

**National Aeronautics and Space Administration
President's FY 2006 Budget Request**

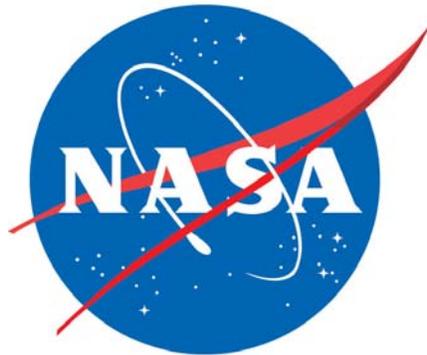
(Budget authority, \$ in millions)		FULL COST						Chapter Number
By Appropriation Account		Initial Operating Plan 12/23/04						
By Mission Directorate		<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	
By Theme								
Science, Aeronautics, and Exploration	9,334.7	9,661.0	10,549.8	11,214.6	12,209.6	12,796.1	SAE SUM-1	
Science*	5,527.2	5,476.3	5,960.3	6,503.4	6,853.0	6,797.6	SAE 1	
Solar System Exploration	1,858.1	1,900.5	2,347.7	2,831.8	2,998.9	3,066.1	SAE 2	
The Universe	1,513.2	1,512.2	1,531.5	1,539.4	1,495.0	1,406.7	SAE 3	
Earth-Sun System	2,155.8	2,063.6	2,081.2	2,132.2	2,359.0	2,324.8	SAE 4	
Exploration Systems**	2,684.5	3,165.4	3,707.0	3,825.9	4,473.7	5,125.5	SAE 5	
Constellation Systems	526.0	1,120.1	1,579.5	1,523.7	1,990.9	2,452.2	SAE 6	
Exploration Systems Research and Technology	722.8	919.2	907.3	989.2	1,050.3	1,078.5	SAE 7	
Prometheus Nuclear Systems and Technology	431.7	319.6	423.5	500.6	614.0	779.0	SAE 8	
Human Systems Research and Technology	1,003.9	806.5	796.7	812.4	818.5	815.8	SAE 9	
Aeronautics Research	906.2	852.3	727.6	730.7	727.5	717.6	SAE 10	
Aeronautics Technology	906.2	852.3	727.6	730.7	727.5	717.6	SAE 11	
Education Programs	216.7	166.9	154.9	154.7	155.4	155.4	SAE 12	
Education Programs	216.7	166.9	154.9	154.7	155.4	155.4	SAE 13	
Exploration Capabilities	6,704.4	6,763.0	6,378.6	6,056.7	5,367.1	5,193.8	EC-SUM 1	
Space Operations	6,704.4	6,763.0	6,378.6	6,056.7	5,367.1	5,193.8	EC 1	
International Space Station	1,676.3	1,856.7	1,835.3	1,790.9	2,152.3	2,375.5	EC 2	
Space Shuttle	4,543.0	4,530.6	4,172.4	3,865.7	2,815.1	2,419.2	EC 3	
Space and Flight Support	485.1	375.6	370.9	400.0	399.7	399.1	EC 4	
Inspector General	31.3	32.4	33.5	34.6	35.2	37.3	IG 1	
TOTAL	16,070.4	16,456.3	16,962.0	17,305.9	17,611.9	18,027.1		
Year to year increase		2.4%	3.1%	2.0%	1.8%	2.4%		
Emergency Hurricane Supplemental	126.0							

*Science Mission Directorate reflects the combination of the former Space Science and Earth Science Enterprises.

**Beginning in FY 2006, Exploration Systems moves from Exploration Capabilities to Science, Aeronautics and Exploration. Exploration Systems Mission Directorate reflects the combination of the former Biological & Physical Research and Exploration Systems Enterprises.

Totals may not add due to rounding.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION



FY 2006 Budget Request Summary

The Exploration Vision is Well Under Way	SUM 1-2
Transforming NASA.....	SUM 1-3
Making Great Progress.....	SUM 1-4
Science Mission Directorate	SUM 1-5
Exploration Systems Mission Directorate	SUM 1-9
Aeronautics Research Mission Directorate	SUM 1-12
Space Operations Mission Directorate	SUM 1-14
Education.....	SUM 1-17
Institutional Investments	SUM 1-19
President's Management Agenda	SUM 1-21
Budget Structure.....	SUM 1-23

The Exploration Vision is Well Under Way

On January 14, 2004, President George W. Bush announced *A Renewed Spirit of Discovery: The President's Vision for U.S. Space Exploration*, a new directive for the Nation's future in space exploration. The fundamental goal of this directive is "...to advance U.S. scientific, security, and economic interests through a robust space exploration program." In issuing it, the President committed the Nation to a journey of exploration, returning humans to the Moon by the year 2020, then venturing further into the solar system, ultimately sending humans to Mars and other destinations. He challenged NASA to establish new and innovative programs to enhance understanding of the planets, ask new questions, and answer questions as old as humankind.

The *Vision for Space Exploration*, published in February 2004, embodies the strategy and guiding principles NASA will follow in pursuing the President's directive. The *Vision* lays out important, fundamental goals and embodies a strategy of specific milestones that will move NASA and the Nation forward in the years to come.

The President demonstrated his commitment to the *Vision for Space Exploration*, and Congress supported this commitment, with full funding for NASA at the budget level requested for FY 2005. The President reaffirmed this commitment by providing NASA with a 2.4 percent increase for FY 2006 to meet established critical priorities and milestones.

The FY 2006 budget identifies what is needed to continue transforming America's civil space program. It preserves the priorities, milestones, and schedules introduced with the *Vision* in the FY 2005 budget, and it supports NASA's continuing organizational and cultural transformation through new management organizations and a revised budget structure consistent with the recommendations of the *President's Commission on Implementation of the United States Space Exploration Policy* (Aldridge Commission). The budget for FY 2006 continues to support the *Vision for Space Exploration* and is reflected in *The New Age of Exploration: NASA's Direction for 2005 and Beyond*, a new document that outlines NASA's strategic planning efforts and the Agency's commitment to implementing and achieving the *Vision*. *The New Age of Exploration* also establishes the new NASA Strategic Objectives that are reflected in the FY 2006 Budget.

The 2006 budget maintains a focus on key exploration priorities and critical milestones informed by NASA's science priorities:

- First Step—Space Shuttle return to flight and completion of International Space Station assembly.
- Flagship Program—Project Constellation (maintain 2008 CEV flight demonstration).
- Technology Base—Critical exploration technologies.
- Transforming Technologies—Project Prometheus (flight demonstration in a decade).
- Robotic Precursors—Lunar missions beginning in 2008 and Mars missions added in 2011.
- Shuttle Transition—ISS cargo and crew services via near-term commercial service.
- Scientific Breakthroughs—Exploration of the solar system and the universe (e.g., James Webb Space Telescope to be launched in 2011) and the search for Earth-like planets.

The budget also supports critical national needs and revolutionary technologies in aeronautics, climate change, and education.

Transforming NASA

Guided by NASA's core values of Safety, the NASA Family, Excellence, and Integrity, the Agency is changing to meet the needs the *Vision*. First, NASA is embedding a safety culture throughout the organization. The Agency has reduced workforce accident rates to industrial world-class standards and implemented an Independent Technical Authority to guide NASA's continued improvement.

