Overview

NASA's Space Operations Mission Directorate (SOMD) is responsible for providing mission critical space exploration services to both NASA customers and to other partners within the United States and throughout the world: flying the Space Shuttle to assemble the International Space Station (ISS); operating the ISS; ensuring safe and reliable access to space; maintaining secure and dependable communications between platforms across the solar system; and ensuring the health and safety of our Nation's astronauts.

At the heart of SOMD is nearly half a century of experience at safely and reliably building, flying, and maintaining some of the world's most advanced and complex aerospace systems. The U.S. Space Exploration Policy and the NASA Strategic Plan recognize the role of the ISS as a unique orbital outpost for carrying out the scientific and engineering research needed for prolonged stays on the Moon and Mars. The lessons being learned during the construction and operation of the ISS are directly applicable to the challenges that may be faced by explorers on the lunar and Martian surfaces.

Completing assembly of the ISS orbiting facility in a manner consistent with NASA's International partner commitments and the needs of human exploration will enable its full use. The Space Shuttle plays an important role as the only vehicle that can launch the remaining elements of the ISS and serve as a platform for joint human and robotic assembly operations at the ISS. SOMD is responsible for ensuring the safety and continued success of the Space Shuttle Program (SSP). Though the fleet of Space Shuttle orbiters will be retired once their role in ISS assembly is complete in 2010, portions of the Space Shuttle's legacy (including manufacturing facilities, ground operations equipment, launch pads, flight hardware, workforce skills, and experience) will be the foundation for the exploration vehicles being developed by the NASA Exploration Systems Mission Directorate (ESMD). This budget provides for careful planning, optimized utilization, and responsive disposition of processes, personnel, resources, and real and personal property, focused upon leveraging legacy assets for Exploration programs' safety and mission success.

In addition to these high-profile programs, SOMD is also responsible for adhering to the U.S. Space Transportation Policy by ensuring that the critical infrastructure needed for space access and space communications is available to meet the needs of NASA's customers. The Launch Services Program (LSP) facilitates access to space by providing leadership, expertise and cost-effective launch services for NASA's Expendable Launch Vehicle (ELV) missions. The Rocket Propulsion Test (RPT) Program maintains NASA's wide variety of test facilities for use by both the Space Shuttle and Constellation Systems Programs. The Crew Health and Safety (CHS) Program ensures that NASA's astronauts are fully prepared for current and future missions. The Space Communications and Navigation (SCaN) Program operates NASA's extensive network of terrestrial and orbiting communications nodes, as well as all of the associated hardware and software needed to pull down the terabytes of data generated by NASA's fleet of crewed vehicles and robotic spacecraft.

As the SSP comes to closure in 2010 with the accompanying completion of the ISS, there are a number of unique human spaceflight capabilities and facilities that have primarily supported the Space Shuttle and ISS assembly which NASA will sustain to support human space flight operations into the future. These capabilities are required for ongoing ISS operations and support of the Constellation program.

In FY 2010, NASA is consolidating the funding for the Flight Crew Operations Directorate from ESMD and SOMD under the newly established Human Space Flight Operations (HSFO) Program. HSFO was established as a single integrated program that will consolidate capabilities in support of multiple human space flight programs. The projects that will be included in the future will be those deemed to be discrete multi-program functions that support the agency's Human Space Flight Operations required regardless of the vehicle being supported.

FY 2010 Budget Request

Budget Authority ($ millions)	FY 2008 Actual	FY 2009 Enacted	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
FY 2010 President's Budget Request	**5,427.2**	**5,764.7**	**6,175.6**	**3,663.8**	**3,485.3**	**3,318.6**	**3,154.8**
Space Shuttle	3,295.4	2,981.7	3,157.1	382.8	87.8	0.0	0.0
International Space Station	1,685.5	2,060.2	2,267.0	2,548.2	2,651.6	2,568.9	2,405.9
Space and Flight Support (SFS)	446.2	722.8	751.5	732.7	745.9	749.7	748.9
FY 2009 President's Budget Request	**5,526.2**	**5,774.7**	**5,872.8**	**2,900.1**	**3,089.9**	**2,788.5**	**--**
Space Shuttle	3,266.7	2,981.7	2,983.7	95.7	0.0	0.0	--
International Space Station	1,813.2	2,060.2	2,277.0	2,176.4	2,448.2	2,143.1	--
Space and Flight Support (SFS)	446.3	732.8	612.1	628.0	641.7	645.4	--
Total Change from FY 2009 President's Budget Request	**-99.0**	**-10.0**	**302.8**	**763.7**	**395.4**	**530.1**	**--**

