National Aeronautics and Space Administration

FY 2007
Performance Highlights

To pioneer the future in space exploration, scientific discovery, and aeronautics research.

Strategic Goals for achieving NASA's Mission:

1. Fly the Shuttle as safely as possible until its retirement, not later than 2010.
2. Complete the International Space Station in a manner consistent with NASA's International Partner commitments and the needs of human exploration.
3. Develop a balanced overall program of science, exploration, and aeronautics consistent with the redirection of the human spaceflight program to focus on exploration.
4. Bring a new Crew Exploration Vehicle into service as soon as possible after Shuttle retirement.
5. Encourage the pursuit of appropriate partnerships with the emerging commercial space sector.
6. Establish a lunar return program having the maximum possible utility for later missions to Mars and other destinations.

NASA's annual Performance and Accountability Report (PAR) meets relevant U.S. government reporting requirements, including the *Government Performance and Results Act* of 1993, the *Chief Financial Officers Act* of 1990, and the *Federal Financial Management Improvement Act of 1996*.

For FY 2007, NASA chose to participate in the Office of Management and Budget's (OMB's) PAR pilot program, as described in OMB Circular A-136. This pilot entails producing three reports as an alternative to the consolidated PAR:

- An **Agency Financial Report (AFR)**, which provides NASA's financial statements and accompanying notes, an audit of the financial statements, a summary of materials weaknesses and management challenges, as well as corrective actions, and an overview of the year's performance achievements. NASA issued this report on November 15, 2007.
- An **Annual Performance Report (APR)** detailing NASA's performance towards achieving the FY 2007 Performance Plan. The APR is part of NASA's FY 2009 Budget Estimates, released on February 4, 2008.
- **FY 2007 Performance Highlights**, presented here, is a high-level summary intended for a reader with general interest in NASA's science and technology achievements, and its financial and management performance and challenges.

The AFR, NASA's FY 2009 Budget Estimates with accompanying APR, and FY 2007 Performance Highlights are available on the Web at *www.nasa.gov/news/budget/index.html*.

Cover Photo: Expedition 16 Commander Peggy Whitson participates in a spacewalk as construction continues on the International Space Station. During the 7-hour, 4-minute spacewalk, Whitson and Flight Engineer Daniel Tani (out of frame) continued the external outfitting of the Harmony node in its new position in front of the Destiny laboratory. (NASA)

Letter from the Administrator

February 1, 2008

The *National Aeronautics and Space Act* of 1958 founded NASA nearly 50 years ago to conduct research into problems of flight within and outside Earth's atmosphere, and to conduct activities in space devoted to peaceful purposes for the benefit of humankind. Today, NASA continues its quest to fulfill this charter and carry on the American tradition of pioneering the future in space exploration, scientific discovery, and aeronautics research.

Pursuant to the NASA Authorization Act of 2005, NASA carried out a balanced set of priorities for our Nation's civil space and aeronautics research goals in FY 2007. In support of our mission, NASA also made noteworthy improvements to the financial and performance reporting systems we use to allocate resources for maximum return on the Nation's investment in civil space and aeronautics research activities.

Consistent with our Strategic Goals, we continued the assembly of the International Space Station (ISS) to fulfill our commitments to our International Partners by augmenting the ISS's capabilities to support a larger crew, and to use the ISS as a National Laboratory to test technologies and countermeasures to enable longer journeys in space, as well as benefit life on Earth. One of NASA's greatest management challenges is safely flying the Space Shuttle to complete the ISS prior to retiring the Shuttle in 2010. As part of this, NASA must transition from Shuttle operations to new commercial cargo and crew transportation capabilities to support the ISS while developing NASA's new Orion Crew Exploration Vehicle and Ares launch vehicles to take us to destinations on the Moon, Mars, and beyond. We are making progress toward developing these new capabilities, developing the means for America to pioneer new frontiers.

NASA has fostered innovative partnerships with the emerging commercial space sector, and we carried out numerous science, exploration, and aeronautics research programs, projects, and activities during FY 2007 in a credible and affordable manner. Our science activities included innovations in interpreting satellite data to determine ice coverage and its sea level impacts as a result of global warming; successful launches of robotic spacecraft to better identify Sun–Earth interactions; detection of water-vapor geysers on Saturn's moon, Enceladus, suggesting an environment that could support life; and insights into the distribution of dark matter in our universe. Our aeronautics research activities included successful tests of the X–48B aircraft to pave the way to quieter, cleaner, more fuel-efficient air travel. Additionally, pursuant to the President's executive order for our Nation's aeronautics research and development efforts, we continue to support innovative research to advance the United States' technological leadership in aeronautics and to facilitate the educational development of our aeronautics workforce.

There is considerable work still to do, but NASA's commitment to achieving our goals with a sense of purpose is unwavering. We are making steady progress, taking small steps that will result in the next giant leap for mankind. It is my pleasure to provide this summary of NASA's accomplishments in FY 2007.

Michael D. Griffin
Administrator

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Management

Pursuing a Mission, Achieving a Vision

NASA has developed unique competencies in science and engineering over a number of years to fulfill its purpose and achieve the NASA Mission:

To pioneer the future in space exploration,
scientific discovery, and aeronautics research

Within this Mission, NASA is pursuing an ambitious Vision—known as the Vision for Space Exploration—for sending humans to explore the solar system. To turn this Vision into reality, NASA has established a series of stepping-stone activities to give the Agency operational and technical experience and capabilities: complete the International Space Station (ISS) and use it as a platform to develop and validate exploration technologies; return humans to the Moon using the Ares I Crew Launch Vehicle and Orion Crew Exploration Vehicle; establish outposts on the Moon where crews can further test technologies and improve capabilities for "living off the land"; and finally venture on to Mars and other destinations in the solar system.

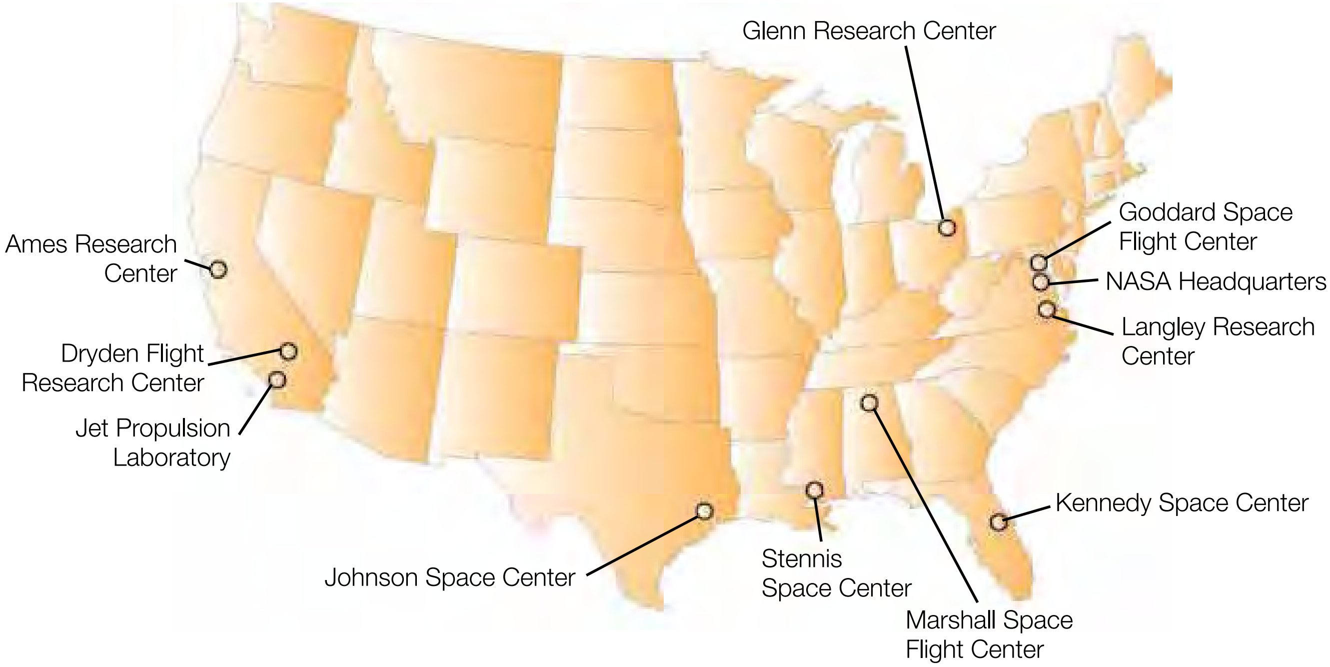
Core Values—the Key to Mission Success

NASA is privileged to take on extraordinary projects, often accompanied by great risk and complexity, to address scientific and national priorities. The Agency's employees and contractors recognize their responsibilities for the important work entrusted to them, and believe that mission success is the natural consequence of an uncompromising commitment to technical excellence, safety, teamwork, and integrity.

The Agency's shared core values support its commitment to technical excellence and express the ethics that guide the Agency's behavior. These values are the underpinnings of NASA's spirit and resolve.

- **Safety:** NASA's constant attention to safety is the cornerstone upon which NASA builds mission success. NASA employees are committed, individually and as a team, to protecting the safety and health of the public, NASA's employees and contractors, and the assets that the Nation entrusts to the Agency.
- **Teamwork:** NASA strives to ensure that the Agency's workforce functions safely at the highest levels of physical and mental well-being. NASA's most powerful tool for achieving mission success is a multi-disciplinary team of competent people. The Agency builds and values high-performing teams that are committed to continuous learning, trust, and openness to innovation and new ideas.
- **Integrity:** NASA is committed to maintaining an environment of trust built upon honesty, ethical behavior, respect, and candor. Building trust through ethical conduct as individuals and as an organization is a necessary component of mission success.

Workers at Kennedy Space Center's Parachute Refurbishment Facility prepare a parachute for an upcoming test. The first stage of the Ares I rocket and Orion spacecraft will use parachutes to return to Earth. NASA is performing tests in Arizona to make sure the parachute designs can safely handle their intended weight. (K. Shiflett/NASA)



NASA's Organization

NASA is comprised of its Headquarters in Washington, D.C., nine Centers located around the country, and the Jet Propulsion Laboratory, a Federally Funded Research and Development Center operated under a contract with the California Institute of Technology. In addition, NASA partners with academia, the private sector, state and local governments, other federal agencies, and a number of international organizations to create an extended NASA family of civil servants, allied partners, and stakeholders. Together, this skilled, diverse group of scientists, engineers, managers, and support personnel share the Mission, Vision, and values that are NASA.

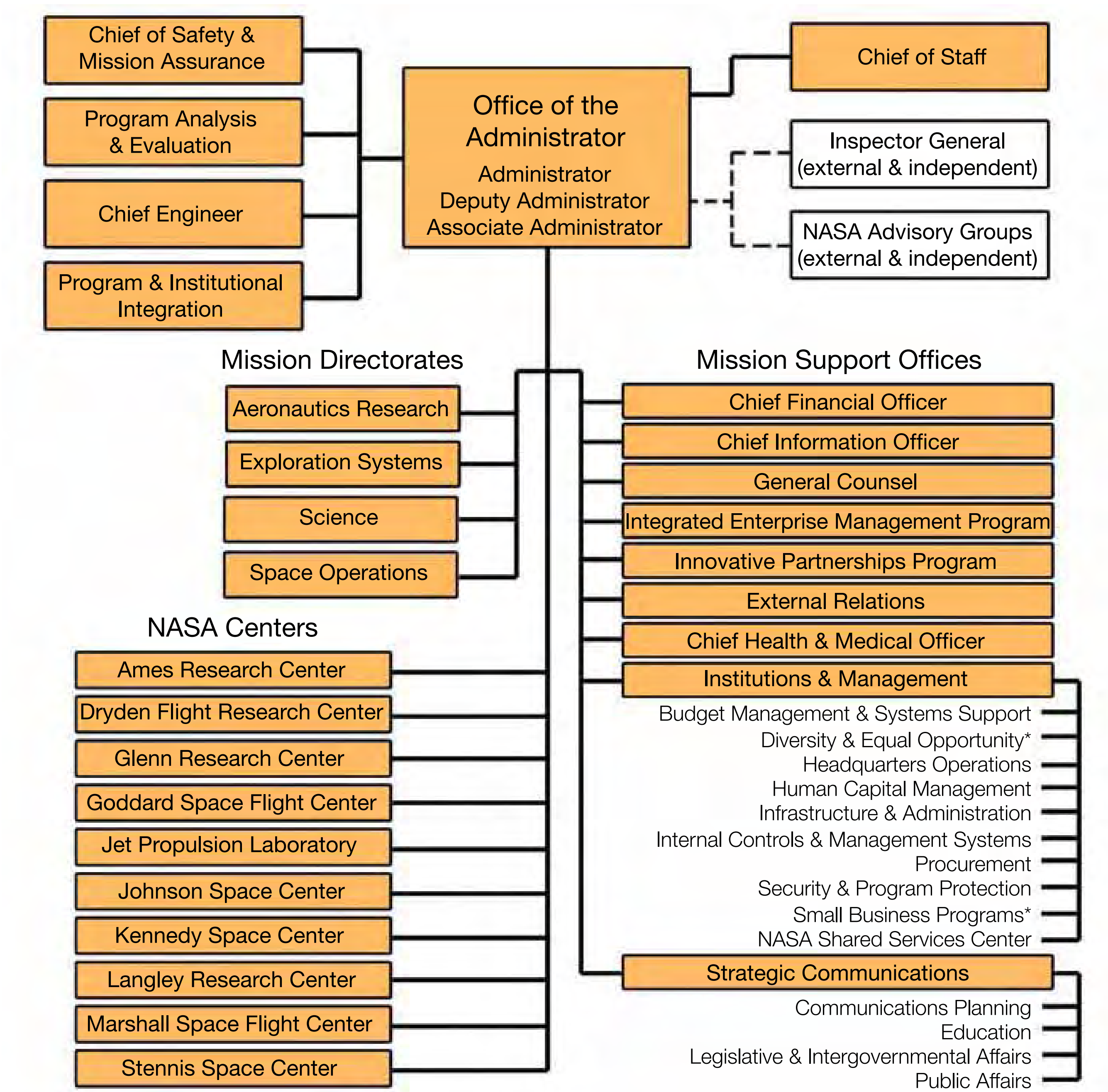
NASA Headquarters is organized into four Mission Directorates responsible for programmatic direction and ensuring that Agency programs and projects deliver on their commitments:

- The **Aeronautics Research Mission Directorate (ARMD)** conducts fundamental research in aeronautical disciplines and develops capabilities, tools, and technologies to enable safe, reliable, capable, and efficient flight vehicles and aviation systems.
- The **Exploration Systems Mission Directorate (ESMD)** develops capabilities and supporting research and technology that enable sustained and affordable human and robotic exploration and that ensure the health and performance of crews during long-duration space exploration. ESMD will develop the robotic precursor missions, human transportation elements, and life support systems for the near-term goal of lunar exploration.
- The **Science Mission Directorate (SMD)** conducts the scientific exploration of Earth, the Sun, the solar system, and the universe. Large, strategic missions are complemented by smaller missions, including ground-, air-, and orbiting space-based observatories, deep-space automated spacecraft, and planetary orbiters, landers, and surface rovers. SMD also develops increasingly refined instrumentation, spacecraft, and robotic techniques in pursuit of NASA's science goals.
- The **Space Operations Mission Directorate (SOMD)** directs spaceflight operations, space launches, and space communications and manages the operation of integrated systems in low Earth orbit and beyond, including the ISS. SOMD also is laying the foundation for human missions to Mars and a human lunar outpost through using the ISS. This orbital outpost continues to provide vital scientific and engineering information that will lead to more capable and safer systems for human explorers. It is a superb test bed for technologies to sustain and enhance the lives of human space explorers.

NASA Headquarters also has Mission Support Offices that serve the entire Agency by providing tools and processes for effective and efficient management and communication by:

- Adopting standard business and management tools to improve the effectiveness of cross-Agency operations;

- Implementing innovative practices in human capital management that support and encourage increased teamwork and individual capabilities;
- Reducing long-term operations costs by decreasing environmental liability costs;
- Ensuring facilities and capabilities are available for current and future missions and partner needs;
- Providing innovative ways to develop and acquire technologies and capabilities for mission needs and public benefit;
- Using NASA missions to inspire student interest in science, technology, engineering, and mathematics (STEM) disciplines to maintain a highly skilled U.S. workforce; and
- Improving communication and information sharing throughout the organization so everyone in NASA can contribute more effectively.