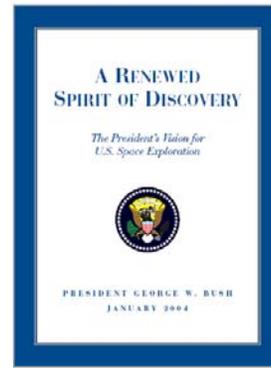
NASA is embracing competition. The Agency is using competitive processes to elicit the best from industry, academia, and NASA's Centers. NASA is seeking innovation from all sources by casting a broad net worldwide in search of beneficial partnerships and innovative solutions to technical and management challenges.

NASA is enhancing the Agency's long range planning processes and improving decision-making. The Agency's transformed structure includes a Strategic Planning Council and a supporting Office of Advanced Planning and Integration to enable better long-range planning, an Operations Council to integrate NASA's tactical and operational decisions, and a revised advisory council to integrate Agency activities. And, NASA's 2006 Strategic Plan will be based on a set of strategic and capability roadmaps currently being developed by national teams of external and NASA experts to ensure that NASA's activities are aligned with the *Vision for Space Exploration*.

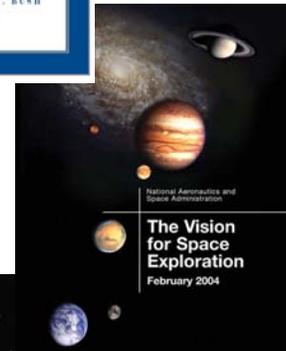
NASA has streamlined the Agency's corporate structure by cutting the number of Headquarters organizations in half. As of August 2004, NASA has four Mission Directorates—Exploration Systems, Space Operations, Science, and Aeronautics Research—and eight Mission Support Offices, including the Office of Education and the Office of Safety and Mission Assurance. And, to reinvigorate NASA's Centers, Agency leaders are identifying core competencies and reviewing possible alternate management structures for NASA's Centers.

Finally, NASA is building a sound management foundation. NASA scored well on the President's Management Agenda initiatives in 2004, especially in developing and implementing new tools to recruit the next generation of engineers, scientists, and astronauts.

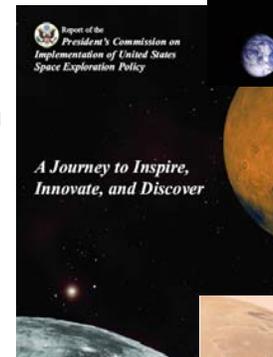
The President's Policy Directive



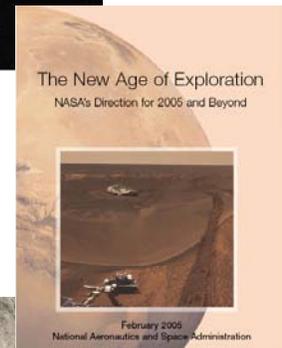
NASA's response to *The President's Vision for U.S. Space Exploration*.



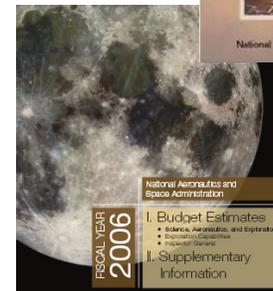
The Aldridge Commission Report on how NASA should proceed with implementing *The Vision for Space Exploration*.



NASA's strategic planning efforts for pursuing and fulfilling *The Vision for Space Exploration*.



NASA's FY 2006 Budget Request details how *The Vision for Space Exploration* and its related activities will be funded and sustained.



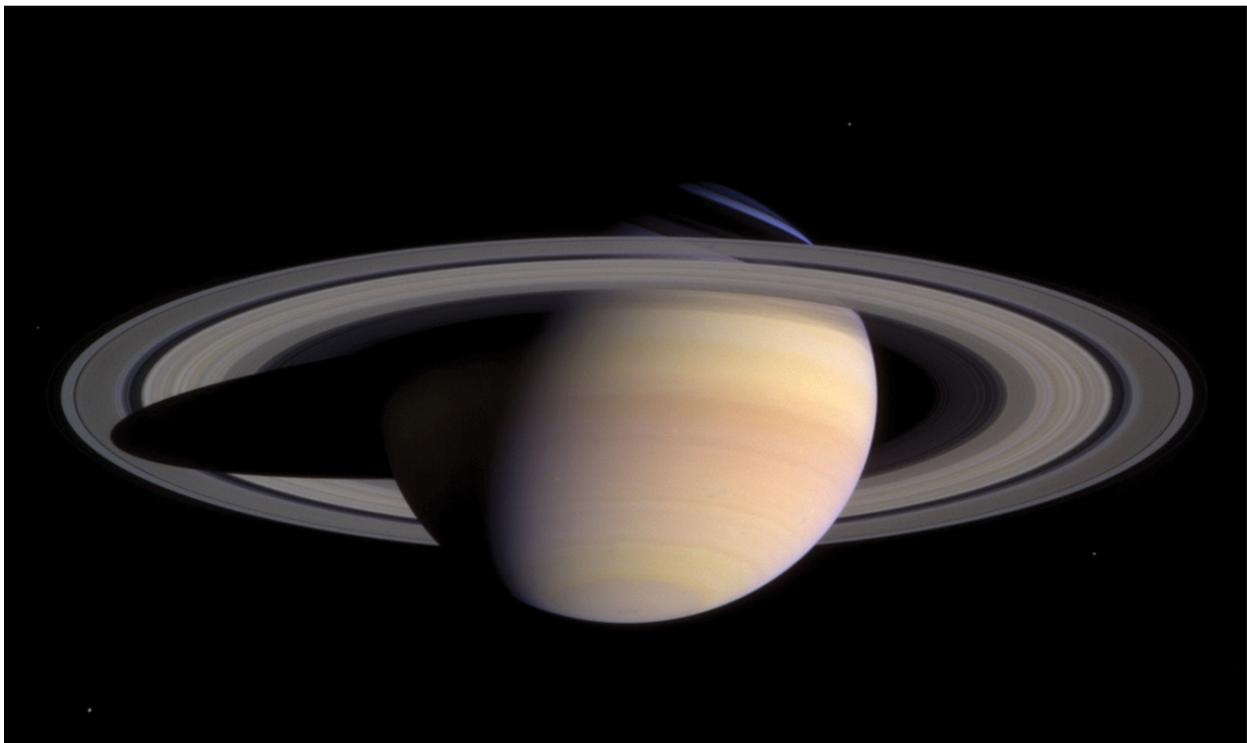
Making Great Progress

NASA's transformation and journey to achieving the *Vision for Space Exploration* is off to a strong start. NASA is making final preparations to return the Space Shuttle to flight, and this year NASA began its fifth year of continuous astronaut presence in space aboard the International Space Station.