Note: In all budget tables, the FY 2010 President's Budget Request depicts the September 2008 Operating Plan for the 2008 Actuals and the 2009 Omnibus Appropriations Act (P.L. 111-8) and the American Recovery and Reinvestment Act (P.L. 111-5) for the 2009 enacted.

Plans for FY 2010

Space Operations

Space Shuttle

New Initiatives:

None.

Major Changes:

The FY 2010 budget includes increases in FY 2011 and FY 2012 to reflect costs for both Shuttle Transition and Retirement along with severance and retention. This increase is a result of a comprehensive assessment conducted during the last year, and was accommodated in the existing budget.

Major Highlights for FY 2010

In FY 2010, NASA will fly six Space Shuttle missions which will complete the Space Shuttle manifest. After twenty-eight years, 133 missions, over 650 days spent working in orbit, and over 500 million miles traveled in space, the Space Shuttle will be retired.

International Space Station

New Initiatives:

None.

Major Changes:

None.

Major Highlights for FY 2010

The FY 2010 budget completes assembly of the ISS, flying six missions to deliver hardware, supplies, and an international scientific laboratory to the ISS.

Space and Flight Support (SFS)

New Initiatives:

None.

Major Changes:

The Space and Flight Support theme will have two major changes in the FY 2010 budget. The first change is the transfer of Flight Crew operations from Constellation, Space Shuttle, and International Space Station programs to the newly created Human Space Flight Operations line item under the Space and Flight Support theme. The second change in the FY 2010 budget is an increase to the Space Communications and Navigation Program to continue the Optical Communications Flight Demonstration Project.

Major Highlights for FY 2010

In FY 2010, the Space Flight Support theme has several major highlights for the Space Communications and Navigation program, the Launch Services program, and Human Space Flight Operation programs. The Space Communication and Navigation Program provides Deep Space Network sustainment, Space Network Ground Segment sustainment, and the Tracking and Data Relay Satellites K/L. Flexible and common communication technologies such as Software Defined Radio and antenna arraying are being pursued. The Optical Communications Flight Demonstration Project will continue to support the development of small and medium optical payloads for demonstration on three Near Earth flights in 2012, 2013, and 2016, with the overall goal to be suitable for deep space optical communications. The Launch Services Program will continue to work with alternative launch providers to fill the current gap in medium-class lift capability left by the retirement of the Delta II launch vehicle. The Human Space Flight Operations has been established to fund required multi-program capabilities which support the Space Shuttle Program and the International Space Station now as well the Constellation Program in the future.

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Mission Directorate:	Space Operations
Theme:	Space Shuttle

Theme Overview

Thirty-seven years ago, NASA was charged with developing the world's first reusable space transportation system, a vehicle capable of astonishing power and versatility that would revolutionize humanity's ability to operate regularly in near-Earth space. It was a breathtaking challenge, one that tested the technical leadership of the nation every bit as much as the Apollo Program, and one that was worthy of a nation bold enough to be the first to send its citizens beyond the cradle of the home planet. The result was the Space Shuttle, a vehicle that to this day remains the most advanced and capable aerospace system ever built. For twenty-eight years, the Space Shuttle has been the foundation of U.S. preeminence in space exploration. The Space Shuttle has carried more people (over 320) and more cargo (almost four million pounds) on more (and many different types), of missions than any other launch system in history. At the same time, two tragic accidents serve as a continuing reminder that while we have come far since the earliest days of the space program, the Space Shuttle is still a first-generation system, and flying in space remains at the absolute cutting edge of what is humanly possible.