* In accordance with law or regulation, the offices of Diversity & Equal Opportunity and Small Business Programs maintain reporting relationships to the Administrator and Deputy Administrator.

Management Challenges and Actions

Conducting research, developing advanced technologies, exploring the space frontier, and supporting ongoing operations all require different management approaches to maximize results. These activities are carried out across the Nation at NASA Centers and partner sites, which can create communication and coordination challenges. NASA's senior management must allocate its limited resources to programs supporting these activities while balancing internal and external requirements and stakeholder expectations. NASA recognizes that improved management will enable more effective use of Agency resources in meeting its Mission, so in the same tradition of solving its technical challenges, NASA strives to solve its management challenges—identifying issues and constraints, setting goals, analyzing solution options, implementing and measuring progress for the chosen solution path, and updating action plans as necessary. This section discusses NASA's top management challenges and the Agency's plans and actions to remedy them.

Internally Identified Challenges

Every year, NASA management is required by the *Federal Managers' Financial Integrity Act* to identify the most serious issues that need to be addressed by the Agency to improve internal controls and financial management systems. Senior management evaluates these issues and reports to the President and Congress (through the Office of Management and Budget) the most serious ones as material weaknesses. In FY 2007, NASA reported three material weaknesses: Information Technology (IT) Security, Asset Management, and Financial Systems, Analyses, and Oversight.

IT Security is vital to the Agency for maintaining the integrity, availability, and confidentiality of mission-critical data. The consistent application of security solutions at different NASA Centers must be addressed to improve the operational efficiency of the Agency. If IT Security weaknesses continue, mission resources may have to be reallocated to bring the Agency's IT systems into compliance.

The Asset Management material weakness could prevent material misstatements from being detected and corrected in a timely manner. NASA recently implemented a change in accounting practice to address the accuracy of Property, Plant, and Equipment (PP&E) accounting. This includes procedures that will better track these assets and improve the accuracy of NASA's financial statements.

Financial Systems, Analyses, and Oversight continues to be a material weakness for the Agency. Corrective actions began in FY 2002 and 2003, and in subsequent years the Agency has made significant progress in improving its financial management systems. In FY 2007, NASA implemented a major system upgrade to the Core Financial Module of the Integrated Enterprise Management Program system to address many of the most critical system data and process issues. NASA also improved related business processes to accompany the changes to new system configurations.

In addition, the Inspector General notes that adequately identifying requirements prior to program execution and overseeing contractor performance is an internal weakness that continues to challenge NASA, and introduces fiscal and schedule tightening risks to its programs. In addition, pressures to reprioritize resources to meet continually evolving demands can manifest as risks in subtle and incremental ways. These fiscal challenges are not new and NASA's past difficulty in developing systems within cost, schedule, and performance parameters are well documented.

NASA is instituting the following initiatives to better measure performance and lay the foundation for better control of program and project costs and schedules as they proceed through the phases of development and implementation:

- Instituting regular cost and schedule tracking and reporting processes for Management Councils, to serve as the leading indication of breaches to baseline commitments;
- Reporting quarterly and/or annually to Congress and the Office of Management and Budget (OMB) on baselines and baseline updates for key programs and projects; and
- Revising key policies on standardizing yearly cost-accounting differences in the estimation and tracking of life-cycle costs and schedules, reserve strategies, and conditions for re-baselining.

Externally Identified Challenges

The NASA Inspector General, reporting on management challenges at the Agency, notes that "an overarching challenge [to all NASA programs] concerns how NASA integrates diverse programmatic and institutional functions across geographically dispersed operations." The NASA Inspector General identified two additional challenges to NASA management. These are (1) transitioning from the Space Shuttle to Constellation Systems Program vehicles and (2) the Agency's risk management processes.

Transitioning NASA's human spaceflight vehicles involves balancing the human capital, equipment, and property needs of the Space Shuttle Program with the needs of the Constellation Systems Program without compromising either program. The challenge arises within the framework of a projected five-year gap between the last expected flight of the Space Shuttle in 2010 and the first projected flight of the Crew Exploration Vehicle in 2015. At issue is maintaining the critical skills now present in the Space Shuttle workforce throughout the remaining Shuttle flights while placing additional emphasis on defining the skill sets needed by the Constellation Systems Program. This five-year period will challenge NASA's ability to maintain employee skill sets, use its infrastructure and suppliers efficiently, and provide adequate support to the activities of the ISS. NASA's plans to rely on international partners and commercial providers to provide the support necessary to operate the ISS during the five-year gap will also be a challenge because the capabilities, schedules, and funding for NASA, its international partners, and commercial cargo vehicles are not firm enough to ensure that the ISS mission objectives can be fulfilled.

NASA's role as the Nation's leader in space and aeronautics research and development contains inherent challenges for risk management. Operational and safety risks and the capabilities to mitigate these risks, continue to confront the Agency, such as those associated with continued Shuttle flights needed to complete the ISS (Strategic Goal 2). The Agency's willingness to accept these risks may reflect—or it may exceed—the Nation's tolerance for such risk.

NASA management continues to evaluate and identify its challenges in successfully implementing programs to achieve the Agency's Mission. This due diligence is leading to improvements in management systems and processes, creating better value for NASA stakeholders. Additional detail is available in the FY 2007 NASA Annual Financial Report, found online at *www.nasa.gov/news/budget/index.html*.

The President's Management Agenda (PMA)

Initiated in 2001, PMA is an initiative to improve management across the federal government in key areas. Under PMA, NASA rates performance in six management areas: Human Capital, Competitive Sourcing, Improving Financial Performance, E-Government, Budget and Performance Integration, and Real Property Asset Management.

OMB oversees the PMA efforts on an annual basis, negotiates performance goals with each agency, and rates agency performance quarterly using a stoplight grading system: Green for success, Yellow for mixed results, and Red for unsatisfactory. OMB rates the current status and the progress an agency has made towards timelines and deliverables agreed upon by the agency and OMB.

The table below shows NASA's PMA status and progress for FY 2007 (as of September 30, 2007) and status of the three previous fiscal years.

PMA Scorecard Status					
	FY04	FY05	FY06	FY 2007	FY 2007 Progress
Human Capital	Green	Green	Green	Green	Green
Competitive Sourcing	Yellow	Green	Green	Green	Green
Financial Performance	Red	Red	Red	Red	Green
E-Government	Green	Yellow	Red	Red	Red
Budget and Performance Integration	Green	Green	Green	Green	Green
Real Property Asset Management	Red	Yellow	Green	Green	Yellow

In FY 2007, NASA maintained a Green rating for status in four of the six management areas. In two areas, Financial Performance and E-Government NASA received Red ratings for status; these areas coincide with the internally identified management challenges.

The PMA scores from each agency are rolled up into an Executive Branch Management Scorecard that tracks government-wide status and progress in all PMA focus areas. For more information on PMA and other White House initiatives to improve government management, please visit *Results.gov*.

Against the blue and white backdrop of Earth, the ISS moves away from Space Shuttle *Endeavour* on August 19, 2007. Earlier, the STS-118 and Expedition 15 crews concluded nearly nine days of cooperative work onboard the Shuttle and the ISS. (NASA)

Performance

Measuring NASA's Performance

In accordance with the *Government Performance and Results Act* of 1993*,* the Agency achieves its Mission through Strategic Goals, Sub-goals, multi-year Outcomes, and Annual Performance Goals (APGs) established in the 2006 NASA Strategic Plan. NASA managers monitor multi-year Outcome and APG performance based on a number of factors, including internal and external assessments.

Internally, NASA monitors and analyzes each program's adherence to budgets, schedules, and key milestones. These analyses are provided during monthly reviews at the Center, Mission Directorate, and Agency levels to communicate the health of the program. (Programs are identified in NASA's annual Budget Estimates, available at *www.nasa.gov/news/budget/index.html*.)

External advisors, like the NASA Advisory Council, the National Research Council, and the Aerospace Safety Advisory Panel, assess program content and direction. Also, experts from the science community, coordinated by the Science Mission Directorate, review NASA's progress toward meeting performance measures under Sub-goals 3A through 3D.

During the fiscal year, approximately one-third of the Agency's Themes also participate in the Office of Management and Budget's Program Assessment Rating Tool (PART) evaluation, which is a rigorous and interactive assessment that involves both internal and external reviewers. (See NASA's PART Assessments for a list of URLs.)

After weighing input from internal and external reviews, NASA managers determine a program's progress toward achieving its respective multi-year and annual performance measures. Based on the ratings, managers formulate appropriate follow-up actions. NASA's Outcome ratings for FY 2007 and Outcome trending information are provided in the Performance Overview in the following pages.

Multi-year Outcome Rating Scale

Green	NASA achieved most APGs under this Outcome and is on-track to achieve or exceed this Outcome.
Yellow	NASA made significant progress toward this Outcome, however, the Agency may not achieve this Outcome as stated.
Red	NASA failed to achieve most of the APGs under this Outcome and does not expect to achieve this Outcome as stated.
White	This Outcome was canceled by management directive or is no longer applicable based on management changes to the APGs.

Other Trending Information

Blue	NASA exceeded (beyond a Green rating) performance expectations for this performance measure. NASA discontinued this rating as of FY 2005.
None	Although NASA may have conducted work in this area, management did not include a performance measure for this work in the fiscal year's performance plan.
8.3.1 Green	In prior years where data is available, NASA notes the applicable Outcome reference number and rating to provide a Theme's performance trends. The annual Performance Report or Performance and Accountability Report for an indicated performance year provide the full text and explanations. In some cases, an Outcome may track to more than one performance measure in past performance years.

NASA's FY 2007 Annual Performance Report, part of the Agency's FY 2009 Budget Estimates, includes APG ratings, detailed information on performance areas, performance measure ratings, APG rating trends, plans to improve performance as needed, and PART assessments. The Annual Performance Report also is available as a separate document online, beginning February 4, 2008, at *www.nasa.gov/news/budget/index.html*.

Performance Overview

Strategic Goal 1: Fly the Shuttle as safely as possible until its retirement, not later than 2010.

The Space Shuttle has supported NASA's Mission for over 25 years, carrying crews and cargo to low Earth orbit, performing repair, recovery, and maintenance missions on orbiting satellites, providing a platform for conducting science experiments, and supporting construction of the International Space Station (ISS). As required by Strategic Goal 1, NASA will retire the Shuttle fleet by 2010, making way for the new generation of launch and crew exploration vehicles being developed under Strategic Goal 4. Until then, the Agency will demonstrate NASA's most critical value—safety—by promoting engineering excellence, maintaining realistic flight schedules, and fostering internal forums where mission risks and benefits can be freely discussed and analyzed.

Benefits

The Shuttle is recognized around the world as a symbol of America's space program and the Nation's commitment to space exploration. NASA's Space Shuttle Program has inspired generations of schoolchildren to pursue dreams and careers in science, technology, engineering, and mathematics. The Space Shuttle Program also provides direct benefits to the Nation by advancing national security and economic interests in space and spurring technology development in critical areas such as navigation, computing, materials, and communications. Furthermore, due to its heavy-lift capacity, the Shuttle is the only vehicle capable of completing assembly of the ISS in a manner consistent with NASA's International Partner commitments and exploration research needs. The remaining Shuttle flights will be dedicated to ISS construction and a Hubble Space Telescope service mission.

A primary public benefit of retiring the Shuttle is to redirect resources toward new programs, such as the Orion Crew Exploration Vehicle and the Ares launch vehicles being developed by Constellation Systems, needed to send humans to the Moon and beyond. NASA will use the knowledge and assets developed over nearly three decades of Shuttle operations to build a new generation of vehicles designed for missions beyond low Earth orbit. As the Shuttle fleet approaches its retirement year, the Agency gradually is directing Shuttle personnel, assets, and knowledge toward the development and support of new hardware and technologies that will support Constellation Systems vehicle. For the American public, this means continuity in the access to space and sustained U.S. leadership in technology development and civilian space exploration.

Crewmembers aboard STS-116 release a Department of Defense pico-satellite known as the Atmospheric Neutral Density Experiment (ANDE) from *Discovery*'s payload bay into low Earth orbit on December 21, 2006. ANDE consists of two pico-satellites that will measure the density and composition of the atmosphere while being tracked from the ground. Researchers will use the ANDE data to better predict the movement of objects in orbit. (NASA)

Highlight

NASA launched three Shuttle missions to increase power for the ISS and maintain and resupply the orbiting complex. STS-116 (December 2006) delivered Sunita Williams to replace German astronaut Thomas Reiter, and also delivered the P5 truss segment and supplies. The crew reconfigured the ISS power system and retracted the P6 solar array. STS-117 (June 2007), launched after NASA repaired damage caused by a February hailstorm, delivered astronaut Clayton Anderson, who replaced Williams. STS-117 also delivered the S3/S4 truss and supplies. The Shuttle and ISS crews deployed the solar arrays and radiators on the new truss, configured the ISS for activation of the Oxygen Generation System (OGS), and repaired a loose thermal blanket on the Shuttle's right Orbital Maneuvering System pod. STS-118 (August 2007) delivered supplies and the S5 truss, which the crew installed. The crew activated the Station–Shuttle Power Transfer System (SSPTS), which enables longer orbiter stays and more flexible ISS missions. STS-118 also was the first flight of Mission Specialist and teacher Barbara Morgan. More information on these flights can be found at *www.nasa.gov/mission_pages/shuttle/shuttlemissions/index.html*.

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome 1.1: Assure the safety and integrity of the Space Shuttle workforce, systems and processes while flying the manifest.	8.3.1 Yellow	6.1 Green	1.1 Yellow	Green
Outcome 1.2: By September 30, 2010, retire the Space Shuttle.	None	None	None	Green

Strategic Goal 2: Complete the International Space Station in a manner consistent with NASA's International Partner commitments and the needs of human exploration.

Built and operated using state of the art science and technology, the ISS—and by extension Strategic Goal 2—is a vital part of NASA's program of exploration. The ISS provides an environment for developing, testing, and validating the next generation of technologies and processes needed to support Sub-goal 3F, Strategic Goal 4, and NASA's Vision to return to the Moon and send human explorers deeper into space.

On August 13, 2007, STS-118 Mission Specialists Dave Williams (left) and Rick Mastracchio conduct a spacewalk to replace a faulty moment control gyroscope on the ISS's Z1 truss with a new gyroscope. Williams is anchored to the foot restraint on the Canadarm2 robotic arm. The new gyroscope is one of four that control the ISS's position in orbit. (NASA)

Benefits

The ISS is a testbed for exploration technologies and processes. Its equipment and location provide a one-of-a-kind platform for Earth observations, microgravity research, and investigations of the long-term effects of the space environment on human beings. The ISS also enables research in fundamental physics and biology, materials sciences, and medicine. Crewmembers test processes for repairing equipment in microgravity, conducting spacewalks, and keeping systems operational over long periods of time—capabilities critical to future missions.

When completed, the ISS will be the largest crewed spacecraft ever built. Many nations provide the resources and technologies that keep the ISS flying, and these international partnerships have increased cooperation and goodwill among participating nations.

Highlight

NASA is on schedule to meet its commitments toward completing the ISS. In May and June 2007, ISS crew completed three extravehicular activities (EVAs) for maintenance, science, and assembly tasks. The newly installed S3/S4 truss increased the ISS's power capability, while the Oxygen Generating System rack, activated in July, will allow the ISS to accommodate a six-member crew and enable NASA to further develop and validate life-support technology for long-duration human space missions. The STS-118 crew attached the S5 truss, which will enable the crew of a future miss ion (15A) to attach the next truss segment (S6), providing additional solar arrays. In August, the crew conducted three more EVAs for maintenance, science, and assembly tasks, including repair of the Carbon Dioxide Removal Assembly and activation of the SSPTS. Also, during the second EVA, crew successfully removed and replaced the Control Moment Gyroscope #3, restoring full Gyroscope capability to the ISS. Continued successful Space Shuttle and ISS missions will allow completion of ISS assembly by FY 2010. For more on ISS, please visit *www.nasa.gov/mission_pages/station/main/index.html*.

