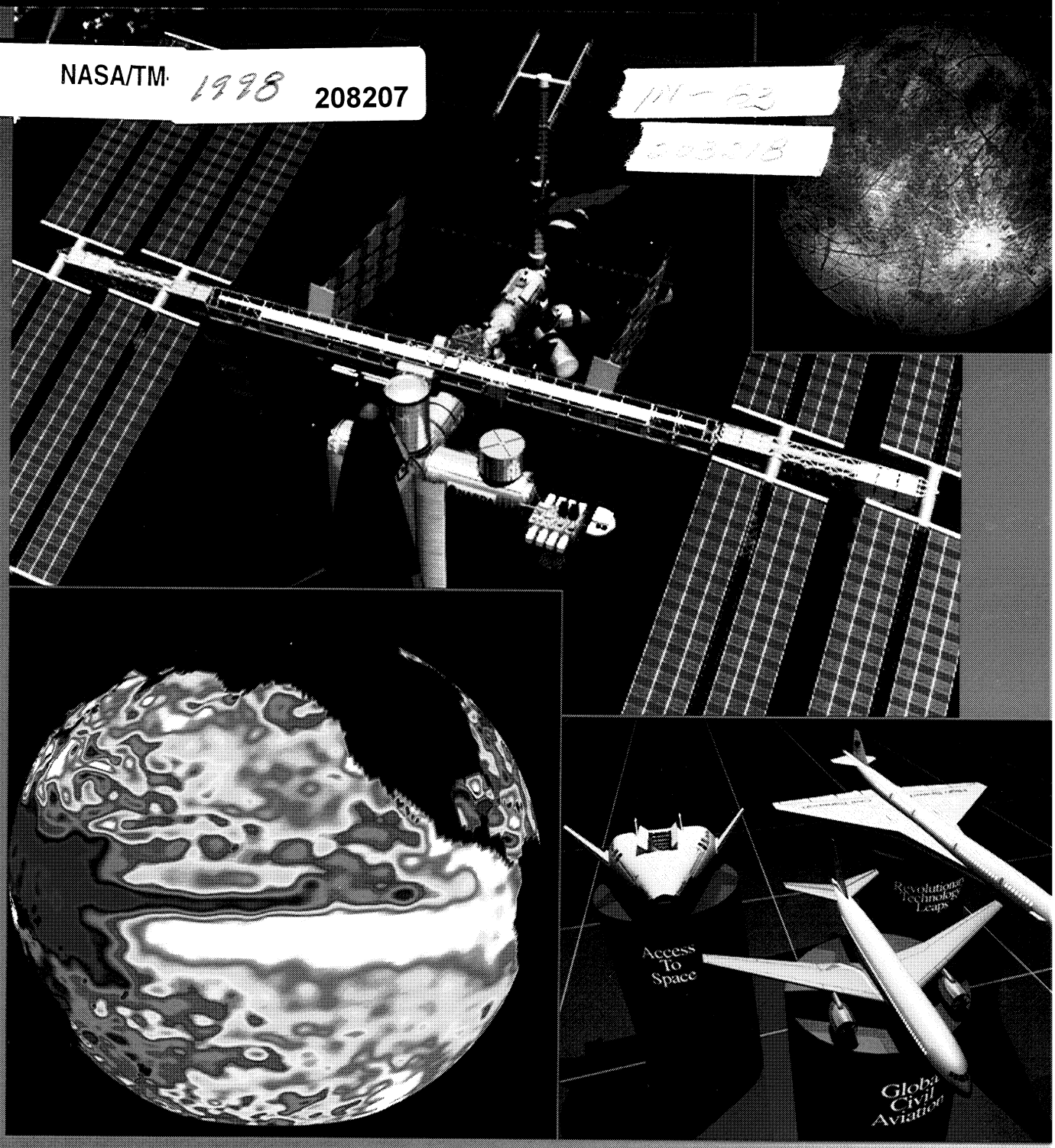


NASA 1997 Accountability Report

Contents

NASA at a Glance

Statement of the Administrator

Over the past several years, NASA has made tremendous advances: both in terms of delivering programs faster, better, and cheaper; and in reforming itself as a vital American institution. The credit for these accomplishments goes to all of the members of the NASA team: employees, contractors, academic researchers, industry, government, and international partners; as well as to the President, the Congress, and the millions of Americans who support and encourage our efforts.

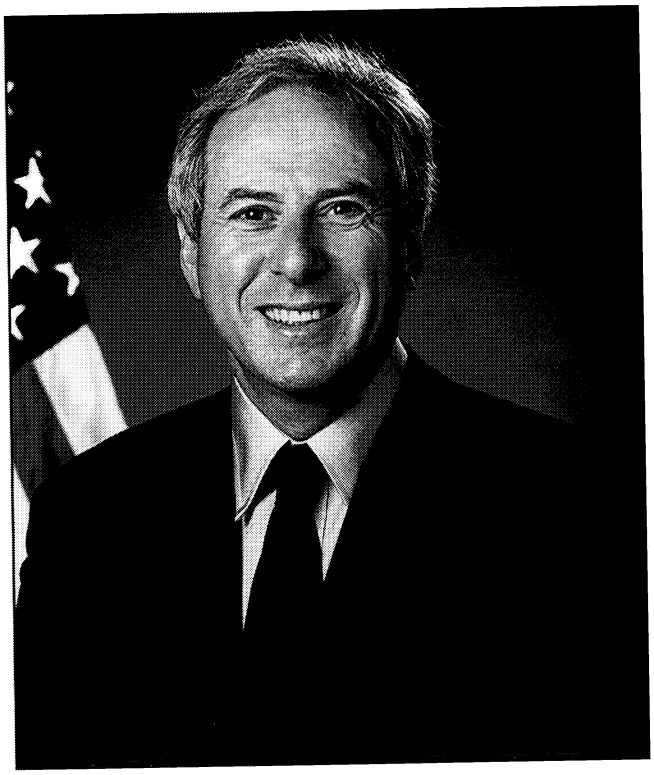
Our programmatic accomplishments include new understandings in the four strategic areas that are NASA's focus: Space Science, Earth Science, Human Exploration and Development of Space, and Aeronautics and Space Transportation Technology.

- In studying the origin and operations of the universe, the success of the Mars Pathfinder demonstrates the advantages of rapid development and deployment of less expensive, yet highly capable missions. The Hubble Space Telescope continues to produce spectacular scientific results.

- In trying to understand the effect of natural and human activities on the earth, our activities have provided significant new data about the ocean, contributing to the understanding of El Niño and similar effects.

- In exploring and developing space, our continuous presence on the Mir space station has enabled us to reduce risks for the International Space Station (ISS) while taking advantage of Mir to conduct scientific research. The flight and reflight of the Microgravity Science Laboratory supported groundbreaking research in combustion science and other research disciplines. Through fiscal year (FY) 1997, we have produced over 220,000 pounds of hardware for the ISS and by the close of FY 1998, we will have achieved completion of over 80 percent of ISS development activity. With eight successful missions, including three to Mir and five carrying major science payloads, the Space Shuttle was both safer and cheaper to operate in 1997 than ever before.

- In aeronautics and space transportation, we are making significant advances in each of the three pillars of our program: global civil aviation, revolutionary technology leaps, and access to space. Accomplishments this year have included the design of technologies that will dramatically reduce airplane crash rates.



Our institutional accomplishments have been no less significant: an intensive zero-based review of NASA as an institution, substantial downsizing in civil service staffing, reorganization of our Centers around areas of excellence, performance-based contracting, privatization, and meeting severe budget challenges. We have saved the taxpayers nearly $40 billion in the past 6 years compared to earlier projections.

Looking to the future, we will continue to progress through our Strategic Plan, our reorganization into four externally focused strategic Enterprises, and our resulting alignment of Centers and contractors. We are focusing on fundamental questions in each strategic area, and continuing to streamline and strengthen NASA as a premiere Federal Agency.

Daniel S. Goldin
Administrator

Statement of the Chief Financial Officer

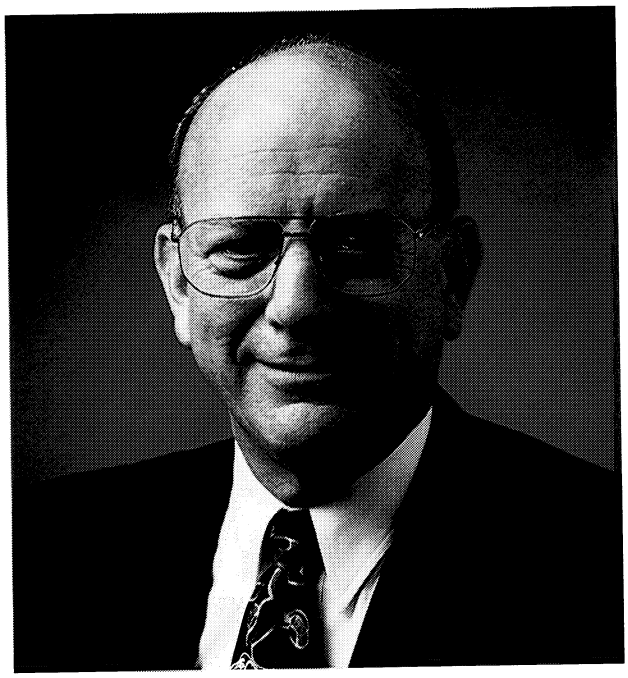
NASA is one of 12 Federal agencies piloting fiscal year (FY) 1997 Accountability Reports for the Federal Government. These pilot reports streamline and upgrade reporting to the Congress and the Public, bringing together reports required under various statutes.

This Accountability Report is the culmination of our management process. The process begins with the definition of NASA's mission and development of its strategic plan. It continues with formulation and justification of its proposed budgets to the President and Congress, and results in scientific and engineering program accomplishments. Planning, budgeting, and performance are discussed in subsequent sections of this report, which covers activities from October 1, 1996, through September 30, 1997. This Accountability Report includes the Agency's financial statements, which for the fourth consecutive year, have received an "Unqualified Opinion," the highest possible rating given by the audit profession.

Program and institutional accomplishments are highlighted in the Administrator's Statement and presented in the subsequent section on performance. Accomplishments were made in the face of severe budget challenges. Agency budgets have gone from a high of 4.4 percent of the Federal budget during the Apollo years, in the sixties, to less than 1 percent of the current Federal budget. We have reduced our budgets significantly by reorienting programs, eliminating low-priority efforts, reducing support contracts and civil service staffing, and reforming procurement.

The Agency has several initiatives under way to improve budget and financial management. In 1997, NASA significantly improved its timely use of budget/financial resources. In 1997, NASA also awarded a contract for its Integrated Financial Management Project (IFMP). Systems to accomplish IFMP Phase 1 processes (core financial, budget, travel, time and attendance, labor distribution, procurement, and executive information) are targeted for implementation during FY 1999. NASA is also in the early stages of the introduction of a system of full cost accounting, budget, and management. This combined with IFMP will enhance cost-effective mission performance and support managers by providing complete cost information.

Financial statements were prepared in accordance with standards developed by the Federal Accounting Standards Advisory Board (FASAB), and reporting instructions specified by the Office of Management and Budget. For its 1998 financial statements, NASA will reflect the implementation of new FASAB standards,



including those for property, plant, and equipment. Those standards will be particularly important for NASA because of its extensive physical assets.

The preparation of this report required the teamwork and dedicated efforts of NASA's staff and its auditors. We appreciate their dedication and professionalism.

Arnold G. Holz
Chief Financial Officer

NASA at a Glance

NASA is a program-driven research and engineering organization, which accomplishes most of its programs through field Centers and contractors spread across the United States. The NASA organization consists of a Headquarters Office, which provides oversight and support to its programs, nine Centers, and the Jet Propulsion Laboratory, a Federally Funded Research and Development Center.

NASA Program

NASA has a detailed and comprehensive program, project, and sub-project structure. The structure is consistent throughout the Agency and its systems—including both budget and accounting. Management of programs is organized around four Strategic Enterprises:

- Space Science,
- Mission to Planet Earth (renamed Earth Science in 1998),
- Human Exploration and Development of Space, and
- Aeronautics and Space Transportation Technology.

All NASA programs are managed by these Enterprises. For example, Space Science manages the Hubble Space Telescope and the current missions to other planets. Mission to Planet Earth (or Earth Science) is responsible for our growing knowledge of the earth as a planetary system. Human Exploration and Development of Space is responsible for the Space Shuttle and the International Space Station. Aeronautics and Space Transportation Technology is responsible for advances in capabilities and safety of civil aviation, as well as improved access to space.

Additional information on NASA programs is contained in the planning and budget section and the performance section of this report. Detailed information may be found at NASA's Web site at *http://www.nasa.gov/.*

NASA Organization

The NASA team is a diverse group of men and women at Headquarters and at nine Centers and one Federally Funded Research and Development Center. NASA also relies on partnerships with large and small contractors, members of the academic community, other Federal agencies, State and local agencies, and other space agencies throughout the world.

NASA upholds its values related to people, excellence and integrity. NASA's greatest strength is its workforce. NASA is committed to demonstrating and promoting excellence. NASA also preserves America's confidence and trust by ensuring that its missions are consistent with national goals, carefully conceived, and well executed.

Headquarters Organization

NASA's Headquarters organization consists of the Administrator's Office, the four Strategic Enterprises, its Functional and Staff Offices, and the Office of the Inspector General (OIG).

Office of the Administrator

The Office of the Administrator directs NASA in carrying out the policies approved by the President and Congress, overseeing Agency and program management.

Enterprise Management

NASA has established the four Strategic Enterprises to function as primary business areas for implementing NASA's mission and serving its customers. Each Enterprise has a unique set of strategic goals, objectives, and implementation strategies that address the requirements of the Agency's primary customers.

Oversight responsibility for NASA Centers is assigned to the Strategic Enterprises.

Space Science (SS)

- Jet Propulsion Laboratory (a Federally Funded Research and Development Center [FFRDC] managed by the California Institute of Technology)

Mission to Planet Earth (MTPE)
(renamed Earth Science in 1998)

- Goddard Space Flight Center

Human Exploration and Development of Space
(HEDS)

- Kennedy Space Flight Center
- Marshall Space Flight Center
- Johnson Space Center
- Stennis Space Center

Aeronautics and Space Transportation Technology
(ASTT)

- Ames Research Center
- Dryden Flight Research Center
- Langley Research Center
- Lewis Research Center

Functional and Staff Offices

Agency Functional and Staff Offices establish and disseminate policy and leadership strategies within their assigned areas of responsibility. As a group they serve in an

advisory capacity to the Administrator and work in partnership with Enterprise Associate Administrators and Center Directors to ensure that activities are being conducted in accordance with all statutory and regulatory requirements, including fiduciary responsibilities. They also advise the Administrator and senior managers of potential efficiencies to be gained through Agency-wide standardization and consolidation, as well as coordinate the implementation of approved initiatives.

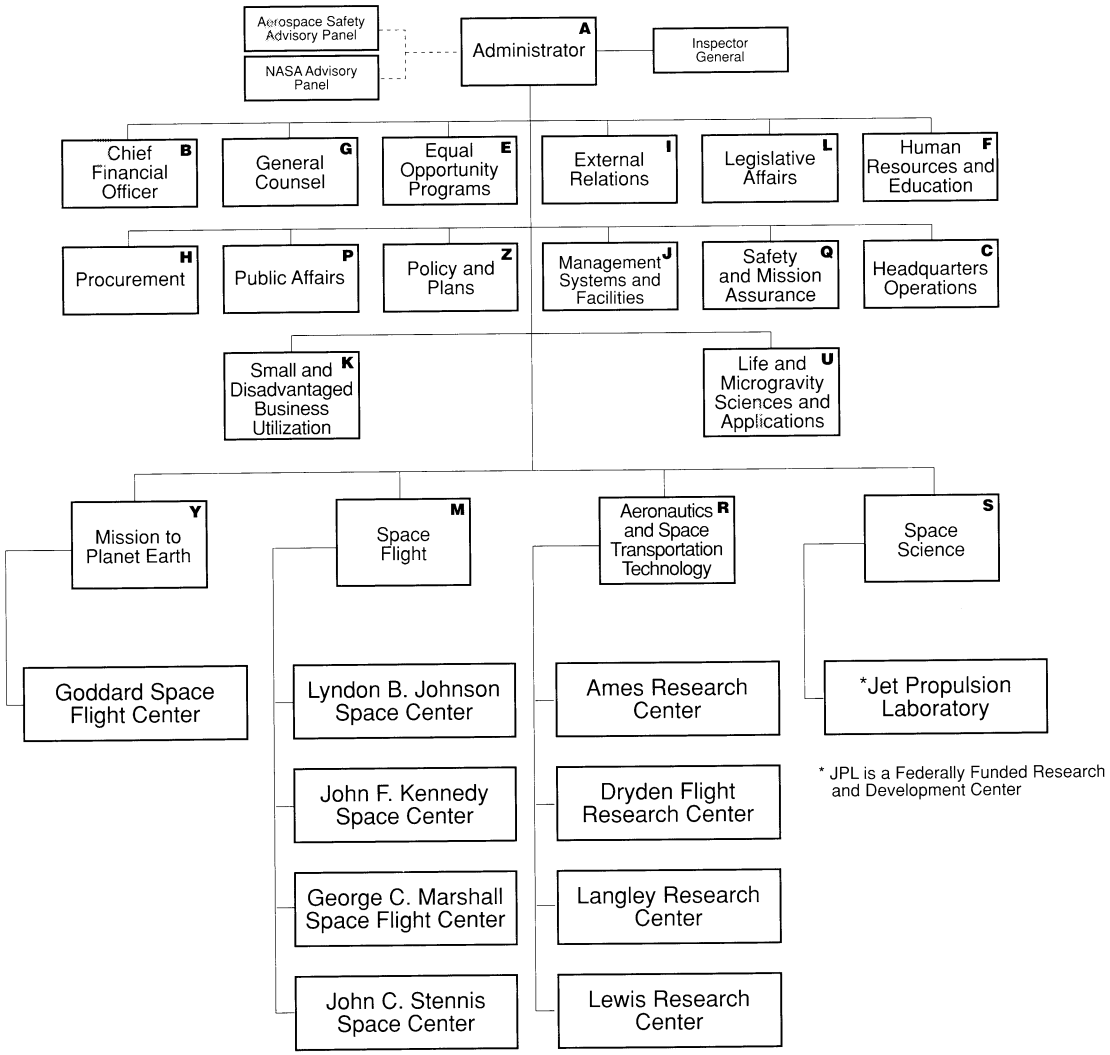
The Office of the Inspector General

The OIG serves as an independent and objective audit and investigative organization to assist NASA by performing audits and investigations. The OIG prevents and detects fraud, waste and abuse and assists NASA Management in promoting economy, efficiency, and effectiveness in its programs and operations. OIG auditors and agents are located at Headquarters and all NASA Centers.

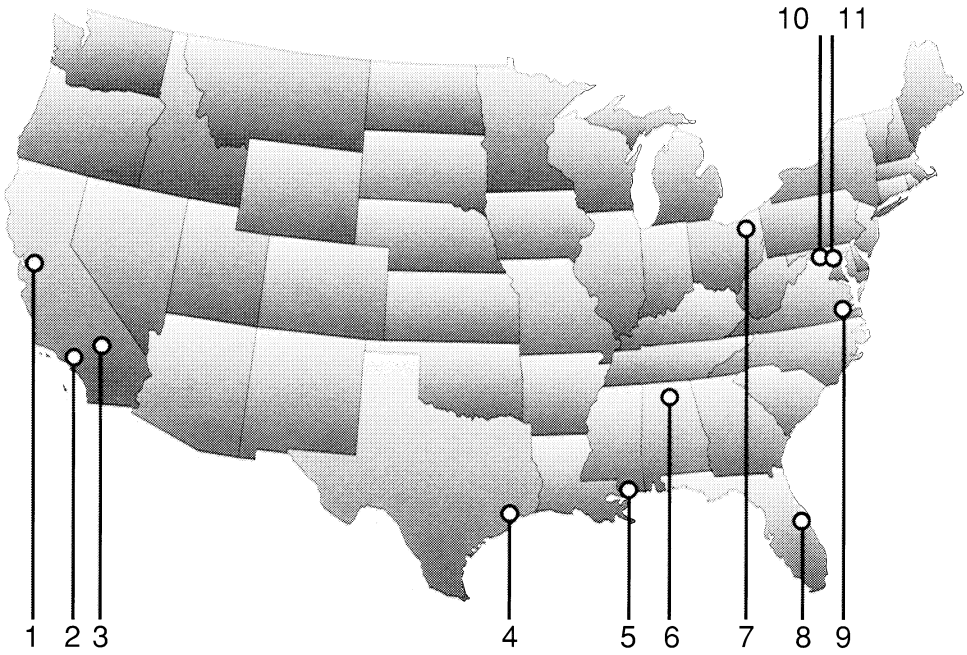
NASA Centers

Much of NASA's scientific and engineering work is carried out at its Centers, and at one Federally Funded Research and Development Center. These installations are Centers of Excellence in their scientific and engineering specialties and their missions. They are spread across the United States. Additional NASA work is carried out by off-site contractors, the academic community, and NASA's international partners.

National Aeronautics and Space Administration



NASA Centers

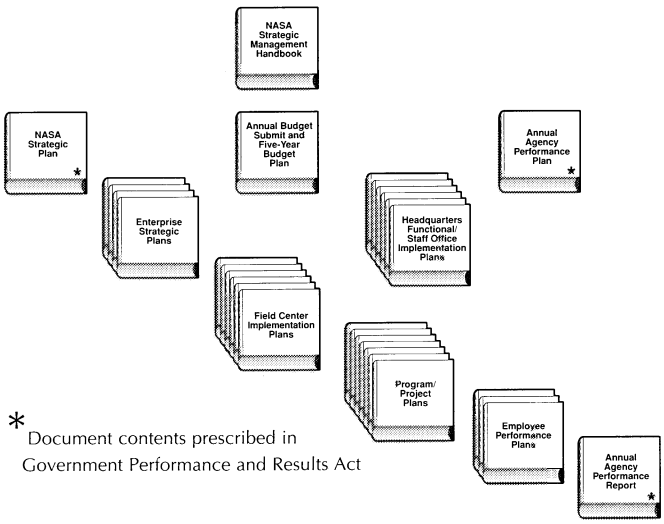


1	**Ames Research Center**	Information Technology
2	**Jet Propulsion Laboratory**	Deep Space Systems
3	**Dryden Flight Research Center**	Atmospheric Flight Operations
4	**Johnson Space Center**	Human Operations in Space
5	**Stennis Space Center**	Rocket Propulsion Test
6	**Marshall Space Flight Center**	Space Propulsion
7	**Lewis Research Center**	Turbomachinery
8	**Kennedy Space Center**	Launch and Payload Processing Systems
9	**Langley Research Center**	Structures and Materials
10	**NASA Headquarters**	Agency Management
11	**Goddard Space Flight Center**	Scientific Research

Planning and Budget

NASA has made steady progress in its planning endeavors by focusing on the basics through a system which closely aligns the requirements of the Agency's customers and stakeholders with its programs. NASA is implementing a new Strategic Management System that integrates the Agency's strategic planning, performance management, budgeting, process management, accounting, and reporting activities.

NASA's Strategic Management System Documents



* Document contents prescribed in Government Performance and Results Act

NASA's vision and mission, combined with its fundamental scientific and engineering questions provide a philosophical underpinning for why NASA exists and a foundation for its goals and objectives.

NASA Vision

NASA is an investment in America's future. As explorers, pioneers, and innovators, we boldly expand frontiers in air and space to inspire and serve America and to benefit the quality of life on Earth.

NASA's vision, mission, and goals are a product of close collaboration with its customers; its partner agencies, which are carrying out related programs; and its stakeholders in the Administration and Congress. These goals and objectives are supported by the NASA budget described on subsequent pages of this section.

Progress toward achievement of these goals is described in the performance section of this document, which provides the Agency's detailed performance goals and accomplishments for each Strategic Enterprise and for the Agency's Crosscutting Processes, which include strategic management, providing aerospace products and capabilities, generating knowledge, and communicating knowledge.

NASA Mission

To advance and communicate scientific knowledge and understanding of the Earth, the solar system, and the universe and use the environment of space for research.

To explore, use, and enable the development of space for human enterprise.

To research, develop, verify, and transfer advanced aeronautics, space, and related technologies.

NASA's high-level near-term goals are listed on page 12. NASA's Strategic Plan also includes mid-term and long-term goals. These goals take the Agency through the year 2023.

This plan is available from NASA at its Web site. *http://www.nasa.gov/*

NASA Fundamental Questions

1. How did the universe, galaxies, stars, and planets form and evolve? How can our exploration of the universe and our solar system revolutionize our understanding of physics, chemistry, and biology?
2. Does life in any form, however simple or complex, carbon-based or other, exist elsewhere than on planet Earth? Are there Earth-like planets beyond our solar system?
3. How can we utilize the knowledge of the Sun, Earth, and other planetary bodies to develop predictive environmental, climate, natural disaster, and natural resource models to help ensure sustainable development and improve the quality of life on Earth?
4. What is the fundamental role of gravity and cosmic radiation in vital biological, physical, and chemical systems in space, on other planetary bodies, and on Earth, and how do we apply this fundamental knowledge to the establishment of permanent human presence in space to improve life on Earth?
5. How can we enable revolutionary technological advances to provide air and space travel for anyone, anytime, anywhere more safely, more affordably, and with less impact on the environment and improve business opportunities and global security?
6. What cutting-edge technologies, processes, and techniques and engineering capabilities must we develop to enable our research agenda in the most productive, economical, and timely manner? How can we most effectively transfer the knowledge we gain from our research and discoveries to commercial ventures in the air, in space, and on Earth?

NASA Near-Term Goals
1998–2002: Establish a Presence

Develop lower cost missions:

- Characterize the Earth system with data, models, and analysis
- Chart the evolution of the universe, from origins to destiny, and understand the galaxies, stars, planets and life
- Explore the role of gravity in physical and chemical processes in space

Share new knowledge with our customers and contribute to educational excellence

Advance human exploration of space:

- Assemble and conduct research on the International Space Station
- Develop robotic explorers as forerunners to human exploration beyound low-Earth orbit

Improve Space Shuttle safety and efficiency and transition to private operations as appropriate

Develop and transfer cutting-edge technologies:

- Provide new technologies, processes, world class facilities, and services to enhance research and to make aeronautics and space programs more affordable (e.g., develop and demonstrate a reusable launch vehicle, advance intelligent systems and the miniaturization of technologies, and utilize simulation-based design)
- Cooperate with industry and other agencies to develop affordable technologies for U.S. leadership in the aviation markets of the 21st century
- Stimulate the application of NASA technology in the private sector and promote commercial use of space

In addition to this plan, the Office of Inspector General (OIG) has its own Strategic Implementation Plan and each program area (i.e., Audits, Investigations, Inspections, and Partnerships and Alliances) is currently preparing a more detailed implementation plan, including appropriate metrics. Annually, the OIG will prepare and submit to the President and Congress a performance plan and report on its accomplishments.

NASA Budget

NASA has the following appropriations:

Human Space Flight—This appropriation provides for the International Space Station and Space Shuttle programs, including flight support for cooperative programs with Russia and other nations.

Science, Aeronautics, and Technology—This appropriation provides funding for various research and development activities: earth and space science, aeronautics, life and microgravity science, technology investments, education programs, and mission communication services.

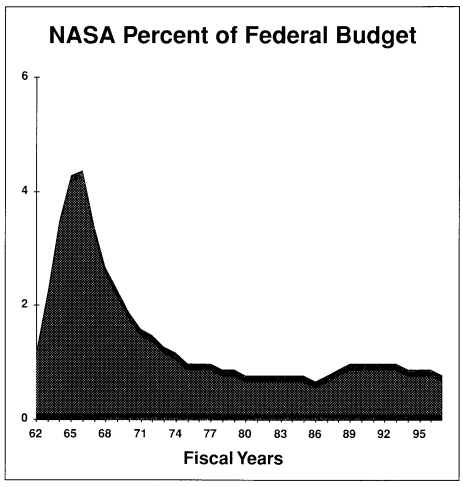
Mission Support—This appropriation provides funding for space communication services, safety and quality assurance activities, facilities maintenance and construction activities to preserve the Agency's core infrastructure, and NASA's civil service workforce.

Inspector General—This appropriation provides funding for the staffing and support required to perform audits, evaluations, and investigations of NASA's programs and operations.

The Fiscal Year 2000 appropriation and budget structure will reflect a realignment consistent with NASA's Enterprise management structure—Space Science, Earth Science (renamed from Mission to Planet Earth in 1998), Human Exploration and Development of Space, and Aeronautics and Space Transportation Technology. The most significant change, however, will be a realignment of the budget structure in support of NASA's full cost budget, accounting and management initiative. This is a fundamental change that will help NASA achieve its program objectives faster, cheaper, and better. This realignment will integrate the current mission support appropriation into NASA's programmatic accounts.

NASA Budget Trends

NASA's share of Federal spending has been declining from a high of 4.4% of the Federal Budget in 1966, at the height of the Apollo program, to about 0.7% currently. NASA continues to make significant scientific and engineering advances with less resources.

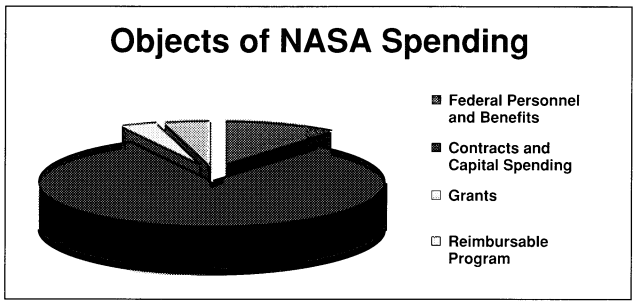


Recent Program Trends

In the face of declining budgets, NASA has made changes in program emphasis during the last few years. The Agency has reoriented its budgets consistent with its strategic planning and its missions—explore, use and enable the development of space; advance scientific knowledge; and research, develop, verify and transfer space-related technologies. Its declining resources have been allocated to its mission-related top priorities: safe operation of the Space Shuttle, development and operation of the International Space Station, while maintaining a strong program of science and technology development.

