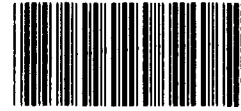


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Management Issues at the National Aeronautics and  
Space Administration

Statement of  
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Before the  
Subcommittee on Investigations and Oversight  
Committee on Science, Space, and Technology  
House of Representatives



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Mr. Chairman, Members of the Subcommittee:

I am pleased to be here today to discuss management issues at the National Aeronautics and Space Administration (NASA). My comments will primarily reflect the major assignments we have performed at NASA within the last 4 years. As you requested, I will put my comments about these issues in the framework of the experience we have gained from performing general management reviews of executive branch agencies generally.

PERSPECTIVE ON GENERAL  
MANAGEMENT REVIEWS

In the early 1980s, GAO began to conduct broad, general reviews of the management of executive agencies. The overall objective of these general management reviews is to determine the need for improved management by focusing on how well an agency's policies, procedures, and systems contribute to accomplishing its mission. Specifically, our basic approach to these reviews is designed to assess how well management

- systematically identifies and resolves emerging policy issues in ways that avoid or mitigate crises,
- provides effective direction and control of major program operations to accomplish program objectives, and

-- ensures that effective administrative systems are in place to safeguard federal resources and support policy-makers' information needs.

The most common issues emerging from our general management reviews concern basic management activities, such as developing strategic planning systems to prepare the agency for future challenges; dealing with leadership problems that result from a high rate of turnover and lack of accountability; addressing long-standing problems involving information resources management, financial management, and internal controls; and focusing on how managers and workers are recruited and trained.

The issues addressed during our general management reviews can generally be grouped under the following six topics:

(1) strategic planning, (2) organizational management, (3) human resources management, (4) program and project management, (5) financial management, and (6) information management. I will discuss our NASA work in the framework of these topics.

#### MANAGEMENT ISSUES IN NASA

Since early 1988, we have issued over 40 products presenting the results of our major assignments at NASA. As you can see from the list we have attached to this testimony, these products have addressed a wide variety of subjects. When we categorize our work

into the six management topics, we see that the extent each topic is covered varies widely, from 2 products addressing strategic planning to 20 products focusing primarily on program and project management. The extent and nature of my remarks will reflect these differences.

### Strategic Planning

In late 1988, when we issued two reports on strategic planning in NASA, all signs were pointing to the completion of the planning process throughout the agency and to the issuance of agencywide and program office strategic plans. We expressed our support for the strategic planning process and urged NASA to set a timetable for completing the process and issuing a strategic plan. However, several years later, the NASA-wide and some program office strategic plans are still not issued.

Subsequent to the issuance of our 1988 reports, NASA eliminated its Office of Planning, and the development of an overall strategic plan was put on hold. In July 1990, the Administrator renewed efforts to devise a NASA-wide strategic plan under the guidance of a committee made up of the Administrator, Deputy Administrator, Associate Deputy Administrator, Assistant Deputy Administrator, and the four program office Associate Administrators. Then a series of events again put the overall strategic plan on hold--the Hubble Space Telescope problem; the space shuttle hydrogen

leaks; the debates over the Space Station's purpose, design, and cost; and the Augustine and Stafford Committees' work on the future of the U.S. space program and on human space exploration.

Strategic planning efforts resumed once more in March 1991, and a draft strategic plan is awaiting the Administrator's approval. In addition, two of NASA's four major program offices have prepared strategic plans, and the other two are in the process of doing so.

We said in 1988 that "if NASA is to provide the technological leadership necessary to put the United States at the forefront of advancements in aeronautics, space science, and exploration, it must develop a strategic plan which clearly states its vision for the future and the steps to realize that future in an affordable manner." We still believe this and continue to encourage NASA to prepare and periodically update such plans at the agencywide and program office levels.

#### Organizational Management

The main issue arising from our work in the organizational management area centers around the need to strengthen headquarters' oversight of the field centers. NASA operates largely in a decentralized fashion under which field centers have considerable operating latitude. For this approach to work effectively, we believe that there should be both headquarters' guidance, in the

form of policies and standards that set out clear expectations, and headquarters' oversight to help ensure reasonably consistent and adequate agencywide performance. When headquarters' guidance and oversight are ineffective, there is increased risk of inconsistent and substandard performance across the agency. This risk can be exacerbated in times of scarce resources when a natural competition develops between what I will call housekeeping and support activities and the relentless pressures to maintain the pace of programs. Our work in NASA has shown the need for improved headquarters' guidance and oversight of field center activities in a number of areas--principally environmental control, facilities' maintenance, scientific data management, and procurement management.

We recently reported on the centers' widely varying compliance with environmental regulations. We pointed out that NASA headquarters did not have an agencywide strategy for preventing, or mitigating and controlling, environmental pollution. We recommended a series of actions designed to strengthen NASA's environmental management, including the establishment of an agencywide implementation strategy, the identification of funding requirements, and periodic audits of the centers' regulatory compliance.