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome 2.1: By 2010, complete assembly of the U.S. On-orbit Segment; launch International Partner elements and sparing items required to be launched by the Shuttle; and provide on-orbit resources for research to support U.S. human space exploration.	8.4.1 Green	8.1 Green 8.2 Green	2.1 Green	**Green**
Outcome 2.2: By 2009, provide the on-orbit capability to support an ISS crew of six crewmembers.	None	None	None	**Green**

As the saying goes, great minds think alike. This was particularly true for six schools from around the country that each proposed the name "Harmony" for a contest to name ISS Node 2. The schools—from Virginia, Louisiana, Texas, Florida, and Wisconsin—were notified that they won the contest just prior to the official announcement at the Space Station Processing Facility at NASA's Kennedy Space Center in March 2007. Harmony (shown here at Kennedy being prepared for flight on STS-120) will be the fourth named U.S. module on the ISS, taking its place with the Destiny laboratory, the Quest airlock, and the Unity node. (NASA)

Strategic Goal 3: Develop a balanced overall program of science, exploration, and aeronautics consistent with the redirection of the human spaceflight program to focus on exploration.

Sub-goal 3A: Study Earth from space to advance scientific understanding and meet societal needs.

Earth is a dynamic system. Its land, oceans, atmosphere, climate, and gravitational fields are changing constantly. Some of these changes, especially short-duration and localized phenomena like hurricanes and earthquakes, are regionally significant and pose immediate hazards to humans. Other changes, like climate variability, take longer to have effects—which spread over large regions, including the entire Earth—that are revealed through long-term observations and modeling. To achieve Sub-goal 3A, NASA's Earth Science Program helps researchers better understand the causes and consequences of these changes through data gathered by Earth-observing satellites, aircraft, and balloons. Using advanced computer systems, program scientists analyze and model the data into useful Earth science information and distribute it to end users around the world.

Benefits

NASA's Earth Science Program is central to three Presidential initiatives that serve the public:

- The Climate Change Research Initiative, established in 2001 to study global climate change and to provide a forum for public debate and decision-making about how the United States monitors and responds to climate change;
- The Climate Change Science Strategic Plan (July 24, 2003) with special emphasis on global observations; and
- The U.S. Ocean Action Plan, released in 2004 as part of a Bush Administration effort to ensure that benefits derived from oceans and other bodies of water will be available to future generations.

To support these initiatives, NASA and its partners—other government agencies, academia, non-profit organizations, industry, and international organizations—conduct vital research that helps the Nation manage environmental and agricultural resources and prepare for natural disasters. In the course of conducting this research, NASA applies the resulting data and knowledge with the Agency's operational partners to improve their decision-making in societal need areas such as public health, aviation, water management, air quality, and energy.

NASA's Earth Science Program also helps NASA achieve the Agency's other Strategic Goals and overall Mission:

- Earth observing satellites provide meteorological information used by NASA, the National Oceanic and Atmospheric Administration (NOAA) and the Department of Defense in providing weather forecasts that are used to fulfill their Agency mandates.
- Measurement and analysis techniques, demonstrated first in Earth orbit and applied first to Earth studies, may help advance exploration and understanding of other planets in the solar system.

Highlight

Scientists at NASA's Goddard Space Flight Center and the University of Colorado have developed an innovative technique for using data from the GRACE mission to estimate, with unprecedented spatial detail, the growth and shrinkage of major drainage systems of the Greenland and Antarctic ice sheets. For Greenland, these results show significant ice loss in the southeastern section of the ice sheet, as well as modest losses elsewhere, while the interior has been growing. Between 2003 and 2005, the ice sheet lost 155 gigatonnes of ice per year in the areas below 2,000 meters elevation (essentially

A team of U.S. and Brazilian scientists using the insightful eyes of two NASA satellites has shown that one of the worst droughts in decades could not stop the undisturbed regions of the Amazon forest from "greening up." During the 2005 drought, intact primary forest showed an increase in photosynthetic activity (left image) despite below-average rainfall (right image). Data from NASA's Terra satellite (left) showed areas of higher (green) and lower (red) growth during the peak of the drought (July–September). Data from the TRMM satellite (right) showed areas of severe rainfall reduction due to the drought (red) and few areas with above normal rainfall (blue). (K. Didan, University of Arizona Terrestrial Biophysics and Remote Sensing Lab)

the areas that experience melt), but those losses were partially offset by a gain of 54 gigatonnes per year at the higher elevations (above 2,000 meters, where melt is very limited). The estimated net change in mass of 101 gigatonnes per year is the equivalent of 0.3 millimeters per year of sea level rise. For additional information, please see *podaac.jpl.nasa.gov/grace/*.

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome 3A.1: Progress in understanding and improving predictive capability for changes in the ozone layer, climate forcing, and air quality associated with changes in atmospheric composition.	None	None	3A.1 Green	**Green**
Outcome 3A.2: Progress in enabling improved predictive capability for weather and extreme weather events.	None	None	3A.2 Green	**Green**
Outcome 3A.3: Progress in quantifying global land cover change and terrestrial and marine productivity, and in improving carbon cycle and ecosystem models.	None	None	3A.3 Green	**Green**
Outcome 3A.4: Progress in quantifying the key reservoirs and fluxes in the global water cycle and in improving models of water cycle change and fresh water availability.	None	None	3A.4 Yellow	**Green**
Outcome 3A.5: Progress in understanding the role of oceans, atmosphere, and ice in the climate system and in improving predictive capability for its future evolution.	None	None	3A.5 Yellow	**Yellow**
Outcome 3A.6: Progress in characterizing and understanding Earth surface changes and variability of Earth's gravitational and magnetic fields.	None	None	3A.6 Green	**Green**
Outcome 3A.7: Progress in expanding and accelerating the realization of societal benefits from Earth system science.	None	None	3A.7 Green	**Green**

Why NASA did not achieve Outcome 3A.5: Performance toward this Outcome continues to be a concern due to uncertainties in climate data continuity and delays and technical issues related to the NPOESS Preparatory Project (NPP) mission. Although the NASA-developed NPP spacecraft and the NASA-supplied Advanced Technology Microwave Sounder (ATMS) instrument have been successfully delivered and tested and the ATMS is integrated onto the NPP spacecraft, significant technical and schedule problems have caused delays with the development and delivery of the NPOESS-developed Visible/Infrared Imager/Radiometer Suite (VIIRS) instrument. The performance of the instrument will not meet all of NASA's NPP Level 1 requirements and, therefore, will impact key climate research measurements of ocean color and atmospheric aerosols.

Contractor performance also poses risks to both the NPP and Glory missions. Performance issues have been causing cost and schedule overruns, which impact not only the timely implementation of the systematic Earth Observation missions, but the overall success of the flight program.

Plans for achieving 3A.5: In order to improve contractor performance and limit further cost and schedule overruns, NASA implemented management changes on the Glory mission. Management changes also were approved by the Tri-Agency (NASA, NOAA, Department of Defense) Executive Committee and implemented by the Integrated Program Office (IPO) on NPOESS.

Program funding ensures NASA support to the IPO technical management personnel, funding for the competitively selected NPP science team, and the continued NPP project requirements. NASA continues to work with partner agencies to utilize the assessment information developed by the NPP project and science team in developing a joint mitigation strategy and implementation plan.

Educators can bring a hurricane expert into their classroom with the release of a new NASA Web site containing short pre-produced video segments, teaching segments, and question and answer sections, all packaged for use by teachers and students. This image shows a teacher audience on the large left screen, while the screen on the right shows Dr. Jeff Halverson explaining a NASA QuikSCAT satellite image behind him that shows wind speed and direction of a storm. Dr. Halverson is actually standing in the studio (far right) in front of a green screen used to insert computer graphics into live-action video. The Web site is available at *www.nasa.gov/mission_pages/hurricanes/features/hurricane_educ_links.html*.

Sub-goal 3B: Understand the Sun and its effect on Earth and the solar system.

Life on Earth is linked to the behavior of the Sun. The Sun's energy output is fairly constant, yet its spectrum and charged particle output are highly variable on numerous timescales. Moreover, short-term events like solar flares and coronal mass ejections (CMEs) can change drastically solar radiation emissions over the course of a single second. All of the solar system's classical nine planets orbit within the outer layers of the Sun's atmosphere, and some planetary bodies, like Earth, have an atmosphere and magnetic field that interacts with the solar wind. While Earth's magnetic field protects life, it also acts as a battery, storing energy from solar wind until it is released, modifying "space weather" that can disrupt communications, navigation, and power grids, damage satellites, and threaten the health of astronauts.

To achieve Sub-goal 3B, Heliophysics Theme researchers study the Sun and its influence on the solar system as elements of a single, interconnected Earth–Sun system using a group of spacecraft that form an extended network of sensors that allow the investigation of the magnetic sun and its effect on the planets and the solar system. Using data from these spacecraft, NASA seeks to understand the fundamental physics behind Sun–planet interactions and study space environmental hazards.

Benefits

Society is increasingly dependent on technologies that are vulnerable to solar activity and space weather events, so the need to predict solar events and mitigate their effect is critical to the public's safety, security, and the Nation's economy.

This predictive capability is critical to NASA's human and robotic space missions as well. Better understanding and improved observations of solar events and of heliophysics will provide the information needed to develop early warning systems and technologies that will protect astronauts, spacecraft, and the systems that support both from hazardous space radiation.

Highlight

With the launches of Solar–B, STEREO, THEMIS, and AIM, NASA is embarking on a new campaign to explore the Sun's dynamics and understand and forecast its interactions with Earth. These new missions replace or extend existing capabilities in terms of observing and measuring fundamental physical processes and physical conditions operating throughout the solar system. Working in synergy with the Heliophysics constellation of satellites, they mitigate potential risks to Sub-goal 3B that were noted in the FY 2006 Performance and Accountability Report. For more, please see: *science.hq.nasa.gov/sun/index.html*.

<table>
<tr><th>Multi-year Outcomes</th><th>FY04</th><th>FY05</th><th>FY06</th><th>FY 2007</th></tr>
<tr><td rowspan="5">Outcome 3B.1: Progress in understanding the fundamental physical processes of the space environment from the Sun to Earth, to other planets, and beyond to the interstellar medium.</td><td>5.6.1 Green</td><td>15.4 Green</td><td rowspan="5">3B.1 Green</td><td rowspan="5">Green</td></tr>
<tr><td>5.6.2 Blue</td><td>15.5 Green</td></tr>
<tr><td>5.6.3 Green</td><td>15.6 Green</td></tr>
<tr><td>5.7.1 Green</td><td>15.7 Green</td></tr>
<tr><td>5.7.2 Green</td><td>15.8 Green</td></tr>
<tr><td rowspan="2">Outcome 3B.2: Progress in understanding how human society, technological systems, and the habitability of planets are affected by solar variability and planetary magnetic fields.</td><td>1.3.2 Green</td><td>15.2 Green</td><td rowspan="2">3B.2 Green</td><td rowspan="2">Green</td></tr>
<tr><td>1.3.3 Green</td><td>15.3 Green</td></tr>
<tr><td>Outcome 3B.3: Progress in developing the capability to predict the extreme and dynamic conditions in space in order to maximize the safety and productivity of human and robotic explorers.</td><td>1.3.1 Green</td><td>15.1 Green</td><td>3B.3 Green</td><td>Green</td></tr>
</table>

On February 25, 2007, the Moon transited across the face of the Sun. STEREO project scientists tweaked the spacecraft's orbit in December so it could witness this event, one never before visible to human eyes. Two spacecraft comprise the STEREO mission and the one trailing Earth was able to capture this beautiful image of the event as the spacecraft headed for its nominal operational orbit. The transit was a unique opportunity for scientists to measure the focus and scattered light performance of the STEREO imaging systems and to validate the pointing of the STEREO coronagraphs. Structures of the corona and the disk of the sun were captured in this picture and inform the viewer of temperatures at the Sun. The pink-red structure is formed at around 100,000 degrees Celsius, while the yellow-white material comes from regions that are much hotter, 2,500,000 degrees Celsius. (NASA)

Sub-goal 3C: Advance scientific knowledge of the solar system, search for evidence of life, and prepare for human exploration.

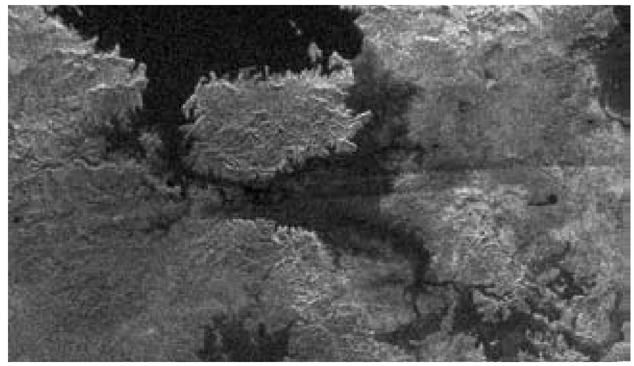
To achieve Sub-goal 3C, the Solar System Exploration (now Planetary Science) Theme uses robotic science missions to investigate alien and extreme environments throughout the solar system. These missions help scientists understand how the planets of the solar system formed, what triggered the evolutionary paths that formed rocky terrestrial planets, gas giants, and small, icy bodies, and how terrestrial bodies originated, evolved, and their habitability. The data from these missions guide scientists in the search for life and its precursors beyond Earth and provide information to help NASA plan future human missions into the solar system.

Benefits

NASA's robotic science missions are paving the way for understanding the origin and evolution of the solar system and to identify past and present habitable locations. With this knowledge, the Theme also is potentially enabling human space exploration by studying and characterizing alien environments and identifying possible resources that will enable safe and effective human missions to the Moon and beyond.

Robotic explorers gather data to help scientists understand how the planets formed, what triggered different evolutionary paths among planets, and how Earth formed, evolved, and became habitable. To search for evidence of life beyond Earth, scientists use this data to map zones of habitability, study the chemistry of alien worlds, and unveil the processes that lead to conditions necessary for life.

Through the Near Earth Object Observation Program, NASA identifies and categorizes asteroids and comets that come near Earth. Every day, a hundred tons of interplanetary particles drift down to Earth's surface, mostly in the form of dust particles. Approximately every 100 years, rocky or iron asteroids larger than 50 meters crash to Earth, causing damage like craters and tidal waves, and about every few hundred thousand years, an asteroid larger than a kilometer threatens Earth. In the extremely unlikely event that such a large object threatens to collide with Earth, NASA's goal is to provide an early identification of these hazardous objects as far in advance as possible (perhaps years).



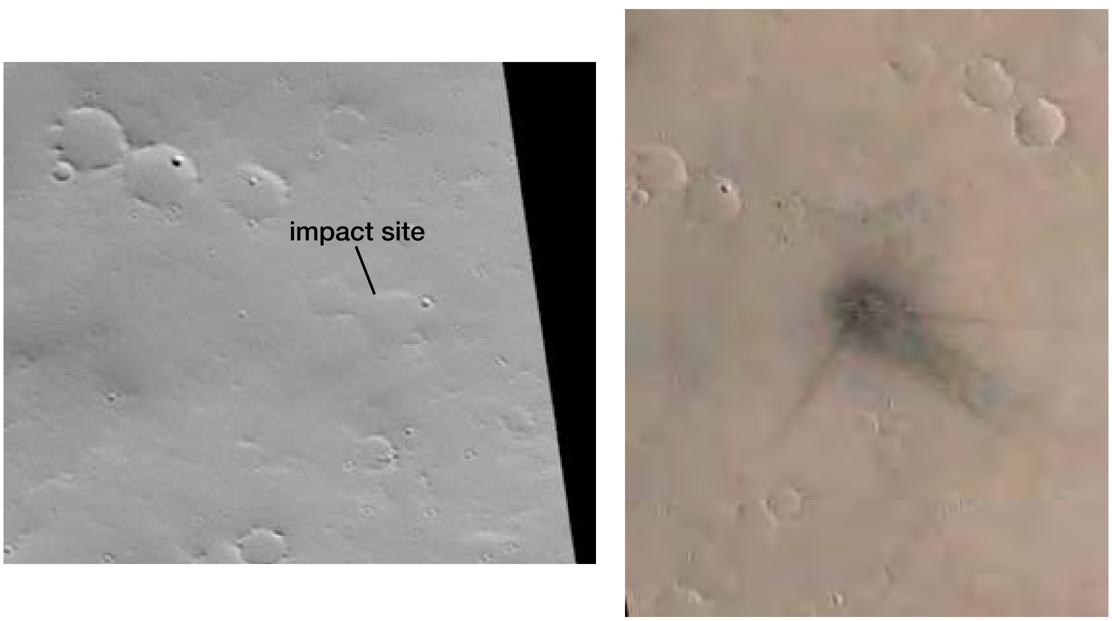
This radar image, obtained by the Cassini spacecraft during a near-polar flyby on February 22, 2007, shows a big island in the middle of one of the larger lakes imaged on Saturn's moon Titan. This image offers further evidence that the largest lakes are at the moon's highest latitudes. The island is about 90 kilometers (62 miles) by 150 kilometers (93 miles) across, about the size of Kodiak Island in Alaska or the big island of Hawaii. (NASA/JPL)

Highlight

Cassini used its powerful radar to see through Titan's dense hazy atmosphere and obtain a clear image of lakes in the north polar region. The atmosphere is approximately two percent methane, similar to the percentage of water in Earth's atmosphere. At Titan's temperature, methane can exist as solid, liquid, or gas, just as water does on Earth, and the moon has methane clouds, rain, lakes, rivers, and erosion features. Titan also has a methanological cycle that acts like Earth's hydrological cycle. A picture (with caption) of methane lakes on Titan is available at *www.saturn.jpl.nasa.gov/multimedia/images/image-details.cfm?imageID=2432*.