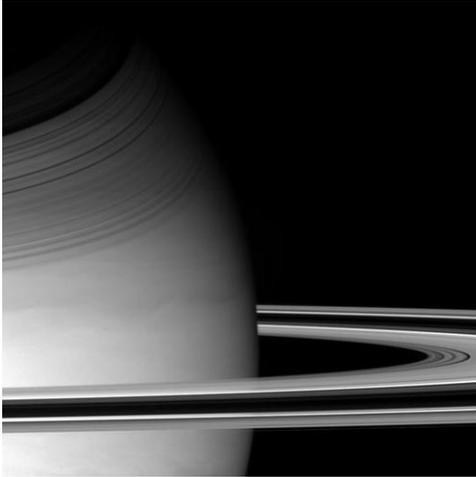
NASA is moving further into the solar system. The Mars rovers, *Spirit* and *Opportunity*, are exceeding all goals with their unprecedented discoveries and longevity. They found definitive evidence of water on the Red Planet and continue to gather data more than a year after their successful landing. The Cassini–Huygens spacecraft entered Saturn's orbit and sent back breathtaking images of that planet's rings and moons. The Genesis mission successfully returned primordial samples from space. MESSENGER launched to visit and map Mercury while NASA's eyes in the sky, including Hubble, Chandra, and Spitzer, continued to amaze the world with images from the deepest reaches of space. And, with NASA's international partners, the Agency added to the constellation of Earth observing satellites that monitor this fragile planet.

NASA also is laying the groundwork for the future. The Agency competitively awarded 118 contracts for exploration technologies based on an overwhelming response to the call for proposals. NASA began the Crew Exploration Vehicle competition process, and flight demonstrations are planned for 2008. The Agency is putting the building blocks in place to return astronauts to the Moon, and early preparations have begun – including system design and technology tests for nuclear power in place – to ensure that explorers head for Mars and other destinations on schedule.

NASA and the *Vision for Space Exploration* are generating worldwide excitement. Over 17 billion hits on NASA's Web site is evidence of public interest in America's space exploration program.



Science Mission Directorate

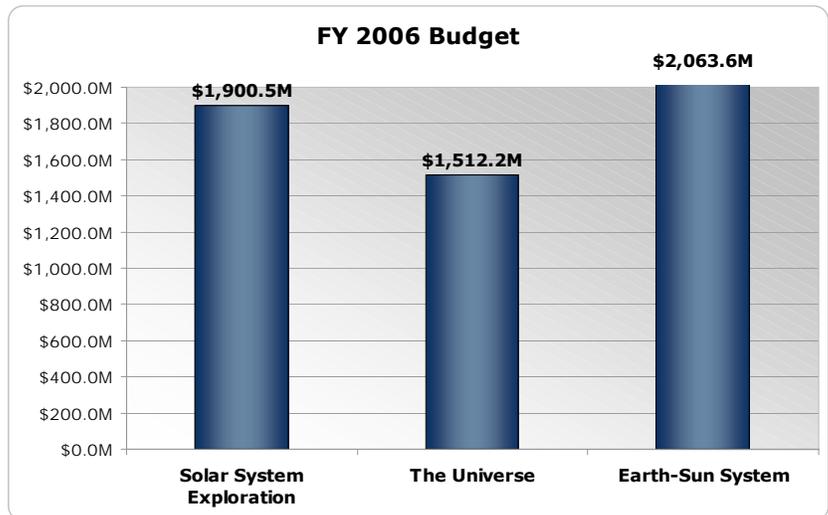


The newly organized Science Mission Directorate (SMD) engages the Nation's science community, sponsors scientific research, and develops and deploys satellites and probes in collaboration with NASA's partners around the world to answer fundamental questions requiring the view from and into space. SMD seeks to understand the origins, evolution, and destiny of the universe and to understand the nature of the strange phenomena that shape it. SMD also seeks to understand: the nature of life in the universe and what kinds of life may exist beyond Earth; the solar system, both scientifically and in preparation for human exploration; and the Sun and Earth, changes in the Earth-Sun system, and the consequences of the Earth-Sun relationship for life on Earth.

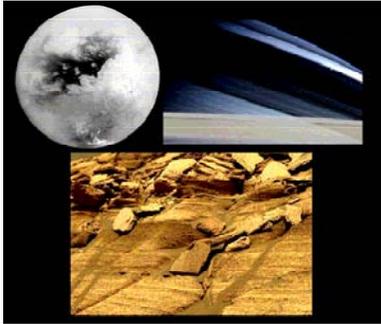
The Science Mission Directorate also sponsors research that both enables, and is enabled by, NASA's exploration activities. The SMD portfolio is contributing to NASA's achievement of the *Vision for Space Exploration* by striving to:

- Understand the history of Mars and the formation of the solar system. By understanding the formation of diverse terrestrial planets (with atmospheres) in the solar system, researchers learn more about Earth's future and the most promising opportunities for habitation beyond our planet. For example, differences in the impacts of collisional processes on Earth, the Moon, and Mars can provide clues about differences in origin and evolution of each of these bodies.
- Search for Earth-like planets and habitable environments around other stars. SMD pursues multiple research strategies with the goal of developing effective astronomically-detectable signatures of biological processes. The study of the Earth-Sun system may help researchers identify atmospheric biosignatures that distinguish Earth-like (and potentially habitable) planets around nearby stars. An understanding of the origin of life and the time evolution of the atmosphere on Earth may reveal likely signatures of life on extrasolar planets.
- Explore the solar system for scientific purposes while supporting safe robotic and human exploration of space. For example, large-scale coronal mass ejections from the Sun can cause potentially lethal consequences for improperly shielded human flight systems, as well as some types of robotic systems. SMD's pursuit of interdisciplinary scientific research focus areas will help predict potentially harmful conditions in space and protect NASA's robotic and human explorers.

In recent years, NASA science missions and research have returned spectacular and important results. Space observations have played a central role in these fascinating discoveries. From activities directly supporting the *Vision for Space Exploration* and investigations of the structures and processes at work in the universe to studies of Earth, NASA's Science Mission Directorate will continue to build upon its past successes.



Solar System Exploration Theme



The Solar System Exploration (SSE) Theme seeks to understand how the solar system formed and evolved, and whether there might be life in the solar system beyond Earth. This Theme pursues three simple yet profound questions: Where do we come from? What is our destiny? Are we alone? These overarching questions lead to more focused questions about our solar system: How do planets and their satellites form and how have they evolved over the lifetime of the solar system? How are the planets alike and how do they differ and why? What physical and chemical conditions and history must a planet have in order to be suitable for life? How were the ingredients for life, water and simple organic substances, brought to the inner terrestrial planets?

Planets and satellites receiving special attention in the SSE Theme include Mars and the Moon. The Mars program will continue to determine the planet's physical, dynamic, and geological characteristics. It will also investigate both the variability of the Martian climate in the context of understanding habitability and whether Mars ever harbored any kind of life. The Lunar program's main focus will be demonstrating capabilities to conduct sustained research on Mars as well as deeper and more advanced explorations of the solar system. Discovery and New Frontiers are competed and peer reviewed programs that give the scientific community the opportunity to assemble a team and design focused science investigations that complement other science explorations. Technology investments in propulsion and radioisotope power systems will reduce mission costs and increase capabilities for exploration and science return. The Research program provides new scientific understanding and instrumentation that enables the next generation of flight missions. Deep Space Mission Systems provides capabilities and infrastructures for tracking, navigation, and data return to Earth to support interplanetary spacecraft missions.