We made similar recommendations in our report earlier this year on facilities' maintenance. Here again, the centers lacked headquarters' guidance on the scheduling and funding of facility

repairs. While some centers were strongly committed to performing scheduled maintenance, others did not assign maintenance high priority and tended to defer it when faced with a funding crunch, thus raising the risk of equipment failures and costly repairs.

One of NASA's key information management responsibilities is the identification and preservation of valuable scientific data. Last year we reported that NASA's data management policies and procedures were not adequate to protect space science data. Specifically, late last year we noted that NASA was not archiving data from some important missions and was not requiring missions to have data management plans. Earlier in 1990 we had disclosed widely varying and potentially harmful physical storage practices. These two reports set out a series of recommendations designed principally to establish more effective management controls for properly storing space science data and for identifying and archiving those data having potential long-term scientific value.

Some of our past and ongoing work, especially in the procurement management area, also supports our view that NASA headquarters needs to be doing more to establish and enforce performance expectations and operational requirements at the field centers. In late 1988, we reported that the Marshall Space Flight Center had not properly followed the requirements of the Competition in Contracting Act in a noncompetitive procurement of almost

\$3 billion worth of parts and fabrication services for the space shuttle's external tanks.

Under work to be reported soon to this subcommittee, we developed statistically valid estimates of cost increases and time extensions experienced under contracts awarded by NASA's four largest procurement centers (Goddard, Marshall, Kennedy, and Johnson). These centers spend over 70 percent of NASA's annual procurement budget of more than \$12 billion. Our work showed some notable differences in contract cost increase and time extension growth rates by center, type of contract, and contract product. We are currently discussing these differences and the potential management usefulness of such analyses with NASA procurement policy officials.

We also reviewed the specific circumstances involved in nearly 70 modifications and related contract actions on some of the contracts in our sample. Our work disclosed about 30 instances of noncompliance with governmentwide, agencywide, or field center procurement requirements. Specific types of major problems we identified at one or more of the centers included

- contracting officers' technical representatives acting outside the scope of their authority,
- change orders not definitized in a timely manner,
- technical and cost evaluations being performed inadequately, and



-- contracting officers improperly adding new work noncompetitively to existing contracts.

Many of the problems we have identified in our recent procurement work have been known to NASA for some time. Just this past year the agency reported that it was not able to adequately oversee its contractors. NASA wants to assign more people to the task and is also examining where it might improve other aspects of procurement management, including personnel training, subcontract oversight, and contract administration delegations. We believe our work can help NASA decide the type, scope, and pace of changes it needs to make in such areas as the numbers and types of procurement personnel, their training requirements, supervisory review of their efforts, and other management oversight activities.

#### Human Resources Management

Our work in the human resources management area holds some good news for NASA. We recently reported on the results of our survey of the retirement intentions of the large numbers of NASA scientists and engineers who were or would soon be eligible for voluntary retirement. Our survey results indicated that annual retirements agencywide were highly likely to be within or below the normally expected rate for scientists and engineers. A normal retirement rate will provide NASA management with the time needed

to plan the replacement of its most experienced scientists and engineers.

Our work in this area also showed that NASA still attracted large numbers of high-quality scientists and engineers. About 2,500 scientists and engineers were hired in 1989 and 1990, and the agency continued to have many more applicants than it had positions to fill. In addition, an internal NASA study concluded that the agency was hiring highly qualified scientists and engineers, a view shared by the scientists and engineers who recruit for the four centers we visited during our review.

NASA's ability to attract high-quality scientists and engineers does not mean that NASA always gets the most highly prized recruits, or that it does not lose good employees as individuals make personal career choices. Nor does it mean that NASA does not have difficulty in filling its needs in highly specialized scientific and engineering fields, including microgravity, robotics, and artificial intelligence. Overall, however, we believe that NASA has done a commendable job in managing the continuity and quality of its scientific and engineering work force in a very competitive environment. The overriding question is whether it can continue to do so if this competition increases in future years.

## Program and Project Management

Our largest body of work at NASA in recent years relates to program and project management. We have reviewed the cost, schedule, and performance status of many major projects, including deep space missions, Space Station Freedom, the Orbital Maneuvering Vehicle, and the next generation of geostationary weather satellites. The dominant theme emerging from this work is the management challenges NASA faces in identifying and mitigating developmental problems that significantly and adversely affect projects' cost, schedule, and performance. Clearly, this is no easy task on technologically challenging and high-risk projects that, in addition to their inherent complexity, may also be affected by external factors, such as launch delays and year-to-year funding instability.

Even though some factors with cost, schedule, and performance implications are beyond NASA's control others are not. In some instances, NASA has been slow to act in overseeing project development activities. For example, NASA reduced or eliminated planned capabilities of a reusable transporter for earth-orbiting satellites (the Orbital Maneuvering Vehicle) to such an extent that it was no longer needed. Last summer we sent a draft report to NASA recommending that the project be terminated. Shortly thereafter, NASA terminated the project, citing budgetary pressures and the lack of a firm, near-term requirement.

Just last week we reported on the status of efforts to develop the next generation of geostationary weather satellites. We described NASA's inadequate management of the project, including the lack of the detailed engineering analyses that typically precedes the award of contracts for developmental systems and the limited post-award technical oversight of instrument development activities.