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome 3C.1: Progress in learning how the Sun's family of planets and minor bodies originated and evolved.	5.1.2 Green	3.2 Green	3C.1 Green	**Green**
	5.1.3 Green	3.3 Green		
Outcome 3C.2: Progress in understanding the processes that determine the history and future of habitability in the solar system, including the origin and evolution of Earth's biosphere and the character and extent of prebiotic chemistry on Mars and other worlds.	5.2.3 Green	3.7 Green	3C.2 Green	**Green**
	5.2.4 Green	3.8 Green		

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome 3C.3: Progress in identifying and investigating past or present habitable environments on Mars and other worlds, and determining if there is or ever has been life elsewhere in the solar system.	5.3.1 Green	2.1 Green	3C.3 Green	**Green**
	5.3.2 Blue	2.2 Green		
	5.3.3 Blue	2.3 Green		
	5.4.1 Green	2.5 Green		
	5.4.2 Green	2.6 Green		
	5.2.2 Green	3.6 Green		
Outcome 3C.4: Progress in exploring the space environment to discover potential hazards to humans and to search for resources that would enable human presence.	5.5.1 Blue	2.7 Green	3C.4 Green	**Green**
	1.4.1 Green	3.9 Green		
	1.4.2 Green	3.10 Green		



The Mars Global Surveyor (MGS), which launched in 1996 and went silent in November 2006, provided a record of newly formed impact craters on the surface of Mars over seven years. NASA is using this record, the first measurement of actual impact rate on Mars, to validate that model predictions are accurate to within a factor of two of the measurements. NASA uses these model predictions to help identify safe landing sites for robotic and human missions to the Red Planet. The black and white image on the left, taken by MGS on February 24, 2002, does not show any recent impact craters. The colorized image, taken by MGS on March 13, 2006, shows an impact crater (on the upper north flank of the Martian volcano Ulysses Patera) that occurred at some point after the 2002 image. (NASA/JPL/Malin Space Science Systems)

Sub-goal 3D: Discover the origin, structure, evolution, and destiny of the universe, and search for Earth-like planets.

Through Sub-goal 3D, NASA seeks to answer some of humankind's enduring questions: How did the universe begin? Will the universe have an end? Are humans alone in the universe?

Using ground-based telescopes and space missions, NASA enables research to understand the structure, content, and evolution of the universe. This research provides information about humankind's origins and the fundamental physics that govern the behavior of matter, energy, space, and time. NASA-supported researchers look far into the universe, towards the beginning of time, to see galaxies forming. They also search for Earth-like planets around distant stars, determine if life could exist elsewhere in the galaxy, and investigate the processes that formed Earth's solar system.

On June 5, 2007, Goddard Space Flight Center unveiled a new extra-solar planet exhibition, Worlds Beyond, at its Visitor Center. The exhibition showcases the first effort of a larger, ongoing education program in which groups of local middle-school students adopt extrasolar planets and, after learning all they can about the planet, turn that knowledge into a visual representation of their "alien" world. In this photo, the students' extra-solar planets begin to illuminate the grounds of the Visitors Center as the Sun sets. Worlds Beyond was organized by the National Space Society in partnership with the James Webb Space Telescope's education effort at Goddard. (P. Izzo/NASA)

Benefits

The study of the universe benefits the Nation's scientific research community by focusing research and advanced technology development on optics, sensors, guidance systems, and power and propulsion systems. Some of these technologies find their way into the commercial and defense sectors.

Research into the origins and nature of the universe contributes to "the expansion of human knowledge . . . of phenomena in the atmosphere and space," a charter objective in the 1958 Space Act. NASA's astrophysics missions—particularly the three Great Observatories: the Hubble Space Telescope, the Spitzer Space Telescope, and the Chandra X-ray Observatory—have provided researchers with new ways of looking at the universe so that they can expand knowledge about cosmic origins and fundamental physics. The interesting and beautiful images from these observatories also are educational tools to help spark student interest in science, technology, engineering, and mathematics and serve to prominently illustrate the role of the United States in scientific exploration.

Highlight

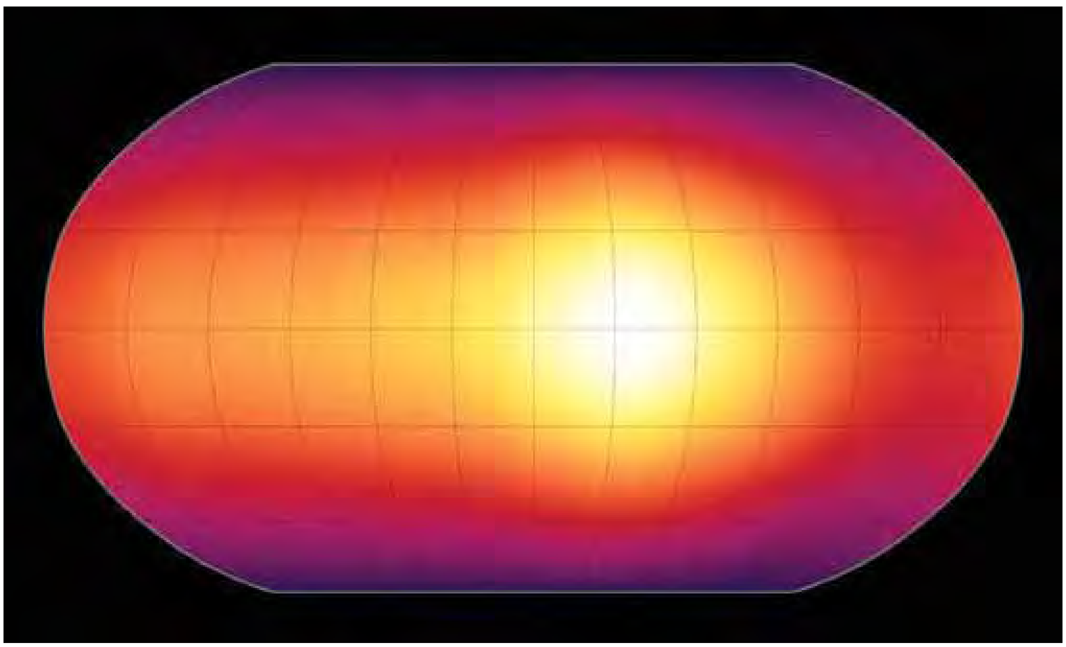
Scientists used the Hubble Space Telescope, in combination with a world-wide suite of ground-based telescopes, to create a three-dimensional map showing the distribution of dark matter in the universe, providing the best evidence that normal matter, largely in the form of galaxies, accumulates along the densest concentrations of dark matter. The map reveals a loose network of filaments that grew over time and intersect in massive structures at the locations of clusters of galaxies. The map stretches halfway back to the beginning of the universe and shows how dark matter has grown increasingly "clumpy" as it collapses under gravity. Mapping dark matter's distribution in space and time is fundamental to understanding how galaxies grew and clustered over billions of years. For more, please go to *www.nasa.gov/home/hqnews/2007/jan/HQ_07002_Hubble_Dark_Matter.html*.

<table>
<tr><th>Multi-year Outcomes</th><th>FY04</th><th>FY05</th><th>FY06</th><th>FY 2007</th></tr>
<tr><td rowspan="4">Outcome 3D.1: Discover the origin, structure, evolution, and destiny of the universe, and search for Earth-like planets.</td><td>5.10.1 Green</td><td>5.1 Green</td><td rowspan="4">3D.1 Green</td><td rowspan="4">Green</td></tr>
<tr><td>5.11.1 Green</td><td>5.4 Green</td></tr>
<tr><td>5.11.2 Green</td><td>5.5 Green</td></tr>
<tr><td>5.11.3 Green</td><td>5.6 Green</td></tr>
</table>

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome 3D.2: Progress in understanding how the first stars and galaxies formed, and how they changed over time into the objects recognized in the present universe.	5.8.1 Blue	4.1 Green	3D.2 Yellow	**Green**
Outcome 3D.3: Progress in understanding how individual stars form and how those processes ultimately affect the formation of planetary systems.	5.8.3 Green	4.3 Green	3D.3 Yellow	**Green**
Outcome 3D.4: Progress in creating a census of extra-solar planets and measuring their properties.	5.1.4 Green	3.4 Green	3D.4 Yellow	**Yellow**

Why NASA did not achieve Outcome 3D.4: NASA's performance towards this Outcome continues to be "Yellow" due primarily to the inability to ramp up flight developments in previously planned planet-finding and characterizing missions. Science progress is good, but the scale of investments needed to start new missions, coupled with the decreasing overall budget contributing to this Outcome and other significant commitments, resulted in previously envisioned missions slipping beyond the budget horizon.

Plans for achieving 3D.4: NASA solicited mission concept studies for planet-finding and characterizing missions that would be more affordable. The proposals, which were due in November 2007, will be evaluated in FY 2008.



Researchers using data from the Spitzer Space Telescope made the first-ever map of the surface of a planet beyond the solar system. The map is of a sizzling "hot Jupiter" planet known as HD 189733b. Hot Jupiters "hug" their stars, orbiting at distances that are much closer than Mercury is to the Sun. Researchers believe that hot Jupiters are tidally locked to their stars, just as the Moon is to Earth. This means that one side of a hot Jupiter always faces its star. The map shows that temperatures on HD 189733b are fairly even, ranging from a balmy 1,200º Fahrenheit on the dark side to 1,700º Fahrenheit on the sunlit side (brighter colors indicate hotter temperatures). Since the planet's overall temperature variation is somewhat mild given its close proximity to its parent star, astronomers believe winds must be spreading the heat from the sunlit side to the dark side. The grids of this map are spaced 30º apart and the center vertical line is the star-facing longitude. (NASA/JPL-Caltech/H. Knutson, Harvard-Smithsonian CfA)

Sub-goal 3E: Advance knowledge in the fundamental disciplines of aeronautics, and develop technologies for safer aircraft and higher capacity airspace systems.

NASA is the Nation's leading government organization for aeronautical research. This world-class capability is built on a tradition of expertise in core disciplines like aerodynamics, acoustics, combustion, materials and structures, and dynamics and control. The Aeronautics Research Mission Directorate (ARMD) is comprised of four programs:

- The Fundamental Aeronautics Program conducts research to enable the design of vehicles that fly through any atmosphere at any speed. Future aircraft must address multiple design challenges, and therefore a key focus will be the development of physics-based, multidisciplinary design, analysis, and optimization (MDAO) tools.
- The Aviation Safety Program develops innovative tools, concepts, methods, and technologies that will improve the intrinsic safety attributes of current and future aircraft, and that will help overcome aviation safety challenges that would otherwise constrain the full realization of the Next Generation Air Transportation System (NextGen).
- The Airspace Systems Program conducts research to enable NextGen capabilities such as foundational research in multi-aircraft flow and airspace optimization, trajectory design and conformance, separation methods, and adaptive systems. The Airspace Systems Program research for the airspace and airportal domains is integrated into gate–to–gate solutions.
- The Aeronautics Test Program ensures the strategic availability and accessibility of a critical suite of 1) major wind tunnels at Ames, Glenn, and Langley Research Centers, and 2) flight operations assets at the Western Aeronautical Test Range, support/test bed aircraft, and simulation and loads labs at Dryden Flight Research Center.

Benefits

NASA's aeronautics program ensures long-term focus in fundamental research in both traditional aeronautical disciplines and relevant emerging fields for integration into multidisciplinary system-level capabilities for broad application. This approach will enable revolutionary change to both the airspace system and the aircraft that fly within it, leading to a safer, more environmentally friendly, and more efficient national air transportation system. Furthermore, ARMD will disseminate all of its research results to the widest practical and appropriate extent (consistent with foreign policy and national security).

ARMD uses the NASA Research Announcement (NRA) process to foster collaborative research partnerships with the academic and private sector communities. The NRA process encourages awardees to spend time at NASA Centers in order to enhance the exchange of ideas and expand the learning experience for everyone involved. Furthermore, ARMD has focused its educational activities to better attract the Nation's best and brightest students to aeronautics. These activities include design competitions and the establishment of graduate and undergraduate scholarships and internships.

Highlight

NASA, in partnership with the Air Force Research Lab and Boeing Phantomworks, successfully completed flight experiments of the X–48B Blended Wing Body (BWB) advanced aircraft at NASA's Dryden Flight Research Center. The BWB is a hybrid configuration combining the best attributes of a conventional "tube-and-wing" aircraft with a flying wing. It has the potential to meet expected future Next Generation Air Transportation System requirements for low noise, low emissions, and high efficiency, with the added potential capability to land and take-off on shorter runways than current aircraft. The flight experiments conducted with the X–48B explored the low-speed aerodynamic performance and stability and control characteristics of this promising aircraft configuration. It is the first time a dynamically scaled BWB was flown. The experiments demonstrated the basic flying qualities of the X–48B and the effectiveness of the on-board flight control system. For more, please visit *www.aeronautics.nasa.gov/releases/07_26_07_release.htm*.

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome 3E.1: By 2016, identify and develop tools, methods, and technologies for improving overall aircraft safety of new and legacy vehicles operating in the Next Generation Air Transportation System (projected for the year 2025).	None	None	3E.1 Green	**Green**

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome 3E.2: By 2016, develop and demonstrate future concepts, capabilities, and technologies that will enable major increases in air traffic management effectiveness, flexibility, and efficiency, while maintaining safety, to meet capacity and mobility requirements of the Next Generation Air Transportation System.	None	None	3E.2 Green	**Green**
Outcome 3E.3: By 2016, develop multidisciplinary design, analysis, and optimization capabilities for use in trade studies of new technologies, enabling better quantification of vehicle performance in all flight regimes and within a variety of transportation system architectures.	None	None	3E.3 Green	**Green**
Outcome 3E.4: Ensure the continuous availability of a portfolio of NASA-owned wind tunnels/ground test facilities, which are strategically important to meeting national aerospace program goals and requirements.	None	None	None	**Green**

The unique X–48B BWB subscale demonstrator banks over desert scrub at Edwards Air Force Base during the aircraft's fifth test flight on August 14, 2007. The 8.5 percent dynamically scaled, unmanned aircraft is designed to mimic the aerodynamic characteristics of a full-scale large cargo transport with the same blended wing body shape. The initial flight tests focused on evaluating the X–48B's low-speed flight characteristics and handling qualities. The Aeronautics Research Mission Directorate and its project partners plan a second set of flight tests to evaluate the aircraft's low-noise and handling characteristics at transonic speeds. (C. Thomas, NASA)

Sub-goal 3F: Understand the effects of the space environment on human performance, and test new technologies and countermeasures for long-duration human space exploration.

When astronauts return to the Moon and journey to further destinations, they will be subjected to the microgravity, radiation, and isolation of space for long periods of time. Keeping crews physically and mentally healthy during such long-duration missions will require new technologies and capabilities. Through a combination of ground- and space-based research, NASA is studying how the space environment, close quarters, heavy workloads, and long periods of time away from home contribute to physical and psychological stresses and is developing technologies that can prevent or mitigate the effects of these stresses. NASA also is developing innovative ways to meet the basic needs of astronauts—oxygen, water, food, and shelter—with systems that can operate dependably for weeks on the Moon and, eventually, for months on Mars.

Expedition 13 Flight Engineer Thomas Reiter (representing the European Space Agency) processes samples for the Renal Stone study on July 23, 2006. With the on-orbit portion of the study completed, the principal investigator, Dr. Peggy Whitson (astronaut and commander of Expedition 16), can conduct a final analysis of the data and render findings on the effectiveness of potassium citrate as a countermeasure to renal stone development during spaceflight missions. (NASA)

Benefits

The medical knowledge and diagnostic and treatment technologies NASA uses to keep humans healthy and productive in space improve the medical treatment and health of humans on Earth. For example, NASA's research into human adaptation to microgravity has helped scientists better understand the changes that come with aging, such as bone loss, muscle atrophy, and loss of balance. NASA-developed telemedicine technologies, which help doctors on Earth monitor and treat astronauts in space through a combination of computer-assisted imaging and diagnostics, video, and telecommunications, also help doctors deliver quality medical care to people in isolated or underserved areas of the world. These technologies allow doctors located thousands of miles apart to collaborate in real time on medical treatment.