OVERALL BUDGET

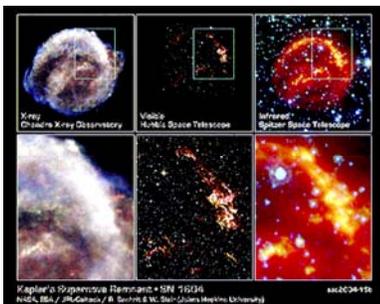
The FY 2006 request is \$1,900.5 million, including:

- \$858 million for Mars and lunar robotic exploration (a 17 percent increase above FY 2005), following up NASA's success with the *Spirit* and *Opportunity* rovers with the Mars Reconnaissance Orbiter, Mars Science Laboratory, Lunar Reconnaissance Orbiter, and the competition for Phoenix, a new mission to look for complex organic chemicals.

MAJOR ACTIVITIES PLANNED FOR FY 2006:

- Launch the first New Frontiers mission, to Pluto and the Kuiper Belt in January 2006.
- Insert the Mars Reconnaissance Orbiter into orbit around Mars and begin science investigations.
- Achieve a major MESSENGER Discovery mission milestone with the flyby of Venus (on the way to Mercury).
- Return the Stardust Discovery mission science samples to Earth in January 2006.
- Launch the Dawn Discovery mission by July 2006.

The Universe Theme



How did the universe begin? How will it end? Does time have a beginning and an end? The universe is a dynamic, evolving place governed by cycles of matter and energy. Through the Universe Theme, NASA seeks to understand these cycles and how they created the unique conditions that support life. Astronomers search for answers to these questions by looking far away, towards the beginning of time, to see galaxies forming, and close to home, in search of planetary systems around nearby stars.

NASA FY 2006 Budget Request Summary

The Universe suite of operating missions includes three Great Observatories which have helped astronomers unravel the mysteries of the cosmos: the Hubble Space Telescope, which has literally rewritten astronomy textbooks since its launch in 1990; the Chandra X-Ray Observatory in 1999, and the Spitzer Space Telescope in 2003.

In the years to come, new technologies and more powerful instruments will allow the Universe Theme's Beyond Einstein missions to look deeper into the cosmos, going to the edge of black holes and nearly to the beginning of time. In the search for origins, scientists will peer one-by-one at hundreds of Earth's nearest neighbor stars and inventory their planets, searching for solar systems resembling this one with a balmy, wet planet like Earth. Researchers do not yet know whether other similar worlds are common or exceedingly rare, but the journey to discovery has already begun.

OVERALL BUDGET

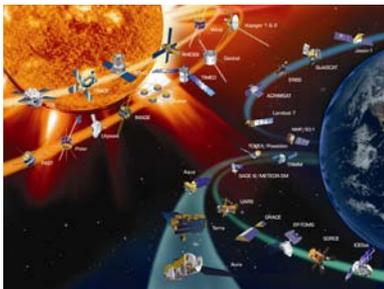
The FY 2006 request is \$1,512.2 million, including:

- \$372 million to the James Webb Space Telescope (a 19 percent increase above FY 2005) for a wide array of detailed flight design and long-lead procurement and flight hardware fabrication efforts.
- \$56 million for Beyond Einstein (a 33 percent increase above FY 2005) to test and validate theories about the nature of the universe.

MAJOR ACTIVITIES PLANNED FOR FY 2006:

- Gravity Probe B science results will become available.
- James Webb Space Telescope confirmation to enter development phase.
- The Keck Interferometer nulling mode will become available for key project observing.
- The Large Binocular Telescope Interferometer will be commissioned.

Earth-Sun System Theme



Life on Earth prospers in a climate powered by energy from the Sun that is moderated by water and carbon cycles and protected from the harshness of space by Earth's enveloping magnetic field and an atmosphere. The Earth-Sun System (ESS) Theme is comprised of research programs to understand how the Earth system is changing, to probe the connections between the Sun, Earth, and the rest of the solar system, and to discern the consequences for life on Earth.

Working with the Agency's domestic and international partners, NASA provides accurate, objective scientific data and analyses to advance understanding of Earth-Sun system processes and phenomena. This advanced understanding enables improved prediction and response capabilities for climate, weather, natural hazards, and even human-induced disasters. NASA is expanding and using its constellation of over 28 Earth-Sun observing satellites routinely making measurements with over 100 remote sensing instruments.

NASA has defined two strategic objectives within the Earth-Sun System Theme: (1) conduct a program of research and technology development to advance Earth observation from space, improve scientific understanding, and demonstrate new technologies with the potential to improve future operational systems; and (2) explore the Sun's connection to the solar system to understand the Sun and its effects on Earth, the solar system, and the space environmental conditions that will be experienced by human explorers, and demonstrate technologies with the potential to improve future operational systems.

NASA FY 2006 Budget Request Summary

OVERALL BUDGET

The FY 2006 request is \$2,063.6 million, including:

- \$243 million for Living with a Star (a 16 percent increase above FY 2005) to investigate the variability of the Sun and its impact on Earth.
- \$136 million for Earth System Science Pathfinder (a 26 percent increase above FY 2005), including CloudSat, Cloud-aerosol LIDAR and Infrared Pathfinder Satellite Observation (CALIPSO), Orbiting Carbon Observatory, Hydros, and Aquarius.
- \$845 million for Earth-Sun research (a three percent increase above FY 2005) to improve NASA's capability to predict weather, climate, natural hazards, and space weather.

MAJOR ACTIVITIES PLANNED FOR FY 2006:

- Ready Solar Dynamics Observatory and NPP for launch.
- Launch the Solar-Terrestrial Relations Observatory (STEREO).
- Retrieve/distribute scientific data from Cloudsat and CALIPSO.
- Continue development of the Orbiting Carbon Observatory and Aquarius.

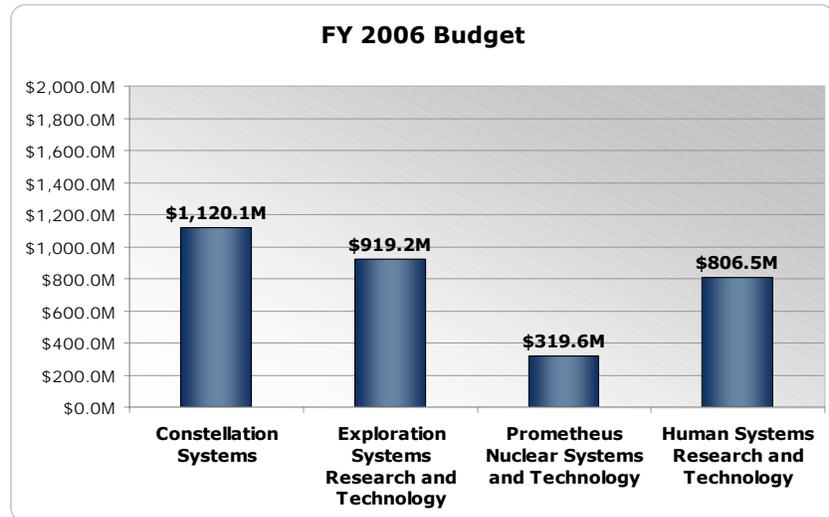
Exploration Systems Mission Directorate



The role of the Exploration Systems Mission Directorate (ESMD) is to develop a constellation of new capabilities, supporting technologies, and foundational research that enables sustained and affordable human and robotic exploration. The research and technology development activities of the former Exploration Systems Enterprise and former Biological and Physical Research Enterprise have been merged into ESMD. In this way, ESMD can integrate fully the broad engineering systems infrastructure

requirements and the critical human system requirements necessary for human exploration of the solar system to ensure safety, sustainability, and exploration crew effectiveness.