Until recently, NASA limited its project cost estimates to the cost of those project activities to be funded under the research and development budget account of its appropriation. Project cost estimates did not include project-related activities being funded under other accounts in its appropriation, such as launch costs funded by the space flight account. We believe that this practice hurt NASA's credibility. For example, it is difficult to understand the logic of excluding the cost of launch from the overall cost estimate for a space-based project.

In addition, the more limited estimates, which may have initially helped to win support for a project, can return to haunt the agency. For example, we reported in July 1987 on the limitations of the then-current \$14.5 billion estimate for the Space Station, including the absence of any cost associated with the space shuttle flights needed to assemble and initially supply it. The agency's recent \$30 billion estimate includes some of the cost of shuttle flights for assembly and initial support. The agency's earlier

resistance to recognizing that some space shuttle costs are properly allocable to the Space Station cost estimate partially explains the \$15.5 billion gap between the two estimates.

Until last year, NASA did not officially recognize the allocability of project-related costs outside those to be funded by its research and development budget account. In January 1990 we reported on an agreement between NASA and its authorizations and appropriations subcommittees under which NASA would report a more complete cost estimate twice a year on its major development projects. However, we will continue to review and report on NASA's development of project cost estimates.

#### Financial Management

In early 1988 we noted that NASA was substantially complying with federal financial reporting requirements in preparing its Report on Financial Position, but that improvements were possible in its accounting for, or reporting on, intra-agency transactions, capitalization policy, and inventory valuation methods. About a year and a half later, in September 1990, we reported that NASA, in conjunction with the Office of Management and Budget, had deleted the funding of ongoing projects from the budget request before their suitability for alternative private financing had been adequately determined. Finally, we recently reported that NASA needed to assess its internal management controls for ensuring it

had timely, complete, and accurate accounting information on its grantees' uses of federal funds.

While isolated, individual financial management-related problems can be identified and corrected, there is a more vital, overriding issue. NASA's current accounting and reporting systems are costly and outdated and are not in compliance with OMB or the Chief Financial Officers Act of 1990 requirements for a single, integrated financial management system. NASA is currently designing and developing a standard, agencywide accounting system to meet these requirements and to improve its ability to prepare consistent, reliable, and timely financial reports.

Our current review of NASA's accounting system design and development efforts discloses that NASA does not have an approved project plan and does not identify all costs, milestones, or system conversion and implementation requirements. As a result, the system, which is currently planned to be fully implemented by June 1996, will cost more and take longer to implement than is currently estimated. Until the new system is successfully implemented, NASA will continue to experience difficulty in producing consistent, reliable, and timely financial reports. Our report on NASA's efforts will be issued later this month.

## Information Management

In recent years, we have reported on a number of NASA's information management activities, including its management of space science data and automated administrative systems; development and deployment of advanced spacecraft computers; and space shuttle software development, verification, and validation. I previously noted NASA's difficulties in managing the space science data it has already collected. The other major theme emerging from our information management work has been NASA's future information management requirements--specifically, the need to develop data-handling capabilities for major projects, like the Space Station and the Earth Observing System, both of which are in relatively early development stages. Our specific interests have included the need to become more efficient in developing and deploying advanced spacecraft computers and the need to deal with the extraordinary volume of data to be archived, which is estimated to increase by more than 5,600 percent during the 1990s.

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NASA is a large, diverse agency that deals extensively in technologically challenging and high-risk research and development projects, many of which have been receiving a lot of public attention. The agency has grown rapidly over the last several years and will have to continue growing just to carry out its

already approved activities at their currently planned pace, to say nothing of starting new, major projects.

A good sign for that future is the interest we see at the highest levels of NASA in identifying and implementing management improvements. When advice or recommendations are offered, the agency seems willing to consider them. In our own experience in recent years, we have seen general acceptance of most of our recommendations.

At the same time, we believe our work shows that there are significant management problems at NASA and that the agency faces a formidable task for the foreseeable future.

Mr. Chairman, this concludes my statement. I will be pleased to answer any questions you or the members may have.



MAJOR GAO PRODUCTS ON NASA MANAGEMENT ISSUES  
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Space Operations: Testing of NASA's Technical and Management Information System (GAO/IMTEC-88-28, Mar. 8, 1988).

National Aerospace Plane: A Technology Development and Demonstration Program to Build the X-30 (GAO/NSIAD-88-122, Apr. 27, 1988).

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Space Exploration: NASA's Deep Space Missions Are Experiencing Long Delays (GAO/NSIAD-88-128BR, May 27, 1988).

Space Exploration: Cost, Schedule, and Performance of NASA's Ulysses Mission to the Sun (GAO/NSIAD-88-129FS, May 27, 1988).

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Space Exploration: Cost, Schedule, and Performance of NASA's Mars Observer Mission (GAO/NSIAD-88-137FS, May 27, 1988).

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Is Uncertain (GAO/NSIAD-90-142, June 6, 1990).

Space Transportation: NASA Has No Firm Need for Increasingly  
Costly Orbital Maneuvering Vehicle (GAO/NSIAD-90-192,  
July 31, 1990).

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