Over the years, companies have taken NASA life-support and medical technologies, produced by this and other programs, and developed them into commercial products that serve the public. Light-emitting diodes originally designed to grow plants in experiments aboard the Space Shuttle are now used to treat brain tumors. Devices built to measure the astronauts' equilibrium when they return from space are widely used by major medical centers to diagnose and treat patients with head injuries, stroke, chronic dizziness, and central nervous system disorders. A company turned a small, portable device originally designed to warn Shuttle and ISS crewmembers of depressurization into a hand-held device that warns pilots, mountain climbers, skydivers, and scuba divers of hazardous conditions before depressurization and hypoxia become a health threat. Miniaturized environmental monitoring and detection technologies for spacecraft cabin air monitoring have led to spin-offs that have applications for detection of nerve and blister agents, polychlorinated biphenyls and leaks in underground transmission lines. For more information on NASA technology-transfer successes, please visit the Spinoff home page at *www.sti.nasa.gov/tto/*.

Highlight

NASA completed the Human Research Program (HRP) Requirements Document that identified 33 human health and performance risks associated with human exploration missions. It establishes the requirements to ensure that investments are made in appropriate HRP projects and ISS biomedical flight experiments to enable the delivery of countermeasures and technologies that satisfy exploration mission requirements.

NASA completed the final on-orbit operations of the Renal Stone study, which began during ISS Expedition 3 in 2001. The principal investigator is examining astronaut diet logs and urine collections from 20 subjects on several missions to test whether potassium citrate is an effective countermeasure against the formation of kidney stones while crewmembers are in orbit. The risk of kidney stones is elevated in space due to the mobilization of calcium from bone loss and the effects of microgravity on fluid distribution in the body.

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome 3F.1: By 2008, develop and test candidate countermeasures to ensure the health of humans traveling in space.	None	None	3F.1 Green	**Green**
Outcome 3F.2: By 2010, identify and test technologies to reduce total mission resource requirements for life support systems.	9.2.1 Green	8.7 Green	3F.2 Green	**Green**
Outcome 3F.3: By 2010, develop reliable spacecraft technologies for advanced environmental monitoring and control and fire safety.	3.3.2 Green	None	3F.3 Green	**Green**

Expedition 14 Flight Engineer Sunita Williams flashes a "thumbs up" as she runs the Boston Marathon on the ISS's treadmill, which crewmembers use to help maintain muscle strength and bone density during missions. She not only completed the 26.2-mile race in less than four and a half hours, she also circled Earth almost three times. During her run, participants from Johnson Space Center and Marshall Space Flight Center held their own mini-marathons to show their support. Williams said she hopes her unique run will serve as inspiration, encouraging kids to make physical fitness part of their daily lives. (NASA)

Strategic Goal 4: Bring a new Crew Exploration Vehicle into service as soon as possible after Shuttle retirement.

Strategic Goal 4 is key to achieving NASA's Mission. The Nation's current space transportation systems—NASA's Space Shuttle and commercially available expendable launch vehicles—are unsuitable for human exploration beyond low Earth orbit. To achieve the long-term objective of returning explorers to the Moon and eventually sending them to Mars, NASA initiated the Constellation Systems Program to achieve Strategic Goal 4, developing new space transportation capabilities. So far, the program includes the Orion Crew Exploration Vehicle, the crew launch vehicle Ares I, the heavy-lift cargo launch vehicle Ares V, spacesuits and tools required by the flight crews, and associated ground and mission operations infrastructure to support initial low Earth orbit missions.

Orion will be America's new spacecraft for human space exploration. It will carry four crewmembers to the Moon and serve as the primary exploration vehicle for future missions. It also will be capable of ferrying up to six astronauts (plus additional cargo) to and from the ISS if commercial transport services are unavailable. The Ares I will consist of a solid rocket booster and an upper stage that can carry Orion into low Earth orbit.

Benefits

Orion will support the expansion of human exploration missions and provide the means to take humans to the Moon and eventually Mars, where they can conduct scientific activities and make discoveries not possible solely with robotic explorers.

As with past and current human exploration programs, NASA's efforts to develop Orion and the Ares launchers will accelerate the development of technologies that are important for the economy and national security. The advanced systems and capabilities required for space travel include power generation and storage, communications and navigation, networking, robotics, and improved materials, all of which could be used on Earth to meet commercial and other national needs. As Shuttle activities wind down, Shuttle personnel will find new, challenging positions working on Constellation Systems development efforts, keeping this highly skilled segment of America's workforce productive and competitive. Constellation Systems also will provide a training ground for the next generation of scientists and engineers who will realize the Nation's space exploration dreams.

Furthermore, Orion will serve as a public symbol of the Nation's continued commitment to space exploration, much as the Shuttle has over the past 25 years. NASA anticipates that the exploration initiatives will spark the public's imagination and inspire the Nation's youth to pursue careers in science, technology, engineering, and mathematics as a result of their renewed interest in space.

Highlight

NASA completed the Systems Requirements Review (SRR) for the Constellation Systems Program in November 2006. The SRR is the initial phase of a formal process of assuring that the project requirements are properly defined, implemented, are traceable, and that the hardware and software are designed and built to the authorized baseline configuration requirements. The design, development, and acquisition development phases for the Constellation Systems Program and its associated projects (Orion, Ares I, Ground Operations, Mission Operations, and EVA systems) are on schedule. The Exploration Systems Mission Directorate will continue to refine cost, schedule, and performance trades throughout the design cycle as the system design matures and gains fidelity. Program members will formally baseline an executable program at the Preliminary Design Review in fall 2008.

Researchers study the best technology for returning Orion to Earth using pendulum-swing drop tests at Langley Research Center's Landing and Impact Research Facility. The Orion test article is lifted 40 to 60 feet high and swung back to the ground, testing the orange airbags designed to cushion the impact. (NASA)

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome 4.1: No later than 2014, and as early as 2010, transport three crewmembers to the International Space Station and return them safely to Earth, demonstrating an operational capability to support human exploration missions.	None	7.1 Green	4.1 Green	**Yellow**
Outcome 4.2: By 2010, identify and test technologies to reduce total mission resource requirements for life support systems.	None	None	4.2 Green	**Green**

Why NASA did not achieve Outcome 4.1: In order to meet an Orion Initial Operational Capability (IOC) of 2014, NASA would require additional funds in the out-years to meet that IOC schedule with a 65 percent cost confidence level in the Agency's budgeting. For the sake of clarity, a cost confidence level is a calculation of the probability of performing a certain task over a given time at a specific cost. With a stable budget, NASA can achieve an IOC launch date of March 2015 at a 65 percent confidence level. Acceleration of this date may be possible given additional funding.

Plans for achieving 4.1: The Exploration Systems Mission Directorate completed a critical assessment of recommendations from the Exploration Systems Architecture Study and incorporated changes intended to reduce overall life cycle costs and integrated risk for human lunar landings while meeting the NASA's Mission and Vision. NASA continues to perform trades in support of the requirements development process, which will culminate in a series of Systems Definitions Reviews for the Crew Exploration Vehicle, the Crew Launch Vehicle, and supporting ground elements. NASA's FY 2008 Budget Estimates notified Congress that the commitment date for achieving Outcome 4.1 now is no later than 2015.

Student rocket scientists showcase their rocketry components as part of the annual University Student Rocket Launch Initiative, hosted by NASA's Marshall Space Flight Center in June 2007. A team from the University of Alabama took home top honors in the competition, which encourages college students to tap their science, technology, engineering, and mathematics knowledge to design and build their own rockets, complete with a science payload. The students also developed a Web site charting their progress and demonstrating proof of concept. To determine winners, NASA engineers and scientists evaluated each rocket design, including propulsion systems, materials used for construction, payload and safety features. They also considered the altitude the rockets reached, how the teams conducted formal reviews, and the teams' Web site designs. (C. Shepherd/NASA)

Strategic Goal 5: Encourage the pursuit of appropriate partnerships with the emerging commercial space sector.

The objective of Strategic Goal 5 is to acquire launch services and technologies that enable NASA's robotic and human missions. NASA's robotic missions are launched on commercial vehicles acquired by the Space Operations Mission Directorate. And as the Space Shuttle nears retirement, NASA is interested in crew and cargo transportation services to the International Space Station provided by emerging launch service companies.

Benefits

Since NASA's creation in 1958, the commercial sector has been an important Agency partner in space exploration. NASA purchases launch vehicles for robotic missions from the commercial sector. NASA works with commercial partners to develop communication and navigation systems, build spacecraft, and design spacesuits. Along the way, the commercial space sector has grown into a multi-billion-dollar industry that delivers services, such as satellite television and global navigation, to the public and contributes to a strong U.S. economy.

Historically, several large corporations have driven the commercial space industry, but now start-up ventures are pushing the sector into new areas. To encourage this emerging sector of the space industry, the Exploration Systems Mission Directorate has adopted a Commercial Development Policy that will be used as a basis for an Agency-level policy. Programs and projects, such as Commercial Orbital Transportation Services (COTS) and Centennial Challenges (both described in more detail below) are examples of this policy already being implemented within the Agency. By helping emerging companies expand their services and increase their experience, NASA hopes to encourage the growth of a competitive market that will help to reduce launch costs and provide NASA with access to new capabilities. NASA seeks to stimulate the emerging U.S. entrepreneurial launch sector and accelerate the growth of the commercial space industry by maximizing industry's ability to retain intellectual property rights and awarding prizes for achievements in creating space technologies and systems.

NASA also is encouraging the emerging U.S. commercial space sector through more creative, less traditional approaches. In FY 2006, NASA selected a portfolio of two emerging aerospace companies, Space Exploration Technologies (SpaceX) and Rocketplane–Kistler (RpK), to demonstrate orbital cargo transportation services through the COTS Project. The Agency later added to its portfolio by signing unfunded Space Act Agreements with five other companies.

Since FY 2005, NASA has held prize competitions, called Centennial Challenges, for ground-based demonstrations of breakthroughs in various aerospace technologies. Although there is no guarantee that a breakthrough or winner will emerge from any particular prize competition, by encouraging participation, NASA hopes to encourage private sector breakthroughs across a broad range of technologies and designs.

A crane mounts the first stage of SpaceX's Falcon 9 launch vehicle on a test stand at the company's facility in Texas. SpaceX is one of two companies competing, through a funded Space Act Agreement, to demonstrate cargo transportation services to the ISS after Shuttle retirement. (Courtesy of SpaceX)

Highlight

NASA's COTS Project added five new entrepreneurial space companies with unfunded Space Act Agreements—Constellation Services International, PlanetSpace, SpaceDev, SpaceHab, and Transformational Space (t/Space)—who are expected to make progress in FY 2008 towards demonstrating capabilities associated with this goal. In FY 2007, the two NASA partners with funded Space Act Agreements—SpaceX and RpK—had made progress against what was planned. One company completed all five planned deliverables outlined in their agreement, while the other encountered difficulty, completing two out of five planned deliverables, triggering termination of their Space Act Agreement. The company worked with the Agency for a mutually acceptable resolution. This is an expected potential outcome for investments in this risk area, and the reason for investing in more than one partner. NASA expects to achieve Outcome 5.2, since one partner is still on track to meet the planned deliverables in the next two years leading up to the on-orbit demonstration in 2010.

NASA completed a strategic review of medium-sized expendable launch vehicle options, resulting in an effort to give significant attention to enabling the emerging launch provider community to become certified for NASA use. Stakeholders have reviewed and agreed to the policy changes needed to expedite the use of emerging launch providers. NASA's Ground Communications Network now obtains more than 50 percent of its spacecraft communications passes from non-NASA tracking stations, primarily in the commercial sector.

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome 5.1: Develop and demonstrate a means for NASA to purchase launch services from emerging launch providers.	8.1.1 Green	17.1 Green	5.1 Green	**Green**
Outcome 5.2: By 2010, demonstrate one or more commercial space services for ISS cargo and/or crew transport.	8.1.1 Green	17.1 Green	5.2 Green	**Green**
Outcome 5.3: By 2012, complete one or more prize competitions for independently designed, developed, launched and operated missions related to space science or space exploration.	None	None	None	**Green**

Strategic Goal 6: Establish a lunar return program having the maximum possible utility for later missions to Mars and other destinations.

Missions to the Moon in the 21st century will be vastly different from the Apollo missions. Future missions will carry more crewmembers, expand the range of lunar landing sites, and increase the length of time astronauts spend exploring the lunar surface. Future explorers also will experiment with using lunar resources (e.g., extracting water from the lunar regolith) to reduce the amount of supplies that must be brought from Earth and to support an extended human presence on the Moon.

To achieve Strategic Goal 6, NASA is leveraging partnerships with industry and the international space community to acquire next-generation technologies for life support, communications and navigation, radiation shielding, power generation and storage, propulsion, and resource extraction and processing.

NASA is laying the foundation for the lunar return program by focusing Agency research on robotic reconnaissance explorers, surface nuclear power systems, and advanced communications systems. These technologies will support the lunar return program and will evolve and be adapted to support future Mars missions.

Benefits

NASA and its partners transfer advanced space exploration systems and capabilities—power generation, communications, computing, robotics, and improved materials from space exploration research and execution—to the commercial sector to serve public, national, and global needs. In the past, technologies developed for space exploration have yielded ground-based applications such as non-polluting solar energy systems, advanced batteries for laptop computers and cell phones, and fuel cells for electric vehicles.

Historically, space exploration has inspired industry, academia, and individual researchers to redefine what is "possible." NASA's Vision to expand the limits of robotic and human exploration through a technically ambitious portfolio of programs should provide even greater challenges and opportunities for personal development and future economic growth to NASA's extended family of visionary partners.

To make lunar outposts a reality, NASA will need to conduct detailed site surveys to layout infrastructure, prospect for resources, and plan astronaut excursions. In summer 2007, NASA's Intelligent Robotics Group conducted robotic field tests in Haughton Crater, located in Devon Island, Canada, to test the abilities of two robots—Ames Research Center's K10 "Red" (shown here) and K10 "Black" rovers—to conduct surveys in this Moon-like environment. The rovers were equipped with ground-penetrating radar to map underground layers and a three-dimensional scanning laser to map topography. (NASA)

The activities under Strategic Goal 6 lay the groundwork for NASA's future human space exploration goals. Through the successful completion of these activities, NASA will have the technologies and capabilities to support humans on the Moon by the time the Orion Crew Exploration Vehicle and the Ares launch vehicles are fully operational. Along the way, these activities will benefit other efforts across NASA: new power generation and nuclear technologies will help future space exploration missions; autonomous systems and integrated systems health management can make air travel safer and more efficient; and improved space communications enable better data delivery to and from the Space Shuttle, the ISS, and robotic spacecraft.

Highlight

The Lunar Crater Observation and Sensing Satellite (LCROSS) and the Lunar Reconnaissance Orbiter (LRO) missions are on schedule for a joint launch in late 2008. This mission is the first step toward returning humans to the Moon. LCROSS will fly through the plume created by the impact of its Centaur upper stage in a permanently shadowed crater on the lunar surface to detect the presence of water ice. LRO will create a comprehensive atlas of the moon's topography to help NASA select safe landing sites, identify lunar resources, and study the radiation. For more on these missions, please visit *www.lunar.gsfc.nasa.gov* and *lcross.arc.nasa.gov*.

To further the outpost establishment program, NASA scientists demonstrated a prototype technology, RESOLVE, which heated a small sample of the lunar regolith in the presence of hydrogen to form water. This type of in-situ resource utilization will reduce the amount of consumables NASA would have to transport when establishing a lunar or Martian outpost.

NASA made major strides in centralizing management and budget of Space Communications elements in the Space Communications and Navigation (SCaN) Program Office, which supports missions such as ISS, the Space Shuttle, and MRO. As directed by the NASA Authorization Act of 2005, NASA submitted plans for updating the Space Communications Architecture to the Committee on Science and Technology on July 25, 2007, and began aligning technologies to that architecture. SCaN and its partners completed a Memorandum of Agreement and initiated funding for acquisition of two additional Tracking and Data Relay Satellites (TDRS). SCaN implemented the relocation of systems using spectrum that will be licensed for commercial purposes. The adoption of NASA's interests was ensured by providing U.S. proposals to the 2007 World Radiocommunication Conference, held October 22–November 16, 2007, in Geneva, Switzerland.