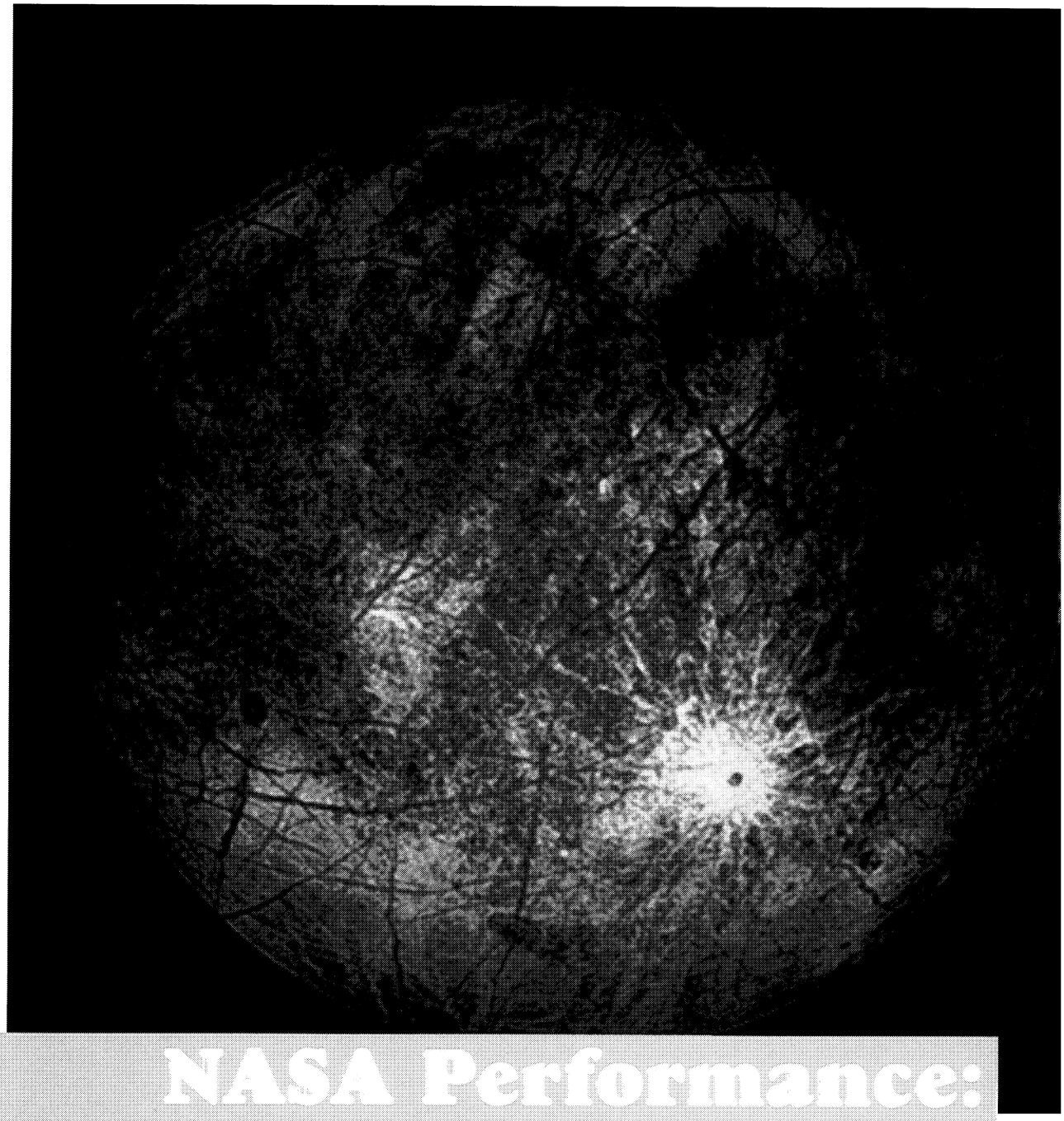
How NASA Spends Its Budget

In accomplishing its programs, NASA spends the greatest part of its resources through contracts for a wide variety of support and services, and the acquisition of capital assets. NASA supported a Civil Service workforce of 19, 883 during 1997. NASA spends the rest of its resources through grants, principally research grants with colleges and universities, and for its reimbursable program with Federal, commercial, and international agency customers.



NASA Budget Request for 1999

NASA's budget request for 1999 is $13.5 billion. The request continues the assembly of the International Space Station and initiates early operations; provides for safe operation of the Space Shuttle, and funds some system upgrades. It maintains ongoing Earth and space science programs including microgravity science, initiating several new missions such as the LightSAR Earth orbiting synthetic aperture radar mission (Earth Science) and the Mars 2001 Orbiter/Lander. This budget continues critical technology development efforts in aeronautical research, aviation safety and advanced space transportation. NASA has taken steps to minimize overhead expenses by continuing to implement recommendations from the 1995 Zero Base Review, while focusing on low-cost/high-payoff missions to maximize the Agency's output from a dwindling budget base.



NASA Performance: Space Science

Space Science

Mission

Humans have a profound and distinguishing imperative to understand our origin, our existence, and our fate. For millennia, we have gazed at the sky, observed the motions of the Sun, Moon, planets, and stars, and wondered about the universe and the way we are connected to it. The Space Science Enterprise (SSE) serves this human quest for knowledge. As it does so, it seeks to inspire our Nation and the world, to open young minds to broader perspectives on the future, and to bring home to every person on Earth the experience of exploring space.

The mission of the Space Science Enterprise is to solve mysteries of the universe, explore the solar system, discover planets around other stars, search for life beyond Earth, from origins to destiny, chart the evolution of the universe and understand its galaxies, stars, planets, and life.

In pursuing this mission, we develop, use, and transfer innovative space technologies that provide scientific and other returns to all of NASA's Enterprises, as well as globally competitive economic returns to the Nation. We also use our knowledge and discoveries to enhance science, mathematics, and technology education and the scientific and technological literacy of all Americans.

Questions to Address

In accomplishing its mission, the Space Science Enterprise addresses most directly the following NASA fundamental questions:

- How did the universe, galaxies, stars, and planets form and evolve? How can our exploration of the universe and our solar revolutionize our understanding of physics, chemistry, and biology?
- Does life in any form, however simple or complex, carbon-based or other, exist elsewhere than on planet Earth? Are there Earth-like planets beyond our solar system?

Goals

The four long-term goals of the Space Science Enterprise are as follows:

- Establish a virtual presence throughout the solar system, and probe deeper into the mysteries of the universe and life on Earth and beyond—a goal focused on the fundamental science we will pursue;
- Pursue space science programs that enable and are enabled by future human exploration beyond low-Earth orbit—a goal exploiting the synergy with the human exploration of space;
- Develop and utilize revolutionary technologies for missions impossible in prior decades—a goal recognizing the enabling character of technology; and
- Contribute measurably to achieving the science, mathematics, and technology education goals of our Nation, and share widely the excitement and inspiration of our missions and discoveries—a goal reflecting our commitment to education and public outreach.

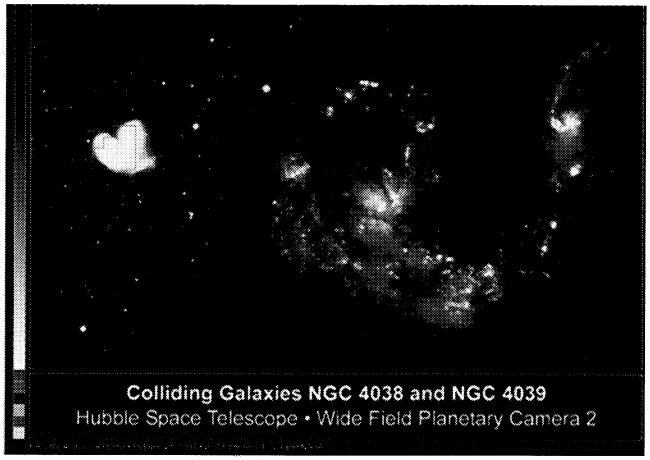
Near-Term Objectives

The numerous near-term objectives for the Space Science Enterprise are identified in the NASA Strategic Plan, NPD-1000.1, within the Space Science Roadmap. Included are scientific objectives, as well as objectives for the development of various critical technologies, and for making education and enhanced public understanding of science an integral part of our missions and research.

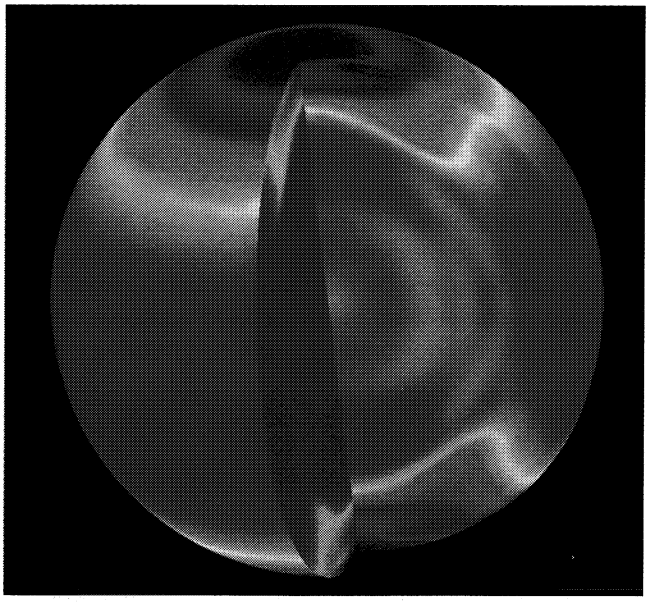
Accomplishments

In 1997 Space Science had a steady stream of successes, perhaps the greatest of which was landing Pathfinder and Sojourner on Mars. That event commanded worldwide attention, as attested to by the almost one billion Internet hits Pathfinder has received. The recent discovery by the Mars Global Surveyor that Mars has a planet-wide magnetic field adds even more to our growing understanding of our neighboring planet.

Other space science missions have yielded fascinating data as well. The second servicing mission of the Hubble Space Telescope dramatically improved its ability to view the universe. The "new" Hubble has seen a group of baby Sun-like stars surrounding their "mother star", detected a titanic shock wave smashing into unseen gas around a supernova, and found a disk at the heart of a galactic collision, just to name a few.

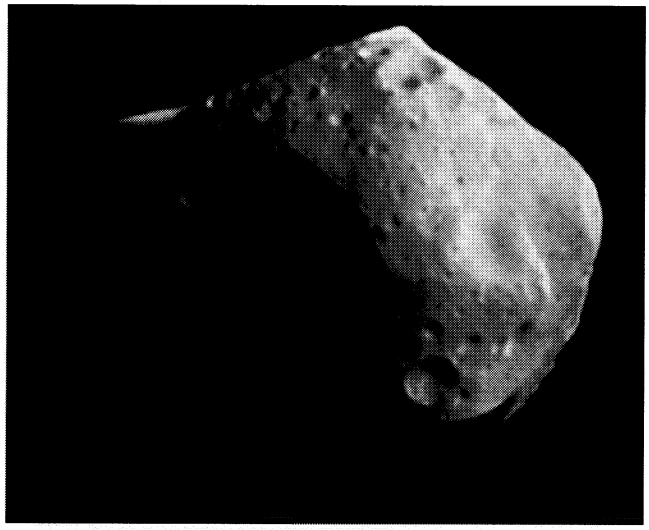


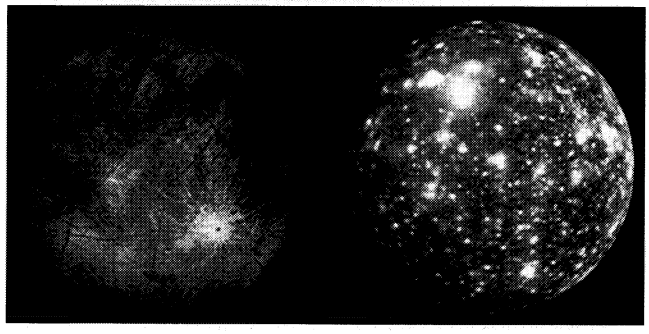
Scientists using the SOHO spacecraft discovered "jet streams" of hot, electrically charged gas flowing beneath the surface of the Sun, which may help explain the famous sunspot cycle that can affect Earth with power and communications disruptions.



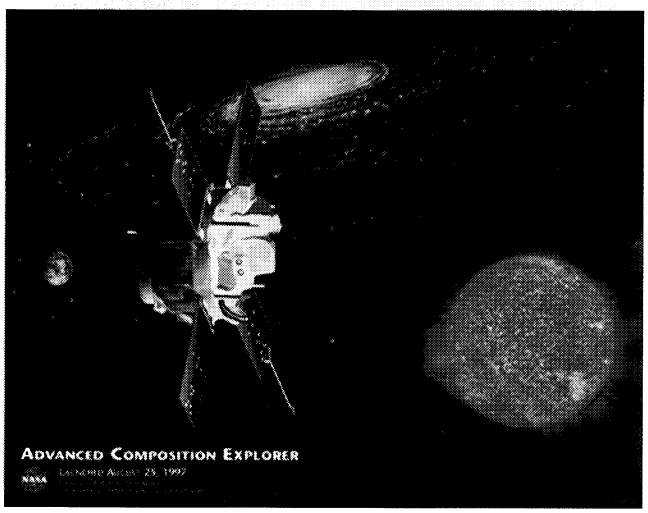
The Near Earth Asteroid Rendezvous spacecraft made a flyby of Mathilde—the most "up close and personal" we've ever been to an asteroid.

Galileo data supported the idea that Jupiter's icy moon Europa once had, and may still have, liquid water under its icy surface. It also showed that Europa has a metallic core and layered internal structure similar to the Earth's, while the heavily cratered moon Callisto is a mixture of metallic rock and ice with no identifiable central core.





The Advanced Composition Explorer began its journey to understand the stream of accelerated particles that constantly bombard Earth.



Technologies being developed for the Deep Space-1 and Deep Space-2 missions promise to revolutionize future space science spacecraft.

The Enterprise has also initiated its vision for involving the space science community in Public Education and Outreach by making these activities integral parts of all research/experiment solicitations, establishing four Centers for space science education, and developing an organized approach for creating alliances between space scientists and educators. These actions will foster a wide variety of highly leveraged education and outreach activities.

Performance Measures

Average Number of Launches Per Year

Description

In the recent past, Space Science launched about two spacecraft each year. However, through program reinvention toward faster, better, and cheaper spacecraft, the number of launches has increased dramatically and will continue to increase. This allows for more frequent access to space for space scientists, less overall program risk in case of failure, and more science output.

Near-Term Enterprise Objective

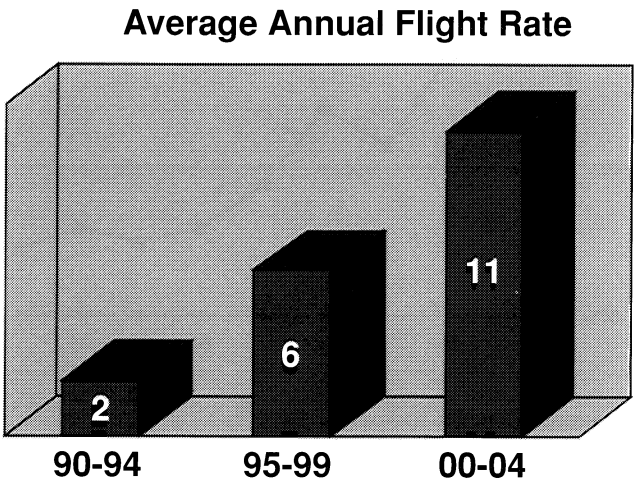
This metric supports all of the scientific objectives of the Enterprise. It further reflects the Enterprise's strategy to "sustain an aggressive program of discovery while using lower cost missions."

Relationship to Agency Goals

The near-term SSE milestones support the Agency near-term goal, as depicted in the NASA Roadmap, "to use low cost missions to chart the evolution of the Universe, from origins to destiny, and understand its galaxies, stars, planets, and life" and "develop robotic missions as forerunners to human exploration beyond low-Earth orbit." In addition, the metric specifically addresses the NASA strategy as noted in the NASA Roadmap for the 1998-2002 timeframe to "deliver world-class programs and cutting-edge technology through a revolutionized NASA."

1997 Performance

Because the number of launches will fluctuate from year to year, performance on this metric is best assessed by looking at long term trends. In 1997, three Space Science missions were launched.



Average Spacecraft Development Time

Description

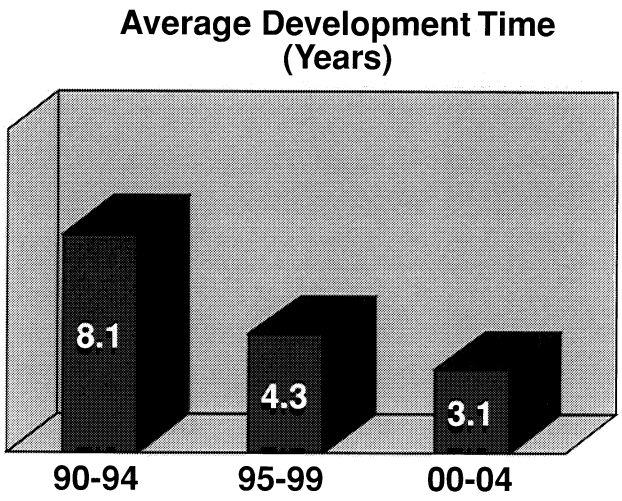
Faster turnaround between approval of missions and their launches will increase the ability of the program to react to new opportunities and allow frequent access to space for space scientists. Faster turnaround also allows for utilization of state-of-the-art technologies, since the time between design and launch is small.

Near-Term Enterprise Objective

This metric supports all of the scientific objectives of the Enterprise. It further reflects the Enterprise's strategy to "sustain an aggressive program of discovery while using lower cost missions."

Relationship to Agency Goals

The near-term SSE milestones support the Agency near-term goal, as depicted in the NASA Roadmap, "to use low cost missions to chart the evolution of the Universe, from origins to destiny, and understand its galaxies, stars, planets, and life" and "develop robotic missions as forerunners to human exploration beyond low-Earth orbit." In addition, the metric specifically addresses the NASA strategy as noted in the NASA Roadmap for the 1998-2002 timeframe to "deliver world-class programs and cutting-edge technology through a revolutionized NASA."



1997 Performance

Performance on this metric is best assessed by looking at long term trends. In 1997, the average development time of the Space Science missions launched was 4.7 years.

Average Development Cost (Constant FY 1995 Dollars)

Description

Reduced cost to the taxpayer for the continuation of NASA space science missions during times of reduced federal budgets. Viewed in concert with the other two metrics, this demonstrates that the NASA Space Science Enterprise is doing more with less at a faster pace.

Near-Term Enterprise Objective

This metric supports all of the scientific objectives of the Enterprise. It further reflects the Enterprise's strategy to

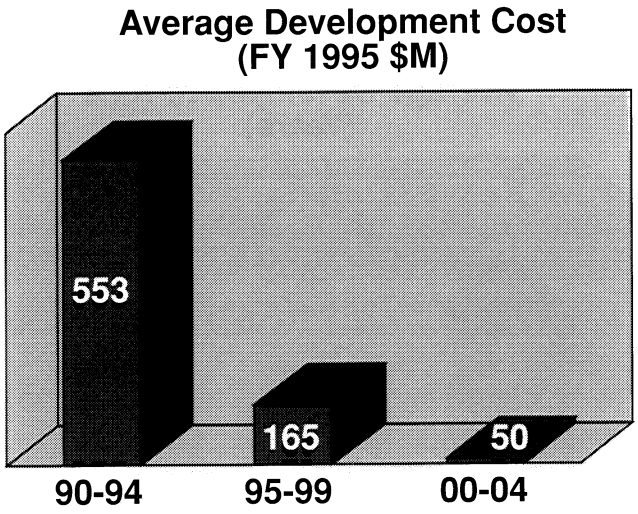
"sustain an aggressive program of discovery while using lower cost missions."

Relationship to Agency Goals

The near-term SSE milestones support the Agency near-term goal, as depicted in the NASA Roadmap, "to use low cost missions to chart the evolution of the Universe, from origins to destiny, and understand its galaxies, stars, planets, and life" and "develop robotic missions as forerunners to human exploration beyond low-Earth orbit." In addition, the metric specifically addresses the NASA strategy as noted in the NASA Roadmap for the 1998-2002 timeframe to "deliver world-class programs and cutting-edge technology through a revolutionized NASA."

1997 Performance

Performance on this metric is best assessed by looking at long term trends. In 1997, the average development cost of the Space Science missions launched was $519 million (FY 1995 dollars). This figure is heavily skewed by the relatively expensive Cassini mission.



Because the above three measures are averages over several years, they are best used for long-term tracking of the program trends. For yearly tracking, an additional measure that addresses program cost status vs. cost commitment (see below) is used to assess Enterprise cost performance.

Program Cost Status Versus Cost Commitment

Description

This measures the annual estimated cost of major missions in development versus commitment to Congress. This assesses the success in meeting cost performance commitments to Congress for major development programs within the Enterprise. The specific measure is the ratio of the present budget estimates compared to the commitments made by the Agency to Congress as a maximum cost for each major SSE spacecraft. The commitment to Congress is established at the time the program moves into development. If this metric is below 100 percent it means that the Space Science Enterprise is meeting or exceeding its commitments to Congress with regard to the cost of major spacecraft.

This area has shown continued improvement in recent years; many larger missions that exceeded their cost commitments were launched, while most of our recent missions are being completed within or under budget. For FY 1998 through FY 1999, we expect that our actual performance on this metric will likely stay between 90 and 100 percent.

Near-Term Enterprise Objective

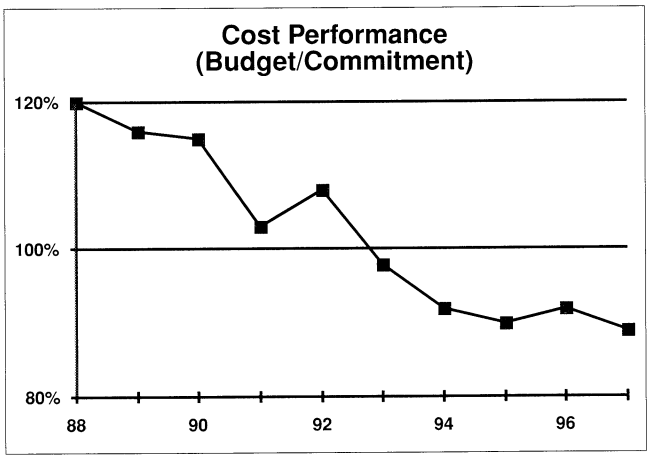
This metric supports all of the scientific objectives of the Enterprise. It further reflects the Enterprise's commitment to "do what we say" in terms of cost performance.

Relationship to Agency Goals

The near-term SSE milestones support the Agency near-term goal, as depicted in the NASA Roadmap, "to use low cost missions to chart the evolution of the Universe, from origins to destiny, and understand its galaxies, stars, planets, and life" and "develop robotic missions as forerunners to human exploration beyond low-Earth orbit." In addition, the metric specifically addresses the NASA strategy as noted in the NASA Roadmap for the 1998-2002 timeframe to "deliver world-class programs and cutting-edge technology through a revolutionized NASA."

1997 Performance

In 1997, the cost of major Space Science missions in development was estimated to be well below (89% of) our commitments to Congress, an excellent performance.



Providing Benefits to Society

The Space Science Enterprise will continue to use our knowledge and discoveries to enhance science, mathematics, and technology education and the scientific and technological literacy of all Americans. The following two metrics serve as relevant indicators.

Produce World-Class Science (Societal Perception)

Description

This measure assesses the percentage of world-class science attributable to the Space Science Enterprise. This is based on Science News magazine's end-of-year summary of approximately 150 "most important stories" from all fields of science. Stories in science magazines indicate the creation of scientific knowledge over time, and Science News serves as one independent, popular source to reflect the contribution specific scientific discoveries make to society as a whole. The Enterprise can be compared to NASA historical performance and current world-wide scientific output through this metric.

This metric will reflect the Enterprise's success in public outreach and in communicating widely the results, relevancy, and excitement of our missions and research. NASA Space Science has recently outperformed its historical average in the production of world-class science. In the coming years, the level of performance is expected to remain above the historical average as the number of spacecraft operating within the Enterprise continues to grow rapidly.

Near Term Enterprise Objective

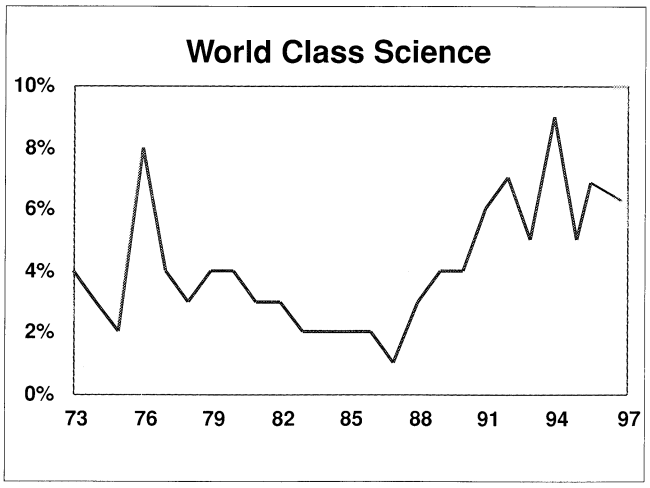
This metric measures our success in making education and enhanced public understanding of science an integral part of our missions and research.

Relationship to Agency Goal

This objective contributes to the achievement of the Agency goal in the NASA Strategic Roadmap to "share new knowledge with our customers and contribute to educational excellence." Furthermore, this objective responds specifically to the NASA Mission to advance and communicate scientific knowledge and understanding.

1997 Performance

Performance on this metric is best assessed by looking at long term trends. In 1997, Space Science accounted for 6.4% of World Class Science, well above the historical average.



College Textbook Impact

Description

This measures the percentage of the NASA contribution to a leading college space science textbook (*Astronomy: From the Earth to the Universe* by Jay Pasachoff) over time (1975 to 1996). This metric provides an independent assessment of the fundamental contributions of NASA to our understanding of the universe, as judged by those who serve the educational needs of students. It is a long-term measure of the educational impact of NASA's science contributions on students at colleges and universities across the Nation. If the trends in this metric continue to follow the trends in the Enterprise's world-class science metric, there will be significant growth in NASA's contribution to the education of college students.

Near Term Enterprise Objective

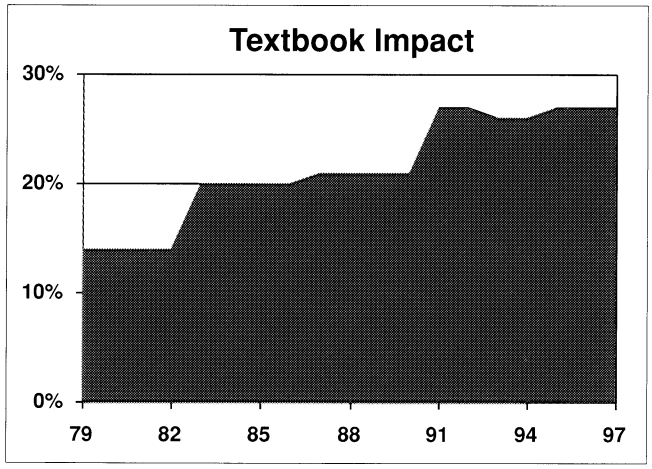
This metric measures our success in making education and enhanced public understanding of science an integral part of our missions and research.

