipment is included in the Research and Development (R&D) Budget. The cost of other general purpose equipment is part of the Research and Program Management (R&PM) budget. Major equipment acquisitions over $250,000 acquired with R&D funds for installation at a NASA center are identified and assessed for need as part of that process using the Equipment Acquisition Document (EAD), NASA Form 1511.

SECTION VII

SUMMARY

This digest has attempted to provide a summary description of the management planning and control processes in the centers and in Headquarters with enough content to convey how the processes work. These processes include R&D program management, manpower management, facilities management, the budget process and an overview of the total NASA management system which describes the role of Headquarters and how it interfaces with the centers.

However, it is important not to infer more rigidity and inflexibility to these processes than exist in reality. The nature of R&D work dictates that the management processes be designed to respond quickly to unforeseen developments and problems, and to allow room for innovation and creativity to thrive. A deeper penetration of the processes will demonstrate that there are procedures that allow for this.

APPENDIX

- List of Documents

This section contains a list of key documents which illustrate the techniques of management employed by Headquarters Program Offices and certain functional management offices fulfilling their assigned roles.

Program Management

NMI 7100.12 - Standard RTOP Management System

NMI 7100.14 - Major Systems Acquisitions

NMI 8020.18 - Space Shuttle Program Management

NMI 8020.21 - Spacelab Program Management

NMI 8020.22 - NASA Interim Upper Stage Project

NHB 8030.6 - Guidelines for Acquisition of Investigations

NMI 8430.1 - Tracking and Data Acquisition Support for Unmanned Space Flight Projects

Institutional Management

NASA Supplements to the Federal Pesonnel Manual

NMI 1102.7 - Role and Responsibilities--Associate Administrator for Management

Functional Management

NMI 1240.1 - Functional Management

NHB 2410.1 - Computer Resources Management

NHB 4000.2 - NASA Equipment Management

NHB 5100.2 - NASA Procurement Regulation

NMI 7232.1 - Master Planning of NASA Facilities

NMI 7234.1 - Facilities Utilization Program

NHB 7320.1 - Facilities Engineering Handbook

NMD 7330.1 - Approval Authorities for Facilities Projects

NMI 8800.1 - Real Property Physical Accountability, Recording and Reporting

NMI 8811.5 - Procedure for Approval of Certain Real Property Acquisitions

Resources Management

NMI 7000.1 - Authorization and Control of Agency Programs

NMI 7000.3 - Allocation and Control of Agency Resources

NHB 7400.1 - NASA Budget Administration Manual

FMM 9100 - NASA Financial Management Manual

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
TM-85840		

4. Title and Subtitle	5. Report Date
THE PLANNING AND CONTROL OF NASA PROGRAMS AND RESOURCES	July 1983
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
	10. Work Unit No.
9. Performing Organization Name and Address National Aeronautics and Space Administration Office of Management Management Support Office Washington, DC 20546	11. Contract or Grant No.
	13. Type of Report and Period Covered Technical Memorandum
12. Sponsoring Agency Name and Address	14. Sponsoring Agency Code

15. Supplementary Notes

Supercedes TM-83090 dated May 1981

16. Abstract

This document describes the major management systems used to plan and control NASA programs and resources and how they are integrated to form the agency's general management approach in carrying out its mission.

An appendix lists documents containing more detailed descriptions of the processes and techniques involved in the agency's major management systems.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Management Systems	Unclassified--Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	42	A04

For sale by the National Technical Information Service, Springfield, Virginia 22161 NASA-Langley, 1983

National Aeronautics and
Space Administration

Washington, D.C.
20546

Official Business
Penalty for Private Use, $300

THIRD-CLASS BULK RATE

Postage and Fees Paid
National Aeronautics and
Space Administration
NASA-451

NASA

POSTMASTER: If Undeliverable (Section 158 Postal Manual) Do Not Return