For the past eleven years, the full capabilities of the Space Shuttle have been applied to the mission for whom the system was originally conceived and uniquely designed - assembly of a large, advanced research station and technology test bed in low-Earth orbit. In FY 2010, that assembly mission, and with it one of the most extraordinary periods in the history of space exploration, will come to a close. As NASA prepares to retire the Space Shuttle, the Agency also continues to transition key workforce, technology, facilities, and operational experience from this remarkable vehicle to a new generation of safer, even more capable systems. Through these new systems, the legacy of the Space Shuttle will live on in future exploration missions that will also be essential for maintaining U.S. leadership in critical areas of advanced technology well into the twenty-first century.

For more information, please visit www.nasa.gov/shuttle.

FY 2010 Budget Request

Budget Authority ($ millions)	FY 2008 Actual	FY 2009 Enacted	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
FY 2010 President's Budget Request	**3,295.4**	**2,981.7**	**3,157.1**	**382.8**	**87.8**	**0.0**	**0.0**
Space Shuttle Program	3,295.4	2,981.7	3,157.1	382.8	87.8	0.0	0.0
FY 2009 President's Budget Request	**3,266.7**	**2,981.7**	**2,983.7**	**95.7**	**0.0**	**0.0**	**--**
Space Shuttle Program	3,266.7	2,981.7	2,983.7	95.7	0.0	0.0	--
Total Change from FY 2009 Request	**28.7**	**0.0**	**173.4**	**287.1**	**87.8**	**0.0**	**--**

Plans for FY 2010

Space Shuttle Program

In FY 2010, NASA will complete assembly of the International Space Station with the last six flights planned for the Space Shuttle Program. Those missions will deliver the last of the U.S. pressurized elements (Node 3/Cupola) as well as environmental control and life support equipment and hardware and logistics needed to safely support and fully utilize the International Space Station once the Space Shuttle is retired. Planning for the sixth flight in FY 2010 is to deliver and install the Alpha Magnetic Spectrometer payload onto the International Space Station. At the same time, transition and retirement plans are in place or nearing completion for all Space Shuttle Program hardware elements as well as primary supporting Centers and all organizations with a substantial role in ensuring a safe and efficient phase-out of Space Shuttle Program capabilities. Significant sharing of workforce, facilities, and operational experience is already taking place between Space Shuttle Program and the Constellation Program, and will accelerate as major capabilities are made available once they are no longer needed to support safe Space Shuttle Program flyout.

Finally, after twenty-eight years, 133 missions, over 650 days spent working in orbit, and over 500 million miles travelled in space, the Space Shuttle will be retired.

Relevance

Relevance to national priorities, relevant fields, and customer needs:

NASA's primary objective is to advance U.S. national scientific, security, and economic interests by ensuring the success of the Nation's exploration goals as enunciated in U.S. Space Exploration Policy. The next step in the U.S. Space Exploration Policy is to complete assembly of the International Space Station in a manner that meets NASA's exploration research needs and international commitments. The Space Shuttle is uniquely qualified to carry out this mission. At the same time, Space Shuttle transition activities will be undertaken in a manner that, where necessary, safeguards the long-term viability of key U.S. technical capabilities.

Relevance to the NASA Mission and Strategic Goals:

The Space Shuttle Theme supports the achievement of NASA's Strategic Goal 1 that states "Fly the Shuttle safely as possible until its retirement, not later than 2010". The Space Shuttle provides the Nation's only capability for launching humans into Earth orbit and delivering the major elements of the ISS. The Space Shuttle is also forming a bridge between current and future operations. NASA is taking advantage of the remaining Space Shuttle flights to conduct detailed data collection and analysis of Shuttle systems in support of Constellation and commercial cargo design and development activities. These include installation of upgraded pressure transducers on the Space Shuttle solid rocket boosters to collect combustion and performance data relevant to Ares I development, measuring g-loads and vibration dynamics within the Shuttle crew cabin to assess crew performance for the Orion cockpit, modifying Space Shuttle tiles to measure boundary layer transitions at high-Mach numbers during re-entry, and demonstrating new ISS rendezvous and docking sensors being assessed by commercial cargo providers. While accomplishing these missions, Space Shuttle transition activities will be undertaken in a manner that, where necessary, safeguards the long-term viability of key U.S. technical capabilities.