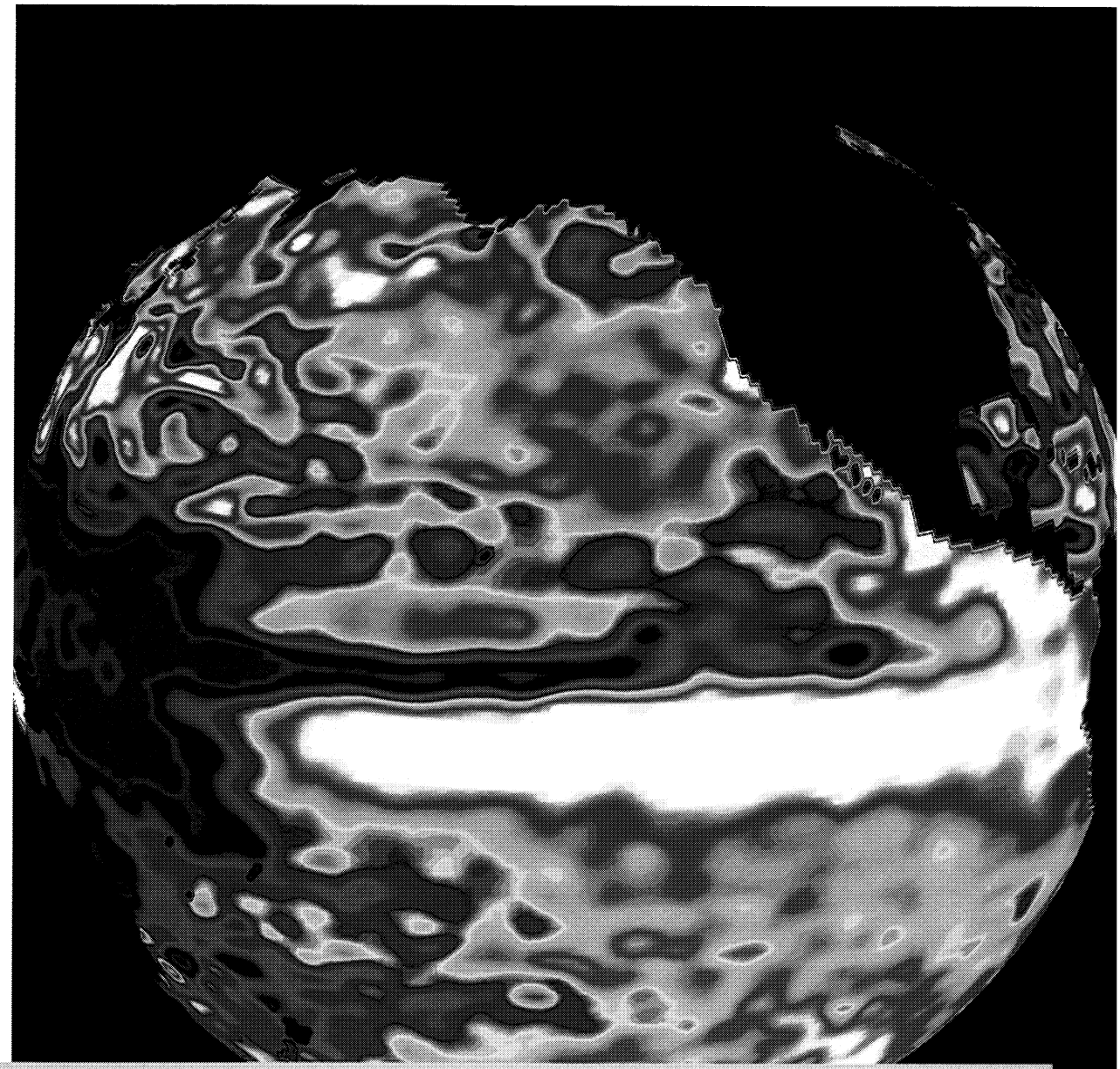
Relationship to Agency Goal

This objective contributes to the achievement of the Agency goal in the NASA Strategic Roadmap to "share new knowledge with our customers and contribute to educational excellence." Furthermore, this objective responds specifically to the NASA Mission to advance and communicate scientific knowledge and understanding.

1997 Performance

Performance on this metric is best assessed by looking at long term trends. In 1997, a new edition of the textbook was published, but the assessment of NASA's contribution has not yet been completed. However, we expect that the percentage of NASA's contribution will at least maintain the level of the last few years.





NASA Performance: Mission to Planet Earth

Mission to Planet Earth

Mission

Over the past fifteen years, scientists have begun to see the Earth as an intricately coupled system involving the interactions of land, oceans, atmosphere, ice and biota. As we have begun to integrate large global data sets—many derived from data provided by satellites—the linkage between and among natural phenomena has become apparent. Thus a new, interdisciplinary field of Earth System Science was created.

On January 21, 1998, NASA announced that the Mission to Planet Earth Enterprise (MTPE) had been renamed the Earth Science Enterprise. This report uses MTPE, since that was the name in effect for 1997.

Mission to Planet Earth brings NASA's space technology to bear on the study of our home planet. The purpose of the MTPE enterprise is to understand the total Earth system and the effects of natural and human-induced changes on the global environment. MTPE is pioneering the new interdisciplinary field of research called Earth System Science, born of the recognition that the Earth's land surface, oceans, atmosphere, ice sheets and biota are both dynamic and highly interactive.

Questions

Mission to Planet Earth addresses most directly two of the six fundamental questions that NASA has established as the key foci for NASA's activities:

- How can we utilize the knowledge of the Sun, Earth and other planetary bodies to develop predictive environmental, climate, natural disaster, resource identification and resource management models to help ensure sustainable development and improve the quality of life on Earth?

- What cutting-edge technologies, processes, and techniques and engineering capabilities must we develop to enable our research agenda in the most productive, economical, and timely manner? How can we most effectively transfer the knowledge we gain from our research and discoveries to commercial ventures in the air, in space and on Earth?

Goals

Mission to Planet Earth endeavors to develop our understanding of the total Earth system, and the effects of natural and human-induced changes on the global environment. In concert with other agencies and the global research community, MTPE is providing the scientific foundation needed for the complex choices by both the private and public sectors that lie ahead on the road to sustainable development. MTPE has established three broad goals to fulfill its purpose:

1. Expand scientific knowledge of the Earth system using NASA's unique capabilities from the vantage points of space, aircraft and in situ platforms;

2. Disseminate information about the Earth system; and

3. Enable productive use of MTPE science and technology in the public and private sectors.

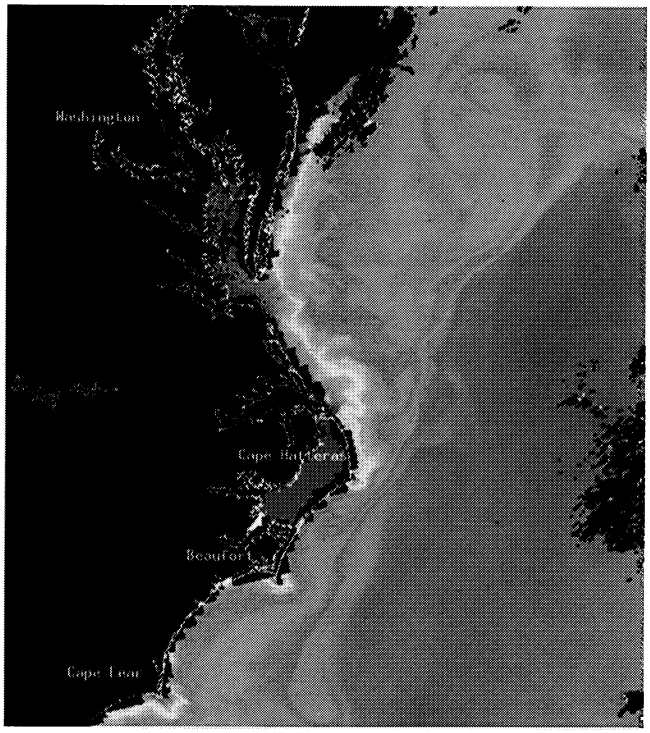
Near-Term Objectives

- Observe and Document Land Cover and Land Use Change and Impacts on Sustained Productivity
- Develop and Improve the Capability to Predict Seasonal-to-Interannual Climate Variability
- Understand Earth System Processes to Better Predict Natural Hazards and Mitigate Natural Disasters
- Understand the Causes and Impacts of Long-Term Climate Variations on Global and Regional Scales
- Understand the Concentrations and Distributions of Ozone in the Stratosphere and Troposphere
- Implement Open, Distributed and Responsive Data System Architectures
- Foster the Development of An Informed and Environmentally-Aware Public
- Develop and Transfer Advanced Remote Sensing Technology
- Extend Use of MTPE Research to National, State, and Local Applications
- Support Development of a Robust Commercial Remote Sensing Industry
- Make Major Scientific Contributions to Environmental Assessments

Accomplishments

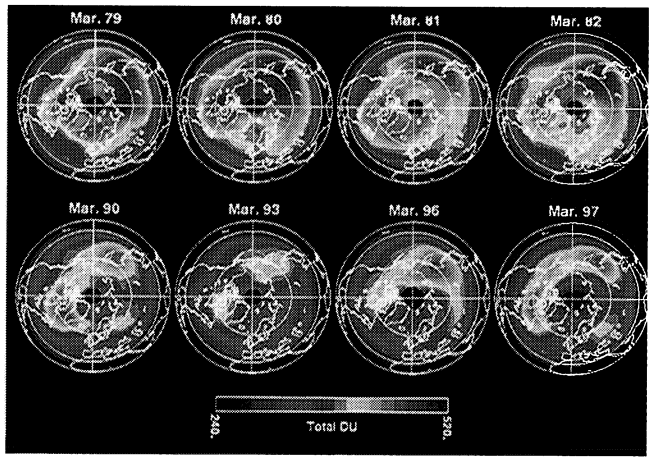
In 1997, MTPE continued to provide invaluable satellite and aircraft observations and sponsor research which are unraveling the mysteries of the key Earth system processes. A few examples are provided here.

August saw the long awaited launch of the Sea-Viewing Wide Field Sensor (SeaWiFS), MTPE's first commercial data purchase project. The data are still undergoing validation prior to purchase by NASA, but early engineering scenes, like the image of the Mid-Atlantic coastal region below, look very promising. The colors in the coastal ocean indicate concentrations of phytoplankton which are the basis of the ocean food chain. These data are important not only for understanding ocean biology, but also are useful to commercial fishing operations seeking to spot the most productive locations for their fleets.



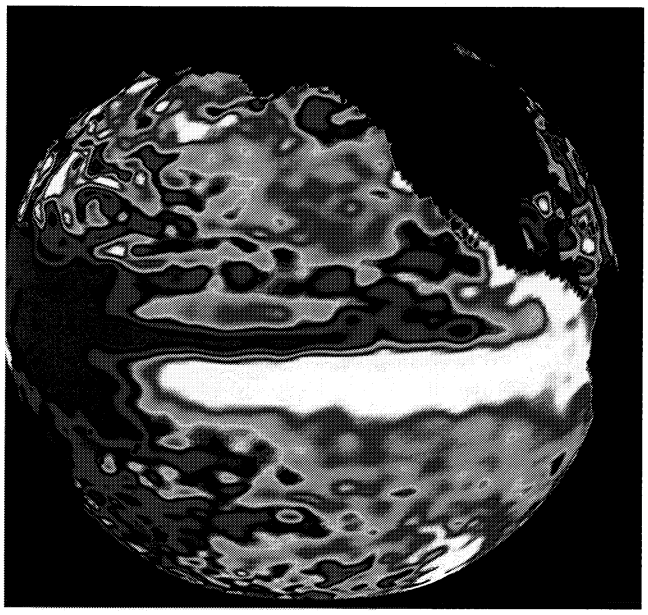
MTPE continued its long record of observations and research into variations in the global concentrations and distributions of stratospheric ozone. The Total Ozone Monitoring Satellite (TOMS) and ER-2 aircraft observed record low concentrations of ozone over the Arctic in late Winter and early Spring 1997. These are not unlike the low concentrations which were followed in subsequent years by the "ozone hole" in the Antarctic.

Together with our NOAA partners, MTPE predicted the strength and timing the current El Niño, using such means as ocean topographic measurements from the TOPEX/Poseidon spacecraft. The white areas in the figure below show the higher ocean surface topography associated with El Niño. A time series of these images shows the progression of this warmer, higher water across the Pacific.



In addition to its many science accomplishments, MTPE conducted its first Biennial Review. Conceived during the last Congressionally mandated review in 1995, the Biennial Review serves as an opportunity to revalidate science priorities and programmatic approaches to meet them. In addition to bringing closure to some open issues in the first series of Earth Observing System (EOS) missions, the Biennial Review resulted in the adoption of a new, more flexible paradigm for planning future missions. This new approach focuses on identifying measurement requirements, seeking commercial or international partnerships to meet them, and coupling "just-in-time" procurement of commercial spacecraft with investment in advanced instrument technology development to reduce the cost of obtaining the entire set of required data.

This area has shown continued improvement in recent years; many larger missions that exceeded their cost commitments were launched, while most of our recent missions are being completed within or under budget. For FY 1998 through FY 1999, we expect that our actual performance on this metric will likely stay between 90 and 100 percent.



Performance Measures

Efficiency and Cost Performance of MTPE Missions

The MTPE Enterprise is aggressively implementing the Agency's reinvention initiative to deliver "Faster, Better, and Cheaper" programs. To assess its progress in reinvention, the Enterprise uses a triad of metrics that address the annual number of launches, spacecraft development time, and spacecraft development costs.

Relationship to Agency Goals

These Enterprise metrics directly address the Agency goal to "develop lower cost missions" to "characterize the Earth system". These metrics support the strategy which is over-arching for all of the near-term objectives listed earlier—namely, to sustain an aggressive program of Earth science research through the use of lower cost missions.

Performance Results for FY97

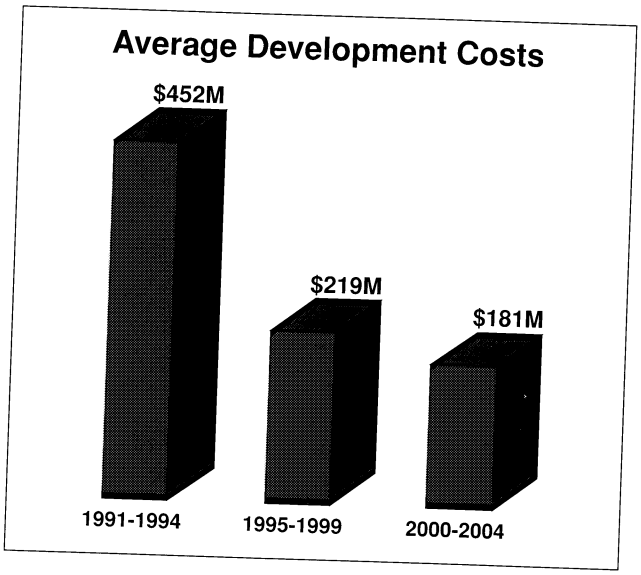
As missions launching in recent years were initiated in the "1991–1994" and prior time frames, we would expect performance to appear somewhere between the "1991–1994" and "1995–1999" statistics for development cost and development time. This is indeed the case for GOES-K, which was developed in five years at a cost of $288 million. The Lewis mission, initiated in 1994, met the "1995–1999 criteria for these two areas, but unfortunately failed to reach a stable orbit, and was lost.

Average Development Cost of Spacecraft Missions

Target:

Average Development Cost from FY95–99: $219M

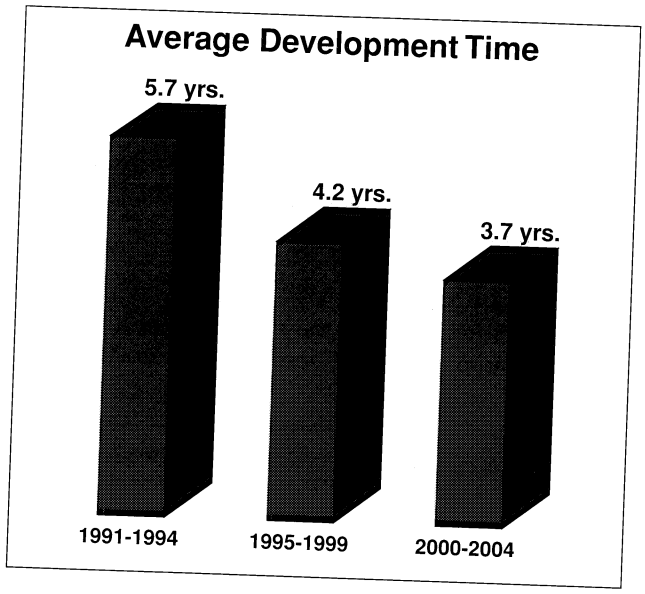
Average Development Cost from FY00–04: $181M



Average Development Time For Spacecraft Missions

Average Development Time FY95–99: 4.2 Years

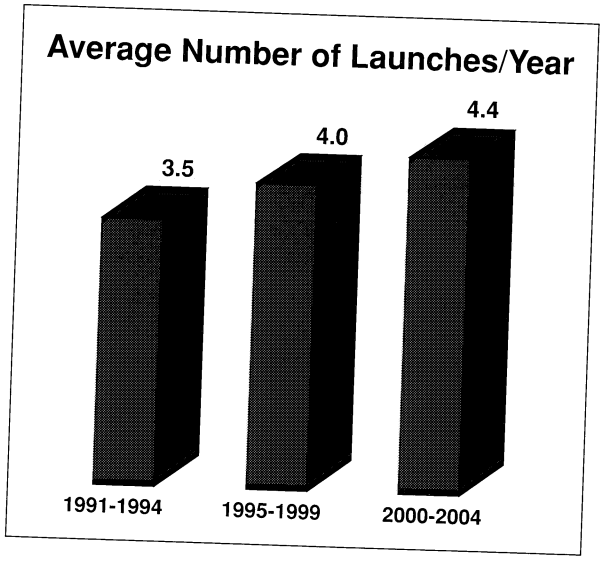
Average Development Time FY00–04: 3.7 Years



Average Number of Launches Per Year

Average Number of Launches/Year for FY 95–99: 4.0

Average Number of Launches/Year for FY 00–04: 4.0



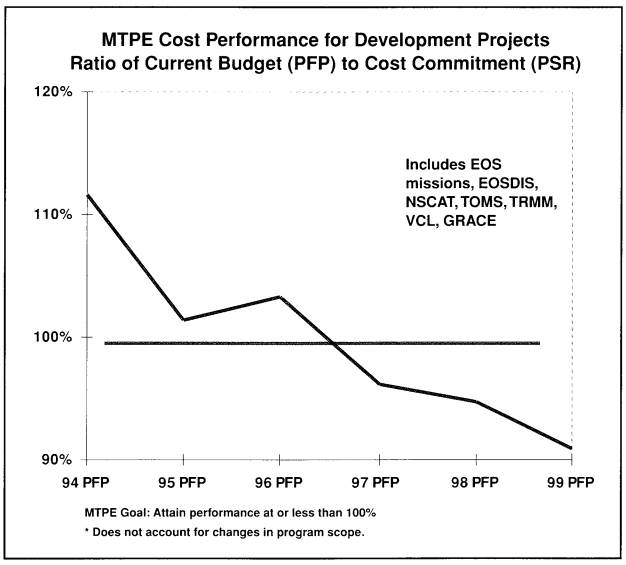
Program Cost Status versus Cost Commitment

This metric measures the annual estimated cost of major missions in development versus commitment to Congress. This metric assesses the success in meeting cost performance commitments to Congress for major development programs within the Enterprise. The specific measure is the ratio of the present budget estimates compared to the commitments made by the Agency to Congress as a maximum cost for each major spacecraft. The commitment to Congress is established at the time the program moves into development. If this metric is below 100 percent it means that the Enterprise is meeting or exceeding its commitments to Congress with regard to the cost of major spacecraft.

This area has shown continued improvement in recent years; many larger missions that exceeded their cost commitments were launched, while most of our recent missions are being completed within or under budget. For FY 1998 through FY 1999, we expect that our actual performance on this metric will likely stay between 90 and 100 percent.

Relationship to Agency Goals

This metric addresses the Agency goal to "deliver on our commitments " with respect to the cost of major programs.



Performance Results for FY97

As this metric was developed in FY97, performance by definition is equal to plan for FY97. During the next few years, we will be able to compare performance on missions that launch in, e.g., 2000, with the original commitment.

Getting MTPE Data to the Users

MTPE's first line customers are the scientists and others who use Earth science data products. Accordingly, MTPE is making a substantial investment in the Earth Observing System Data and Information System (EOSDIS) to distribute these data products. Users access EOSDIS via a set of science discipline-oriented Distributed Active Archive Centers (DAACs).

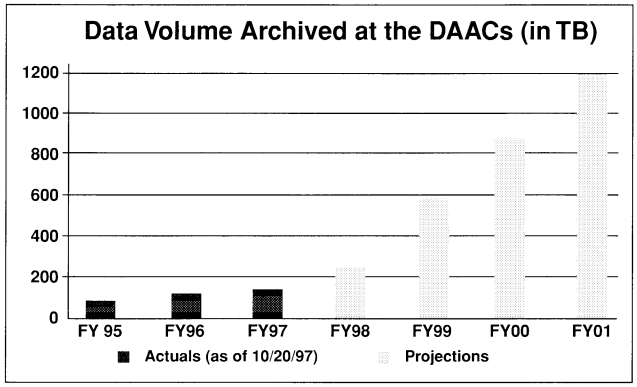
Three key indicators of DAAC performance are the volume of data archived, the number of users accessing the DAACs, and the number of data products delivered in response to user requests. Together, these provide a picture of both the supply and demand for Earth science information products.

Relationship to Agency Goals

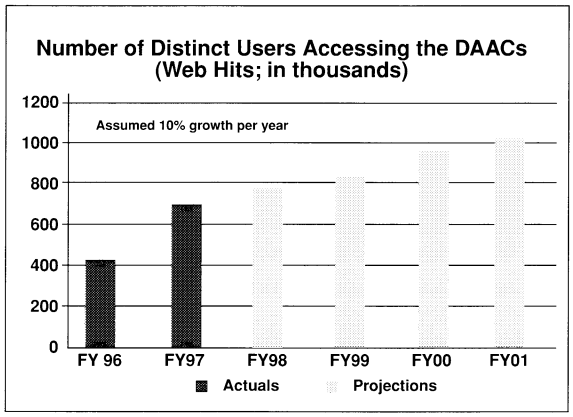
Providing broad and efficient access to data products is key to meeting the Agency mission of advancing and communicating scientific knowledge. The successful functioning of EOSDIS is essential to the accomplishment of all three of MTPE's goals.

Performance Results for FY97

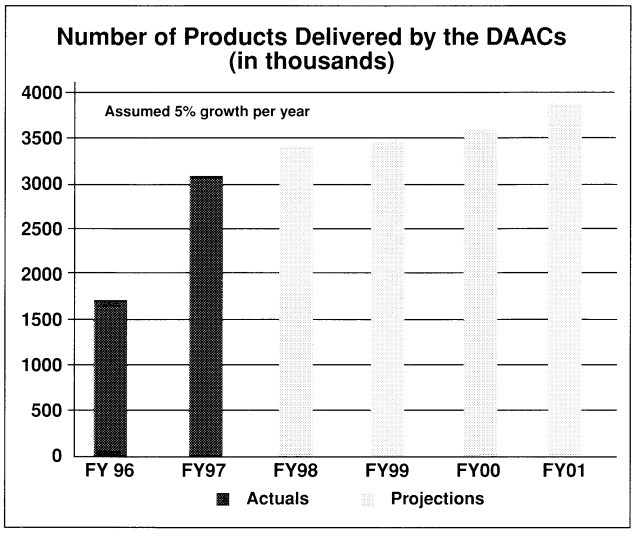
- Data Volume Archived: 126 Terabytes



- Number of Users: 699,000



- Products Delivered: 3,171,000



NASA Performance: Human Exploration and Development of Space

Human Exploration and Development of Space

Mission

The mission of the Human Exploration and Development of Space Enterprise (HEDS) is to open the space frontier by exploring, using and enabling the development of space and to expand human experience into the far reaches of space.

In exploring space, HEDS brings people and machines together to overcome challenges of distance, time, and environment. Robotic science missions survey and characterize other bodies as precursors to eventual human missions. The Space Shuttle and the International Space Station (ISS) serve as research platforms to pave the way for sustained human presence in space through critical research on human adaptation. These programs also provide opportunities for research with applications on Earth. HEDS serves as a catalyst for commercial space development. We will employ breakthrough technologies to revolutionize human space flight.

Questions

HEDS pursues the answers to myriad research and engineering questions that must be answered as we learn to live and work in space. HEDS plays an important role in pursuing answers to the questions: What is the fundamental role of gravity and cosmic radiation in vital biological, physical, and chemical systems in space, on other planetary bodies, and on Earth, and how do we apply this fundamental knowledge to the establishment of permanent human presence in space to improve life on Earth? HEDS also plays an important role working with the other Enterprises to pursue answers to other fundamental questions, including: Does life exist elsewhere than on our planet?

Goals

- Prepare to conduct human missions of exploration to planetary and other bodies in the solar system;
- Use the environment of space to expand scientific knowledge;
- Provide safe and affordable human access to space, establish a human presence in space, and share the human experience of being in space;
- Enable the commercial development of space and share HEDS knowledge, technologies, and assets that promise to enhance the quality of life on Earth.

Near Term Objectives

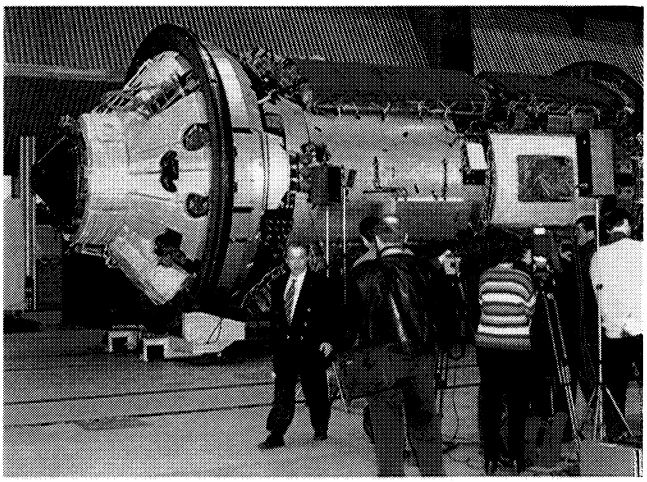
- Expand scientific knowledge by exploring the role of gravity and the space environment in physical, chemical, and biological processes through a vigorous peer-reviewed research program in space
- With the Space Science Enterprise, carry out an integrated program of robotic exploration of Mars to characterize the potential for human exploration to support definition decisions for human exploration as early as 2005
- Establish the requirements and architecture for human exploration that can radically reduce cost through the use of local solar system resources, advanced propulsion technologies, commercial participation, and other advanced technologies
- Sustain Space Shuttle program operations by safely flying the manifest and aggressively pursuing a systems upgrade program that will reduce payload-to-orbit costs by a factor of two by 2002
- Expand a permanent human presence in low-Earth orbit by transitioning from Mir to the ISS program in order to enhance and maximize science, technology, and commercial objectives
- Ensure the health, safety, and performance of space flight crews through cutting-edge medical practice using advanced technology
- Involve our Nation's citizens in the adventure of exploring space, engage educators and students to promote educational excellence, and use human space flight to promote international cooperation
- Invest in advanced concepts that may produce breakthroughs in human exploration and commercial development of space
- Transfer knowledge and technologies and promote partnerships to improve health and enhance the quality of life

Accomplishments

International Space Station

The United States and its International Partners have made significant progress in the design and development of the International Space Station (ISS). During FY 1997, the Program was at its peak period of hard-

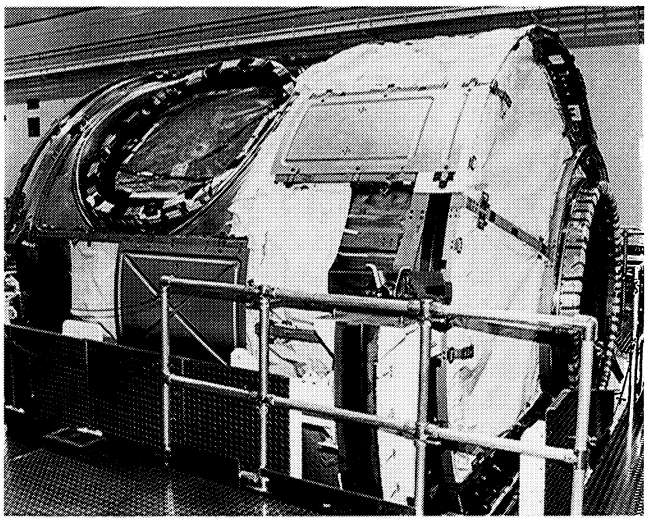
ware and software development activities. The design and development of ISS elements for the first six flights is largely complete, and we are into integration and qualification testing. Through FY 1997, we have produced over 220,000 pounds of hardware and by the close of FY 1998, we will have produced over half a million pounds of hardware and achieved completion of over 80 percent of the development activity.



U.S. funded, Russian–built FGB

The first flight to be launched, the U.S. funded-Russian built Functional Cargo Block (FGB, Russian acronym), is proceeding approximately one month ahead of schedule toward a June 1998 launch from the Baikonur Cosmodrome.

For assembly Flight 2A, Node 1 and Pressurized Mating Adapters 1 and 2 (PMA-1 and PMA-2) have been delivered to KSC, where acceptance testing is under way.



Node 1 of the International Space Station

Flight 5A, the U.S. Laboratory, is our most significant challenge. The Lab structure has been outfitted with one endcone and all four of its standoffs, which contain the element's electrical cable trays and fluid lines. We have achieved a significant milestone by conducting the first power-up of the Lab.

A complete integrated review of Russian development schedules and revisions to these schedules occurred at the Service Module (SM) (GDR) Designer's Review held in September in Russia. Significant work was occurring, funding was flowing, and deliveries were being made by the Russian contractors.

Although significant progress was made during FY 1997, there were major issues with which the program management and NASA management had to deal. First and foremost, the Government of Russia has experienced considerable difficulty in making funds available —in total and on a timely basis—to the Russian Space Agency to enable on-schedule compliance with the International Space Station (ISS) program milestones. This led to a substantial ($200 million) reprogramming of funds appropriated to Human Space Flight, thereby allowing the U.S. Government to take appropriate actions to mitigate the potential schedule threat if the Government of Russian were unable to meet its commitments. These funds were largely reprogrammed from the Space Shuttle program to a new line item, termed "Russian Program Assurance." The funding allowed, among other things, NASA to initiate work on modifications to the FGB and to pursue development of an Interim Control Module. Actions taken will also provide a higher degree of robustness in the orbital altitude-keeping capabilities of the space station configuration, even when the Russian hardware is delivered.

Second, the program experienced continuing performance-against-plan problems with the prime contractor, Boeing North American. The prime contract performance measurement system metrics at fiscal year end exhibited a negative variance of $398 million in the planned cost of work performed compared to the actual cost of work performed, and a negative variance of $139 million in the planned cost of work performed against the planned cost of work scheduled. The contractor's poor performance was penalized through the award and incentive fee process. Corrective actions have been instituted by both the contractor and the government to reduce the risk of future performance problems. Nonetheless, all parties are fully aware of the inherent management and engineering complexities attendant to the ISS development. This situation was fully reported on to the Executive Office of the President and the Congress by the General Accounting Office and NASA.