The Exploration Systems Mission Directorate consists of four Themes that will function cooperatively to enable exploration and scientific discovery: Exploration Systems Research and Technology; Human System Research and Technology; Constellation Systems; and Prometheus Nuclear Systems and Technology.



Constellation Systems Theme



Through the Constellation Systems Theme, NASA will develop, demonstrate, and deploy the collection of systems that will enable sustained human and robotic exploration of the Moon, Mars, and beyond. These include the Crew Exploration Vehicle (CEV) for the transport and support of human crews traveling to destinations beyond low Earth orbit, as well as launch vehicles for transport of the CEV and cargo to low Earth orbit, and any ground or in-space support infrastructure for communications and operations.

These systems, collectively known as the “System of Systems,” will be developed in a “spiral” approach in which early prototypes are used to demonstrate capabilities, validate technologies, and mitigate risk, all along an evolutionary path toward a mature design. The first spiral development planned for Constellation Systems will provide the capability to deliver humans to orbit in a CEV by 2014. The second spiral will deliver humans to the lunar surface by 2020, followed by the third spiral that will enable extended visits on the lunar surface. As spiral development evolves, System of Systems elements will grow to include in-space support systems, destination surface systems, and additional human support systems.

OVERALL BUDGET

The FY 2006 request is \$1,120.1 million, including:

- \$753 million for the Crew Exploration Vehicle, America’s future workhorse for safe and affordable human exploration, with resources to pursue a timely flight demonstration in 2008.

NASA FY 2006 Budget Request Summary

MAJOR ACTIVITIES PLANNED FOR FY 2006:

- System Requirements Review of the Earth Orbit Capability (Spiral 1) program.
- Begin the Concept Development and Preliminary Design phase of the Earth Orbit Capability (Spiral 1) program.

Exploration Systems Research and Technology Theme



The Exploration Systems Research and Technology (ESR&T) Theme represents NASA's commitment to investing in the technologies and capabilities that will make the national *Vision for Space Exploration* possible. Solar system exploration will benefit all of NASA and will be the primary focus of this Theme's activities, demanding a robust, ongoing commitment to innovation. Through such a focused research and development effort, the Theme will develop technologies that can be integrated into different spirals and different missions at appropriate times. The ESR&T Theme is working closely with other government agencies, industry, academia, and other partners to leverage common requirements

and identify innovative ideas.

OVERALL BUDGET

The FY 2006 request is \$919.2 million (a 27 percent increase above FY 2005), including:

- Funding for the Advanced Space Technology and Technology Maturation programs to continue competitively awarded innovative technology development contracts to NASA Centers, industry, and academia.
- An increase of \$34 million for a newly restructured Technology Transfer Partnerships project to improve NASA's ability to both spin-out and spin-in new technologies.
- \$34 million for the Centennial Challenges program.

MAJOR ACTIVITIES PLANNED FOR FY 2006:

- Assess and address critical in-house capabilities and technology gaps.
- Issue a Broad Agency Announcement to fill critical technology gaps for development of the Crew Exploration Vehicle (Spiral 1) and the first human lunar landing missions (Spiral 2).
- Complete Phase I of Advanced Space Technology and Technology Maturation projects and initial validation of new concepts and technologies.

Prometheus Nuclear Systems and Technology Theme



Prometheus Nuclear Systems and Technology represents NASA's effort to develop an advanced technology capability for more complex operations and exploration of the solar system. Historically, space exploration has been limited by the power available from solar and other non-nuclear sources. Radioisotope power systems, a passive form of nuclear power, have enabled a wide range of outer planetary

exploration missions over the past 40 years, as evidenced by the Galileo and Cassini spacecraft.

The development of more sophisticated, more capable (i.e., heavier) spacecraft, and the potential need for more robust power systems on the surface of the Moon or Mars, may require the development of the more powerful and efficient capability provided by nuclear fission. In cooperation with the Department of Energy, NASA's current research and development effort is focused on the first demonstration of a space-based nuclear reactor.

NASA FY 2006 Budget Request Summary

OVERALL BUDGET

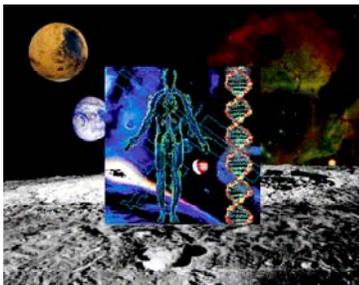
The FY 2006 request is \$319.6 million, including:

- Funding to support the initial development of a first-ever demonstration of space-based nuclear power.
- Funding to support research and development for technologies such as advanced materials, advanced power conversion, and advanced propulsion systems that will be applicable to future missions relevant to both the science and exploration goals of the *Vision*.

MAJOR ACTIVITIES PLANNED FOR FY 2006:

- Conduct the "NASA Dialogue on Nuclear Energy for Space Exploration" to understand public concerns and engage diverse stakeholders in discussions on the need and uses of these technologies.
- Conduct advanced research and development and conceptual studies for follow-on and second-generation missions and applications.
- Following completion of the Prometheus Analysis of Alternatives, initiate preliminary design of a nuclear demonstration mission.
- Conduct technology development of structures, systems, and components for an initial nuclear technology demonstration.

Human Systems Research and Technology Theme



The Human Systems Research and Technology (HSR&T) Theme is new to ESMD and is comprised of several initiatives formerly in the Biological and Physical Research Enterprise (BPRE). The programs of BPRE have been transformed from a discipline focus on biological and physical research to a requirements-driven, product-delivery focus. The Theme now focuses on ensuring the health, safety, and security of humans throughout the course of solar system exploration. Programs within this Theme advance knowledge and technology critical for supporting long-term human survival and performance during

operations beyond low Earth orbit, with a focus on improving medical care and human health maintenance.

OVERALL BUDGET

The FY 2006 request is \$806.5 million, including:

- Funding for three new programs that better align former research activities with present needs and improve NASA's ability to achieve the goals identified in the *Vision*. By transforming the BPRE organization and adopting a requirements-based philosophy in the redirection of its programs, NASA will be able to reprioritize International Space Station research and realize efficiencies in its investments by focusing them on technologies applicable to human exploration of the solar system. Such efficiencies allow NASA to adjust the investment profile for HSR&T and still return significant benefits to the space program.
- The Life Support and Habitation program conducts research and develops technology for life support and other critical systems for spacecraft operations.
- The Human Health and Performance program delivers research on questions about human biology and physiology relevant to the human exploration of the solar system, and delivers technology to help maintain or improve human health in the space environment.
- The Human Systems Integration program focuses on optimizing human-machine interaction in the operation of spacecraft systems.