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome 6.1: By 2008, launch a Lunar Reconnaissance Orbiter (LRO) that will provide information about potential human exploration sites.	5.13.1 Green	None	6.1 Green	**Green**
Outcome 6.2: By 2012, develop and test technologies for in-situ resource utilization, power generation, and autonomous systems that reduce consumables launched from Earth and moderate mission risk.	9.4.2 Green 9.4.1 Green	11.3 Green 11.4 Green	6.2 Green	**Green**
Outcome 6.3: By 2010, identify and conduct long-term research necessary to develop nuclear technologies essential to support human-robotic lunar missions and that are extensible to exploration of Mars.	9.4.3 Green	11.5 White	6.3 Green	**Green**
Outcome 6.4: Implement the space communications and navigation architecture responsive to Science and Exploration mission requirements.	8.5.1 Green	6.2 Green	6.4 Green	**Green**

A high school student works with his NASA mentor on an entry in the FIRST Robotics regional competition held in Richmond, Virginia, in March 2007. FIRST Robotics holds annual competitions around the country, challenging teams of young people and their mentors to use a standard "kit of parts" and a common set of rules to build robots that can tackle specific tasks. Every year NASA employees use their extensive knowledge of engineering and robotics to help high school teams meet the challenge, and several NASA Centers co-sponsor regional competitions. (S. Smith/NASA)

Cross-Agency Support Programs: Education

NASA's Office of Education works through strategic partnerships and linkages between formal and informal education providers to strengthen the Nation's future workforce. Using the excitement of NASA's missions to inspire and capture the imagination of students, NASA programs and learning materials encourage students to pursue studies and careers in science, technology, engineering, and mathematics (STEM). NASA offers a progression of educational opportunities for students, teachers, and faculty that promote STEM literacy, help to attract and retain students in STEM disciplines, and improve awareness of NASA's Mission. Education's collaboration with the NASA Mission Directorates and Centers, other federal agencies engaged in educational activities, and various public and private partners helps to leverage the effectiveness and reach of its programs.

Benefits

NASA's landmark achievements in air and space, made possible by scientific excellence and technical innovation, have deepened humankind's understanding of the universe while yielding down-to-Earth advances in air travel, health care, electronics, computing, and more. These achievements ultimately share a single source—education. NASA's Office of Education uses NASA's unique missions and vast scientific and technical experience to inspire and motivate America's future leaders.

To achieve NASA's Strategic Goals, the Agency must ensure a pipeline of highly skilled, diverse individuals. In the near-term, NASA will meet workforce needs by additional training for current employees and recruiting employees with skills and capabilities in recent research and technology fields into the Agency. To meet long-term workforce needs, NASA's Education programs help inspire students at all levels to pursue STEM-related careers, providing professional development opportunities to STEM teachers, and developing interesting STEM content for the classroom, the Web, and informal learning environments like museums and community-based organizations.

Mission Specialist and Educator Astronaut Barbara Morgan (center) talks with teachers during the Sally Ride Science Workshop at NASA's Johnson Space Center. As part of NASA's Education effort, Morgan is using her experiences as a NASA astronaut and mission specialist for STS-118 to inspire children to study STEM areas. Through training opportunities like Educator Astronaut workshops and the Educator Institute, NASA provides teachers with high-quality, mission-inspired activities and tools to take back to the classroom. (L. Hubbard/NASA)

Highlight

In FY 2006, NASA unveiled a new Education Framework with four categories of involvement—inspire, engage, educate, and employ—to encourage student interest in science, technology, engineering, and mathematics and to maintain a strong workforce in these areas. This fiscal year, Education's goal was to focus its portfolio of programs on the Framework. Education continued to support NASA Explorer Schools and NASA University Research Centers nationwide. NASA awarded more than $17 million to research and technology institutions in the United States and Puerto Rico as part of the Experimental Program to Stimulate Competitive Research. In addition, astronaut Barbara Morgan launched on STS-118, becoming NASA's first Educator Astronaut in space. Selected into the astronaut corps in 1998, Morgan used her background to communicate the STS-118 crew's experiences on-orbit to elementary and middle school students.

<table>
<tr><th>Multi-year Outcomes</th><th>FY04</th><th>FY05</th><th>FY06</th><th>FY 2007</th></tr>
<tr><td rowspan="2">Outcome ED-1: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals through a portfolio of programs.</td><td>None</td><td>13.2 Green</td><td rowspan="2">ED-1 Green</td><td rowspan="2">Green</td></tr>
<tr><td>None</td><td>13.3 Green</td></tr>
<tr><td>Outcome ED-2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.</td><td>None</td><td>None</td><td>None</td><td>Green</td></tr>
<tr><td>Outcome ED-3: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.</td><td>None</td><td>13.5 Green</td><td>None</td><td>Green</td></tr>
</table>

Cross-Agency Support Programs: Advanced Business Systems

NASA established the Advanced Business Systems Theme in FY 2006 to reflect the implementation of Agency-wide business systems as a direct program. This Theme is commonly referred to by its program title, Integrated Enterprise Management Program (IEMP).

NASA established IEMP in 2000 to modernize and integrate NASA's business systems and processes. Since 2000, IEMP has implemented 11 Agency-wide business systems in support of the Agency's Strategic Plan. IEMP will continue to implement four additional Agency systems to provide quality information to decision makers prior to completing the program in FY 2009.

NASA's Gulfstream III research aircraft in preparation for flight tests of a Synthetic Aperture Radar, housed in the white pod attached to the aircraft's underbelly. In FY 2007, IEMP completed Phase I implementation of the Aircraft Management Module, a tool to help NASA manage its fleet of mission-support, research, and mission-management aircraft by tracking aircraft inspections, mission configurations, and aircrew qualifications. (T. Tschida, NASA)

Benefits

Within NASA's Strategic Plan, this Theme supports multiple Strategic Goals and Sub-goals, and aligns with NASA's Cross Cutting Management Strategies. NASA's IEMP is transforming the Agency's business systems, processes, and procedures to improve financial management and accountability and to increase efficiency and cost savings across the Agency. The program also is implementing new systems and processes that improve the management of Agency and contractor-held personal property that will result in cost savings, greater reuse of existing assets, and reduced and better accountability for assets.

Highlight

In November 2006, NASA implemented an updated version of the SAP Core Financial Software, a significant step toward the Outcomes for providing timely, consistent, and reliable business information and helping to improve Agency efficiency. NASA updated the Core Financial system to improve the Agency's compliance with Federal financial and accounting systems standards, improve the quality of financial and management information for decision makers, and to meet recommendations from the Government Accountability Office. The updated software provides enhancements that will help the Agency make progress towards achieving a clean audit opinion and a "Green" rating on the President's Management Agenda scorecard for "Improved Financial Performance." NASA also implemented a Contract Management tool to support contract writing, contract administration, procurement workload management, and data reporting/management for NASA. The tool the tool is being used to facilitate, economize, and expedite NASA's procurement processes.

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome IEM-1: By 2008, implement Agency business systems that provide timely, consistent and reliable business information for management decisions.	None	None	None	**Green**
Outcome IEM-2: Increase efficiency by implementing new business systems and reengineering Agency business processes.	None	None	IEM-2 Green	**Green**

Cross-Agency Support Programs: Innovative Partnerships Program

To achieve the NASA's mission in an affordable and sustainable manner, the Agency partners with industry and academia to leverage outside investments and expertise while providing an economic incentive to invest in NASA programs. The Innovative Partnerships Program (IPP) supports multiple Strategic Goals and Sub-goals in the 2006 NASA Strategic Plan and serves all four Mission Directorates, with offices across NASA's 10 Centers. Mission Directorates outline their technology needs, and IPP helps satisfy those needs through research and development with efficient strategic partnerships.

Benefits

IPP provides the technology solutions for NASA programs and projects through dual-use technology development and joint partnerships. By broadening NASA's connection to emerging technologies, IPP provides an increased range of technological solutions for programs while reducing costs.

IPP provides technology transfer out of NASA (called spin-offs) for commercial or socio-economic benefit to the Nation. In addition, IPP facilitates protection of the government's rights in NASA's inventions, as mandated by legislation. Technology Transfer, Small Business Innovative Research (SBIR), and Centennial Challenges tap into sources of innovation outside of NASA and leverage NASA's resources with private or other external resources to develop new technologies for NASA mission use. IPP also transfers technologies having strong potential for commercial applications, yielding public benefits. All of IPP's functions primarily serve NASA's mission interests, both in the near and long terms and with respect to a broad range of technologies and technology readiness. IPP targets and provides a broad spectrum of U.S. industrial and non-profit entities the opportunity for grass-roots direct involvement in NASA's exploration and other missions.

NASA space technology is helping doctors diagnose and monitor treatments for hardening of the arteries in its early stages, before it causes heart attacks and strokes. With the help of the Innovative Partnerships Program, a company called MTI turned software originally designed by NASA's Jet Propulsion Laboratory to process pictures from space missions into a new diagnostic tool called ArterioVision. Ultrasounds equipped with the ArterioVision software offer a standardized, painless, and non-invasive way to examine the carotid artery, which carries blood from the heart to the brain. (NASA/JPL)

Highlight

IPP facilitated NASA's signing of more than 200 Space Act Agreements with the private and other external sectors for dual-use development of technology having NASA mission relevance and for NASA facility use, as well as 35 license agreements for commercial application of technology to which NASA has title. IPP also facilitated 682 Software Use Agreements for commercial application of software developed by NASA, as well as the reporting of 1268 New Invention Disclosures, the filing of 105 patent applications, and the awarding of 93 patents. Revenues realized from licenses of NASA sponsored technologies exceeded $4 million in FY 2007. The *Spinoff 2007* magazine highlights 39 new examples of how NASA innovation can be transferred to the commercial market place and applied to areas such as health and medicine, transportation, public safety, consumer goods, homes and recreation, environmental and agricultural resources, computer technology, and industrial production. In addition, IPP provided $9.2 million in funding for 38 Seed Fund partnerships for development of a broad spectrum of technologies addressing specific Mission Directorate technology gaps. Partner and Center contributions of cash and in-kind resources leveraged these funds by nearly a factor of four.

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome IPP-1: Promote and develop innovative technology partnerships among NASA, U.S. industry, and other sectors for the benefit of Agency programs and projects.	10.3.1 Blue	11.7 Green	IPP-1 Green	**Green**

Cross-Agency Support Programs: Strategic Capabilities Assets Program

NASA established the Strategic Capabilities Assets Program (SCAP) to ensure key capabilities and assets, such as wind tunnels and test facilities at Centers, are available for future missions and to help NASA prioritize and make strategic investment decisions to replace, modify, or disposition these capabilities/assets. It is managed at the Agency level, with funding and day-to-day management responsibilities generally resident in Centers and in the Office of Infrastructure and Administration. Mission Directorates share management responsibilities with SCAP on the Aeronautics Test Program and High-End Computing Capability Program.

Benefits

SCAP serves each NASA Mission Directorate by providing the facilities and capabilities to investigate, test, and establish new scientific and engineering theories, principles, and methods. SCAP establishes alliances between the NASA Centers with like assets; makes decisions on disposition of capabilities no longer required; identifies re-investments and re-capitalization opportunities within and among classes of assets; executes changes; and reviews these capabilities each year to ensure the requirements are still valid. SCAP ensures that NASA has the assets and capabilities needed to achieve the Agency's Mission, by strategically managing capabilities, setting uniform use policies, and reducing budget constraints by eliminating redundant and unneeded assets,.

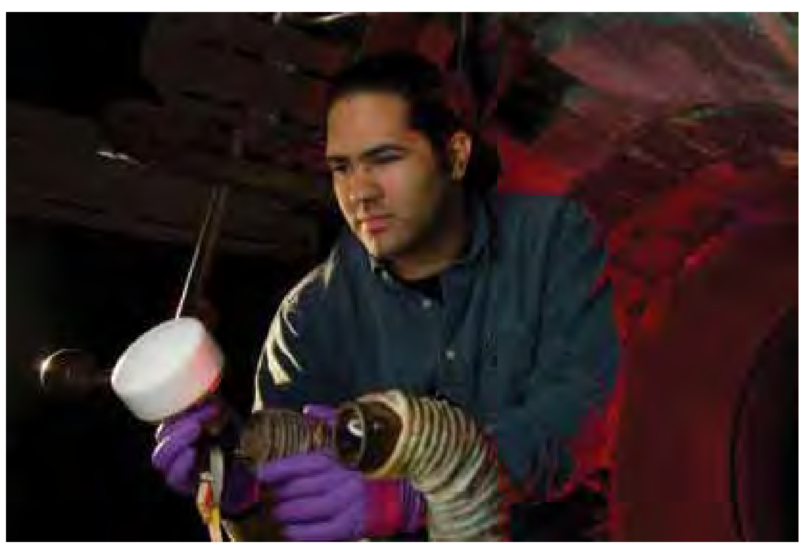
Other government agencies, industry, and academia routinely use the SCAP facilities to enhance their resources in meeting project requirements. The resulting advanced technologies often have dual-use capabilities that improve the Nation's position in the global market place as well as its defense capabilities.

Highlight

SCAP has implemented the projects to fund base operations costs for three major categories of assets: Thermal Vacuum-Acoustic Chambers, Flight Simulators, and the larger of NASA's two Arc Jet Facilities (located at Ames Research Center). SCAP has been very successful in achieving the proper balance of facility operations utilization and maintenance, and has retained the required skilled workforce needed to ensure these capabilities can produce the research, development, testing, and evaluation needed by the programs they support. The other aspect of SCAP's charter is to disposition assets that the Agency will no longer require or will not require for several years, but need to be preserved. In this category, SCAP disposed of a 757 research aircraft (excessed to the Department of Defense); abandoned the Cryogenic Propellant Tank Facility (K Site); and initiated mothballing the Hypersonic Test Facility at Glenn Research Center–Plum Brook Station.

Multi-year Outcomes	FY04	FY05	FY06	FY 2007
Outcome SC-1: Establish and maintain selected Agency level shared capabilities, across multiple classes of assets (e.g., wind tunnels, vacuum chambers, etc.), to ensure that they will continue to be available to support the missions that require them.	None	None	None	**Green**

An engineer at Ames Research Center installs a Teflon calibration "coupon" for testing in the Aerodynamic Heating Facility, part of Ames's Arc Jet complex. The coupon is a sample of material NASA tested for use on the Orion heat shield. SCAP ensures that important facilities and capabilities like the Arc Jets, room-sized blowtorches used to test materials and equipment under extreme temperatures, are available for Mission Directorate and partner use. (NASA)



NASA's PART Assessments

The Office of Management and Budget's (OMB's) PART assessment is a standard questionnaire of approximately 25 important, yet common sense, questions about a program's performance and management. For each question, there is a short answer and a detailed explanation with supporting evidence. The answers determine a program's overall rating. The program rating indicates how well it is performing so the public can see how effectively tax dollars are being spent.

For NASA, OMB reviews Themes, a set of similar programs (e.g., Planetary Sciences) under a Mission Directorate as identified in the Agency's annual budget request. Once each program or Theme assessment is completed, NASA and OMB jointly develop a plan to improve performance and track follow-up actions.

The following Themes, listed by the Strategic Goals or Sub-goals they support, have been rated using PART. The URL provided is to the assessment summary page, which contains a link to the full assessment.

Strategic Goal 1

Space Shuttle: *www.whitehouse.gov/omb/expectmore/summary/10000346.2005.html*.

Strategic Goal 2

International Space Station: *www.whitehouse.gov/omb/expectmore/summary/10000348.2004.html*.

Sub-goals 3A and 3B

Earth–Sun System: *www.whitehouse.gov/omb/expectmore/summary/10004392.2005.html*.

Sub-goal 3C

Solar System Exploration: *www.whitehouse.gov/omb/expectmore/summary/10001144.2006.html*.

Sub-goal 3D

Astronomy and Astrophysics Research: *www.whitehouse.gov/omb/expectmore/summary/10002316.2007.html*.

Sub-goal 3E

Aeronautics Technology: *www.whitehouse.gov/omb/expectmore/summary/10002304.2007.html*.

Sub-goal 3F

Advanced Capabilties: *www.whitehouse.gov/omb/expectmore/summary/10009024.2007.html*.