Finally, there was a material change made in 1997 by the ISS program managers which affects the level of technical performance assurance for the space hardware and software. A multi-element integrated test strategy was adopted, thereby assuring that hardware being flown on individual flights would see a more rigorous ground test

environment prior to launch. The physical (fluids, electrical, gases, mechanical) interfaces will be verified much more extensively than previous planned. This action should reduce the risk of misalignment or inadequate mating of interfaces connections on orbit in the very difficult space environment.

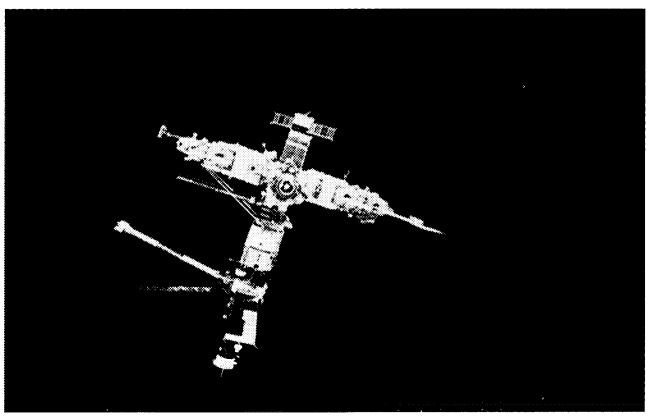
Our other International Partners—Europe, Japan and Canada—are proceeding with their commitments to the Program, investing approximately $6 billion to date for design and development of their contributions.

NASA has also been working with Europe and Japan on arrangements for the offset of their cost commitments to NASA for launch and operation of their elements. On October 8, 1997, NASA and the European Space Agency (ESA) signed an arrangement for the offset of COF launch costs. Under this arrangement, ESA is committed to provide NASA with ISS Nodes 2 and 3 together with other Space Station hardware. Similarly, on September 10, 1997, NASA and the National Space Development Agency of Japan signed an Agreement in Principle for Japan's provision of the Centrifuge Accommodation Module and associated hardware in exchange for launch of its elements on the Space Shuttle.

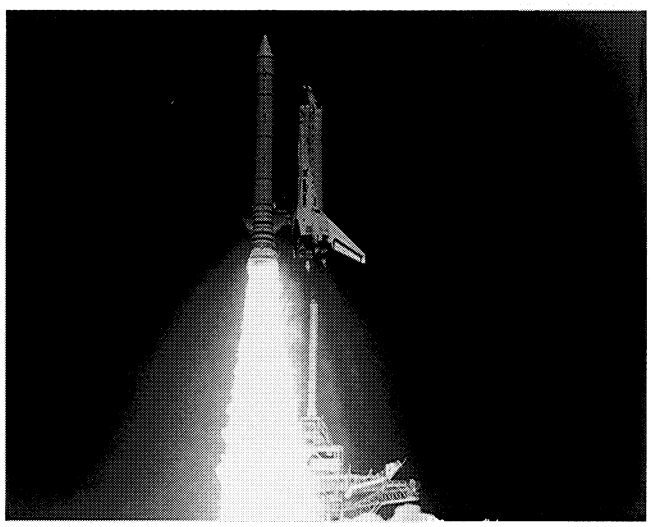
In addition, on October 14, 1997, NASA and the Brazilian Space Agency signed an Implementing Arrangement for Brazil's contribution of Space Station hardware and payload facilities in exchange for utilization from NASA's allocation.

Space Shuttle

Today the Space Shuttle is both safer and less expensive to operate. In-flight hardware problems are down by 50 percent and because of improvements in the main engines, the probability of a catastrophic loss during ascent has improved from 1 in 78 in 1992 to better than 1 in 248. The Space Shuttle is spending more time on orbit to conduct science. Including our astronauts' time on Mir, crew time on orbit has increased by over 125%. Of the 30 flights since 1993, only two had delays greater than eight minutes. One was for weather.



Mir Space Station as seen from STS–84 Space Shuttle Mission



View of STS–85 Discovery's Launch

We also have flown eight rendezvous missions which required a "five-minute" launch window and all were launched on time.

In FY 1997, we flew three highly successful missions to the Russian space station Mir. Those missions not only demonstrated docking procedures and hardware essential to the assembly of the International Space Station, but significantly enhanced international scientific cooperation. The Shuttle delivered supplies and crew members to the Mir in addition to performing numerous scientific experiments. To date, U.S. crew members have spent over 700 days on the Mir.

In FY 1997, we also flew five other Space Shuttle Missions. The spectacularly successful Hubble Space Telescope Servicing Mission, the first flight of the Microgravity Science Laboratory and its successful reflight, flight of the Wake Shield Facility and the second flight of the CRISTA-SPAS satellite.

The safety program has a number of very critical metrics which are watched closely by technicians and management for any trends which may indicate an area of concern. Thus far, in-flight anomalies have decreased from a per flight average in 1993 of 14.3 to a current average of 6.75—an improvement of over 50%. The same trend is true for monthly mishap frequency at Kennedy Space Center—a decrease of over 40% in three years. Other metrics are revealing the same type of trends.

Shuttle management has identified a need for changes that will improve the program's supportability, reduce operating costs, improve cycle times, and ensure Shuttle viability through at least 2012, the projected operational life of the International Space Station.

An upgrades program is being very carefully scoped and is designed as a phased program to be implemented through block changes. Phase I upgrades are currently underway providing improved safety and

performance margins, such as the alternate turbopumps, large throat main combustion chamber and improved powerhead for the Space Shuttle Main Engine. The Super Lightweight Tank is also included in Phase I, increasing the orbiter's performance in support of International Space Station assembly.

United Space Alliance is now over one year into their contract as the single prime contractor for Shuttle operations and the transition is going extremely well. The metrics used to measure contractor performance are all positive. The Aerospace Safety Advisory Panel has verified that the transition is going smoothly.

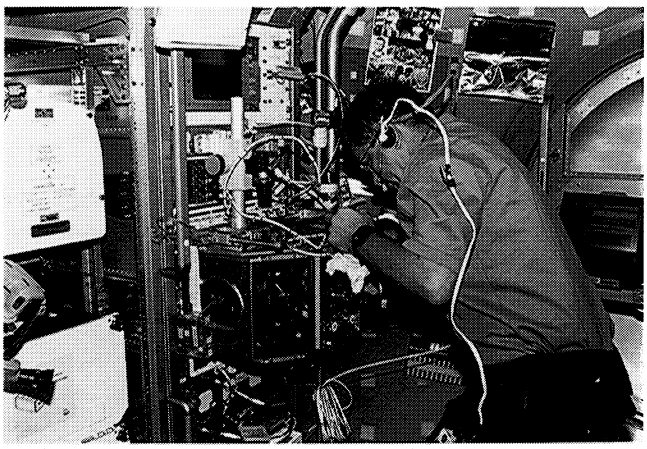
Life and Microgravity Research

In Fiscal Year 1997, NASA's Office of Life and Microgravity Sciences and Applications (OLMSA) conducted significant national and international research and scientific investigations on the Space Shuttle, the Russian Mir Space Station and through an array of ground-based and suborbital facilities.

OLMSA provided world class medical operations for the extended duration missions of John Blaha, Jerry Linenger and Mike Foale on the Mir Space Station.

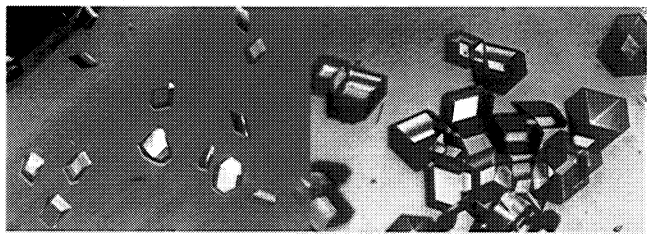
OLMSA's Advanced Human Support Technology program completed a 336-day closed-chamber wheat and potato shared atmosphere evaluation at KSC as well as a 60-day, closed-chamber ISS life support system test with four humans at JSC.

The Biomedical Research and Countermeasures (BR&C) Program uses the unique environment of space as a tool to study functions of human physiology, and its applied research activities enable the development of countermeasures to prevent the undesirable effects of space flight on humans. During FY 1997, selection and establishment of the Baylor College of Medicine consortium as the new National Space Biomedical Research Institute marked a key milestone. Also during FY 1997, the program continued its participation in the NASA-Mir Research Program with experiments on long-duration crew members John Blaha, Jerry Linenger and Mike Foale.



Roger Crouch works at the Glovebox during the MSL–1 mission.

Gravitational Biology and Ecology (GB&E) Program research resulted in a new description of the neural "wiring" of the gravity-sensing portion of the inner ear's equilibrium organs. This research is showing how the brain solves complex information-processing problems and has potential application in the design of electronic microcircuitry. Studies on Mir demonstrated that avian embryos can develop in microgravity, and that wheat seeds can germinate and mature without gravity. Experiments flown on the Russian BION 11 biosatellite contributed much data of significance on mechanisms underlying the atrophy of skeletal muscle during spaceflight.



Insulin crystals, 1g (right) and micro-g (left)

OLMSA's microgravity Research Program supported research in biotechnology, combustion science, fluid physics, fundamental physics, and materials science. In addition to materials science research aboard the Mir Space Station, the major highlight of FY 97 for microgravity research was the Microgravity Sciences Laboratory (MSL-1). The mission's first flight in April 1997 was aborted after five days. A reflight was planned and science payloads refurbished and readied for the July 1997 mission. The mission included investigations in the disciplines of biotechnology, combustion science, fluid physics and materials science, and consistently exceeded researchers objectives. The mission yielded the first measurements of specific heat and thermal expansion of glass-forming metallic alloys and resulted in the highest temperature and largest undercooling ever achieved in space. More than 200 combustion experiments runs (fires) were conducted on MSL-1, resulting in the discovery of a new mechanism of flame extinction caused by radiation of heat from soot. The MSL-1 crew were able to sustain the weakest flames ever burned either in space or on Earth and were able to study the longest burning flames ever ignited in space.

OLMSA's Space Product Development program fosters the use of space for commercial products and services. The program is implemented primarily through Commercial Space Centers (CSCs) across the country.

The program supported the flight of the Commercial Protein Crystal Growth payload on STS-86 to crystallize recombinant human insulin. The Center for Molecular Crystallography's affiliates, Hauptman Woodward Medical Research Institute and the Eli Lilly Company, were com-

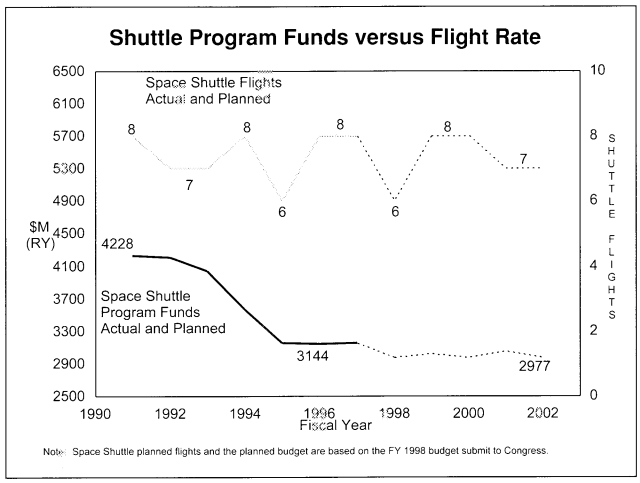
mercial partners in this research effort, which could result in advanced pharmaceuticals for the treatment of diabetes. Other highlights include analysis of the successful Wake Shield-03 mission which employed the ultravacuum of space to produce semiconductor materials, and the initial analysis of samples derived from collaboration between the Consortium for Materials Development in Space and Russia on the use of the Optizone furnace research on Mir.

Performance Measures

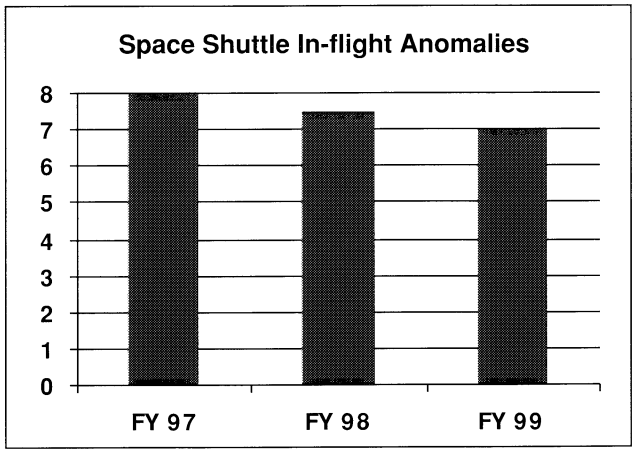
Space Shuttle Safety, Reliability, and Cost

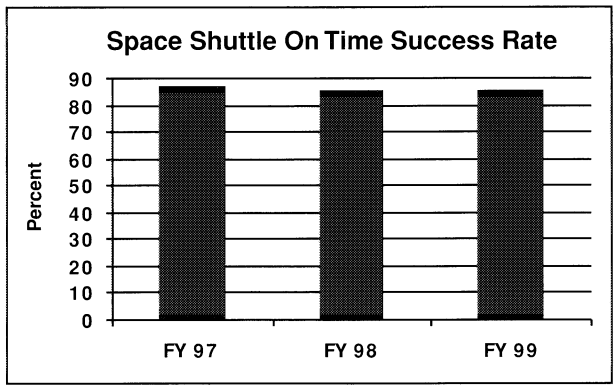
Description

Improving Space Shuttle safety and reliability are indicated by a reduced rate of in-flight anomalies, increased on time success for launches and reduced time required for mission preparation. Specifically, the HEDS Enterprise seeks to achieve 7 or fewer flight anomalies per mission, an on-time launch success rate of 85%, and reduce manifest flight preparation and cargo integration duration by 20% in FY 1999.



The Enterprise also tracks program operating funds versus manifested flight rate for the Space Shuttle program. This metric displays data starting with FY 1991 and plots actual data through the last full fiscal year





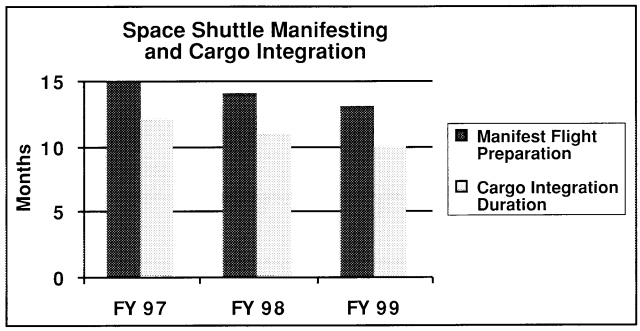
1997 and projected data after that through the year 2002. The projected funding is the FY 1998 budget submission to Congress. The actual and projected manifest is displayed for the same time period as the funding information.

Near-Term Enterprise Objective

Sustain Space Shuttle operations by safely flying the manifest (scheduled missions) and aggressively pursuing a systems upgrade program that will reduce payload-to-orbit costs.

Relationship to Agency Goal

This Enterprise objective directly supports the Agency goal of improving Space Shuttle efficiency, while achieving mission goals and trasitioning to private sector operations as appropriate.



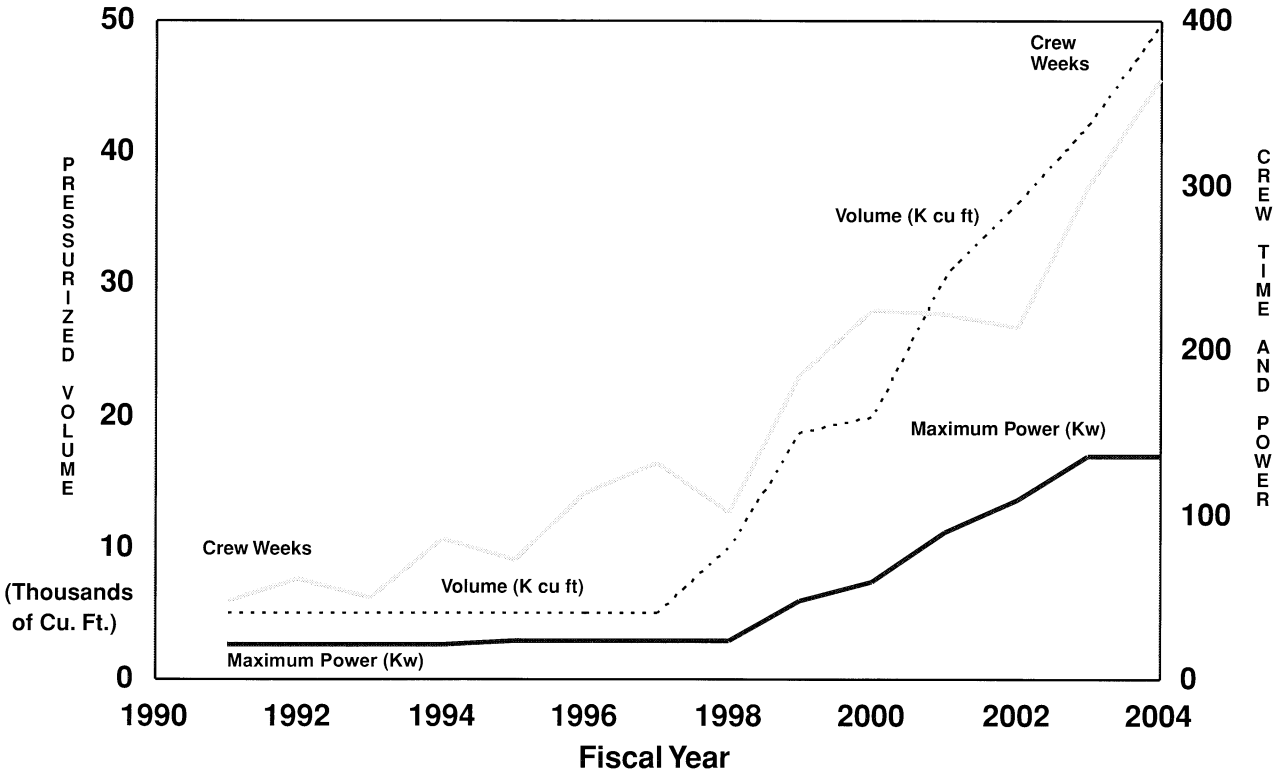
International Space Station Development

Description

International Space Station Development Key Milestones—The HEDS Enterprise will complete development of the International Space Station within budget. Progress is monitored through key milestones.

Resources for Living and Working in Space—This metric displays NASA's plans to expand human presence in space and provide key resources on-orbit for the conduct of research and technology utilization. The graphic represents key resources during the Space Shuttle era, continues through the Shuttle-Mir program, and concludes during ISS assembly. Assembly and operation of the ISS will dramatically increase the levels of these basic resources by providing a six to seven person permanent human presence, international

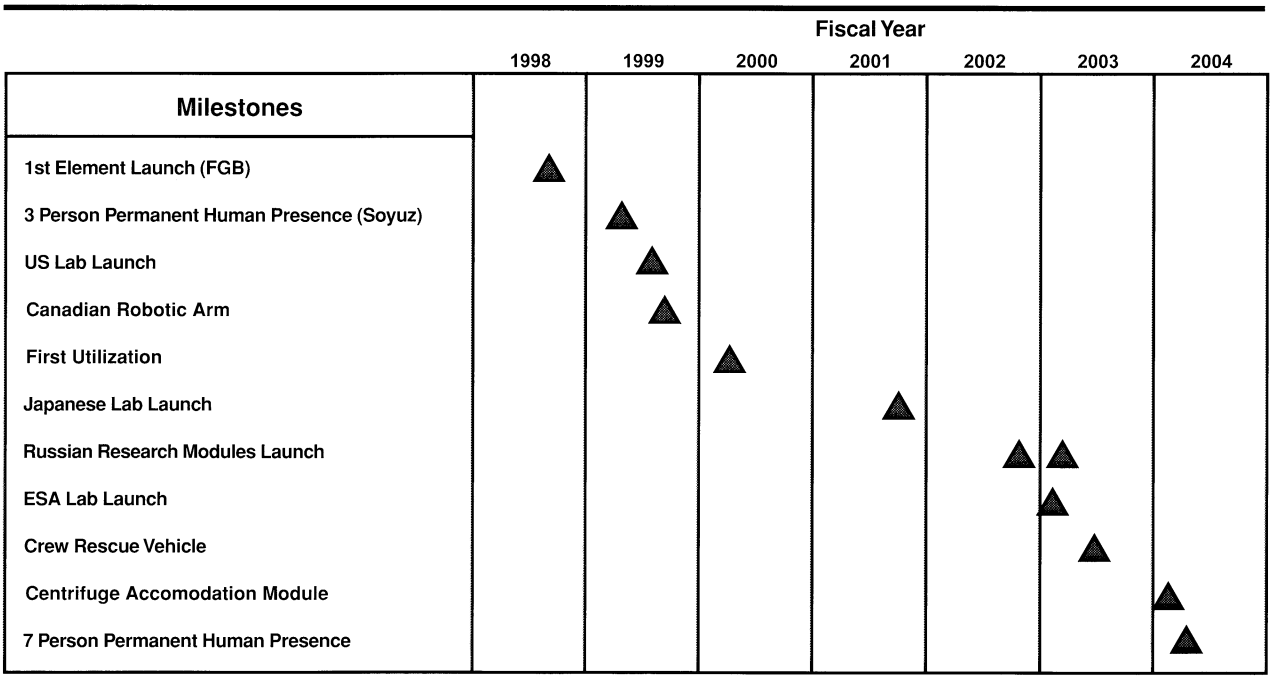
Space Shuttle, Shuttle-MIR, and International Space Station Resources for Living and Working in Space



International Space Station "Rev C" Assembly Sequence, September 1997

International Space Station Development

(Based on Rev C Assembly Sequence)



laboratory capabilities, and more than 1000 kilowatts of power.

Near-Term Enterprise Objective

Expand a permanent human presence in low-Earth orbit by transitioning from Mir to the International Space Station program in order to enhance and maximize science, technology, and commercial objectives.

Relationship to Agency Goals

This Enterprise objective directly supports the Agency goal to advance human exploration of space: assemble and conduct research on the International Space Station.

Measure of Performance: Publications and Science Community Participation

Description

The peer review process is the most widely accepted method for evaluating the merit of scientific research. HEDS applies a vigorous process of peer review to asses all scientific research proposals. HEDS tracks indicators of the strength of this process.

Total Proposals Received—This demonstrates the broad and growing interest within the scientific community in conducting HEDS research over time. Both the success of past research and efforts by the HEDS Enterprise to maintain strong communications with the broadest possible scientific community influence the number of proposals that HEDS receives.

Proposals Selected—Once proposals are received, they are reviewed and scored by peer review committees composed of objective outside experts. Those proposals receiving peer-review scores within a "selectable range" are evaluated by the committee as worthy of funding. Proposals are selected for funding based on available budget.

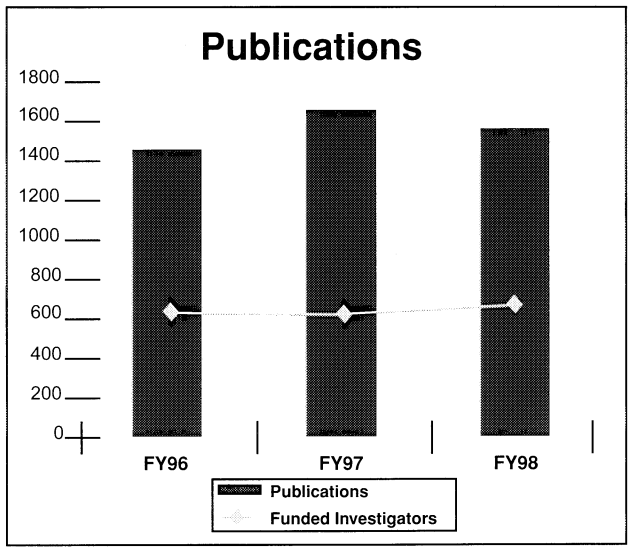
Publications—Publications represent the immediate product of HEDS scientific research efforts. Publications are the tangible manifestation of new scientific knowledge created by the HEDS Enterprise.

Near-Term Enterprise Objective

Expand scientific knowledge by exploring the role of gravity and the space environment in physical, chemical, and biological processes through a vigorous peer-reviewed research program in space.

Relationship to Agency Goals

This Enterprise objective directly supports the Agency's goal to "Explore the role of gravity and the space environment in physical, chemical and biological processes."




Access
To
Space
Revolutionary
Technology
Leaps

1997 Accountability Report

National Aeronautics and Space Administration

Office of the Chief Financial Officer

Washington, D.C.

February 1998

Aeronautics and Space Transportation Technology

Mission

Research and technology play vital roles in ensuring the safety, environmental compatibility, and productivity of the air transportation system, and in enhancing the economic health and national security of the Nation. However, numerous factors, including growth in air traffic, increasingly demanding international environmental standards, an aging aircraft fleet, aggressive foreign competition, and launch costs that impede affordable access and utilization of space, represent formidable challenges to the Nation.

The mission of the Aeronautics and Space Transportation Technology (ASTT) Enterprise is to pioneer the identification, development, verification, transfer, application, and commercialization of high-payoff aeronautics and space transportation technologies. Through its research and technology accomplishments, it promotes economic growth and national security through a safe, efficient national aviation system and affordable, reliable space transportation. The plans and goals of this Enterprise directly support national policy in both aeronautics and space documented in the "Goals for a National Partnership in Aeronautics Research and Technology" and the "National Space Transportation Policy". The Enterprise works in alliance with its aeronautics and space transportation customers, including U.S. industry, the university community, the Department of Defense (DoD), the Federal Aviation Administration (FAA), and other NASA Enterprises to ensure that national investments in aeronautics and space transportation technology are effectively defined and coordinated and that NASA's technology products and services are valuable, timely, and have been developed to the level at which the customer can confidently make decisions regarding the application of those technologies. The Enterprise also has an agency-wide responsibility for technology transfer and commercialization to ensure wide, rapid transfer of NASA developed technologies to U.S. industry for the social and economic benefit of all U.S. citizens.

Questions

How do we enable revolutionary technological advances that provide air and space travel for anyone, anytime, anywhere in the world more safely, more affordably, with less impact to the environment while improving business opportunities and global security?

Goals and Objectives

Global Civil Aviation

Enable U.S. leadership in global civil aviation through safer, cleaner, quieter and more affordable air travel.

- Reduce the aircraft accident rate by a factor of five within 10 years, and by a factor of 10 within 20 years.
- Reduce emissions of future aircraft by a factor of three within 10 years, and by a factor of five within 20 years.
- Reduce the perceived noise levels of future aircraft by a factor of two from today's subsonic aircraft within 10 years, and by a factor of four within 20 years.
- While maintaining safety, triple the aviation system throughput, in all weather conditions, within 10 years.
- Reduce the cost of air travel by 25% within 10 years, and by 50% within 20 years.

Revolutionary Technology Leaps

Revolutionize air travel and the way in which aircraft are designed, built and operated.

- Reduce the travel time to the Far East and Europe by 50% within 20 years, and do so at today's subsonic ticket prices.
- Invigorate the general aviation industry, delivering 10,000 aircraft annually within 10 years, and 20,000 annually within 20 years.
- Provide next-generation design tools and experimental aircraft to increase design confidence, and cut the design cycle time for aircraft in half.

Access to Space

Enable the full commercial potential of space and expansion of space research and exploration.

- Reduce the payload and cost of low-Earth orbit by an order of magnitude, from $10,000 to $1,000 per pound, within 10 years.
- Reduce the payload cost to low-Earth orbit by an additional order of magnitude, from thousands to hundreds of dollars per pound, by the year 2020.

Research and Development Services

Enable, and as appropriate provide, on a national basis, world-class aerospace R&D services, including facilities and expertise, and proactively transfer cutting-edge technologies in support of industry and U.S. Government R&D.

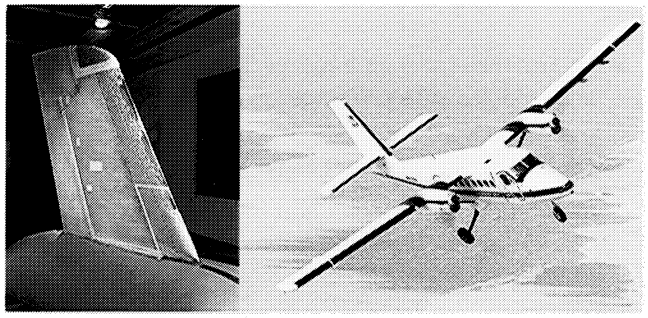
Accomplishments

The Enterprise produced many exciting accomplishments in support of our goals and objectives in FY 1997. These accomplishments will directly benefit the American people through safer, more affordable and more environmentally-friendly air travel and more efficient and affordable access to space. A few of our accomplishments, organized by our goals and objectives, are highlighted here.

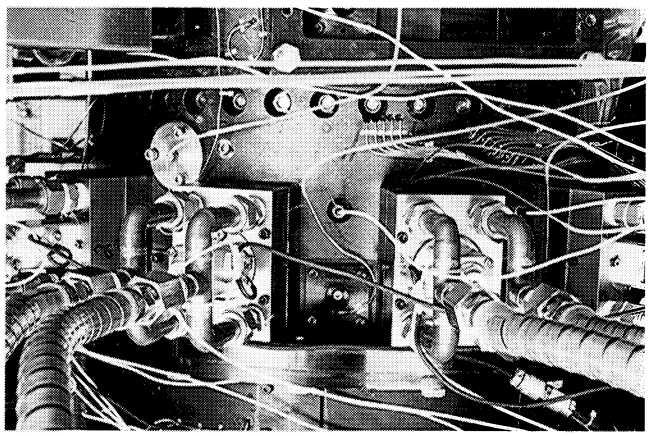
Goal One: Global Civil Aviation

Safety Objective:

- Reduce the aircraft accident rate by a factor of 5 within 10 years, and by a factor of 10 within 20 years.