MAJOR ACTIVITIES PLANNED FOR FY 2006:

- Complete the technology trade studies for both the in-space and surface extra-vehicular activity (EVA) suits.
- Revise and update standards for human cognition, human performance, assessment, and human interfaces.
- Complete study and deliver report on lunar radiation protection requirements.
- Early completion of the renal stone countermeasure development project.
- Begin testing of bone and cardiovascular countermeasures in space.

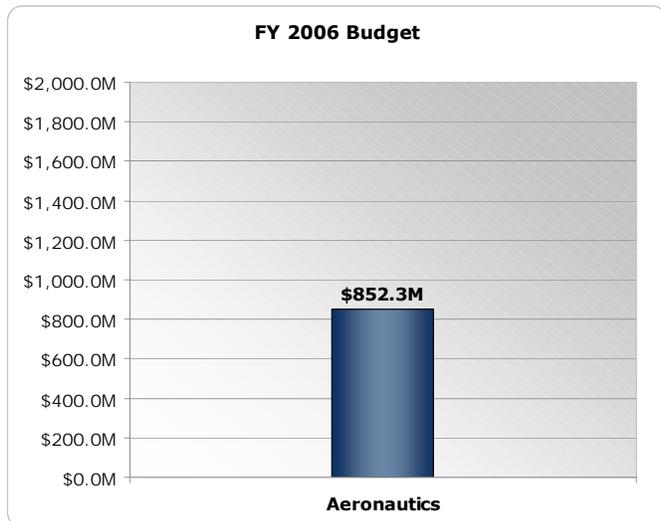
Aeronautics Research Mission Directorate



Over the last century, aviation has evolved into an integral part of our economy, a cornerstone of national defense, and an essential component of everyday life. Aviation generates more than \$1 trillion in economic activity in the United States every year. Americans rely on aviation not just for transportation, but for recreation as well. The ability of aviation to offer safe, affordable, fast, predictable movement of goods and people has fueled the industry's growth. But, just as the Nation has become more dependent on faster and

more efficient air travel, important challenges have emerged: the need to reduce the fatal accident rate; the need to enhance post-9/11 air travel safety and security; the need to reduce air and noise pollution that restrict the number and type of aircraft operating in certain areas; and the need to improve the efficiency/capacity of the air traffic and airport systems.

The Aeronautics Research Mission Directorate (ARMD) supports NASA's mission to understand and protect Earth by playing a key role in the technology developments needed to resolve the challenges faced by the aeronautics community and create a safer, more secure, environmentally friendly, and efficient national aviation system. Research areas include: advanced propulsion technologies using hydrogen fuel; airframe and propulsion technologies for noise reduction; lightweight, high-strength structures; modern decision support tools; revolutionary display and control systems; adverse weather countermeasures; adaptive controls; and advanced vehicle designs. In collaboration with the Federal Aviation Administration (FAA), NASA conducts research in air traffic management technologies for new automation tools and concepts operations. In collaboration with the Department of Homeland Security, NASA conducts similar research to improve the security of the National Airspace System.



Aeronautics Technology Theme



The Aeronautics Technology Theme (AT) serves the Nation by developing technologies to improve aircraft and air transportation system safety, security, and performance; reduce aircraft noise and emissions; and increase the capacity and efficiency of the National Airspace System. AT also conducts research that will enable the use of uncrewed aerial vehicles (UAVs) for revolutionary Earth and space science missions.

AT partners with other government agencies, academia, and industry to enhance research efforts and to ensure effective development and transfer of new technologies. As part of a national effort, NASA and the FAA Joint Planning and Development Office have developed an integrated plan for the Next Generation Air Transportation System that will transform America's air transportation network by 2025.

NASA FY 2006 Budget Request Summary

AT consists of three integrated programs: the Aviation Safety and Security program mitigates actions that would cause damage or loss of life; the Airspace Systems program enables revolutionary improvements to the National Airspace System; and the Vehicle Systems program, which has been restructured to emphasize breakthrough technologies and demonstrations, works to reduce aircraft noise, support development of zero-emissions aircraft, and develop UAVs for Earth and space science missions.

MAJOR ACTIVITIES PLANNED FOR FY 2006:

- Develop a modeling and simulation capability for National Airspace Systems.
- Develop strategic management tools for National Airspace System.
- Develop wake vortex operation procedures/standards to safely increase the terminal area capacity, and allow reduced separation standards for wake vortex avoidance considerations.
- Demonstrate prototype Distributed National Archives for Flight Operations Quality Assurance and Aviation Safety Action Program (ASAP) data with participation of multiple airlines

OVERALL BUDGET

The FY 2006 request is \$852.3 million, including:

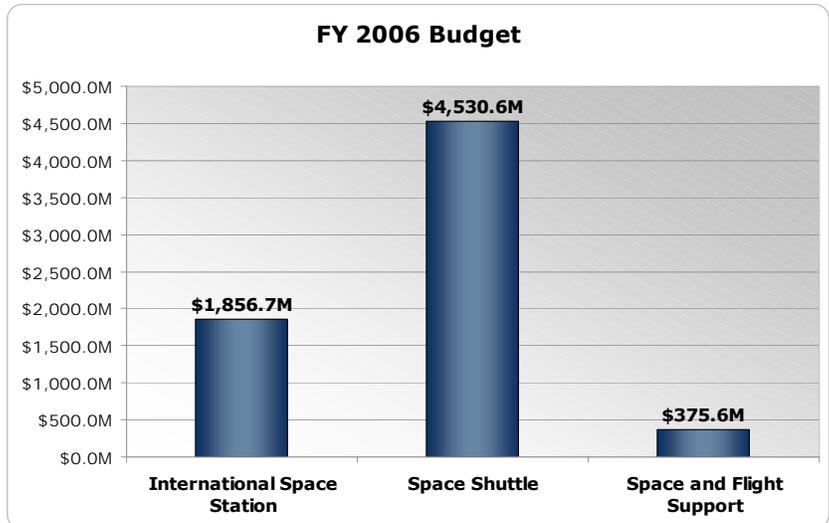
- \$193 million for Aviation Safety and Security (a four percent increase above FY 2005) to decrease aviation accident and fatality rates.
- \$200 million for Airspace Systems (a 32 percent increase above FY 2005) to provide technologies that can dramatically increase the capacity and mobility of the Nation's air transportation system.

Space Operations Mission Directorate

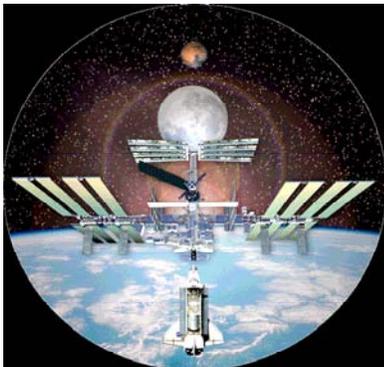


Station (ISS); and space communications systems and its supporting infrastructure. The SOMD also provides the unique human system necessary to open the space frontier as broadly as possible.