Relevance to education and public benefits:

For twenty-eight years, the Space Shuttle has been the foundation of U.S. preeminence in advanced technology and space exploration. The Space Shuttle has carried more people (over 320) and more cargo (almost four million pounds) on more (and more different types of) missions than any other launch system in history. For the past eleven years, the full capabilities of the Space Shuttle have been applied to the mission for which the system was originally conceived and uniquely designed: assembly of a large, advanced research station in low-Earth orbit, one which can serve as a critical international research technology test bed for further missions out to the Moon, to Mars, and beyond. The Space Shuttle's final series of missions are essential to the completion of the ISS, a facility with potential for addressing essential national priorities like energy, the environment, education, international cooperation, and economic competitiveness. SSP is also a highly visible activity that promotes education in math, science, and engineering careers, which are critical to U.S. national security and the future of U.S. economic competitiveness.

Mission Directorate:	Space Operations
Theme:	Space Shuttle

Performance Achievement Highlights:

Space Shuttle Program successfully completed four missions (STS-120, STS-122, STS-123, and STS -124) in FY 2008. All primary mission objectives were completed.

Robust plans are in place or nearly complete to ensure a safe and smooth transition from Space Shuttle to Constellation in 2010. The NASA Transition Management Plan was updated in December 2008, and documents the Agency-level processes, interfaces, and organizations responsible for managing the transition or retirement of Space Shuttle Program assets, capabilities, and workforce. Strategic real property management is tightly integrated between the Centers, programs, and Headquarters, with Space Shuttle Program and Constellation Program now regularly sharing major production and operations facilities at the Stennis Space Center in Mississippi, the Michoud Assembly Facility in Louisiana, Marshall Space Flight Center in Alabama, and the Kennedy Space Center in Florida. A comprehensive assessment of the more than 1.2 million line items of Space Shuttle Program personal property has been completed in preparation for transfer or disposal. Both these real and personal property assessments included determination of relevant environmental, export control, and historic preservation requirements. A Request for Information was released in November 2008 to solicit ideas for how interested organizations could support permanent display of Space Shuttle Orbiters and Main Engines once their primary missions were complete. Strategic workforce activities include sharing of civil servants and contractors between Space Shuttle and Constellation, providing assistance to employees displaced by the transition from Space Shuttle to Constellation, capitalizing on critical capabilities across all NASA Centers, conducting regular surveys of the human spaceflight workforce, promoting open communication, and providing regular updates to the Congress through the NASA Workforce Transition Strategy report. Space Shuttle missions have also provided Constellation Program with opportunities to gain essential vehicle performance data and conduct high-fidelity tests of critical systems in a number of areas, including solid rocket motor performance, ascent vibration loads, rendezvous and docking techniques, and boundary layer transition effects during re-entry.

Independent Reviews:

Review Type	Performer	Last Review	Purpose/Outcome	Next Review
Other	NASA Advisory Council	04/2009	Provides independent guidance for the NASA Administrator. No recommendations were provided to SSP at this time.	07/2009
Other	ASAP	04/2009	Provides independent assessments of safety to the NASA Administrator. In their 2008 Annual Report, the ASAP stated that they "strongly endorse the NASA position on not extending Shuttle operations beyond successful execution of the December 2008 manifest, completing the ISS". NASA will fly the Space Shuttle to complete the International Space Station and then retire the Shuttle in 2010.	07/2009

Mission Directorate:	Space Operations
Theme:	Space Shuttle
Program:	Space Shuttle Program