To reduce the impact of inflight icing, flight tests were accomplished with a Twin Otter aircraft to investigate the effects on stall characteristics of the horizontal stabilizer with ice accumulated from (a) patterns obtained during icing wind tunnel tests, and (b) flight tests in icing weather conditions. This data will be used to better understand ice-caused aircraft stalls so as to design improved ice protection methods and ice avoidance procedures for commuter aircraft. The data will help the FAA revise ice certification standards. Icing has caused at least 16 commuter aircraft accidents.



Emissions Objective:

- Reduce emissions of future aircraft by a factor of three within 10 years, and by a factor of five within 20 years.

Small scale component testing of a new air injection system (at the tips of the compressor blades) demonstrated improved compressor stall stability. Use of this technology will allow future engines to operate closer to the stall margin—resulting in less fuel being used. Burning less fuel produces fewer emissions.

Noise Objective:

- Reduce the perceived noise levels of future aircraft by a factor of 2 from today's subsonic aircraft within 10 years, and by a factor of 4 within 20 years.

Rotorcraft flight tests were performed to investigate optimum flight procedures for minimizing noise. The tests were performed with S-76 and MD-900 helicopters. This data will be used to develop procedures for existing helicopters to minimize noise while flying over communities. Helicopter designers will use the data to influence designs of future helicopters to achieve substantially quieter helicopters.

Capacity Objective:

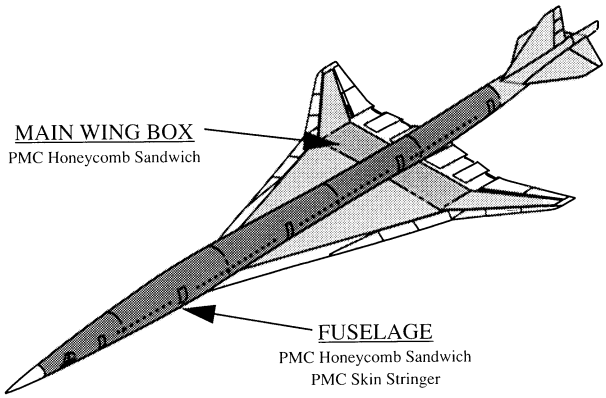
- While maintaining safety, triple the aviation system throughput in all weather conditions within 10 years.

A new Passive Final Approach Spacing Tool allowed closer aircraft spacing on final approach with no decrease in safety. During final tests at Dallas–Ft. Worth airport, it provided a 15 percent increase in traffic throughput. The tool is currently being formatted for FAA computers and will be provided to the FAA in early FY 1998.

Goal Two: Revolutionary Technology Leaps

High-Speed Flight:

- Reduce the travel time to the Far East and Europe by 50% within 20 years, and do so at today's subsonic ticket prices.

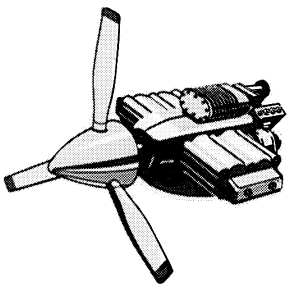


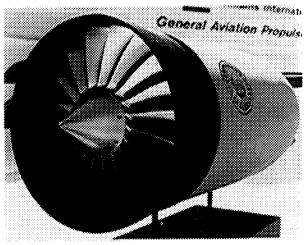
In our High Speed Research (HSR) program in the area of airframe materials and structures, subcomponent-level concepts were selected for the wing and fuselage. Concepts are to be analyzed and tested for the final downselection for the large components in late FY 1998. An airframe noise test was completed on a three–percent scale model of the high speed civil transport (HSCT) baseline providing an estimate of airframe noise levels and identifying the major noise sources: wing tips, landing gear and nacelles.

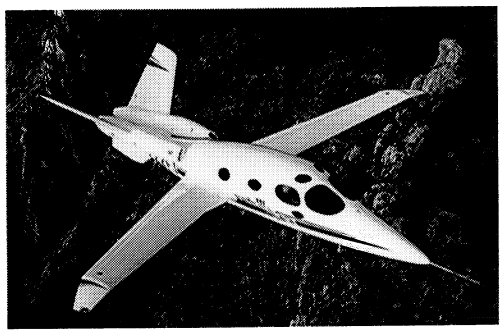
General Aviation:

- Invigorate the U.S. general aviation industry, delivering 10,000 aircraft annually within 10 years, and 20,000 aircraft annually within 20 years.

NASA signed cooperative agreements with two engine contractors, Williams International and Teledyne Ryan, to develop an advanced turbine and internal combustion (piston) engine for general aviation aircraft. Development of these high–efficiency, high–reliability, low–cost engines will greatly increase the safety, utility and marketability of new and retrofitted general aviation aircraft engines and will significantly contribute to the invigoration of the U.S. general aviation industry. Williams International flew its new engine testbed aircraft, the V-Jet 2, at the recent Oshkosh air show outfitted with a set of previously existing FJX-1 engines. The aircraft will eventually be outfitted with the new development engine, the FJX-2.

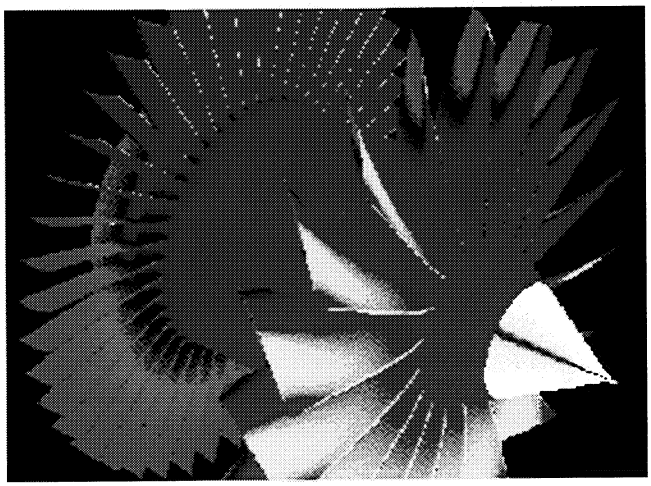




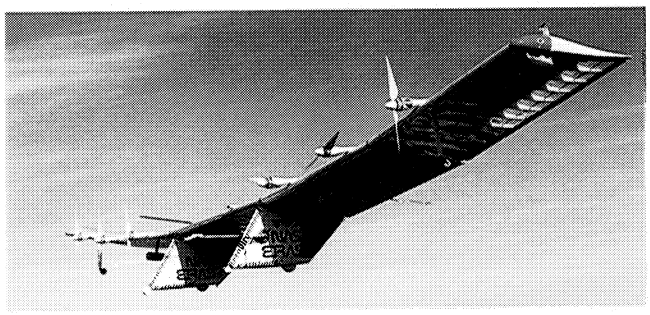


Design Tools and Experimental Aircraft:

- Provide next-generation design tools and experimental aircraft to increase design confidence, and cut the development cycle time for aircraft in half.



NASA utilized a Sun workstation cluster achieved the performance of a Cray C90 Supercomputer but at only 11percent of the cost of the C90. This capability was applied to turbine engine design by reducing the time to analyze a compressor by 90 percent—resulting in an overall 33 percent reduction in compressor design time and a $5M design cost saving. The technology of linking small computers to achieve supercomputer power can now be transferred to U.S. aircraft and engine manufacturers to cut aircraft and engine development time and cost.



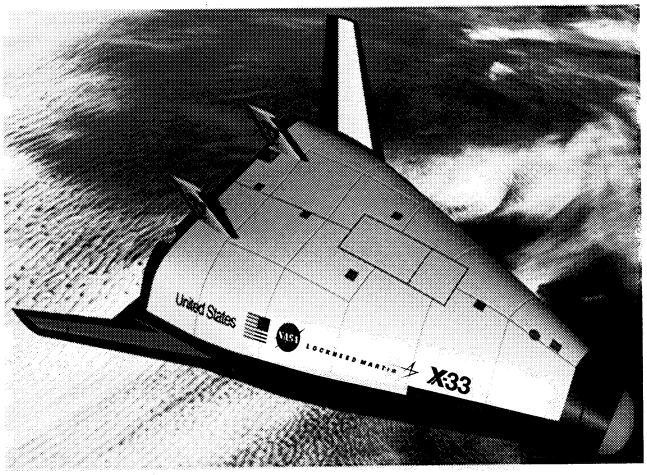
The unmanned ERAST Pathfinder aircraft set a solar electric powered aircraft altitude record of 71,504 feet. This was achieved during one of a series of technology demonstration flight tests that support commercial development of a sensor platform used to acquire sample data of the Earth's upper atmosphere. Upper atmosphere data

supports NASA's Mission to Planet Earth (or Earth Science) Enterprise and helps to assess the impact of aviation emissions on the atmosphere.

Goal Three: Access to Space

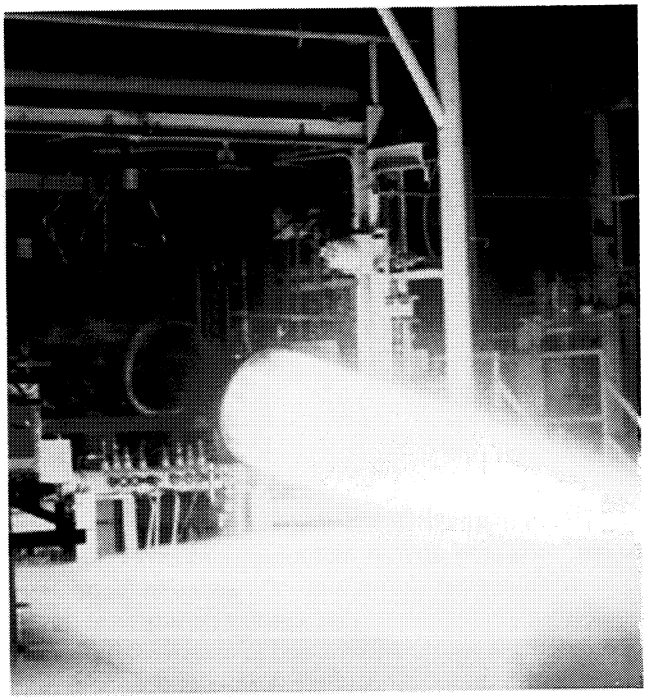
$10K to $1K per pound:

- Reduce the payload cost to low-Earth orbit by an order of magnitude, from $10,000 to $1,000 per pound, within 10 years.



The first piece of X-33 hardware, the liquid oxygen (Lox) tank, had all welding completed and preparations were under way for the integration of the tank insulation and instrumentation.

In our X-34 air-launched flight demonstrator (the Clipper Graham), a test firing was completed of the Fastrac engine nozzle-chamber at the flight operating pressure corresponding to 60,000 pounds engine thrust. The nozzle-chamber operated and performed as expected. Additional design verification tests are planned.



Performance Measures

1. Deliverables Completed as a Percentage of Planned Deliverables

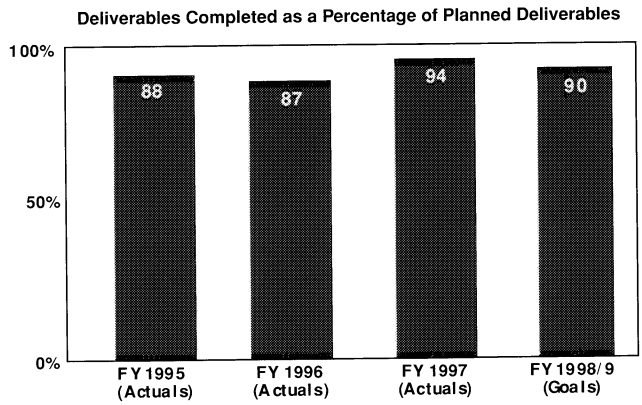
Discussion/Relation to Objectives

Each Enterprise program uses measureable customer-negotiated product and service deliverables to track annual performance against plans, including specific success criteria for milestone completion assessment. This metric aggregates performance of all individual program milestones to provide a composite indicator of progress toward the ten objectives of the Enterprise's three Technology goals.

The Enterprise goal is to complete 90 percent of customer-negotiated product and service deliverables within three months of the established commitment date.

Performance Results for FY 1997

ASTT deliverables completed as a percentage of planned deliverables have improved from 87 percent in 1996 to 94 percent in 1997.



2. Satisfaction with Facility Use

Discussion/Relation to Objectives

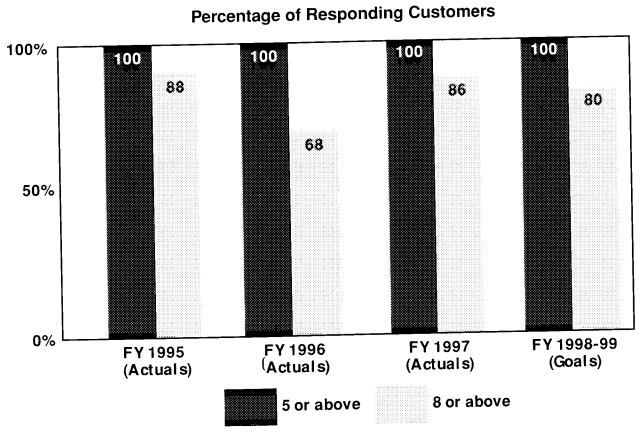
One of the major services provided by the Enterprise to its customers is access to NASA's critical research and development facilities, such as wind tunnels. Each of the four NASA Research Centers (Ames, Dryden, Langley, and Lewis) conducts exit interviews at selected facilities. This metric aggregates the interview results to provide an overall indicator of customer satisfaction relative to the Enterprise Research and Development Services goal. Facility-by-facility data is available and used to improve customer satisfaction.

The Enterprise goal is to have, on a scale of 1 to 10, 100 percent of facility exit interview respondents rate satisfaction with aeronautics facilities at "5" or above and 80 percent rate facilities at "8" or above.

Performance Results for FY 1997

For FY 1997, ASTT once again achieved the 100 percent goal regarding satisfaction rated at "5" or

above, and has improved its "8" ratings score from 68 percent to 86 percent, achieving its goal.



3a. Percentage of NASA R&D Program Involved in Partnerships

Discussion/Relation to Objectives

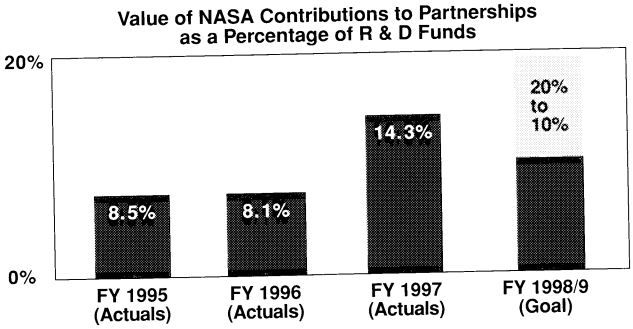
Partnerships, or cooperative programs, feature collaborative research with facility, capability, or other contributions by all parties. Such programs indicate that NASA research (and other services) is both of value to the customer and aligned with overall national requirements. Cooperative programs are one of several mechanisms for indicating or achieving such alignment of public- and private-sector goals and resources. Others include cost-sharing, no-fee contracts, and joint programs with other Government agencies.

This measure provides a key indicator of the relevancy of NASA technolgy activities to the ten objectives of the Enterprise's three Technology goals, as well as the Research and Development Services Goal.

The Agency goal is to have 10 to 20 percent of the dollar value of the total NASA R&D program involved in partnerships.

Performance Results for FY 1997

NASA has markedly increased the value of NASA contributions to partnerships as a percentage of its research and development funds from 8% in 1996 to 14% in 1997, achieving its goal.



3b. Overall Customer Satisfaction

Discussion/Relation to Objectives

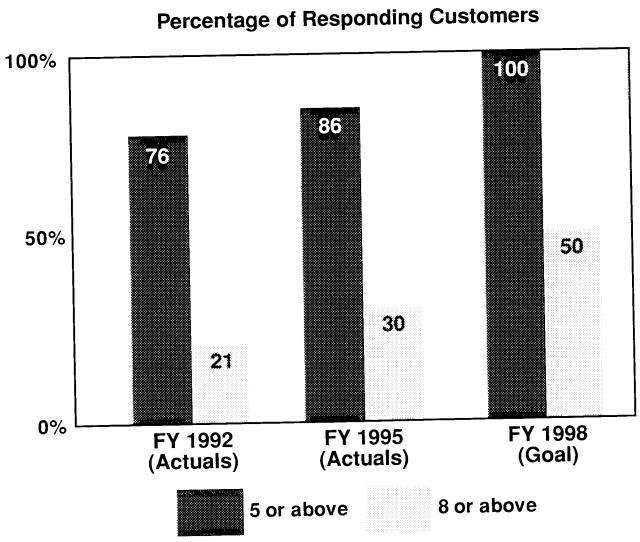
The ASTT Enterprise serves a range of customers, including the aviation and related industries, the academic community, non-aviation industries, and other Government agencies (such as DoD and FAA). On a triennial basis, the Enterprise surveys its customers to get their input on a wide range of issues, including overall customer satisfaction.

This measure provides direct feedback from users and partners on the level of satisfaction with NASA technology activities supporting the ten objectives of the Enterprise's three Technology goals, but also with respect to the Research and Development Services Goal.

The Enterprise goal is to have, on a scale of 1 to 10, 100 percent of customer survey respondents rate the Enterprise at "5" or above, and 50 percent rate the Enterprise at "8" or above.

Performance Results for FY 1997

Based on the latest survey, the Enterprise has improved on the "5" and above satisfaction scale from 78 percent to 86 percent, but has not achieved its goal. For the "8" goal, ASTT has improved from 21 percent to 30 percent.



3c. Examples Where NASA Technology Was Either Enabling or on the Critical path.

Discussion/Relation to Objectives

The transfer and actual application by an end-user of NASA-developed technology is the ultimate measure of program success. In most, if not all, instances, however, this process of technology transfer and application is one that spans years—and often decades—and involves multiple contributors; e.g., engine manufacturers, aircraft manufacturers, the airlines, and also regulatory bodies such as the FAA. This metric, therefore, is tracked through the use of specific, but qualitative examples.

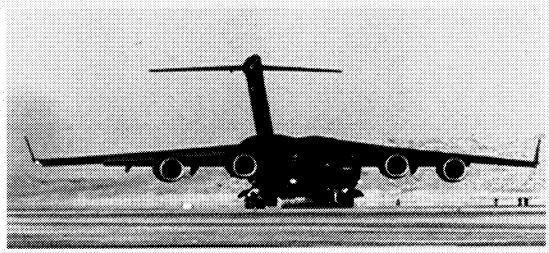
The goal is to continually increase the number of significant examples of the application and impact of NASA-developed products and services.

Performance Results

The most significant recent examples of application of NASA-developed technology are depicted at right for the Boeing 777 and the U.S. Air Force's C-17 aircraft.

Recent NASA Aeronautics Contributions Before 1997

- Glass Cockpit
- Composite Materials
- Digital Fly-by-Wire Control Systems
- Reconfigurable Digital Data Systems
- Energy-efficient, Reduced Noise and Emissions Engines
- Computational Analysis Tools and Testing Facilities



- Powered-lift System
- Winglets and Supercritical Wing
- Composite Materials
- Flight Controls and Displays/Digital Fly-by Wire
- Energy-efficient Engines
- Computational Analysis Tools and Testing Facilities

NASA Performance: Crosscutting Processes

Crosscutting Processes

Overview

NASA programs include earth and space science, human exploration and development of space, and aeronautics. These programs and others are carried out by the four Enterprises discussed in previous sections. The work of these Enterprises is facilitated by carefully managed support and oversight activities, both at Headquarters and Centers.

NASA support and oversight activities comprise four crosscutting processes.

A. Manage Strategically,

B. Provide Aerospace Products and Capabilities,

C. Generate Knowledge; and

D. Communicate Knowledge.

A. Manage Strategically

Mission

This process provides policy, direction, and oversight to Enterprises and functional staff to enable the accomplishment of programs.

Goal

The goal of this process is to provide a basis for the Agency to carry out its responsibilities effectively and safely and enable management to make critical decisions regarding implementation activities and resource allocations that are consistent with the goals, objectives, and strategies contained in NASA's Strategic, Implementation, and Performance Plans.

Objectives

- Align Agency direction and deployment decisions with external mandates and the requirements of our customers, partners, and stakeholders.
- Communicate Agency direction and decisions throughout the NASA Team and to the external community in a timely, consistent, and understandable manner.
- Optimize Agency investment strategies and systems to align human, physical, and financial resources with customer requirements, while ensuring compliance with applicable statutes and regulations.
- Improve the effectiveness and efficiency of Agency acquisitions through the increased use of techniques and management that enhance contractor innovation and performance.
- Ensure that information technology provides an open and secure exchange of information, is consistent with Agency technical architectures and standards, demonstrates a projected return on investment, reduces risk, and directly contributes to mission success.
- Foster leadership that demonstrates a commitment to the Agency's values, principles, goals, and objectives.

Approach

NASA will measure its performance and communicate its results, demonstrating its relevance and contributions to national needs.

This Accountability Report highlights accomplishments and performance measures under the Manage Strategically process in the following areas:

1. Human Resources
2. Procurement
3. Information Technology
4. Physical Resources
5. Financial Management
6. Small and Disadvantaged Business
7. Policy and Plans

Accomplishments and Performance Measures

1. Human Resources

NASA has made significant progress in its movement toward a smaller, but more focused, civil service workforce. In fact, more than three quarters of the 7,500 full-time equivalent (FTE) reductions needed in its civil service workforce have already been accomplished through voluntary measures such as separation incentives, hiring freezes, attrition, and aggressive outplacement.

NASA began its restructuring efforts in 1993 when it had approximately 25,000 civil servants at its Headquarters and Centers.

By the year 2000, NASA plans to have fewer than 18,000 civil servants. This workforce size was determined following a comprehensive Zero Base Review that redefined roles and missions and program management structures consistent with outyear funding levels.

The staff reduction represents a 28 percent cut from 1993 levels and will result in the smallest civil service workforce at NASA since the early 1960s.

Reducing staff levels has been a carefully managed process with continuous monitoring and adjusting. The chart at the end of the this section shows the progress already accomplished as well as the extent of the reductions yet to be made.

NASA has relied on several concurrent approaches for reducing staff and restructuring the organization:

Restricted Hiring. Beginning in FY 1993, some degree of hiring limitation has been in effect each year as hires have been held to a fraction of losses. Before filling a job from outside, the hiring organization must search internally at other Centers to ensure that qualified individuals who could move to the vacancy have not been overlooked.

Expanded Use of Non-permanent Appointments. NASA has recently begun to use temporary and term appointments to acquire some new employees for non-continuing work, especially work of a short-term project nature. This will create a more flexible workforce where modest fluctuations in employment levels can be accomplished by separating non-permanent employees. Individuals taking such appointments are aware of the time-limited nature of their employment.

Transfer of Positions and People. The restructuring of roles and missions among Centers has caused a need to transfer work and workers between organizations. All Centers are affected, but Kennedy Space Center (KSC) and NASA Headquarters have been affected most. NASA is transferring program management responsibility from Headquarters to the field, reducing the staff needed at Headquarters by half. The change to a single prime contractor for launch services at KSC has a profound effect on the number of NASA civil service employees required there.

Where intact positions have been moved, the incumbents of those positions were offered the opportunity to transfer to the gaining Center. This strategy has been particularly effective in the downsizing of the Headquarters staff. Transfers of staff from KSC to other Centers have also been important to the overall restructuring effort. The level of movement among Centers is more than double the level prior to undertaking restructuring.

Buyouts. The staff reductions to date could not have been accomplished smoothly without these incentive payments. More than 3,500 employees left the Agency voluntarily during the first three buyouts. NASA's use of this program received praise from employees, managers, and unions and was recognized by both the Office of Personnel Management (OPM) and the Office of Management and Budget as a model program. NASA developed a logical plan to ensure program integrity, fairness to employees, and assurance that NASA could continue to perform its functions after employees separated. Separation incentives allowed the Agency to reduce overall workforce costs, maintain workforce diversity, and sustain continuity of operations with an appropriate blend of junior and senior employees.

Early Retirement. At NASA's request, OPM has granted early retirement authority for use by NASA employees who do not meet the minimum age and service requirements for regular voluntary retirement. Used in conjunction with buyouts, early retirement authority has been extremely important to achieving voluntary staff reductions.

Career Transition Assistance. Initially implemented to assist employees contemplating taking a buyout, NASA's Career Transition Assistance Program has taken on an active role in encouraging all employees to look at the broad range of opportunities available outside the Federal Government. NASA has also developed innovative trial and phased retirement programs, including a program that enables employees to begin a new career as a teacher.

Organizational and Management Restructuring. In the wake of past buyout losses and in order to align themselves with the NASA Strategic Plan, the Centers have reorganized. This has postured them to carry out their assigned Lead Center and Center of Excellence roles. The reorganizations have also enabled NASA to make significant progress on the Presidential Directive to improve supervisory ratios by a factor of two. A ratio of one supervisor to eleven non-supervisors would constitute a doubling for the Agency. The ratio at this time is nearly 1:9.

The remaining reduction of 2,000 civil servants represents a formidable objective, particularly since the Agency has made a commitment to its employees and Congress to exhaust all available voluntary measures before using involuntary mechanisms. NASA cannot simply allow attrition to take its natural course. That would lead inevitably to reduction in force (RIF) actions at multiple Centers. Active, Agency level management is essential. A combination of strategies will be required to meet the target staffing levels.

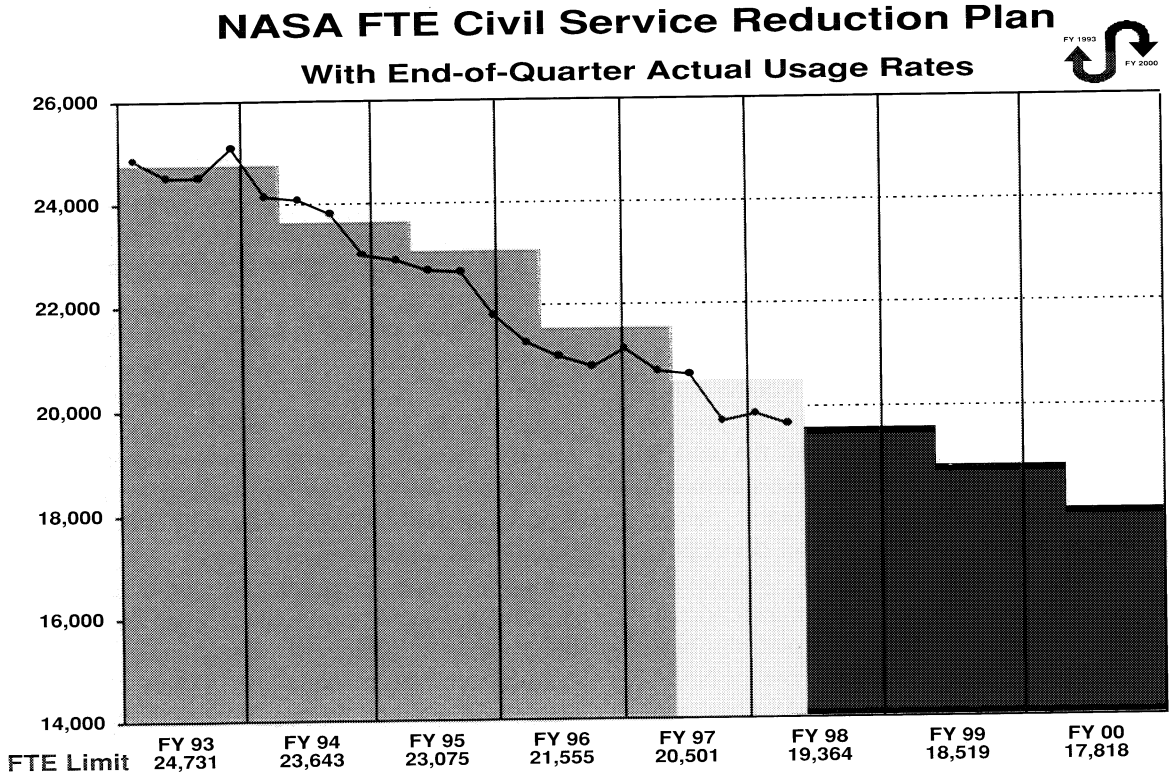
Reduce Civil Service Employment Performance Measure

Discussion/Relation to Objectives

Reducing Civil Service employment aligns human resources levels with external mandates, helps optimize Agency investment strategies, and aligns human resources with customer requirements.

Performance Results for FY 1997

NASA has reduced civil service employment below its targets of 21,555 in 1996 and 20,501 in 1997. Actual results for those years were 20,938 and 19,883. NASA



is working toward its targets of 19,364 in 1998 and 18,519 in 1999.