Strategic Goal 4

Constellation Systems: *www.whitehouse.gov/omb/expectmore/summary/10004394.2006.html*.

Strategic Goal 5

Advanced Capabilties: *www.whitehouse.gov/omb/expectmore/summary/10009024.2007.html*.

Constellation Systems: *www.whitehouse.gov/omb/expectmore/summary/10004394.2006.html*.

Space and Flight Support: *www.whitehouse.gov/omb/expectmore/summary/10002314.2007.html*.

Strategic Goal 6

Advanced Capabilties: *www.whitehouse.gov/omb/expectmore/summary/10009024.2007.html*.

Space and Flight Support: *www.whitehouse.gov/omb/expectmore/summary/10002314.2007.html*.

Cross-Agency Support Programs

Education: *www.whitehouse.gov/omb/expectmore/summary/10002310.2007.html*.

Integrated Enterprise Management Program: *www.whitehouse.gov/omb/expectmore/summary/10004393.2006.html*.

Inside the mobile service tower on Launch Pad 17-B at Cape Canaveral Air Force Station in September 2007, the first half of the fairing (a protective covering that fits over a rocket's payload and forms an aerodynamic nose cone) is in place around the Dawn spacecraft and is ready for the second half to be installed. Launched on September 27 aboard a Delta II rocket, Dawn will rendezvous with Vesta and Ceres, two protoplanets (or baby planets) whose growth was interrupted by the formation of Jupiter, to learn more about the origin and evolution of the solar system. (J. Gossman/NASA)

Letter from the Chief Financial Officer

February 1, 2008

It has been clear from the time I joined NASA in September 2007 that every level of the Agency accepts responsibility for reporting performance and financial data accurately, reliably, and with the same vigor that the Agency manifests in its scientific research and exploration missions. Although NASA's financial systems and processes are not yet operating at that same level of performance, progress was made in FY 2007. The final audit reports presenting the independent auditor's opinion on the Agency's financial statements, internal controls, and legal compliance can be read in the Addendum to the Agency Financial Report online at *www.nasa.gov/news/budget/index.html*. They note NASA's continued inability to provide sufficient evidential support for the amounts presented in the financial statements and cite two internal control material weaknesses associated with Financial Systems, Analyses, and Oversight and controls over Property, Plant, and Equipment. In FY 2007, NASA implemented a corrective action plan to address internal control weaknesses identified at that time. Among other actions, NASA:

- Upgraded the Core Financial System to resolve certain system configuration issues and to improve technical and functional system operations. A key feature of this upgrade provides better funds distribution control.
- Enhanced monthly monitoring and control procedures to promote solid Center account reconciliations and effective Agency oversight. By improving insight into Center-level financial transactions, these enhancements also expedite error detection and correction.
- Implemented a Change in Accounting Principle reclassifying certain costs previously categorized as Property, Plant & Equipment (PP&E) as research and development expenses to be recognized in the period incurred. This change was consistent with June 2007 technical guidance from the Federal Accounting Standards Advisory Board (FASAB).
- Revised policies and procedures for identifying, tracking, and reporting PP&E costs from project inception through final disposition to enhance control over PP&E cost accounting. These revised policies and procedures, becoming effective in FY 2008, will apply to both new projects and retroactively to certain project PP&E for missions in progress.

Throughout FY 2008, NASA will build on this foundation, moving forward with clearly defined goals, metrics and actions to enhance the Agency's financial management capabilities.

Sound financial management is vital to NASA's success in achieving its mission and requires the combined efforts of the entire Agency. Along with my colleagues in the Office of the Chief Financial Officer and throughout NASA's Mission Directorates, Centers, and project offices, I would reaffirm the Agency's continued commitment to achieving financial management excellence.

Ronald R. Spoehel
Chief Financial Officer

Financial Overview

This section analyzes and discusses NASA's Financial Statements and the Agency's stewardship of the resources provided to it by Congress to carry out its mission. The Financial Statements, which describe the results of Agency operations and the Agency's financial position, are the responsibility of NASA's management. The Financial Statements, Notes, Required Supplementary Information, and Required Supplementary Stewardship Information are available in the Agency Financial Report Addendum at *www.nasa.gov/about/budget/index.html*.

Limitations of the Financial Statements

The principal statements have been prepared to report the financial position and results of operations of NASA pursuant to the requirements of 31 U.S.C. 3515(b). While the statements have been prepared from the books and records of NASA in accordance with generally accepted accounting principles for Federal entities and the formats prescribed by the Office of Management and Budget (OMB), the statements are in addition to the financial reports used to monitor and control budgetary resources which are prepared from the same books and records. The statements should be read with the realization that they are for a component of the U.S. Government, a sovereign entity.

Financial Highlights

Results of Operations

The Agency's net cost of operations for FY 2007 was $15.1 billion, a decrease of $2.6 billion (14%) from FY 2006. The decrease did not reflect reduced expenditures on operations; rather, it was primarily due to (i) a $2.9 billion reduction in depreciation expense in FY 2007 over FY 2006 resulting from a Change in Accounting Principle related to capitalization of PP&E which lowered the depreciable base of assets and (ii) a $1.0 billion increase in net capital asset acquisitions not expensed. (See the Assets discussion in the section below for more information on the accounting change.)

Excluding the effect of decreased depreciation and the net increase in capital asset acquisitions, operating expenses increased by $1.3 billion in FY 2007 over FY 2006. The overall Agency budget remained near FY 2006 levels because NASA operated under a Continuing Resolution for all of FY 2007. However, there were changes in costs among program activities as the Agency emphasized programs essential to achieving its strategic goals.

NASA's programs and activities are carried out through four Business Lines: Aeronautics Research, Exploration Systems, Science, and Space Operations. The Consolidated Statement of Net Costs presents the Agency's gross and net costs by Business Line as shown below. The net cost of operations is the gross (total) cost incurred by the Agency, less any earned revenue from other government organizations or from the public. Space Operations (including NASA's Shuttle and International Space Station programs), at $6.1 billion, and Science, at $5.1 billion, were the Agency's largest business lines in FY 2007. Exploration Systems net costs in FY 2007 grew by 22% to $3.2 billion.

Cost by Business Line
(Dollars in Millions)

		$ Change	% Change		Unaudited 2007		Unaudited 2006 Restated
Aeronautics Research							
Gross Costs	$	*-429*	*-38%*	$	700	$	1,129
Less: Earned Revenue		*27*	*34%*		106		79
Net Cost		***-456***	***-43%***		**594**		**1,050**
Exploration Systems							
Gross Costs		*515*	*19%*		3,217		2,702
Less: Earned Revenue		*-59*	*-67%*		29		88
Net Cost		***574***	***22%***		**3,188**		**2,614**
Science							
Gross Costs		*-1,119*	*-17%*		5,506		6,625
Less: Earned Revenue		*4*	*1%*		352		348
Net Cost		***-1,123***	***-18%***		**5,154**		**6,277**
Space Operations							
Gross Costs		*-1,674*	*-21%*		6,443		8,117
Less: Earned Revenue		*-123*	*-29%*		301		424
Net Cost		***-1,551***	***-20%***		**6,142**		**7,693**
Net Cost of Operations							
Gross Costs		*-2,707*	*-15%*		15,866		18,573
Less: Earned Revenue		*-151*	*-16%*		788		939
Net Cost	**$**	***-2,556***	***-14%***	**$**	**15,078**	**$**	**17,634**

Source: AFR Addendum: Consolidated Statement of Net Cost, Unaudited

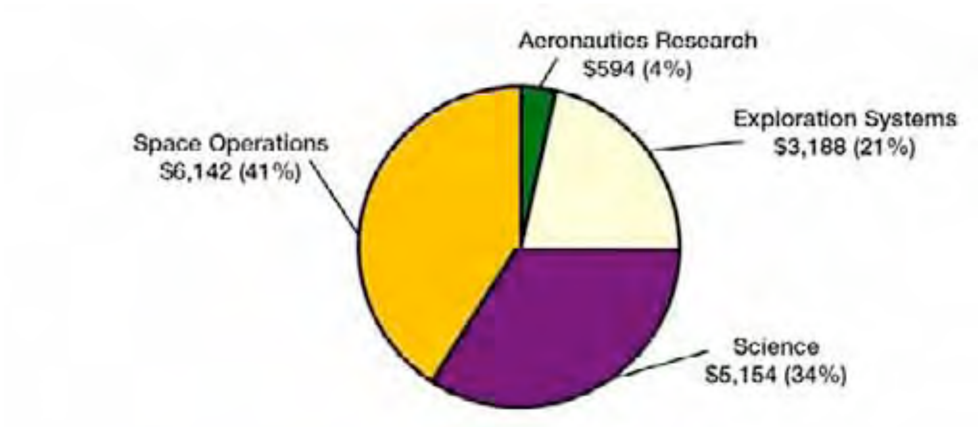
Aeronautics Research net costs decreased $456 million in FY 2007. Expenses on operations grew by $90 million while there were allocated reductions to expenses due to decreased depreciation of $368 million, net increases in capital asset acquisitions of $138 million, and residual administrative reductions of $40 million. The reduction in depreciation expense across all operations resulted from application of the Change in Accounting Principle (discussed below in the Assets section) lowering NASA's depreciable base of assets in FY 2007 as previously capitalized R&D projects were expensed through a prior period adjustment.

Exploration Systems net costs increased $574 million in FY 2007. Expenses on operations grew by $1,277 million while there were allocated reductions to expenses due to decreased depreciation of $596 million, net increases in capital asset acquisitions of $213 million, and residual administrative increases of $106 million. The increase in operations is the result of a significant increase in activities within the Constellation program, specifically for the Orion Crew Exploration Vehicle and the Ares I Crew Launch Vehicle.

Science net costs decreased $1,123 million in FY 2007. Expenses on operations grew by $100 million while there were allocated reductions to expenses due to decreased depreciation of $765 million, net increases in capital asset acquisitions of $273 million, and residual administrative reductions of $185 million.

Space Operations net costs decreased $1,551 million in FY 2007. Expenses on operations decreased by $215 million while there were allocated reductions to expenses due to decreased depreciation of $1,106 million, net increases in capital asset acquisitions of $395 million, and residual administrative increases of $165 million. The decrease in operations reflects the completion of the heavy expenditures incurred during FY 2006 as NASA had focused on Return to Flight activities for the Space Shuttle.

Uses of Funds for the Fiscal Year Ended September 30, 2007
(Dollars in Millions)



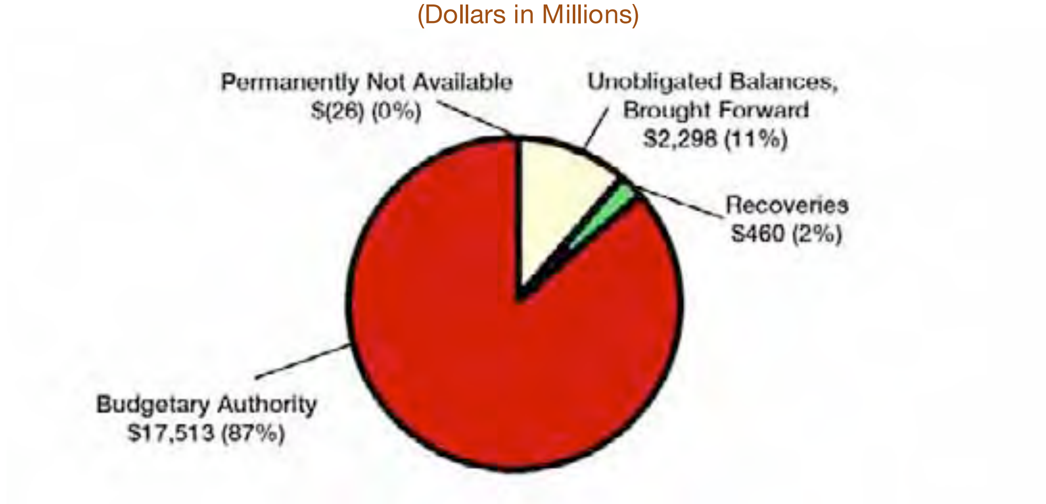
Total Uses of Funds: $15,078

Source: AFR Addendum: Consolidated Statement of Net Cost, Unaudited.

Sources of Funding

Funds available for NASA's FY 2007 operations totaled $20.2 billion as shown below. This compares with total sources of funds in FY 2006 of $20.1 billion. Unobligated Balances, Brought Forward was $2.3 billion, $57 million (2%) more than at the beginning of FY 2006. Congress provides two-year appropriations for the Agency. NASA's Budgetary Authority decreased by $0.2 billion (1%) in FY 2007, to $17.5 billion, primarily due to a $0.6 billion reduction in NASA's appropriations funding compared with the President's request, resulting from the operation of an ongoing Congressional budget resolution affecting most Federal agencies.

Sources of Funds for the Fiscal Year Ended September 30, 2007
(Dollars in Millions)



Total Sources of Funds: $20,246

Note: Nonexpenditure transfers of $1 M do not appear in the chart.
Source: AFR Addendum: Combined Statement of Budgetary Resources, Unaudited.

Expenditures Toward Strategic Goals

Although NASA allocates budgets and tracks costs of each of the Mission Directorates (i.e., the Agency's lines of business), the Agency also measures the cost of pursuing each of its strategic goals. To measure such costs, NASA maps each Mission Directorate's costs (as shown on the Statement of Net Costs) to each strategic goal. A

Expenditures Toward Strategic Goals

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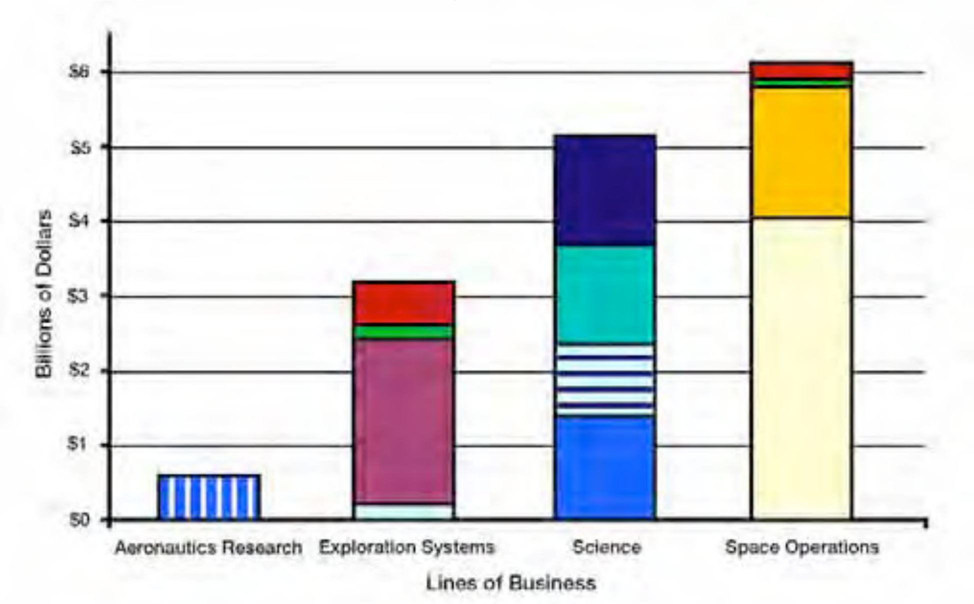
Expenditures on Strategic Goals by Line of Business



Expenditures by Strategic Goal and Sub-goal
(Dollars in Billions)

Strategic Goals and Sub-goals	Unaudited 2007
1: Fly Space Shuttle safely, retire by 2010	$ 4.0
2: Complete International Space Station	$1.8
3: Balanced program of science, exploration, and aeronautics:	
3A: Study Earth from Space	$1.4
3B: Understand the Sun	$1.0
3C: Origin and history of the solar system	$1.3
3D: Origin, structure, and evolution of the universe	$1.5
3E: Aeronautics research	$0.6
3F: Impacts of space environment and long-duration flight on humans	$0.2
4: Develop a Crew Exploration Vehicle to replace Space Shuttle	$2.2
5: Partnerships with commercial space sector	$0.3
6: Lunar return program with utility for farther subsequent missions	$0.8
Total (Net Cost of Operations)	**$ 15.1**

Note: For complete text of Goals and Subgoals, see NASA's Strategic Goals section above.
Sources: AFR Addendum: Statement of Net Cost, Unaudited. Operating Plan for July 2007.

Balance Sheet

The following table provides summary financial information for fiscal years 2007 and 2006.