The Space Operations Mission Directorate (SOMD) programs ensure that NASA's human and robotic explorers have reliable, safe, and affordable access to space while creating new exploration and research opportunities through the extension of human presence in space. The SOMD enables NASA to achieve its goals by providing: transportation systems like the Space Shuttle; operational research facilities in space like the International Space



International Space Station Theme



The International Space Station Theme supports the construction and operation of a research facility in low Earth orbit as one of the first steps toward achieving the *Vision for Space Exploration*. The ISS provides a unique, continuously operating research facility in which researchers can develop and test medical countermeasures and engineering solutions for long-term human space travel while providing ongoing practical experience in living and working in space. The ISS Theme also supports a variety of pure and applied research for the United States and its international partners.

ISS assembly will be completed by the end of the decade. NASA is examining configurations for the ISS that meets the needs of both the Vision for Space Exploration and Agency's international partners using as few Space Shuttle flights as possible. A key element of the ISS program is the crew and cargo services project, which will purchase services for cargo and crew transport using existing and emerging capabilities.

OVERALL BUDGET

The FY 2006 request is \$1,856.7 million, including:

- \$1,697 million (a seven percent increase above FY 2005) for continuous on-orbit operations and assembly after the Shuttle return to flight;
- \$ 160 million for the acquisition of cargo and crew services for the acquisition of cargo and crew services to support the ISS.

NASA FY 2006 Budget Request Summary

MAJOR ACTIVITIES PLANNED FOR FY 2006:

- Reestablish on-orbit crew of three as early as Shuttle flight ULF1.1.
- Select commercial transportation service provider(s).
- Resume assembly of ISS.
- Maintain on-orbit operations.

Space Shuttle



The Space Shuttle is currently the only launch capability owned by the United States that enables human access to space, and it is currently the only vehicle that can support assembly of the ISS. NASA will phase-out the Space Shuttle in 2010 when its role in ISS assembly is complete.

OVERALL BUDGET:

The FY 2006 request is \$4,530.6 million. This budget will enable:

- Five Space Shuttle flights to the International Space Station to continue assemble.
- Planning for the phase-out of the Space Shuttle program in 2010, after nearly 30 years of service.

MAJOR ACTIVITIES PLANNED FOR FY 2006:

- Ensure the proper technical integration of all Space Shuttle elements.
- Safely fly planned Space Shuttle manifest.
- Initiate early actions for an orderly phase-out of the Space Shuttle program.

Space and Flight Support



This Space and Flight Support Theme encompasses Space Communications, Launch Services, Rocket Propulsion Testing, and Crew Health and Safety. Space Communications consists of: (1) the Tracking and Data Relay Satellite System (TDRSS), which supports activities such as the Space Shuttle, ISS, Expendable Launch Vehicles, and research aircraft; and (2) the NASA Integrated Services Network, which provides telecommunications services at facilities, like flight support networks, mission control centers, and science facilities, and administrative communications networks for NASA Centers. The Launch Services program focuses on meeting the Agency's launch and payload processing requirements by assuring safe and cost-effective access to space via the Space Shuttle and expendable launch vehicles. The Rocket Propulsion Testing program supports a core of highly trained rocket test and engineering crews and test facilities. Finally, the

Crew Health and Safety program provides oversight and accountability for the overall health and safety of NASA's astronaut corps.

OVERALL BUDGET:

The FY 2006 request is \$375.6 million. The budget includes:

- \$69 million for Rocket Propulsion Testing (a five percent increase above FY 2005).
- \$9 million for Crew Health and Safety (a 25 percent increase above FY 2005).

NASA FY 2006 Budget Request Summary

MAJOR ACTIVITIES PLANNED FOR FY 2006:

- Participate in technology demonstration of miniature Synthetic Aperture Radar/Communication integrated payload for the Chandrayaan-1 mission.
- Evaluate concepts to support Exploration Systems Mission Directorate timelines.
- Implement the Mission Operation Voice Enhancement Upgrade Project and the Space Network Expansion Project.
- Support Space Shuttle return to flight.
- Launch six primary payloads on Expendable Launch Vehicles.

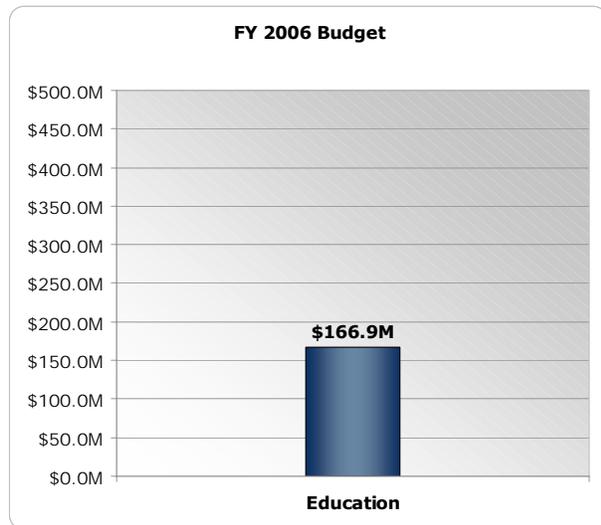
Education



To develop the next generation of explorers, NASA must inspire and motivate students to pursue careers in science, technology, engineering, and mathematics. NASA's mission to understand and explore depends upon educated, motivated people with the ingenuity to invent tools and solve problems and with the courage to always ask the next question. It is not enough to depend on the excitement generated by images of NASA's achievements in space and on Earth; NASA must capitalize on that interest to provide meaningful education programs that will benefit the Agency

and the Nation. To meet this challenge, education is a core part of NASA's mission, and education programs are an integral part of every major NASA activity.

NASA is working to ensure a pipeline of highly trained people prepared to meet mission requirements within NASA, as well as in industry and academia by: motivating students to pursue careers in science, technology, engineering, and mathematics; providing educators with unique teaching tools and compelling teaching experiences; ensuring that public resources are invested wisely; and fully engaging minority and under-represented students, educators, and researchers in NASA's education programs. The Office of Education will strive to reach, connect with, excite and inspire today's youth—the next generation of scientists, inventors, technicians, and explorers.



Education Programs



The Education Programs Theme will provide unique teaching and learning experiences through the Agency's research and flight missions. Students and educators will work with NASA and university scientists using real data to study Earth, explore Mars, and conduct scientific investigations. They will work with NASA engineers to learn what it takes to develop technological breakthroughs required to reach the farthest regions of the solar system and to live and work in space. To ensure diversity in NASA's future workforce, Office of Education programs will continue to pay particular attention to under-represented groups of students at all grade levels and economic

levels. And, NASA Education programs will increase support to the Nation's universities providing challenging research and internship opportunities for qualified students, as well as a roadmap for students seeking NASA careers.

NASA FY 2006 Budget Request Summary

OVERALL BUDGET:

The FY 2006 request is \$166.9 million:

- \$28.4 million is requested for the Elementary and Secondary Education program to make available NASA-unique strategies, tools, content and resources supporting the K-12 education community's efforts that increase student interest and academic achievement in the science, technology, engineering, and mathematics (STEM) disciplines.
- \$39.4 million is requested for the Higher Education program to attract and prepare students for NASA-related careers and to enhance the research competitiveness of the Nation's colleges and universities by providing opportunities for faculty and university-based research.
- \$10.1 million is requested for the e-Education program to develop and deploy technology applications, products, services, and infrastructure that enhance the educational process for formal and informal education.
- \$2.8 million is requested for the Informal Education program to bolster the informal education community efforts to inspire the next generation of explorers and enhance their capacity to engage in STEM education.
- \$86.1 million is requested for the Minority University Research and Education program to prepare under-represented and under-served students for NASA-related careers, and to enhance the research competitiveness of minority-serving institutions by providing opportunities for faculty and university- and college-based research.
- Additional education-related funding is managed by NASA's Mission Directorates in coordination with the Office of Education.