Increase Workforce Diversity Performance Measure

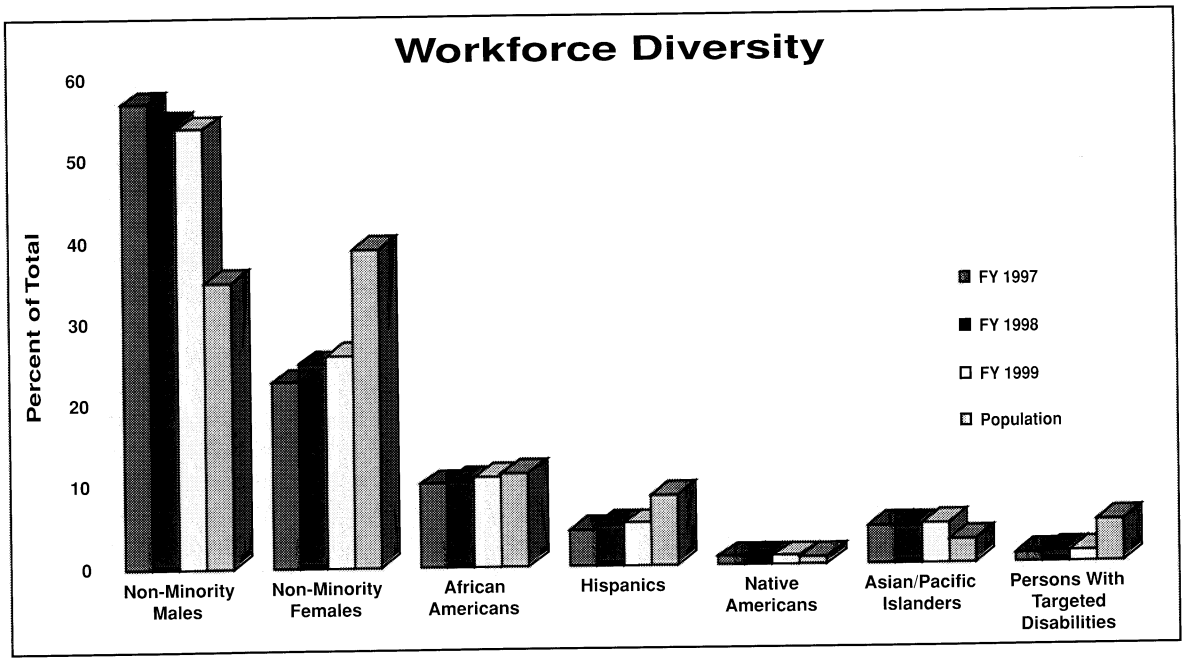
Discussion/Relation to Objectives

NASA is increasing workforce diversity by working toward a long term goal which reflects the diversity of America.

This effort aligns human resources with external mandates and increases alignment with customer requirements.

Performance Results for FY 1997

In 1996, 57.4 percent of NASA's workforce was non-minority males. This percentage has decreased to 57.1 percent in 1997, and is projected to decline to 54 percent by 1999. The percentage of non-minority females decreased from 23.0 percent in 1996 to 22.8 percent in 1997, but is projected to increase to 26.0 percent by 1999.



Representation of all minority groups including African Americans, Hispanics, Native Americans, Asian/Pacific Islanders, and individuals with targeted disabilities is projected to increase by 1999.

2. Procurement

NASA has made significant improvements in streamlining and reforming procurement. It has enhanced communication with the contractor community to ensure better understanding of policies and procedures. Major accomplishments are as follows.

Performance-Based Contracting (PBC) requires structuring all aspects of an acquisition around the purpose of the work to be performed, as opposed to how the work is to be performed or upon broad and imprecise statements of work. It emphasizes quantifiable, measurable performance requirements and quality standards in developing statements of work, selecting contractors, determining contract type, incentives, and performing contract administration, including surveillance. NASA has placed a high priority on using PBC in its procurements. Senior NASA management strongly supports this effort. NASA has conducted an Agencywide PBC awareness program to explain this initiative to both Government and contractor employees, and a training program has been put in place for technical and procurement personnel.

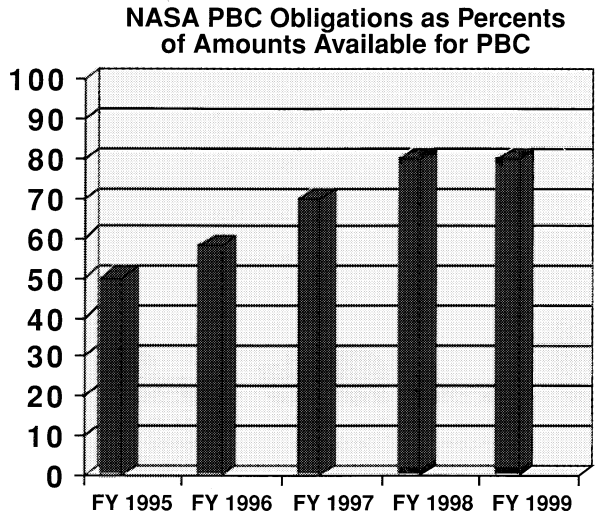
Performance Based Contracting Performance Measure

Discussion/Relation to Objectives

This metric measures efforts to improve the effectiveness and efficiency of Agency acquisitions through the increased use of techniques and management that enhance contractor innovation and performance. Performance based contracting is an example of such techniques.

Performance Results for FY 1997

In Fiscal Year 1997, NASA obligated $7.0 billion under 1261 PBC contracts or 70 percent. In Fiscal Year 1998, NASA expects to obligate $7.5 billion in 1336 PBC contracts or 80 percent.



The Consolidated Contracting Initiative (CCI) emphasizes developing, using, and sharing contracts, among Centers and with other Federal agencies, in order to meet Agency objectives. CCI was initiated on November 4, 1996, with the goals to reduce time spent on acquisition-related tasks; minimize contract duplication; reduce close-out backlogs; and improve contract cooperation with other Federal Government agencies. The CCI program has been very successful.

NASA has posted approximately 100 contracts on the Internet available for use by the Centers and by other Federal agencies. Of these contracts, approximately 40 are with small, disadvantaged, and woman-owned business concerns. Approximately 1200 orders valued at over $126 million have been placed against NASA's shared contracts during FY 1997. NASA regularly posts and promotes other Agency contracts, including the General Service Administration's Advantage Program, on CCI. CCI has also established a link with the Office of Management and Budget's Acquisition Reform Network (ARNet) site. NASA has also utilized other Agency contracts, and has placed 502 orders against their contracts in FY 1997 which were valued in excess of $64 million. NASA's CCI Web site is *http://nais.nasa.gov/msfc/cci/first.html*

While NASA historically has used **Past Performance** in evaluating firms for award, the Agency will continue to expand its use and emphasize its importance as an evaluation factor. To help contracting officers identify both "poor performers," and "excellent performers," the Office of Procurement is developing a database of contractors and their past performance. The database will cover awards from all Centers and will provide contracting officers with a means to quickly identify those firms whose work has met and not met NASA's expectations. In addition to giving contracting officers the ability to tag poor performers, contractors will be given the opportunity to review and discuss NASA's evaluation of their past performance. Emphasis in this area will show contractors that we are serious about selecting contractors who can perform and meet our requirements. By emphasizing this area, contractors will become aware of the need to improve their performance on all their contracts in order to successfully compete in the government marketplace. It is expected that such discussions will enhance contract administration on current as well as future awards.

NASA has moved aggressively to implement the President's Memorandum on **Electronic Commerce.** It has developed a service which delivers acquisition documents over the Internet to slash lead-times, paperwork, and cost. The NASA World-Wide-Web service, called the NASA Acquisition Internet Service (NAIS), provides notices, solicitations, and a host of other procurement related information. We were the first Agency to provide Agencywide implementation of Federal acquisition service on the Internet. Browsing on-line,

vendors can quickly identify acquisitions of interest. Several agencies are adopting NASA's Internet practices and tools, and we are eagerly encouraging others, through frequent demonstrations, to take advantage of this enormous potential. For example, we are working with GSA and several agencies to pilot our Internet-based Electronic Posting System. This system allows the contract specialist to simultaneously post an announcement and related solicitation documents to an Internet site for immediate access by the business community. Some of the benefits from NAIS are the broadcasting of business opportunities in a standard format across the Agency, "common look and feel" to industry, and Agency wide searches of synopses which provide "one-stop shopping" for NASA business opportunities.

NASA has developed a **Comprehensive Program of Formal Procurement Training** requirements, augmented by broadcasts sponsored by the Department of Defense on issues of particular interest. This training program ensures contracting personnel have a thorough knowledge of procurement and the necessary familiarity with the contracting "tools" available for use. The Office of Procurement also developed the Source Evaluation Board course to provide training to both contracting and technical personnel in source selection procedures. In addition, NASA instituted a requirement that all Contracting Officers Technical Representatives receive training in the their duties, responsibilities, and authority. Conventional educational and instructional techniques, new education models, and interactive video teleconferences are used to enhance the business and technical management skills of course participants. In FY 1997, 850 employees were trained in courses involving Performance Based Contracting, Contract Law, Contract Administration, Contract Pricing, and Source Evaluation Board procedures.

NASA has enhanced its **Source Selection Procedures.** Typically, it establishes three evaluation factors: Mission Suitability, Cost/Price, and Past Performance. Proposal evaluation and source selection are based on these factors as defined by specific subfactors (and elements, if further definition is necessary). In accordance with the Federal Acquisition Regulation (FAR) and NASA FAR Supplement, evaluation subfactors, and any elements, are to be tailored to the unique characteristics of each acquisition and structured to identify significant discriminators—or "key swingers"—the essential information required to support a source selection decision. A revision to the FAR covering the evaluation and selection of contractors was published in the Federal Register on September 30, 1997. The goals of the rewrite were to infuse innovative techniques into the source selection process, simplify the process, and facilitate the acquisition of best value. Among other changes, this revision will provide for contracting officers to establish a competitive range of those firms evaluated as "most highly rated," rather than the previous standard of those having a "reasonable chance of being selected for award." While the FAR revision allows Federal agencies to delay its implementation until January 1, 1998, NASA's Office of Procurement has elected to permit its contracting officers to use the new procedures immediately.

3. Information Technology

NASA success in both program Enterprises and supporting activities relies on use of the best of contemporary information technology. The overall direction for management of Agency IT resources is one of consolidation, simplification, and openness.

In fiscal year 1999, NASA plans to invest approximately $1.6 billion in information technology to support space, science, and technology goals. This supports fifty major systems of either high cost or critical management importance, as well as a broad portfolio of supercomputer, mainframe, desktop, and communications applications, capabilities, and assets.

As a premier research and development Agency, information technology—from a laptop flying on the Space Shuttle to a communications network transmitting images from a new galaxy—has enabled the Agency to deliver on its commitments for better, faster, cheaper, and safer missions and products.

Highlights of key information technology initiatives are summarized below.

The imagination and interest of the world was sparked by **Space Science** through the incredible images and data returned by the Mars Pathfinder mission and other missions that resulted in new discoveries about the origin of the universe, identified new planets around neighboring stars, and dramatically increased our understanding of how the Sun works.

The Agency continued to develop and demonstrate revolutionary new technologies to enable more frequent, less costly missions on smaller spacecraft. In each of these initiatives, information technology was essential. For example, almost every aspect of the Mars Pathfinder mission used information technology that has exceeded expectations for performance and helped drive down costs in the new "better, faster, cheaper" tradition. From a radiation-hardened version of IBM's 32-bit RISC System/6000 used to guide the Pathfinder's journey to Mars to the software architecture used for navigation on the planet, information technology helped ensure the success of a leading edge mission at roughly one fourth the cost of previous missions. The same technological innovations that made this smaller, cheaper more efficient spacecraft possible also enabled the public to participate as never before, interacting with front-line researchers via the Internet, sharing the excitement of discovery. The world's interest and participation in the Mars mission was demonstrated by the over 265 million hits on the Pathfinder Web page during the first five days after landing.

In the Nation's **Human Exploration and Development of Space** program, manufacturing and testing of flight hardware to support the first element launch of International Space Station continued. The extensive U.S. presence on the Russian Space Station Mir further enhanced this critical international partnership, provided valuable experience in the long-term effects of weightlessness, and returned invaluable scientific results from a wide range of onboard life and microgravity experiments. The Agency continued activity to enhance the Shuttle's performance and capabilities while sustaining scheduled missions to safely launch, operate, and return the orbiter and crew.

Information technology plays a critical role in the success of this program. The new Mission Control Center at the Johnson Space Center has transitioned from the program-unique, 1960s based manned space flight control center to one which belongs to the 21st century. The new control center eliminates the NASA-unique equipment and massive hardware orientation of the original Mission Control, replacing it with a modular, software-oriented design that uses standard, commercially available equipment. It offers unprecedented flexibility in flight control operations, allowing the facility to be changed from controlling a Space Shuttle to controlling any other spacecraft with almost the speed of simply choosing a different function from a computer menu.

The Agency is also replacing the current Launch Processing System at the Kennedy Space Center to ensure the economical operation of the Space Shuttle fleet through 2012. The existing system, developed in the late 1970s, to track the fleet of orbiters through all steps of processing through launch, has grown costly and difficult to maintain. The replacement Checkout and Launch Control System, using commercial hardware and software and a modular implementation approach, is anticipated to save approximately 50% of the current system costs.

NASA has also made many advances in the new discipline of Earth system science through the initiatives of the **Mission to Planet Earth** Enterprise. Space-based and supporting earth-based capabilities are being used to gain a multi-disciplined understanding of the Earth as an integrated system with a focus on understanding the global environment. The Earth Observing System (EOS) is a key element in the U.S. Global Change Research Program, and NASA's major contribution to this effort. The EOS is a series of spacecraft designed to provide long-term data sets for use in modeling and understanding specialized areas as tropical rainfall, ocean wind speed and direction, and global ozone concentrations. The EOS Data Information System, currently under development, is a state of the art, complex distributed information system for spacecraft control and science data processing for the EOS spacecraft. It will also process, storage, and distribute the EOS science data and resulting scientific products throughout the world, growing at a rate of 2100 gigabytes per day.

In **Aeronautics and Space Transportation Technology,** Agency efforts are focused on a safer, cleaner, and more affordable global aviation system, for sustainable growth in aviation products and services, and for affordable access to space. Information technology is critical to the research, development, and commercialization of high payoff design tools and technology products for industry and Government, and for application to a safe and efficient national aviation system.

NASA is also an active participant in the High Performance Computing and Communications program and has pioneered the application of design and simulation software on parallel machines and developed needed performance, evaluation, and tuning software for applications running on parallel machines. This program provides critical support to a broad range of programs spanning all Enterprises. As part of this program, the Agency supports the Next Generation Internet initiative whose goal is to develop a research network capable of achieving speeds of 100 to 1,000 times faster than today's Internet and large gains in the quality of service.

NASA has an established **Agencywide IT Architecture** to provide integrated, inter-operable, and secure technologies, capabilities, standards, and processes needed to support mission requirements. It has established minimum hardware and software requirements for interoperability, as well as minimum acquisition requirements to help ensure future interoperability between heterogeneous environments of Personal Computer, Macintosh, and UNIX systems, including file interface standards and products. Obsolescence targets for IT equipment (average age of three years) will ensure a consistent and economical architecture over time. A plan for achieving these standards consistently throughout the Agency has been established and all Enterprises and Centers are on schedule to meet established requirements. NASA has also standardized on a networking infrastructure for both the wide and local area applications. The Agency has a successful, Agencywide X.500 Directory implementation and has standardized on an electronic mail backbone supporting two approved electronic mail products. It is in the process of defining an Agencywide IT security infrastructure based on a variety of mechanisms, including firewall/proxy solutions and a public/private key infrastructure. NASA has also embraced the use of the World-Wide-Web (WWW) Browser as a "universal" client and can be considered a leader in its use for dissemination and retrieval of information. The Ames Research Center, Marshall Space Flight Center, and Lewis Research Center have been established as Principal Centers to support Agency architectural and standards initiatives in the areas of IT security, communications architecture, and workstation hardware and software, respectively.

The **Agency is implementing new business approaches to delivering services** to reduce expenditures

on IT. Across the IT spectrum, senior management has carefully evaluated alternative business approaches for delivering capabilities and services that are not the inherent responsibility of the Government. We are consolidating management functions; consolidating routine operations, services and assets; and transferring responsibility for delivering service and managing assets via outsourcing.

The Agency is **consolidating mainframe and mid-range processors.** The **N**ASA **A**DP **C**onsolidation **C**enter (NACC) provides Agencywide mainframe support for ongoing administrative and programmatic requirements. Consolidation activities will be complete with the migration of the workloads supporting the Aeronautics and Space Transportation and Mission to Planet Earth Enterprises by the end of FY 1997. Optimization of the NACC will be a continual process with expected efficiencies to be gained by consolidating and standardizing software licenses, people skills, hardware maintenance, and capacity management. NASA is defining a strategy to review and assess the feasibility of consolidating mid-range processors.

NASA is **consolidating management of supercomputing resources** through its Consolidated Supercomputing Management Office. This office has responsibility for acquiring, maintaining, operating, managing, upgrading, and cost-center budgeting for NASA's supercomputers, including production, research and development, and secure compute engines. Annual savings of approximately $2 million in the first year and $3 million in the ensuing years are estimated as a result of previous consolidation of production and R&D supercomputing. Additional savings are anticipated through continued management efficiencies.

NASA is outsourcing agency desktop computers and local area networks. The Outsourcing Desktop Initiative for NASA (ODIN) will result in outsourcing the vast majority of desktop and server assets, intra-Center communication systems, hardware and software acquisition and maintenance, help desk, training, and other ancillary support services for civil servants and certain on-site contractors. ODIN's objectives are to: reduce the cost of delivering desktop, server, and intra-Center communications services; optimize service delivery by acquiring these as a utility from a single point of contact at a center; transfer asset management responsibilities and risk to the commercial sector; shift civil servant resources to support NASA's core mission; and evolve to a more common computing and communications environment. Current plans call for contract award in late FY 1998.

The National Space Policy stipulates that NASA will "seek to **privatize or commercialize its space communications operations** no later than 2005". The Space Operations Management Office (SOMO), located at the Johnson Space Center, manages the telecommunication, data processing, mission operation, and mission planning services needed to ensure the goals of exploration, science, and research and development programs are met in an integrated and cost-effective manner. As NASA's agent for operational communications and associated information handling services, the SOMO is committed to seeking and encouraging commercialization of operations services and to participate in collaborative interagency, international, and commercial initiatives.

Efforts are ongoing to consolidate and streamline major support contract services in order to optimize space operations, including communications services. In FY 1996, a voluntary contractor partnership was established between the major incumbents. Transition to a Consolidated Space Operations Contract (CSOC) is planned to produce efficiencies and economies across all NASA programs.

The Agency's **Year 2000 Plan** reflects estimated costs to make hardware and software changes to be approximately $45 million through the new millennium. At the highest levels of management, the Agency is committed to meeting Federal-wide Year 2000 goals. NASA has an aggressive Year 2000 Plan, and all work is proceeding as planned to make, test, verify, and deliver changes to ground and in-flight hardware and software affected by the Year 2000 problem. Approximately 40 percent of the systems identified as mission critical are currently Year 2000 compliant. Approximately 100 non-compliant mission critical systems are targeted for repair. Renovation, validation, and implementation activities required to ensure a smooth transition to the new millennium for these critical systems is proceeding on schedule and within cost.

NASA is implementing **Full Cost Accounting, Budget, and Management** and an **Integrated Financial Management System.** Full cost accounting and resources management is a concept that ties all Agency costs to major activities and budgets, accounts, reports and manages such activities from a full cost perspective.

Currently, NASA's financial management systems structure is provided through a series of Agencywide and Center-unique automated systems. Implementing full costing is contingent upon the successful implementation of the Integrated Financial Management Program (IFMP). The IFMP has reengineered financial processes and systems and will provide an integrated set of commercial software packages to meet management objectives, with Agencywide implementation scheduled to occur in FY 1998–1999 timeframe. The Chief Information Officer is working jointly with the Chief Financial Officer to ensure that a robust and secure IT infrastructure is in place to support this strategic business application.

4. Physical Resources

NASA has made significant progress in optimizing Agency investment strategies to align physical resources

with customer requirements. It has identified and integrated new techniques and technologies for the best use of past and future investments which dramatically increase the return on investment of scarce resources.

NASA measures progress made in this area by capturing costs avoided through investment strategies other than new Agency acquisitions. Examples of these strategies include partnering, value engineering, performance-based contracting, energy conservation, recycling, pollution prevention and outsourcing. The 1998 cost avoidance projection is $72 million.

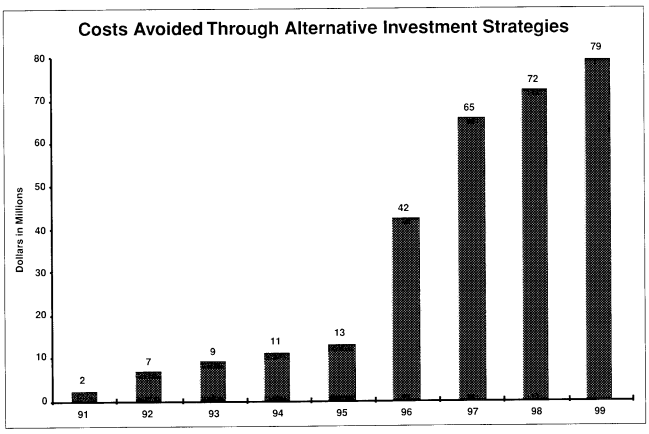
Physical Resources Cost Avoidance Performance Measure

Discussion/Relation to Objectives

This metric measures efforts to optimize investment strategies and systems to align physical resources with customer requirements. The target for this metric is to achieve a 10 percent per year increase in costs avoided through use of these alternative investment strategies.

Performance Results for FY 1997

Costs avoided were $42 million in 1996 and $65 million in 1997. This represents an increase in FY 1997 over 50 percent.



5. Financial Management

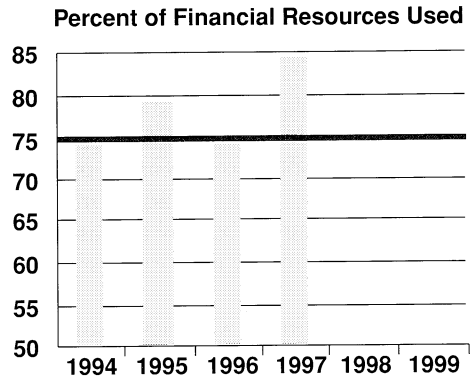
Budget/Resource Management

The planning and use of scarce financial resources are critical activities. NASA must effectively plan, control, distribute, and use available resources in a timely manner, consistent with legal and policy guidelines. A key metric is the rate of use during the performance period. Usage is indicated by the percentage of financial resources that are costed. The use of available financial resources is significantly influenced by the unpredictable nature of highly technical research and development activities. In that regard, a significant proportion of NASA's appropriations are normally available for obligation for a two-year period.

Financial Resources Used Performance Measure

Discussion/Relation to Objectives

This metric measures efforts to optimize investment strategies and systems for use of financial resources and to align financial resources with customer requirements. The target level of performance for financial resource management is to use 70 percent or greater of available financial resources. This includes uncosted resources from prior years and new appropriations. Usage is on the basis of costs incurred. Costs incurred include capital acquisition and are adjusted for unfunded costs.



Performance Results for FY 1997

In FY 1997 the financial resource usage rate reached 84 percent, a significant improvement over prior years.

Accounting and Reporting

The accounting and reporting function of payment of vendors' invoices in a timely and accurate manner is a critical step in the resource use process. Prompt, accurate payment of vendors is also a critical element in the maintenance and enhancement of solid professional working relationships between NASA and the aerospace and other industries. This measure focuses on the percent of vendor dollar billing paid on time. NASA's successful performance of financial and resource management activities requires related supporting capabilities/expertise. Such expertise includes knowledgeable staff, working in partnership with program and administrative officials to achieve NASA missions. Capabilities in this area also include timely, accurate, reliable information provided through an efficient, integrated financial management system. NASA's required capabilities/expertise, including an integrated financial management system project, are being pursued through several strategic financial and resource management initiatives. The integration of these, and other, initiatives is expected to support improved financial and resource management performance during the coming years.

Timely Bill Payment Performance Measure

Discussion/Relation to Objectives

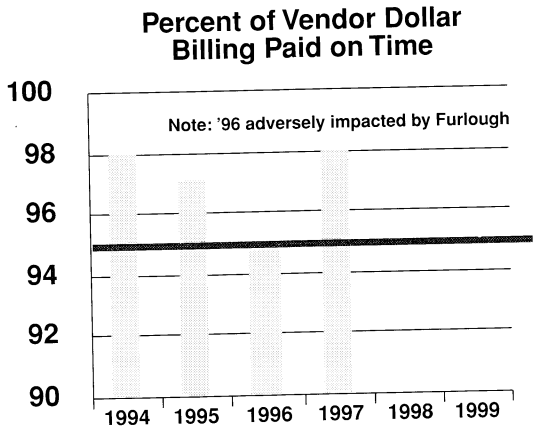
This metric measures efforts to optimize Agency investment strategies and systems to align financial resources with customer requirements by ensuring that financial resources are put to use by paying bills on time but not before. The target level of performance for timely payment of vendor invoices is 95 percent.

Performance Results for FY 1997

Actual experience with timely payment was 98 percent in 1994, 97 percent in 1995, 95 percent in 1996 (impacted by statutory furlough of Federal employees), and 98 percent in 1997.

6. Small and Disadvantaged Business

Public Law 101-144, as amended by *Public Law 101-507,* requires NASA to pursue a goal that at least 8 percent of its contractual dollars go to small disadvantaged business. This requires NASA to award at least 8 percent of its total prime and subcontract dollars to small disadvantaged businesses (SDB), including small women-owned businesses, Historically Black Colleges and Universities, and other minority educational institutions.



NASA's performance against this legally mandated goal is monitored annually during the Budget hearing process in Congress. Data to calculate NASA's 8% goal are extracted from the same procurement database through which the Agency accomplishment is measured against annually negotiated goals with the Small Business Administration.

NASA's implementation of its 8 percent goal integrates three related metrics:

1. Increase the number of contracts awarded to SDBs,

2. Increase the quality of the contracts awarded to SDBs, and

3. Institutionalize the process and initiatives.

The target Level of performance for FY 1997 through FY 1999 is to exceed 8 percent.

Use of Small and Disadvantaged Business Performance Measure

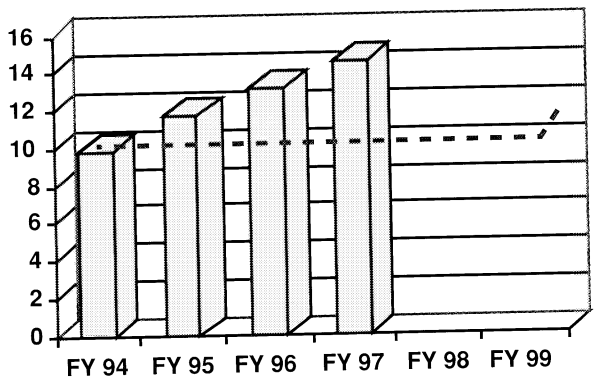
Discussion/Relation to Objectives

This metric measures performance in aligning Agency direction and deployment decisions with external mandates and requirements of customers. It also helps optimize investment strategies and improves the effectiveness and efficiency of acquisitions through increased reliance on small and disadvantaged business.

Performance Results for FY 1997

NASA's performance over the past four fiscal years (FY), against its 8 percent goal follows:

FY 1994	9.9%	$1.186B
FY 1995	11.7%	$1.465B
FY 1996	13.1%	$1.568B
FY 1997	14.5%	$1.750B



7. Policy and Plans

During FY1997 NASA worked aggressively to increase the level of consensus with its customers in the science community, industry, academia, other Federal agencies, and the public; and with its stakeholders in the Administration and Congress. Subjects included mission, goals, and objectives.

This extensive consultation process resulted in a significant improvement in the quality of NASA's Strategic Plan.

Feedback from the Administration and Congress has been very positive on the Agency's Plan and planning process. In a Senate hearing on Government Performance and Results Act implementation in June 1997, NASA was identified as the only Agency meeting GPRA requirements.

In a report issued by the Congress in November 1997, NASA's Strategic Plan was rated as one of the top five in the Federal Government. One element of significant importance in this report was NASA's score in the

area of Congressional and stakeholder consultation. The Agency recorded a score of 10 out of a possible 10, indicating a very high level of satisfaction relative to this performance goal for the Agency.

B. Provide Aerospace Products and Capabilities

Mission

This process is the means by which NASA's Strategic Enterprises and their Centers deliver systems (aeronautics, space, and ground), technologies, data, and operational services to NASA customers so they can conduct research, explore and develop space, and improve life on Earth. The Agency uses this process to answer the fundamental questions:

- What cutting-edge technologies, processes, techniques, and engineering capabilities must we develop to enable our research agenda in the most productive, economical, and timely manner?
- How can we most effectively transfer the knowledge we gain from our research and discoveries to commercial ventures in the air, in space and on Earth?

Goal

The goal of the process is to enable NASA's Strategic Enterprises and their Centers to deliver products and services to customers more effectively and efficiently while extending the technology, research, and science benefits broadly to the public and commercial sectors.

Objectives

- Reduce the cost and development time to deliver products and operational services that meet or exceed customers' expectations.
- Seek out and apply innovative approaches, in cooperation with NASA partners and customers, to enable ambitious new science, aeronautics, and exploration missions.
- Focus on integrated technology planning and the technology development driven by Strategic Enterprises and customer needs.
- Facilitate the insertion of technology into all programs and projects, and proactively transfer technology, form commercialization partnerships, and integrate other innovative approaches to strengthen U.S. competitiveness.
- Improve and maintain NASA's engineering capability, so that NASA will be recognized as the leading aerospace engineering research and development organization in the World.
- Capture and preserve engineering and technological best practices and process knowledge to continuously improve NASA's program/project management capability.

Approach

This process enables the Strategic Enterprises to reduce development cost and time for cutting-edge technology to enable increased opportunity for research exploration, and discovery.