Summary Balance Sheet
(Dollars in Millions)

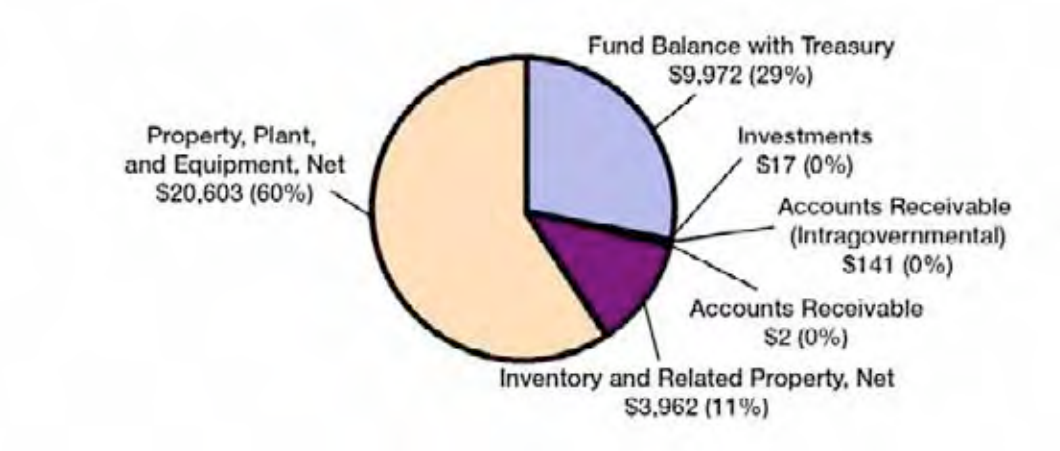
	$ Change	% Change	Unaudited 2007	Unaudited 2006 Restated
Balance Sheet Data:				
Intragovernmental				
Fund Balance With Treasury	$ 387	4%	$ 9,972	$ 9,585
Investments	0	0%	17	17
Accounts Receivable	-39	-22%	141	180
Total Intragovernmental	348		10,130	9,782
Accounts Receivable	-3	-60%	2	5
Inventory and Related Property, Net	1,632	70%	3,962	2,330
Property, Plant, and Equipment, Net	-12,658	-38%	20,603	33,261
Total Assets	**$ -10,681**	**-24%**	**$ 34,697**	**$ 45,378**
Intragovernmental:				
Accounts Payable	$ 279	192%	$ 424	$ 145
Other	-48	-31%	109	157
Total Intragovernmental	231		533	302
Accounts Payable	188	22%	1,036	848
Federal Employee and Veteran Benefits	4	7%	64	60
Environmental and Disposal Liabilities	70	8%	963	893
Other	179	15%	1,389	1,210
Total Liabilities	**672**	**20%**	**3,985**	**3,313**
Unexpended Appropriations	-215	-3%	7,470	7,685
Cumulative Results of Operations	-11,138	-32%	23,242	34,380
Total Net Position	**-11,353**	**-27%**	**30,712**	**42,065**
Total Liabilities and Net Position	**$ -10,681**	**-24%**	**$ 34,697**	**$ 45,378**

Source: AFR Addendum: Consolidated Balance Sheet, Unaudited

Assets

The Consolidated Balance Sheet shows NASA with total assets of $34.7 billion at the end of FY 2007, a decrease of $10.7 billion (24%) over the previous year's total of $45.4 billion. PP&E decreased by $12.7 billion (38%) primarily due to a Change in Accounting Principle discussed below. Inventory and Related Property increased by $1.6 billion (70%) due to increased acquisition of operating materials and supplies for the Space Shuttle and the International Space Station (ISS). The assets shown in the Consolidated Balance Sheet are summarized in the following chart.

Major Assets by Type as of September 30, 2007
(Dollars in Millions)



Total Assets: $34,697

Source: AFR Addendum: Consolidated Balance Sheet, Unaudited.

In FY 2007, NASA changed its accounting policy for Property, Plant and Equipment (PP&E) to reclassify costs previously categorized as General Property, Plant and Equipment (PP&E) as Research and Development (R&D) expenses. This resulted in the reclassification of $12.7 billion of previously classified PP&E to period expenses. The reclassification represented 37% of the Agency's total FY 2007 assets balance. The Change in Accounting Principle acknowledges that much of the Agency's work is primarily Research & Development (R&D) and creates better alignment between the Agency's accounting practices and the use of its program and project funding. NASA requested and received technical guidance from FASAB* on applying Statement of Financial Accounting Standards (SFAS) No. 2, *Accounting for Research and Development Costs,* when accounting for the cost of R&D programs and projects. This clarification permitted the application of the criteria of SFAS No. 2 when determining if a program or project acquisition should be capitalized or if it should be expensed in the period the costs are incurred. NASA retroactively applied these criteria to items previously acquired and classified as PP&E, resulting in the reduced PP&E balance shown in the FY 2007 financial statements. NASA has revised its accounting policies and procedures to incorporate these criteria into the capitalization decision process for costs it incurs in the future to acquire items that support its programs and projects (see *Note 1. Summary of Significant Accounting Policies* for additional discussion of the Change in Accounting Principle).

Also in FY 2007, NASA revised the classifications used to accumulate and report PP&E costs (see *Note 7. Property, Plant, and Equipment, Net*). NASA now classifies PP&E costs as either Space Exploration PP&E or General PP&E. Space Exploration PP&E is comprised of those assets employed by the Agency's programs and projects in pursuit of specific mission goals. General PP&E is comprised of common-use institutional assets that support multiple programs and projects.

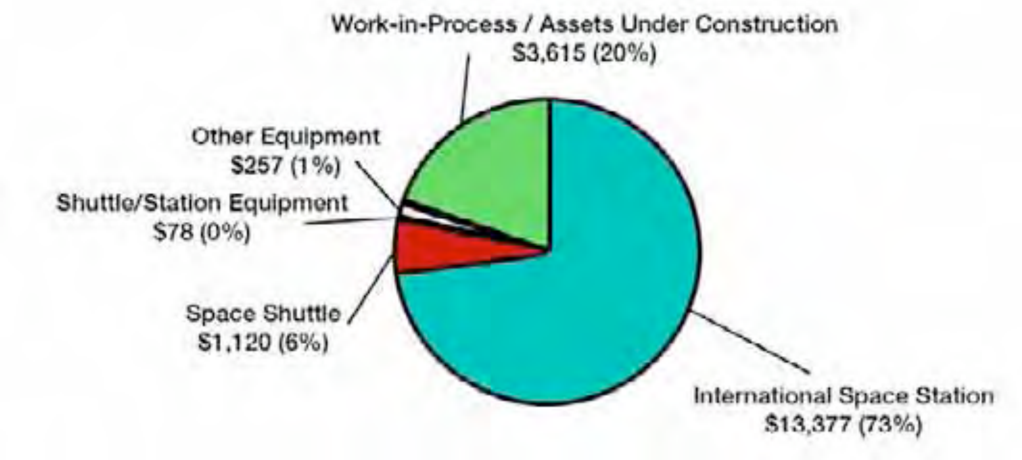
NASA's total combined Space Exploration and General PP&E of $20.6 billion at the end of FY 2007 remained essentially flat as depreciation and new capitalized assets were roughly equivalent at $2.9 billion in FY 2007. Of NASA's total $20.6 billion PP&E at fiscal year end 2007, 90% was Space Exploration PP&E (net of accumulated depreciation). Of total Space Exploration PP&E, 72% was International Space Station (ISS) PP&E. The category "Work-in-Process/Assets Under Construction" pertains to Space Shuttle and ISS development. Consistent with President Bush's vision for the Nation's space exploration program, NASA expects to retire the Space Shuttles in 2010. The International Space Station is being depreciated based upon a 15-year specification life through 2016.

General PP&E (net of accumulated depreciation), at $2.2 billion, comprised the remaining 10% of the Agency's total PP&E. Of General PP&E, the largest component was Structures, Facilities and Leasehold Improvements, with a net book value of $1.6 billion.

Space Exploration PP&E and General PP&E are summarized in the following charts.

* Federal Accounting Standards Advisory Board

Space Exploration PP&E by Type, Net as of September 30, 2007
(Dollars in Millions)



Total Space Exploration PP&E, Net: $18,447

Source: AFR Addendum: Note 7. Property, Plant, and Equipment, Net, Unaudited.

General PP&E by Type, Net as of September 30, 2007
(Dollars in Millions)

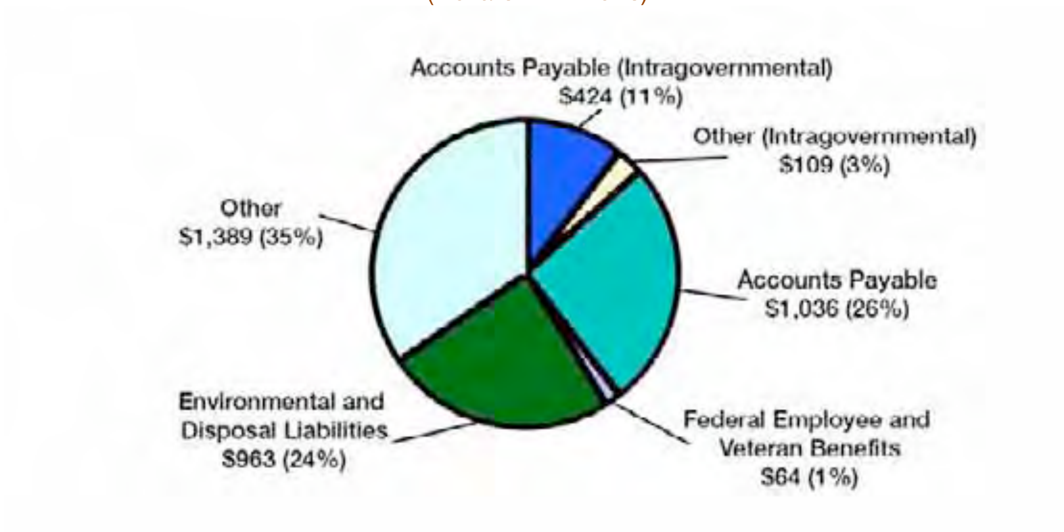
Total General PP&E, Net: $2,156

Source: AFR Addendum: Note 7. Property, Plant, and Equipment, Net. Unaudited.

LIABILITIES

NASA had total liabilities of $4.0 billion as of September 30, 2007, an increase of $0.7 billion (20%) over FY 2006. This increase reflected an increase in program activities, primarily due to the recent expansion of contract expenditures for Crew Exploration Vehicle (CEV) development by the Exploration Systems Mission Directorate.

Major Liabilities by Type
(Dollars in Millions)



Total Liabilities: $3,985

Source: AFR Addendum: Consolidated Balance Sheet, Unaudited.

Environmental and Disposal liabilities are estimated cleanup costs for actual or anticipated contamination from waste disposal methods, leaks, spills, and other past NASA activity that created or could create a public health or environmental risk. The estimate represents the amount that NASA expects to spend in the future to remediate currently known contamination. This estimate could change in the future due to the identification of additional contamination, inflation, deflation, or changes in technology or applicable laws and regulations. The estimate will also change through ordinary liquidation of these liabilities as the cleanup program continues. NASA has implemented new procedures and tools to improve the accuracy and consistency of environmental cleanup estimates.

RESTATEMENTS

NASA has undertaken a continuous effort to validate and correct Agency financial data. In the course of this action, the Agency identified erroneous account balances. These erroneous account balances occurred in years prior to FY 2006 and stemmed from the Agency's consolidation of its legacy systems into a single Agency-wide system beginning in FY 2002 and FY 2003.

In FY 2007, NASA identified and recorded a prior period adjustment to reflect the retroactive correction of these errors. As described in *Note 17* to the financial statements in the Addendum to this AFR, the error occurred prior to FY 2006 and pertains to differences between supported and unsupported balances in legacy accounting records and data that was converted into the Net Position account in the new system. The FY 2006 beginning balance of Cumulative Results of Operations, as reported on the Statement of Changes in Net Position, has been adjusted (decrease of $712 million) and Unexpended Appropriations was also adjusted (increase of $704 million) to reflect this correction.

Additionally, in FY 2007 NASA recorded a prior period adjustment to reflect correction of an error related to property leased to other entities. Leased property was improperly excluded from the property inventory and the associated correcting adjustments resulted in a $68 million increase in Cumulative Results of Operations and an increase in the net book value of Property, Plant and Equipment.

NET POSITION

Net Position is the sum of Unexpended Appropriations and Cumulative Results of Operations. NASA's Net Position as of September 30, 2007, reported on the Consolidated Balance Sheet and the Consolidated Statement of Changes in Net Position, was $30.7 billion, an $11.4 billion decrease from 2006. This decrease is due primarily to the Change in Accounting Principle discussed in the Assets section above, which resulted in the reclassification of $12.7 billion from PP&E to period expenses offset by a $1.4 billion net change in Financing Sources.

As described above in the Restatement section, NASA's Net Position also decreased due to a prior period adjustment made in FY 2007 to correct erroneous entries made in 2003 during conversion to a new financial system.

Summary of Financial Statement Audit and Management Assurances

The following tables summarize the Agency's FY 2007 material weaknesses as identified by the Financial Statement Auditor and Management. Table 1 summarizes the Financial Statement Audit material weaknesses. Table 2 summarizes the material weaknesses identified by NASA Management in the Statement of Assurance included in the Management Assurance section.

Table 1: Summary of Financial Statement Audit

Audit Opinion	Disclaimer
Restatement	Yes

Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Ending Balance
Controls Over Property, Plant and Equipment	1	0	0	0	1
Financial Systems, Analyses and Oversight	1	0	0	0	1
Total Material Weaknesses	**2**	**0**	**0**	**0**	**2**

Table 2: Summary of Management Assurances

Effectiveness of Internal Control Over Financial Reporting (FMFIA 2)

Statement of Assurance	Qualified

Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
Asset Management	0	1	0	0	0	1
Financial Systems, Analyses, and Oversight	1	0	0	0	0	1
Total Material Weaknesses	**1**	**1**	**0**	**0**	**0**	**2**

Effectiveness of Internal Control Over Operations (FMFIA 2)

Statement of Assurance	Qualified

Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
Information Technology Security	1	0	0	0	0	1
Asset Management	1	0	0	0	0	1
Financial Systems, Analyses, and Oversight	0	1	0	0	0	1
Total Material Weaknesses	**2**	**1**	**0**	**0**	**0**	**3**

Conformance With Financial Management System Requirements (FMFIA 4)

Statement of Assurance	Systems do not conform to financial management system requirements.

Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
Information Technology Security	0	1	0	0	0	1
Financial Systems, Analyses, and Oversight	1	0	0	0	0	1
Total Material Weaknesses	**1**	**1**	**0**	**0**	**0**	**2**

Compliance With Federal Financial Management Improvement Act (FFMIA)

<table>
<tr><th></th><th>Agency</th><th>Auditor</th></tr>
<tr><td>Overall Substantial Compliance</td><td>No</td><td>No</td></tr>
<tr><td>1. System Requirements</td><td colspan="2">No</td></tr>
<tr><td>2. Accounting Standards</td><td colspan="2">No</td></tr>
<tr><td>3. USSGL at Transaction Level</td><td colspan="2">Yes</td></tr>
</table>

NASA Contact Information

NASA Headquarters (HQ)
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(202) 358-0000
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Lyndon B. Johnson Space Center (JSC)
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www.nasa.gov/centers/johnson/home/index.html

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www.nasa.gov/centers/kennedy/home/index.html

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www.nasa.gov/centers/langley/home/index.html

George C. Marshall Space Flight Center (MSFC)
Huntsville, AL 35812-0001
(265) 544-2121
Hours: available 24 hours
www.nasa.gov/centers/marshall/home/index.html

John C. Stennis Space Center (SSC)
NASA Public Affairs
IA10
Stennis Space Center, MS 39529-6000
(228) 688-2211
Hours: 6:00-6:00 CST
www.nasa.gov/centers/stennis/home/index.html

Wallops Flight Facility (WFF)
Goddard Space Flight Center
Wallops Island, VA 23337-5099
(757) 824-1000
Hours: 8:00-5:00 EST
www.nasa.gov/centers/wallops/home/index.html

Back Cover: An ATHLETE robot and a Robonaut–vehicle hybrid called a Centaur work together during the Desert RATS field test in Arizona. The field test evaluated NASA's ability to use remotely controlled robots to deploy lunar infrastructure, a capability vital to future missions to the Moon. (NASA)

National Aeronautics and Space Administration

NASA Headquarters
Washington, DC 20546

NP-2008-01-493-HQ

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