NASA FY 2006 Budget Request Summary

Institutional Investments

As a function of full cost management, the following institutional investments are included in the preceding Mission Directorate budgets as either direct program charges or as Center or Corporate General and Administrative (G&A) charges. These areas are included in the summary below to document the resources provided for these activities.

Center G&A

Center G&A costs include Center security, ground maintenance, fire protection, business computing, public affairs, institutional construction of facilities, human resources, procurement, budgeting, etc. FY 2006 highlights include:

- Investing \$1.5 billion in the critical Center infrastructure required to support the *Vision for Space Exploration*.

Center	FY 2006 (\$ in millions)
Ames Research Center	191
Dryden Flight Research Center	40
Glenn Research Center	161
Goddard Space Flight Center	214
Johnson Space Center	207
Kennedy Space Center	232
Langley Research Center	195
Marshall Space Flight Center	226
Stennis Space Center	39
Total, Center G&A	1,505

Corporate G&A

Corporate G&A costs include Headquarters operations and Agency-wide functions. FY 2006 highlights include:

- \$882 million total for FY 2006, as shown in the table below.
- \$77 million for the Integrated Financial Management Program (IFMP) to continue improvement of NASA financial systems.
- \$70 million for the Chief Information Office to provide tools and systems for efficient operations.
- \$79 million for the NASA Engineering and Safety Center providing independent expertise to NASA's programs.
- \$69 million for Environmental Compliance and Restoration supporting NASA's stewardship of government property.

NASA FY 2006 Budget Request Summary

Corporate G&A	FY 2006 (\$ in millions)
Headquarters Corporate Activities	373
NASA Engineering and Safety Center	79
Corporate IFMP/HQ IFM	77
Chief Information Officer	70
Environmental Compliance and Restoration	69
Chief Engineer	53
Safety and Mission Assurance	52
Agency Operations	27
Independent Verification and Validation Facility	27
Advanced Planning and Integration	20
Center-Based Corporate G&A	11
Corporate CoF	10
Security Management	9
Chief Health and Medical Officer	5
Total, Corporate G&A	882

WORKFORCE

FY 2006 highlights include:

- \$2.390 billion for salaries and benefits and \$74.9 million for travel for 18,798 full time equivalent personnel. Salaries are included in G&A or program direct costs as appropriate.

CONSTRUCTION OF FACILITIES

FY 2006 highlights include:

\$292.7 million for Construction of Facilities (CoF);

- \$110.8 million for program direct CoF, carried in program budgets;
- \$172.9 million for non-programmatic CoF, carried within Center G&A; and
- \$9.0 million for a Facility Demolition initiative, carried within Corporate G&A, to remove unused buildings at the NASA field Centers.

ENVIRONMENTAL COMPLIANCE AND RESTORATION

FY 2006 highlights include:

- \$69.1 million for environmental compliance, including \$9.2 million for Plum Brook cleanup.
- Effective this fiscal year, Environmental Compliance and Restoration was transferred to Corporate G&A.

President's Management Agenda

In 2004, Office of Personnel Management Director Kay Coles James and Office of Management and Budget Deputy Director Clay Johnson, III, honored NASA as the first Federal agency to achieve the highest standards of excellence ("Green") in two of the original five government-wide President's Management Agenda (PMA) initiatives: (1) Strategic Management of Human Capital, and (2) Budget and Performance Integration. NASA also achieved "Green" in the PMA initiative of e-government. And, in December 2004, NASA was awarded a President's Quality Award in a third initiative, Competitive Sourcing. NASA's goal is to achieve "Green" ratings in all five PMA initiatives within three to four years. Like several other agencies, NASA also is working toward improvement in a new PMA initiative, Federal Real Property Management.

NASA's President's Management Agenda Scorecard (December 31, 2004)

	Human Capital	Competitive Sourcing	Financial Performance	E-Government	Budget and Performance Integration	Federal Real Property Management
Status*						
Progress						

Human Capital

NASA has implemented a human capital plan, established an accountability system to track the associated results, and demonstrated the ability to make distinctions in employee performance using a comprehensive awards system. NASA also has received Office of Personnel Management provisional certification in 2004 for its Senior Executive Service and SL/ST performance appraisal system.

Competitive Sourcing

NASA has a competitive sourcing plan and has announced two standard competitions involving more than 230 positions. Science competitions are an integral part of this plan enabling NASA scientists to compete against those in academia, industry, and other government agencies for research opportunities.

Financial Performance

NASA continues to face significant challenges in improving the quality of the Agency's financial reporting; however, NASA has an aggressive action plan and timetable to correct deficiencies. In 2003, NASA implemented the Core Financial Module of the Integrated Financial Management Program (IFMP) to standardize financial data and processes across Headquarters and the 10 NASA Centers. IFMP replaced 140 disparate legacy financial systems. Data reconciliation issues due to the conversion from the old to the new systems, however, presented challenges in preparing NASA's FY 2003 and FY 2004 financial statements.

e-Government

NASA has an information technology (IT) architecture in place to guide Agency investments and strengthen IT security. All NASA IT systems are now operating within 10 percent of planned budget and schedule. NASA is committed to implementing government-wide e-government solutions, such as the e-payroll system, which will improve the efficiency of government operations.

Budget and Performance Integration

NASA used performance information and full-cost considerations to develop the FY 2004, FY 2005, and FY 2006 budget requests and to support the Agency's management decisions. As noted, NASA was the first government agency to achieve a "Green" for this initiative.

Federal Real Property Management

NASA is an active participant on the Federal Real Property Council, which supports government-wide best practices. The Agency currently is developing a comprehensive asset management plan to guide planning, acquisition, operation, and disposal of real property.

NASA FY 2006 Budget Request Summary

Budget Structure

NASA's budget is aggregated under three appropriation accounts: (1) Science, Aeronautics, and Exploration; (2) Exploration Capabilities; and (3) Inspector General. Under the first two accounts, the budget is organized according to Mission Directorates, NASA's primary areas of activity, and Themes, programmatic subdivisions of Mission Directorates that function as program "investment portfolios."

In response to the *Vision for Space Exploration*, supported by recommendations from the Aldridge Commission, NASA streamlined its budget structure from seven Enterprises with 18 Themes to four Mission Directorates and 12 Themes that align the Agency's resources with the *Vision for Space Exploration* while allowing for the flexibility NASA needs as it proceeds with the Agency's transformation. The new structure consolidates the Science Themes and more clearly delineates the Exploration Systems Themes. The Aeronautics activities are clearly defined as research, and the new structure continues to clearly identify NASA's Education activities.

Comparison of NASA's FY 2005 and FY 2006 Budget Structures