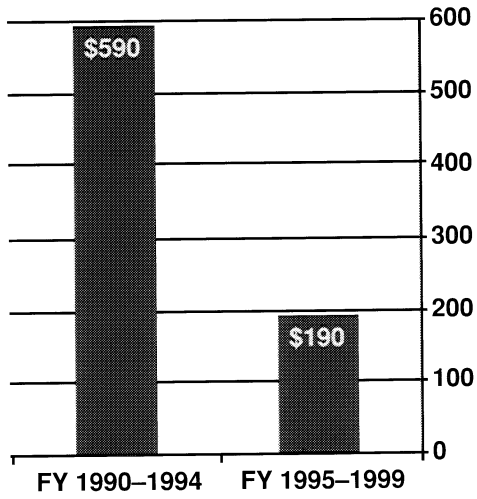
a. Reduce Development Cost Performance Measure

Discussion/Relation to Objectives

This metric measures the change in cost to deliver high quality aerospace products and capabilities.

Performance Results for FY 1997

Reduced average system development cost to $190M from $590M.



b. Reduce Development Time Performance Measure

Discussion/Relation to Objectives

This metric measures the change in development time to deliver high quality aerospace products and capabilities.

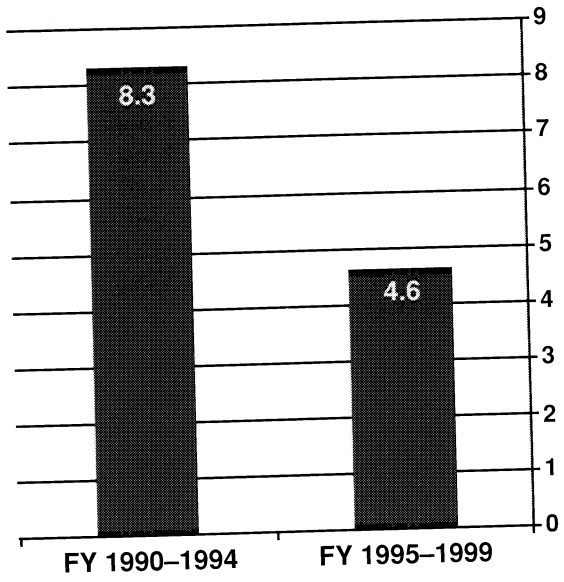
Performance Results for FY 1997

Reduced average system development time to 4.6 years from 8.3 years.

c. Percentage of NASA R&D Program Involved in Partnerships Performance Measure

Discussion/Relation to Objectives

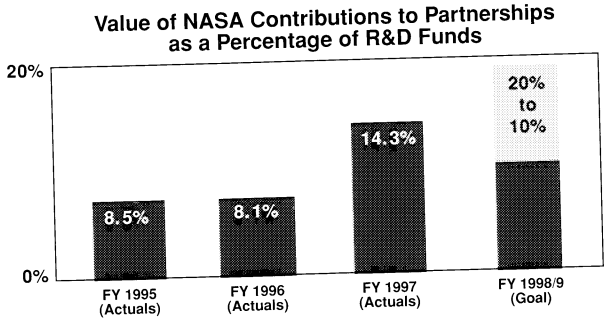
This metric assesses the quality and alignment with customer needs of NASA technology development by measuring the percentage of the R&D budget in



partnership with industry. The agency goal is to have 10 to 20 percent of the dollar value of the total R&D program involved in partnerships. This metric is managed by the Aeronautics and Space Transportation Technology Enterprise. In the future, separate measures will be established in support of this metric.

Performance Results for FY 1997

NASA has markedly increased the percentage of NASA's R&D budget in partnerships to 14 percent in FY 1997 from 8 percent in FY 1996, meeting the goal.



C. Generate Knowledge

Mission

This is the crosscutting process through which NASA provides new scientific and technological knowledge from exploring Earth, the solar system, and the universe and from researching the space environment, aeronautics, and astronautics. This knowledge is provided to scientists, engineers, and technologists in industry, academia, and other organizations, as well as to natural resource managers, policy makers, educators, and other customers. This process plays a major role in seeking answers to the fundamental questions of science and research.

The Generate Knowledge process includes the following crucial subprocesses, and the steps within each of them, which are the focus of the process improvement activity.

Solicit and Select Researchers

- Develop solicitation instrument (e.g., NASA Research Announcement, Cooperative Agreement Notice)
- Establish selection process
- Choose reviewers
- Release solicitation and receive responses
- Conduct review
- Make selections
- Debrief proposers

Fund researchers

- Finalize budget
- Prepare funding authorization document package
- Obtain required signatures
- Notify recipient institutions and others as appropriate
- Disburse funds

Provide data to researchers and information to the public

- Establish data systems, archives, and procedures
- Make data available to researchers and information to the public expeditiously through data systems, archives, and procedures

Goals

The goals of the Generate Knowledge process are to extend the boundaries of knowledge of science and engineering, to capture new knowledge in useful and transferable media, and to share new knowledge with customers.

Objectives

Improve the efficiency with which NASA:

- Acquires advice from diverse communities
- Plans and sets research priorities
- Selects, funds, and conducts research programs
- Archives data and publishes, patents, and shares results

Accomplishments

During FY 1997, NASA initiated a broad review of the Agency's grant award process. NASA is examining its own internal practices at the various Centers, as well as the practices of other Government agencies. The Agency expects significant changes and efficiencies to result from this review.

Also in FY 1997, the Mars Pathfinder mission set new standards for the dissemination of science results. Images were televised instantaneously, and posted to the World Wide Web within minutes to days of receipt from the spacecraft. Over 500 million Web hits were received from all over the globe during July 1997. Preliminary science results were presented frequently in press conferences. And the first scientific papers were published in December. NASA is applying the lessons learned from this mission to other missions.

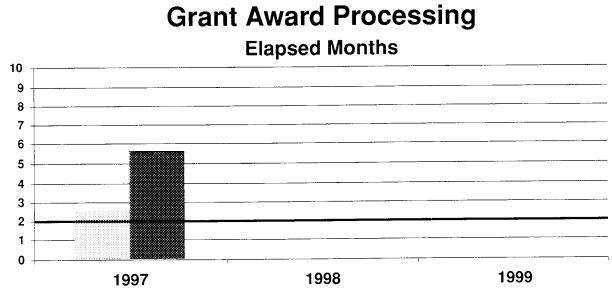
Reduce Time from Selection of Researchers to Payment Performance Measure

Discussion/Relation to Objectives

This metric measures the elapsed time from the selection, by the NASA Selecting Official, of winning proposals to the receipt of funds at the respective research institution. The target for this metric is to fund all grants within two months of selection by 1999.

Performance Results for FY 1997

In FY 1997, this process required a minimum of 2.5 months, and a maximum of 5.6 months.



D. Communicate Knowledge

Mission

NASA uses this process to increase understanding of science and technology, advance its broad application, and inspire achievement and innovation. This process also ensures that the knowledge derived from NASA's research and development programs is presented and transmitted to meet the specific needs and interests of the public and NASA's constituency groups.

Goal

The goal of this process is to ensure that NASA's customers receive the information derived from the Agency's research and development efforts that they want, when they want it, for as long as they want it.

Objectives

The process objectives are as follows:

- Highlight existing and identify new opportunities for customers, including the public, the academic community, and the Nation's students, to directly participate in the space research and discovery experience.
- Improve the external constituent communities' knowledge, understanding, and use of the results and opportunities associated with NASA's programs.

Approach

To achieve the goal and objectives for this process:

- We will foster partnerships with teachers and students.
- We will work with teachers and others in the academic community to inspire America's students and create increased learning opportunities.
- We will help enlighten inquisitive minds and involve teachers and students in our endeavors to seek answers to fundamental questions of research and science.

Management's Discussion and Analysis

Management's Discussion and Analysis

This section provides discussion and analysis of NASA's financial statements, addressing the objectives of the:

A. Federal Managers' Financial Integrity Act (FMFIA),

B. Federal Financial Management Improvement Act (FFMIA),

C. NASA's Five-Year Financial Plan,

D. Prompt Payment Act,

E. Civil Monetary Penalty Act,

F. Debt Collection Act.

This section also provides an introduction to NASA's financial statements.

A. Federal Managers' Financial Integrity Act (FMFIA)

NASA's management controls and financial systems, taken as a whole, provide reasonable assurance that the *objectives of Section 2 of the FMFIA* have been achieved. Section 2 concerns the adequacy of internal controls to prevent fraud, waste, abuse, and mismanagement.

NASA is pleased to report continued progress in establishing reasonable management controls. While budgetary constraints and accelerated efforts at streamlining our work result in greater management risks, NASA is aggressively working to improve management by finding effective and efficient means for maintaining reasonable controls. NASA initiatives include Agencywide efforts to obtain third-party International Organization for Standardization (ISO 9001) certification of key management processes, significant directives reduction, an on-line directives information system, and implementation of management processes through strategic planning and management.

Our conclusion that NASA has reasonable controls in place does not mean that NASA is without management improvement opportunities. Audits, functional reviews, and other evaluations have revealed management weaknesses in individual systems. We are aggressively correcting the financial management system control weaknesses. This year, NASA made significant progress in implementing the corrective action plan for its reported financial management systems weakness and completed corrective action on three significant areas of concern. Two new significant areas of management concern are reported: Equitable Environmental Cost Sharing and Information Technology Security. (See discussion below.)

NASA's management controls and financial systems, taken as a whole, provide reasonable assurance that *the objectives of Section 4 of the FMFIA* have been met. Section 4 concerns accounting systems' compliance with appropriate Federal requirements. This conclusion is based upon the review and consideration of a wide variety of evaluations, internal analyses, reconciliations, reports, and other information, including quality assurance evaluations, Office of Inspector General (OIG) and General Accounting Office (GAO) audits, and an independent public accountant's (IPA's) opinion on our financial statements and IPA's reports on our internal control structure and compliance with laws and regulations.

NASA's revised process for financial management system reviews, the Quality Assurance Evaluation, became operational in FY 1997. It provides a review process based upon the evaluation of performance measures and quantitative data and relies to the maximum extent possible upon data already available to Headquarters, rather than requiring Centers to develop or collect new data for evaluation purposes. When we implement the integrated financial management system and directly access data, we will achieve even greater efficiency in this process. The Quality Assurance Evaluation process has proven effective in identifying the need for corrective actions at the Centers and ensuring that those actions are taken.

Status of Material Weakness and Significant Areas of Concern Reported in FY 1996

The Office of Management and Budget (OMB) Circular A-127, "Financial Management Systems," requires that Federal agencies maintain a single, integrated financial management system. Because NASA's use of individual non-integrated systems at Headquarters and Centers to meet its statutory and regulatory reporting requirements does not conform to Circular A-127 requirements, NASA continues to report a financial management system material weakness. The corrective action plan for the financial management system material weakness calls for the implementation of an Agencywide fully integrated financial management system at Marshall Space Flight Center and Dryden Flight Research Center by October 1, 1998, and NASA-wide by July 1999. This effort is discussed in more detail below under the Five-Year Financial Plan.

In addition to the material weaknesses, NASA identified three areas of significant management concern in FY 1996. These areas involved estimated cleanup costs for environmental waste sites; Government-owned, Contractor-held property accounting; and operating aircraft accounting information.

The Environmental Program Significant Area of Concern was reported in FY 1994. In FY 1996, NASA

revised cost estimates for cleanup of hazardous waste sites based on improved data and a new parametric cost estimating model developed by the Department of Defense. In addition the Hazardous Waste Site Inventory was completed. The number of sites was reduced from 800, at an estimated cost of $2 billion, to 361, at an estimated cost of $1.5 billion. The new model uses more detailed site data and assumptions based on actual site observations, whereas the old model only considered the type of site without site specific data. The new model was validated with existing site cost data. As a result, NASA has closed this significant area of concern.

Numerous new controls have been implemented in the area of financial management of Government-owned, Contractor-held property. The reporting format and NASA's Federal Acquisition Regulation Supplement instructions for collection of the related data from contractors were completed in FY 1996, and no material findings in this area resulted from the audits of NASA's FY 1995, FY 1996, and FY 1997 financial statements. The contractor report was reduced from four to two pages, greater uniformity with other Government agencies' formats was achieved, and redundancy in reporting instructions was eliminated. At the same time, the revised format corrected reporting inconsistencies noted during earlier audits, more comprehensive information was provided for financial statement presentation, and provision was made for penalties for noncompliance. As a result, contract report preparation was eased and accuracy enhanced. NASA has closed this significant area of concern.

NASA's account coding structure has been revised to incorporate codes for the collection of all necessary data regarding its operating aircraft. The use of aircraft codes will be fully integrated with IFMP. While some NASA Centers' accounting systems do not presently provide the flexibility to collect the data without extensive and costly software reprogramming on old systems, such expenditures are inconsistent with NASA's efforts to implement an entirely new Agencywide system. As a result, NASA has closed this significant area of concern.

New Significant Area of Management Concern: Equitable Environmental Cost Sharing

NASA has established a new significant concern in the environmental area: Equitable Cost Sharing among Potentially Responsible Parties (PRP) for environmental cleanup activities. NASA issued a Procedures and Guidance directive (NPG) in June 1997 to establish procedures for PRPs and for pursuing equitable cost sharing arrangements for the cleanup of hazardous waste sites. Implementation of the NPG remains a management concern because studies are needed at NASA's Centers to identify the PRPs and determine appropriate cost sharing levels. Results are likely to be contentious, litigation may be necessary, and resolution with the PRPs may take several years. In addition, significant resources will be required. NASA will carefully monitor the implementation of equitable cost sharing with PRPs.

New Significant Area of Management Concern: Information Technology Security

Oversight of management controls over Information technology (IT) security is a significant management concern. This area of concern includes the adequacy of IT security policies and procedures, as well as their implementation.

NASA IT security policies and procedures are undergoing a comprehensive review. New directives are being drafted and will be promulgated in FY 1998. These directives will comply with the NASA Strategic Management Handbook and IT security-related laws, regulations, and best practices.

In FY 1998, mandatory training requirements, including certification standards for key IT security positions, will be promulgated and enforced. The Office of the Chief Information Officer, in concert with the Enterprises and Centers, will establish the following management controls:

- annual reports on the adequacy of NASA's IT security,
- metrics which assess compliance with IT security rules and best practices, as well as
- compliance reviews.

NASA Commitment to Strong Management Controls

The reporting of corrective actions for NASA's material weakness and significant areas of concern does not provide a full account of the management control improvements that NASA undertakes. We are committed to continuously improve the management of programs and related controls independently, as well as part of Governmentwide reengineering and reinventing processes. NASA is committed to removing unnecessary, burdensome requirements and controls while evaluating streamlined processes to ensure that reasonable management controls remain in place. NASA is committed to improving every aspect of management.

B. Federal Financial Management Improvement Act (FFMIA)

NASA substantially complies with the Federal Management Improvement Act.

C. NASA's Five-Year Financial Plan

NASA prepares a Five-Year Financial Plan in compliance with the Chief Financial Officers' Act. This plan becomes part of the Governmentwide Five-Year Financial Plan for submission by the Office of Management and Budget to Congress.

NASA's Five-Year Financial Plan is a description and status of the Agency, a summary of the most recently completed financial statement audits and reports, and a summary of reports on internal accounting and administrative control systems.

The Five-year plan (1997-2001) includes an Introduction to the Agency, its vision, goals and strategies, financial systems development, and audited financial statements.

Office of the Chief Financial Officer (CFO)

The CFO office is responsible for budget and financial management, systems and processes that support effective and efficient implementation of the CFO Act of 1990 and related legislation.

The Headquarters CFO office is supplemented by offices at nine Centers. These offices provide financial management and resource management for the Agency and its programs.

These offices coordinate the work of other related activities throughout NASA. Additional budget staff work is carried out in program and functional offices.

Activities related to budget and financial management report functionally to the CFO's office. A similar relationship exists at the Centers. However, due to the unique mission and size of each Center, the structure varies.

NASA's vision of world-class budget and financial management reflects a team of professionals working in partnership with program, project, and other functional managers; with modern, integrated financial management systems; and with timely, accurate information that is used to cost-effectively guide, control, manage, and support NASA missions.

Several major initiatives demonstrate NASA's current efforts to achieve financial management professional excellence.

CFO Initiatives

Initiative 1. Financial Systems

In February 1995, NASA initiated the Integrated Financial Management Project (IFMP). Its goal is to establish an integrated financial management system, compliant with Federal Joint Financial Management Improvement Program (JFMIP) requirements.

NASA's financial systems include a baseline existing structure and a targeted new structure.

The *baseline structure* comprises a series of Agencywide and Center-unique automated systems. These systems support budget, financial, and procurement functions.

Each Center has a Center-unique financial accounting system, which, in some cases, is integrated with Center budget systems. These systems are augmented by Agencywide systems in the areas of Personnel, Payroll, Procurement, Supply and Inventory, as well as Center-unique systems.

In order to achieve the *targeted new structure,* NASA has initiated activities that are resulting in standard Agency business processes and systems. The target integrated system will provide a financial management core, together with integrated budget, procurement, time and attendance, and travel modules to meet the needs of functional managers and end users, as well as decision-makers at all levels.

In 1997, NASA acquired commercial off-the-shelf software (COTS) packages that will enable NASA to meet these objectives.

The IFMP effort to move from *baseline to target* is comprised of a project management staff located at NASA Headquarters, Goddard Space Flight Center, and Marshall Space Flight Center, and various Process Teams whose membership includes individuals from all Centers and Headquarters. The project is reengineering current business processes into a single set of integrated processes to work with the recently acquired COTS packages.

The project has two major phases:

- Phase I processes are core financial, budget, travel, time and attendance, labor distribution, procurement, and an executive information system.
- Phase II processes are asset management, personnel/payroll, grants management, and revenue.

In May 1995, six of the seven Phase I Process Teams began reengineering their respective processes, ensuring seamless integration among the processes, defining functional requirements and developing an integrated financial management data model and data dictionary. This work was completed in April 1996 and was included in the Request for Proposals released in June 1996.

The Asset Management Process Team began its reengineering work in late summer 1996. This is a large and

complex area, and we expect the reengineering and data definition work to continue into1998.

Later in 1995, Center Transition Teams were formed. The teams are comprised of functional and technical people responsible for planning and implementing IFMP their respective Centers. Center Transition Teams are currently working with the Process Teams on data conversion and implementation plans. In the coming months, transition managers and other key individuals at the Centers will meet with project staff and consultants to begin detailed planning for the large-scale changes the new software and business processes will bring.

NASA is now in the implementation stage of the project. We are matching our reengineered business processes to the software's capabilities. Processes will be further refined to take maximum advantage of available technology.

The schedule for implementation is extremely aggressive. During 1998, NASA will focus on this task, making the necessary organizational, staffing, and internal policy changes, converting data, training, and testing.

All Phase I systems are expected to be deployed by FY 1999.

The new Asset Management system is planned to be deployed by FY 2000. That same year, NASA will begin reengineering the other Phase II systems: personnel/payroll, grants management, and revenue.

Initiative 2. Full Costing in NASA

Full cost accounting is a concept that ties all Agency costs (including civil service personnel costs, service pool costs, and general and administrative expenses) to major activities and budgets. NASA plans to budget, account, report, and manage its programs with a full cost perspective. No resources are free.

The Agency plans to implement full costing to enhance cost-effective mission performance by providing complete cost information for fully informed decision-making and management.

NASA completed its first year Agencywide testing of full costing during 1997. The testing is ongoing.

The approach to full cost introduces broad and significant management implications. Full costing also supports full disclosure and reporting on programs and projects and an improved matching of costs with related performance. In that regard, full costing is consistent with sound business practices and recent legislative and administrative guidance, including the CFO Act of 1990, Government Performance and Results Act of 1993, the National Performance Review of 1993, NASA's Zero Base Review of 1995, and the Statement of Federal Financial Accounting Standard on Managerial Cost Accounting, effective for fiscal year 1998.

Full costing is also consistent with the requirement for cost-effective Agency responsiveness to the current and challenging future budget environment of the Federal Government.

The implementation of full costing is targeted for the late 1990s. This target is contingent upon a variety of related activities, including the timely completion of the IFMP.

The IFMP is designed to include accounting and budgeting system capabilities that can support full costing. Several other key tasks must be performed to translate an agreed upon full cost accounting and budgeting concept into operational systems that will provide management with timely data on cost performance and provide the basis for analyses of results.

Initiative 3. Center Financial Management Restructuring

The financial management and budgetary operations at the Centers were restructured to be on a more uniform basis. This action normalized the reporting of Center financial and resources managers to Center Directors.

NASA has established a CFO council consistent with its new CFO structure. The council oversees the Agency CFO initiatives and provides advice on major issues. The Council also supports needed improvements in the quality of financial information and management controls.

The council also serves as a forum to monitor progress, resolve issues, provide coordination, and develop consensus on new directions and initiatives in financial and resources management.

The council meets on a quarterly basis through NASA's video teleconference system and through an annual CFO conference.

Initiative 4. Financial Management Training and Development Program

In April 1996, the NASA CFO designated an Agency Leader (Center CFO) to pursue an Agency-wide approach to staff development. The approach includes active Center participation.

NASA is developing a curriculum for CFO personnel, and plans to include suggested areas of education proposed by the JFMIP for accountants and budget personnel.

Each Center and Headquarters has been directed to establish a development program for financial and

resources personnel. Progress will be monitored by the Headquarters Office of the CFO.

D. Prompt Payment

In FY 1997, NASA processed 98 percent of its 201,858 payments on time. representing approximately $10.9 billion. There were 2,252 interest penalty payments, a decrease of 2,729 over FY 1996. The Agency paid only $7.75 in interest penalties for every $1 million disbursed in FY 1997, compared to $19.10 in 1996.

Virtually all recurring payments are processed electronically. We are working with our payment centers to maximize electronic payment for all vendors and have established goals for full implementation of the electronic funds transfer provisions of the Debt Collection Improvement Act of 1996. Finalization of Treasury's guidance under the Act will assist us in the full realization of our goals.

E. Civil Monetary Penalty Act

There were no Civil Monetary Penalties assessed by NASA during the relevant financial statement reporting period.

F. Debt Collection Act

Accounts Receivable totaled $176 million at September 30, 1997. Of that amount, $170 million was receivable from other Federal agencies. The remaining $6 million was receivable from the public.

Introduction to NASA's Financial Statements

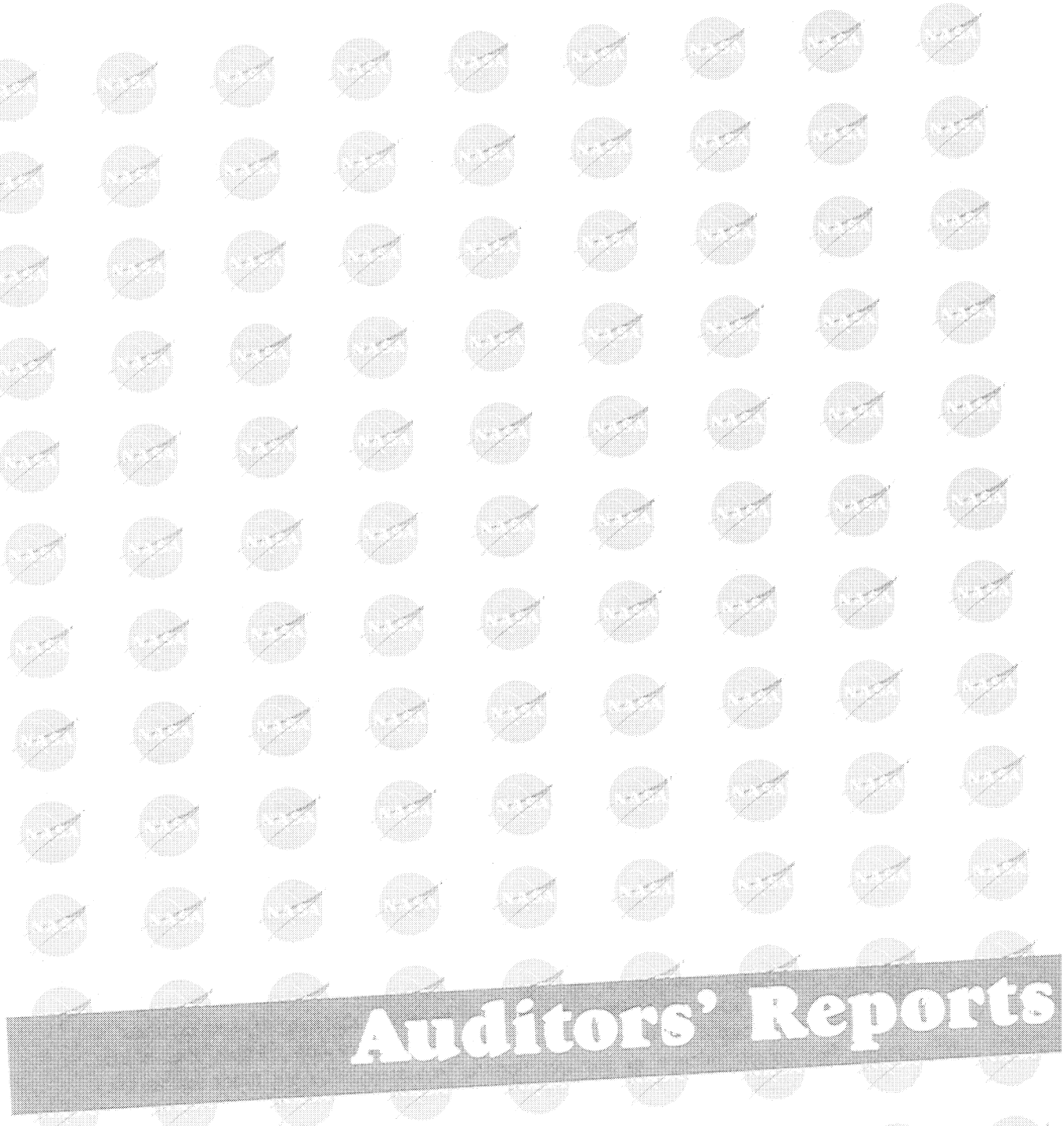
Financial statements have been prepared for Fiscal Year (FY) 1997 to report NASA's financial position (balance sheet) and its results of operations (budget authority used and costs), pursuant to the requirements of the Chief Financial Officers Act of 1990 and the Government Management Reform Act of 1994.

These statements include all Agency activities and 100 percent of its budget authority. These statements have been prepared from the books and records of NASA, in accordance with formats prescribed by the Office of Management and Budget (OMB) Bulletin 94-01, "Form and Content of Agency Financial Statements." These financial statements are reconcilable to budgetary reports which are prepared from the same books and records, but on a different basis of accounting—the same basis as the President's budget, rather than in accordance with Generally Accepted Accounting Principles (GAAP).

These statements are for an Agency of the U. S. Government, not for a sovereign entity. Intra-governmental Assets and Liabilities are those with other Federal agencies. For example, NASA's Fund Balance is held by the U. S. Treasury Department, another Federal agency. NASA has no authority to pay liabilities not covered by budgetary resources. Liquidation of such liabilities requires enactment of an appropriation. Since the U. S. Government is a sovereign entity, certain liabilities, other than for contracts, can be abrogated by new legislation.

NASA received consecutive "Unqualified Opinions" on its financial statements for fiscal years 1994, 1995, 1996 and 1997. The first two were from NASA's Inspector General. The last two were from the independent public accounting firm of Arthur Andersen. These were major milestones in NASA's continuing quest for financial management excellence.

The FY 1997 financial statements were developed in conformance with the Federal hierarchy of accounting guidance. In that regard, NASA used published Statements of Federal Financial Accounting Standards, OMB Form and Content guidance, and its own accounting policy manuals.


Auditors' Reports

ARTHUR ANDERSEN LLP

Report of Independent Public Accountants on Financial Statements

To the Inspector General of the
National Aeronautics and Space Administration:

We have audited the accompanying Statement of Financial Position of the National Aeronautics and Space Administration (NASA) as of September 30, 1997 and 1996, and the related Statement of Operations and Changes in Net Position for the years then ended. These financial statements are the responsibility of NASA management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards, the standards for financial audits contained in *Government Auditing Standards* (1994 Revision), issued by the Comptroller General of the United States, and Office of Management and Budget (OMB) Bulletin Number 93-06, as amended, "Audit Requirements for Federal Financial Statements." Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

As described in Note 1, the accounting policies used by NASA to prepare these financial statements are in accordance with OMB Bulletin Number 94-01, "Form and Content of Agency Financial Statements," which is a comprehensive basis of accounting other than generally accepted accounting principles.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of NASA as of September 30, 1997 and 1996, and the results of its operations and changes in its net position for the years then ended in conformity with the comprehensive basis of accounting described in Note 1.

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As explained in Note 1 to the financial statements, effective October 1, 1996, NASA implemented Statement of Federal Financial Accounting Standards Number 5, "Accounting for Liabilities of the Federal Government."

We have also issued separate reports dated January 16, 1998, on NASA's internal control structure and on its compliance with laws and regulations.

Arthur Andersen LLP

Washington, D.C.
January 16, 1998

ARTHUR ANDERSEN LLP

Report of Independent Public Accountants on Internal Control Structure

To the Inspector General of the
National Aeronautics and Space Administration:

We have audited the Statement of Financial Position of the National Aeronautics and Space Administration (NASA) as of September 30, 1997, and the related Statement of Operations and Changes in Net Position for the year then ended, and have issued our report thereon dated January 16, 1998.

We conducted our audit in accordance with generally accepted auditing standards, the standards for financial audits contained in *Government Auditing Standards* (1994 Revision), issued by the Comptroller General of the United States, and Office of Management and Budget (OMB) Bulletin Number 93-06, as amended, "Audit Requirements for Federal Financial Statements." Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement.

Management of NASA is responsible for establishing and maintaining an internal control structure. In fulfilling this responsibility, estimates and judgments by management are required to assess the expected benefits and related costs of internal control structure policies and procedures. The objectives of an internal control structure are to provide management with reasonable, but not absolute, assurance that assets are safeguarded against loss from unauthorized use or disposition, that transactions are executed in accordance with management's authorization and recorded properly to permit the preparation of financial statements in accordance with the comprehensive basis of accounting described in OMB Bulletin Number 94-01, "Form and Content of Agency Financial Statements," and that data supporting reported performance measures are properly recorded and accounted for to permit preparation of accurate and complete performance information. Because of inherent limitations in any internal control structure, errors or irregularities may nevertheless occur and not be detected. Also, projection of any evaluation of the internal control structure to future periods is subject to the risk that procedures may become inadequate because of changes in conditions or that the effectiveness of the design and operation of policies and procedures may deteriorate.

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In planning and performing our audit of the financial statements of NASA for the year ended September 30, 1997, we obtained an understanding of the internal control structure. With respect to the internal control structure, we obtained an understanding of the design of relevant policies and procedures and whether they have been placed in operation, and we assessed control risk in order to determine our auditing procedures for the purpose of expressing an opinion on the financial statements for the year then ended and not to provide an opinion on the internal control structure. Accordingly, we do not express such an opinion. Additionally, in accordance with OMB Bulletin Number 93-06, as amended, we obtained an understanding of the internal control structure for the data supporting reported performance measures in the section entitled "NASA Performance" and assessed control risk related to the existence and completeness assertions. Also, in accordance with OMB Bulletin Number 93-06, as amended, for those significant internal control structure policies and procedures that were properly designed and placed in operation, we performed tests to determine whether such policies and procedures were operating effectively at September 30, 1997.

We noted certain matters involving the internal control structure and its operation that we consider to be reportable conditions under standards established by the American Institute of Certified Public Accountants and OMB Bulletin Number 93-06, as amended. Reportable conditions involve matters coming to our attention relating to significant deficiencies in the design or operation of the internal control structure that, in our judgment, could adversely affect NASA's ability to record, process, summarize and report financial data consistent with the assertions of management in the financial statements and in reported performance measures.

The following reportable conditions are more fully described in a separate letter to the Inspector General and the Administrator of NASA dated January 16, 1998.

1. Supervisory and monitoring controls require strengthening to ensure that changes to NASA's accounting policies and procedures are implemented effectively.

2. NASA's information technology policies and procedures require improvement to ensure that controls over financial management systems are properly designed and operating effectively to prevent unauthorized access to certain NASA financial management applications and data.

3. NASA's internal controls over the receipt and review of audit reports of its grant recipients require improvement to detect audit reports that have not been received and to take appropriate action.

A material weakness is a reportable condition in which the design or operation of one or more of the internal control structure elements does not reduce to a relatively low level the risk that errors or irregularities in amounts that would be material in relation to the financial statements being audited may occur and not be detected within a timely period by employees in the normal course of performing their assigned functions.

Our consideration of the internal control structure would not necessarily disclose all matters in the internal control structure that might be reportable conditions and, accordingly, would not necessarily disclose all reportable conditions that are also considered to be material weaknesses as defined above. However, we believe none of the reportable conditions above is a material weakness.

We also noted other matters involving the internal control structure and its operation that we have reported to the Inspector General and the Administrator of NASA in a separate letter dated January 16, 1998.

This report is intended for the information of the Inspector General, the Administrator and management of NASA and is not intended for any other purpose. However, this report is a matter of public record and its distribution is not limited.

Arthur Andersen LLP

Washington, D.C.
January 16, 1998

ARTHUR ANDERSEN LLP

Report of Independent Public Accountants on Compliance with Laws and Regulations

To the Inspector General of the
National Aeronautics and Space Administration:

We have audited the Statement of Financial Position of the National Aeronautics and Space Administration (NASA) as of September 30, 1997, and the related Statement of Operations and Changes in Net Position for the year then ended, and have issued our report thereon dated January 16, 1998.

We conducted our audit in accordance with generally accepted auditing standards, the standards for financial audits contained in *Government Auditing Standards* (1994 Revision), issued by the Comptroller General of the United States, and Office of Management and Budget (OMB) Bulletin Number 93-06, as amended, "Audit Requirements for Federal Financial Statements." Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement.

Compliance with laws and regulations applicable to NASA is the responsibility of NASA's management. As part of obtaining reasonable assurance about whether the statements referred to above are free of material misstatement, we performed tests of NASA's compliance with provisions of certain laws and regulations, noncompliance with which could have a direct and material effect on the determination of financial statement amounts and certain other laws and regulations specified in OMB Bulletin Number 93-06, as amended, including the requirements referred to in the Federal Financial Management Improvement Act (FFMIA) of 1996.

Under FFMIA, we are required to report whether NASA's financial management systems substantially comply with 1) Federal financial management systems requirements, 2) applicable accounting standards and 3) the requirement to record transactions consistent with the United States Standard General Ledger at the transaction level. To meet this requirement, we performed tests of compliance using the implementation guidance for FFMIA issued by OMB on September 9, 1997.

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The results of our tests disclosed no instances of noncompliance that are required to be reported herein under *Government Auditing Standards*. Additionally, the results of our tests disclosed no instances where NASA's financial management systems did not substantially comply with the requirements of FFMIA described in the preceding paragraph. However, the objective of our audit of the financial statements was not to provide an opinion on overall compliance with provisions of certain laws and regulations. Accordingly, we do not express such an opinion.

Additionally, the objective of our audit of the financial statements was not to determine whether NASA's systems are Year 2000 compliant. NASA management is solely responsible for Year 2000 compliance for its systems and any other systems that impact NASA's operations, such as those of NASA's vendors, service providers or other third parties. Accordingly, we have no responsibility to determine, and provide no assurance on, whether NASA has addressed or will be able to address the affected systems on a timely basis.

This report is intended for the information of the Inspector General, the Administrator and management of NASA and is not intended for any other purpose. However, this report is a matter of public record and its distribution is not limited.

Arthur Andersen LLP

Washington, D.C.
January 16, 1998

Financial Statements

National Aeronautics and Space Administration
Statement of Financial Position
As of September 30
(In Thousands)

	1997	1996
Assets:		
Intragovernmental Assets:		
Fund Balance With Treasury (Note 2)	$ 6,857,980	$ 8,061,920
Investments (Note 3)	18,416	18,138
Accounts Receivable, Net (Note 4)	170,325	143,349
Advances and Prepaid Expenses	57,018	6,358
Governmental Assets:		
Accounts Receivable, Net (Note 4)	5,418	5,633
Operating Materials and Supplies (Note 5)	15,653	46,999
Property, Plant and Equipment (Note 6)	27,593,191	26,408,422
Other Assets (Note 7)	2,103,630	1,960,040
Total Assets	$ 36,821,631	$ 36,650,859
Liabilities:		
Liabilities Covered by Budgetary Resources:		
Intragovernmental Liabilities:		
Accounts Payable	$ 353,519	$ 488,642
Other Liabilities (Note 8)	46,046	78,379
Governmental Liabilities:		
Accounts Payable	2,995,942	2,581,268
Lease Liabilities (Note 9)	277	6,668
Other Liabilities (Note 8)	132,318	185,104
Total	3,528,102	3,340,061
Liabilities not Covered by Budgetary Resources:		
Intragovernmental Liabilities:		
Other Liabilities (Note 8)	4,954	1,208
Governmental Liabilities:		
Actuarial	56,891	63,230
Lease Liabilities (Note 9)	1,182	5,167
Other Liabilities (Note 8)	1,681,380	1,624,654
Total	1,744,407	1,694,259
Total Liabilities	5,272,509	5,034,320
Net Position (Note 10):		
Unexpended Appropriations	3,559,741	4,884,464
Invested Capital	29,710,029	28,402,640
Cumulative Results of Operations	17,094	16,623
Donated Property	986	986
Future Funding Requirements	(1,738,728)	(1,688,174)
Total Net Position	31,549,122	31,616,539
Total Liabilities and Net Position	$ 36,821,631	$ 36,650,859

The accompanying notes are an integral part of these statements.

National Aeronautics and Space Administration
Statement of Operations and Changes in Net Position
For the Year Ended September 30
(In Thousands)

	1997	1996
Revenues and Financing Sources:		
Appropriated Capital Used	$ 12,017,425	$ 11,722,470
Revenues from Sales of Goods and Services:		
Governmental	60,922	45,508
Intragovernmental	602,866	568,488
Interest, Federal	1,845	1,571
Imputed Financing Sources, Employee Retirement Benefits	111,367	0
Other Revenues and Financing Sources (Note 11)	44,072	30,232
Less: Receipts Transferred to Treasury	(44,033)	(30,231)
Total Revenues and Financing Sources	12,794,464	12,338,038
Expenses:		
Program or Operating Expenses by Appropriation:		
Human Space Flight	4,232,683	4,512,860
Science, Aeronautics and Technology	5,243,702	4,516,797
Mission Support	2,619,417	2,390,318
Space Flight Control and Data Communications	(10,742)	36,555
Research and Development	37,091	226,694
Research and Program Management	(4,307)	(2,223)
Construction of Facilities	20,286	59,313
Office of Inspector General	16,100	16,099
National Aeronautics Facility	31,544	0
Trust Fund Expenses	1,324	1,240
Reimbursable Expenses	663,788	613,996
Other Expenses	(6,339)	469
Total Expenses	12,844,547	12,372,118
Revenues and Financing Sources Less Expenses	(50,083)	(34,080)
Nonoperating Changes:		
Unexpended Appropriations	(1,324,723)	2,673
Invested Capital	1,307,389	2,161,276
Total Nonoperating Changes	(17,334)	2,163,949
Change in Net Position	(67,417)	2,129,869
Net Position, Beginning Balance	31,616,539	29,486,670
Net Position, Ending Balance	$ 31,549,122	$ 31,616,539

The accompanying notes are an integral part of these statements.

National Aeronautics and Space Administration
Notes to Financial Statements
For the Fiscal Years Ended September 30, 1997 and 1996

1. Summary of Accounting Policies and Operations:

Basis of Presentation

These financial statements were prepared to report the financial position and results of operations of NASA as required by the Chief Financial Officers Act of 1990 and the Government Management Reform Act of 1994. The statements were prepared from the books and records of NASA, in accordance with the comprehensive basis of accounting specified in Office of Management and Budget (OMB) Bulletin 94-01, "Form and Content of Agency Financial Statements," and supplemented by OMB Bulletin 97-01, "Formats and Instructions for the Form and Content of Agency Financial Statements," and NASA's accounting policies which are summarized in this note. These financial statements were prepared under the accrual basis of accounting, where expenses and revenues are recorded in the accounts in the period in which they are incurred or earned. These statements are therefore different from the financial reports, also prepared by NASA pursuant to OMB directives, that are used to monitor and control NASA's use of budgetary resources.

Reporting Entity

NASA is an independent agency established to plan and manage the future of the Nation's civil aeronautics and space program. These financial statements reflect all NASA activities including those of its Centers. NASA's Jet Propulsion Laboratory is a Federally Funded Research Development Center; it is funded by NASA and its physical assets are owned by NASA, but it is managed by an independent contractor. Financial management of NASA operations is the responsibility of Agency officials at all organizational levels. The accounting system consists of ten distinct operations located at nine NASA Centers and Headquarters. Although each Center is independent of the other and has its own chief financial officer, NASA Centers operate under Agencywide financial management policies. These accounting systems provide basic information necessary to meet internal and external budget and financial reporting requirements and provide both fund control and accountability. All significant intra-entity activities have been eliminated.

Budgets and Budgetary Accounting

NASA is funded by appropriations, listed in the Statement of Operations and Changes in Net Position, that require individual treatment in the NASA accounting and control system. Four of these appropriations reflect only spending of prior year balances as these appropriations are now expired. Reimbursements to NASA's appropriations total about $600 million annually. As part of this reimbursable program, NASA launches devices into space and provides tracking, station-keeping and data relay for the Defense Department, the National Oceanic and Atmospheric Administration, and the National Weather Service.

Research and Development Costs

NASA expenses research and development (R&D) costs, including those for devices launched into space, when devices are launched. Such devices for NASA's own programs have included satellites in low earth orbit and deep space probes. Devices launched into space for NASA programs have been expensed because they are intended to be consumed in experiments. NASA classifies some costs related to R&D activities as capital property costs. These include items of property, plant, and equipment that have alternative future uses or that are used in the ongoing NASA R&D effort, for example, the Space Shuttle Orbiters. This policy is under review and will be changed as necessary to comply in fiscal year 1998 with Statements of Federal Financial Accounting Standards (SSFAS) No. 6, "Accounting for Property, Plant, and Equipment," and No. 8, "Supplementary Stewardship Reporting."

Funds with the U.S. Treasury and Cash

NASA's cash receipts and disbursements are processed by the U.S. Treasury. The funds with the U.S. Treasury include appropriated funds, trust funds, and deposit funds for advances received for reimbursable services. Cash balances held outside of the U.S. Treasury have been reduced to zero in 1997 due to the elimination of imprest funds.

Investments in U.S. Government Securities

NASA's intragovernmental non-marketable securities include investments as follows:

1. National Aeronautics and Space Administration Endeavor Teacher Fellowship Trust Fund was established from public donations in tribute to the crew of the Space Shuttle Challenger.

2. Science Space and Technology Education Trust Fund was established from appropriated funds for programs to improve science and technology education.

3. The operation and maintenance expenses of the visitor center at the Lyndon B. Johnson Space Center are financed in part through investments that provide funding to the Manned Space Flight Education Foundation, which operates the facility. With the exception of this investment, the assets and liabilities of the Foundation are not included in NASA's financial statements.

Advances

NASA provides funds to its University Contracts and Grants Program by recipient drawdowns on letters of credit or through the use of predetermined payment schedules where letters of credit are not used.

Accounts Receivable

Most receivables are due from other Federal agencies for reimbursement of research and development services related to satellites and launch services. Non-Federal customers provide advance payments which are placed on deposit with the U.S. Treasury until services are performed.

Prepaid Expenses

Payments in advance of the receipt of goods and services are recorded as prepaid expenses at the time of prepayment and recognized as expenses when the related goods and services are received.

Operating Materials and Supplies

In accordance with SFFAS No. 3, "Accounting for Inventory and Related Property," materials held by NASA Centers which are repetitively procured, stored, and issued on the basis of demand are considered Operating Materials and Supplies.

Property, Plant and Equipment

NASA-owned Property, Plant and Equipment may be held by the Agency or its contractors. Property with a unit cost of $5,000 or more and a useful life of 2 years or more, that will not be consumed in an experiment, is capitalized. Capitalized cost includes unit cost, transportation, installation, handling, and storage costs.

Equipment includes space hardware, which represents the largest dollar value of assets owned by NASA. Space hardware includes the Space Shuttle Orbiters and other configurations of spacecraft: engines, unlaunched satellites, rockets, and scientific components unique to NASA space programs. Other equipment includes special tooling and special test equipment. Property includes land, buildings including collateral equipment, other structures, and facilities. Other structures include the acquisition cost of capital improvements such as airfields, power distribution systems, flood control, utility systems, roads, and bridges. NASA also has the use of certain properties at no cost. These properties include land at Kennedy Space Center withdrawn from the public domain as well as land and facilities at Marshall Space Flight Center under a no cost, 99-year lease with the Department of the Army.

NASA's contractors report their Government-owned property balances annually to NASA. Under the provisions of the Federal Acquisition Regulation (FAR), contractors are responsible for control over and accountability for such Government-owned property in their possession. Contractor-held property, plant, and equipment are valued in accordance with guidance set forth in the NASA FAR Supplement (NFS). The valuation policy allows for use of historical acquisition or estimated costs, which may be abstracts of data from contractors' records, computations based upon engineering estimates, estimates from NASA contractor financial management reports, formula procedures, latest acquisition/pricing estimates or other approved methods. Most of NASA's contractors are using historical acquisition cost as their valuation basis. It is estimated that if all contractors had used historical acquisition cost as their bases, the year-end balance of Contractor-held property would have been approximately $400 million less in 1996. In 1997, a contractor elected to adopt historical acquisition cost as its valuation basis, resulting in a $350 million reduction in property value, with a corresponding increase in current expenses. Another contractor continued to use latest acquisition cost; had the contractor used historical acquisition cost as its valuation basis, the year-end balance of Contractor-held property would have been approximately $35 million less in 1997.

NASA does not depreciate its Property, Plant and Equipment; it does, however, charge non-Federal customers for depreciation. Automated data processing software is expensed when acquired rather than capitalized. NASA includes idle property in its property, plant and equipment account. Idle property no longer provides service in the operation of the Agency and has been identified for disposal, retirement, or removal from service. This occurs because the property has suffered damage, become obsolete in advance of expectations, or is identified as excess. The total amount of idle property was $487 million in 1997 and $370 million in 1996. This amount includes both Government-held and Contractor-held property. Idle Contractor-held property totaled $72 million in 1997 and $156 million in 1996. Government-held property which is idle totaled $415 million in 1997 and $214 million in 1996. In FY 1998, NASA will implement SFFAS No. 6, "Accounting for Property, Plant and Equipment," which will require NASA to record an allowance for obsolete and excess property and depreciate property, plant and equipment.

Space Exploration Equipment

In addition to property, plant and equipment, NASA has space exploration equipment (e.g., satellites and space probes) operating outside of the earth's atmosphere which is not reflected on the Statement of Financial Position. NASA expenses space exploration equipment when launched because of its experimental nature and the high degree of uncertainty associated with its missions. NASA has 36 such satellites and probes. Six satellites are devoted to earth science as part of the Mission to Planet Earth. These satellites address such issues as ozone depletion and global warming. Twenty-three satellites and probes are devoted to Space Science. These include the Hubble Space Telescope as well as Voyager, Galileo, and the recently launched Mars Pathfinder and Surveyor. Seven NASA satellites are devoted to space communications. These satellites

provide communications service to NASA and reimbursable customers. In FY 1998, NASA will implement SFFAS No. 6, which will require the capitalization of assets in space and the depreciation of these assets.

Liabilities Covered by Budgetary Resources

Accounts payable includes amounts recorded for receipt of goods or services furnished to the Agency, based on billings rendered. Additionally, NASA accrues cost and recognizes liability based on information provided monthly by contractors on cost reports (NASA Form 533). NASA relies on independent audits by the Defense Contract Audit Agency to ensure the reliability of reported costs and estimates. To provide further assurance, financial managers are required to test the accuracy of cost accruals generated from the NF 533's monthly, and NASA Headquarters independently analyzes the validity of Centers' data.

Liabilities Not Covered by Budgetary Resources

NASA's liabilities that are not covered by budgetary resources include environmental matters, legal claims, pensions and other retirement benefits (ORB), workers' compensation, annual leave (see discussion below) and closed appropriations.

NASA is a party in various administrative proceedings, legal actions, environmental suits, and claims brought by or against it. During FY 1997, NASA also implemented SFFAS No. 5, "Accounting for Liabilities of the Federal Government," which requires among other changes the disclosure and accrual of cases related to the Judgment Fund. In the opinion of NASA management and legal counsel, the ultimate resolution of these proceedings, actions, and claims will not materially affect the financial position or results of operations of NASA. NASA has accrued $1.5 billion for these matters.

In addition, NASA has contingencies as of September 30, 1997, where it is possible, but not probable that some cost will be incurred, ranging from zero to $500 million. Accordingly, no amounts have been recorded in the financial statements for these contingencies.

NASA liabilities not covered by budgetary resources consist primarily of environmental cleanup costs. NASA uses parametric models to estimate the total cost of cleaning up these sites over future years. A 25 percent contingency and a 10 percent project management oversight mark-up were added to the estimates. The estimates also included a 5-year operational period within the remedial action phase and Centers were required to indicate the exact number of years if different than 5 years. In addition, a 5-year monitoring period was added to the estimate for ground water, surface water/sediment and ecological monitoring. This year, NASA estimates the total cost of this cleanup to be $1.4 billion over the next 20 years, and has recorded an unfunded liability in its financial statements for that amount. The $1.4 billion does not represent a current legal obligation, but is an estimate of the amount that NASA will spend over a period of years to remediate the currently known sites, subject to the availability of appropriated funds. This liability could be shared by other responsible parties that may be required to contribute to the remediation funding. In addition, NASA has accrued $100 million related to future environmental clean-up costs associated with the decommissioning of a nuclear reactor. In FY 1997, NASA was appropriated $33 million for environmental compliance and restoration.

SFFAS No. 5, requires Government agencies to report the full cost of employee benefits for the Civil Service Retirement System (CSRS), Federal Employees Retirement System (FERS), Federal Employee Health Benefit (FEHB) and Federal Employees Group Life Insurance (FEGLI) programs. Office of Personnel Management Financial Management Letter F-97-08 provided the applicable cost factors and procedures to be implemented for recording this liability. NASA recorded $111 million for these ORB costs and an imputed financing source for the aforementioned programs in its financial statements for FY 1997.

Additionally, NASA has recorded a liability for $71 million, as of September 30, 1997, for workers' compensation claims related to the Federal Employees' Compensation Act (FECA), which is administered by the U.S. Department of Labor (DOL). FECA provides income and medical cost protection to covered Federal civilian employees injured on the job, employees who have incurred a work-related occupational disease, and beneficiaries of employees whose death is attributable to a job-related injury or occupational disease. The FECA program initially pays valid claims and subsequently seeks reimbursement from the Federal agencies employing the claimants.

This liability includes $57 million of estimated future costs of death benefits, workers' compensation, and medical and miscellaneous costs for approved compensation cases. The present value of these estimates at the end of FY 1996 was calculated by DOL using a discount rate of 6.21 percent for FY 1997, 5.97 percent for FY 1998, 5.60 percent for FY 1999, 5.32 percent for FY 2000, and 5.15 percent for FY 2001 and 5.10 percent for FY 2002 and thereafter. The present value of these estimates at the end of FY 1997 was calculated by DOL using a discount rate of 6.24 percent for FY 1998, 5.82 percent for FY 1999, 5.60 percent for FY 2000, 5.45 percent for FY 2001, and 5.40 percent for FY 2002 and thereafter.

NASA has unfunded liabilities for obligations originally funded by appropriations which are now closed. When paid, these liabilities will be funded by current appropriations.

Annual, Sick, and Other Leave

Annual leave is accrued as it is earned and the accrual is reduced as leave is taken. Each year, the balance in

the accrued annual leave account is adjusted to reflect current pay rates. To the extent current or prior year appropriations are not available to fund annual leave earned but not taken, funding will be obtained from future financing sources. Sick leave and other types of non-vested leave are expensed as taken.

Employee Benefits

NASA's employees participate in either the CSRS, a defined benefit plan, or the FERS, a defined benefit and contribution plan. For CSRS employees, NASA makes matching contributions equal to 7 percent of pay. For FERS employees, NASA automatically contributes 1 percent of pay to a retirement savings plan and matches employee contributions up to an additional 4 percent of pay. For FERS employees, NASA also contributes the employer's matching share for Social Security.

2. Fund Balance with Treasury:

(In Thousands)

Fund Balances:	Obligated	Unobligated Available	Unobligated Restricted	Total
Appropriated Funds	$ 5,704,931	$ 947,265	$ 104,222	$ 6,756,418
Trust Funds	255	339	609	1,203
Total	$ 5,705,186	$ 947,604	$ 104,831	$ 6,757,621
Deposit Funds				104,103
Clearing Accounts				(3,744)
Total Fund Balance with Treasury				$ 6,857,980

3. Investments:

(In Thousands)

	Par Value	Amortization Method	Amortized Discount	Net Investments
Intragovernmental Non-Marketable Securities	$ 18,510	Interest method	$ (94)	$ 18,416

Interest rates range from 4 percent to 9 percent and individual bonds mature during FY 1998.

4. Accounts Receivable, Net:

(In Thousands)

	Entity Accounts Receivable	Non-Entity Accounts Receivable	Allowance for Uncollectible Receivables	Net Amount Due
Intragovernmental	$169,225	$1,336	($236)	$170,325
Governmental	1,028	4,939	(549)	5,418
Total	$170,253	$6,275	($785)	$175,743

Non-entity accounts receivable represent amounts that will be deposited to miscellaneous receipts when collected and subsequently returned to the U.S. Treasury.

5. Operating Materials and Supplies:

(In Thousands)

	1997	1996	Valuation Method
Stores Stock	$ 12,758	$ 43,220	Weighted Avg.
Standby Stock	2,895	3,779	Weighted Avg.
Total	$ 15,653	$ 46,999	

Stores stock represents material being held in inventory which is repetitively procured, stored and issued on the basis of recurring demand.

Standby stock represents material held for emergencies.

6. Property, Plant and Equipment:

(In Thousands)

	1997	1996
Government-owned/Government-held:		
Land	$ 113,626	$ 112,432
Structures, Facilities and Leasehold Improvements	5,229,066	5,126,057
Equipment	3,043,112	2,995,595
Assets Under Capital Lease	62,075	70,279
Work in Process	583,562	615,820
Total	9,031,441	8,920,183
Government-owned/Contractor-held:		
Land	11,920	11,920
Structures, Facilities and Leasehold Improvements	761,964	733,852
Equipment	1,944,327	1,961,593
Special Tooling	643,286	629,752
Special Test Equipment	596,568	560,283
Space Hardware	8,719,262	9,206,460
Work in Process	5,884,423	4,384,379
Total	18,561,750	17,488,239
Total Property, Plant and Equipment	$ 27,593,191	$ 26,408,422

See Note 1 for further discussion on property, plant and equipment.

7. Other Assets:

(In Thousands)

	1997	1996
Contractor-held Materials	$ 2,103,630	$ 1,852,744
Personal Property Held by the Disposal Officer	0	107,296
Total	$ 2,103,630	$ 1,960,040

Contractor-held materials represent material being held in inventory which is repetitively procured, stored and issued on the basis of recurring demand.

NASA changed, during fiscal year 1997, its accounting policies related to Personal Property Held by the Disposal Officer. This asset category represented excess property and the amounts were reduced to zero with a corresponding decrease to invested capital. Had this policy not been changed in FY 1997 the balance in this account would have been $159 million, as of September 30, 1997.

8. Other Liabilities:

(In Thousands)

Liabilities Covered by Budgetary Resources (all current):

Intragovernmental Liabilities:	
Liability for Deposit and Suspense Funds	$ 46,046
Governmental Liabilities:	
Liability for Deposit and Suspense Funds	$ 55,115
Accrued Payroll and Benefits	77,203
Total Governmental Liabilities	$ 132,318

The liability for deposit and suspense funds includes cash advances received from other Government agencies and public reimbursable customers. Also included are funds on deposit with the U. S. Treasury for employees' savings bonds and state tax withholdings.

Liabilities Not Covered by Budgetary Resources:

	Current	Non-Current	Total
Intragovernmental Liabilities:			
Accounts Payable for Closed Appropriations	$ 1,191	$ 2	$ 1,193
Liability for Receipt Accounts	3,761	0	3,761
Total Intragovernmental Liabilities	$ 4,952	$ 2	$ 4,954
Governmental Liabilities:			
Environmental Remediation	$ 11,000	$ 1,455,784	$ 1,466,784
Workers' Compensation	6,761	7,128	13,889
Accounts Payable for Closed Appropriations	30,056	2,144	32,200
Contingent Liabilities	0	25,369	25,369
Liability for Receipt Accounts	736	0	736
Unfunded Annual Leave	15,421	126,981	142,402
Total Governmental Liabilities	$ 63,974	$ 1,617,406	$ 1,681,380

See Note 1 for further discussion of liabilities not covered by budgetary resources.

9. Leases:

(In Thousands)

Entity as Lessee:

Asset

Capital Leases:

Equipment	$ 62,075

Consists of assorted ADP and copier equipment.

Liability

Future Lease Payments:

Year 1	$ 1,176	
Year 2	253	
Year 3	54	
Year 4	13	
Year 5	5	
After 5 years	0	
Future Lease Payments	1,501	
Less: Imputed Interest	(42)	
Less: Total Capital Lease Liability		$ 1,459
Net Amount Included in Invested Capital		$ 60,616

Funded	$277
Unfunded	1,182
Total	$1,459

Operating Leases:

NASA has no material operating leases.

Entity as Lessor:

Operating Leases:

NASA leases and allows use of its land, facilities, and equipment by the public and other Government agencies for a fee.

Future Projected Receipts:

Year 1	$ 188
Year 2	214
Year 3	171
Year 4	169
Year 5	181
After 5 years	831
Total	$ 1,754

10. Net Position:

(In Thousands)

	Trust Funds	Appropriated Funds	Total
Unexpended Appropriations:			
Undelivered Orders	$ 255	$ 2,507,660	$ 2,507,915
Unobligated:			
Available	339	947,265	947,604
Unavailable	0	104,222	104,222
Invested Capital	0	29,710,029	29,710,029
Cumulative Results	17,556	(462)	17,094
Donated Property	0	986	986
Future Funding Requirements:			
Environmental remediation	0	(1,466,784)	(1,466,784)
Annual leave	0	(142,402)	(142,402)
Workers' compensation	0	(70,780)	(70,780)
Closed appropriations	0	(33,393)	(33,393)
Other	0	(25,369)	(25,369)
Total	$ 18,150	$ 31,530,972	$ 31,549,122

11. Other Revenues and Financing Resources:

(In Thousands)

	1997	1996
Donated Trust Fund Revenue	$ 38	$ 1
General Fund Proprietary Revenue	44,034	30,231
Total	$ 44,072	$ 30,232

General Fund Proprietary Revenue represents receipts of user fees, gifts, fines or interest penalties.

Notes

Notes