FY 2010 Budget Request

Budget Authority ($ millions)	FY 2008 Actual	FY 2009 Enacted	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
FY 2010 President's Budget Request	3,295.4	2,981.7	3,157.1	382.8	87.8	0.0	0.0
Program Integration	516.6	489.6	678.1	152.0	22.7	0.0	0.0
Flight and Ground Operations	1,124.9	1,031.2	1,035.1	109.5	49.1	0.0	0.0
Flight Hardware	1,653.9	1,460.9	1,443.9	121.3	16.0	0.0	0.0
FY 2009 President's Budget Request	3,266.7	2,981.7	2,983.7	95.7	0.0	0.0	--
Program Integration	470.3	489.6	614.8	95.7	0.0	0.0	--
Flight and Ground Operations	1,121.8	1,031.2	955.9	0.0	0.0	0.0	--
Flight Hardware	1,674.6	1,460.9	1,413.0	0.0	0.0	0.0	--
Changes from FY 2009 Request	28.7	0.0	173.4	287.1	87.8	0.0	--

Project Descriptions and Explanation of Changes

Program Integration

The Program Integration budget includes the following: funds for flight software; system engineering, flight operations, and management integration; safety and mission assurance; business management; propulsion system integration; safety and sustainability; and all Shuttle support accounts that are performed for the Space Shuttle Program. Program Integration includes payload integration into the Space Shuttle and systems integration of the flight hardware elements through all phases of flight. It provides for the engineering analysis needed to ensure that payloads are safe and meet Space Shuttle interface requirements. Finally, Program Integration includes the necessary mechanical, aerodynamic and avionics engineering tasks to ensure that the launch vehicle can be safely launched, fly a safe ascent trajectory, achieve planned performance and descend to a safe landing.

Flight and Ground Operations

Flight Operations assures the successful accomplishment of pre-flight planning, mission training, operations control activities, and life sciences operations support for each mission to efficiently and effectively meet our customer requirements. Flight operations funding also provides for the maintenance and operation of critical mission support facilities including the Mission Control Center, Integrated Training Facility, Integrated Planning System, and the Software Production Facility.

Ground Operations provides final integration and checkout of all hardware elements for launch. It also includes coordination with other government agencies and foreign entities for Shuttle landing capabilities. The major launch site operational facilities at the Kennedy Space Center include three Orbiter Processing Facilities, two launch pads, the Vehicle Assembly Building, the Launch Control Center and three Mobile Launcher Platforms. Ground operations support capability include launch countdown and landing for Shuttle missions. Ground support for Shuttle landing includes both the Kennedy Space Center and Edwards Air Force Base runways and multiple contingency landing sites in the United States and other countries. Ground Operations also includes the maintenance and operations of ground infrastructure to support launch and landing.

In FY 2010, NASA consolidated and transferred the Flight Crew Operations Directorate project funding to the Human Space Flight Office under the Space and Flight Support Theme. These capabilities include the training of crew members for all of NASA human space flight endeavors.

Flight Hardware

Space Shuttle Flight Hardware ensures the vehicle hardware and software are designed, developed, manufactured, and tested for safe and reliable transportation. Five major flight elements make up the Space Shuttle system: the Orbiter, the Space Shuttle Main Engines, the External Tank, the Reusable Solid Rocket Motors, and the Solid Rocket Boosters.

The Orbiter, the winged vehicle that carries the payload and a crew of up to seven astronauts, is the principal element of the Space Shuttle system. Each Orbiter measures 122 feet long, 57 feet high, with a wingspan of 78 feet, and can carry approximately 35,000 to 41,000 pounds of payload to the International Space Station depending on the configuration of the Space Shuttle, rendezvous altitude, and other mission-specific requirements. There are three reusable Orbiters in the fleet: Discovery (Orbital Vehicle (OV)-103), Atlantis (OV-104), and Endeavour (OV-105).

The Space Shuttle Main Engines were developed in the 1970s and are the most efficient liquid-fueled rocket engines ever built. Each Block II main engine can produce 418,000 pounds of thrust at sea level. The main engines are throttle-able, reusable, and have a high degree of redundancy. Three main engines are mounted in a triangular configuration at the aft end of the Orbiter and provide about 29 percent of the total thrust at liftoff. Critical engineering skills are being maintained to ensure safe mission flyout, and sufficient Space Shuttle Main Engine component spares are being produced to support the program through FY 2010.

The External Tank is the largest and heaviest (approximately 1.7 million pounds when fully loaded with liquid oxygen fuel and liquid hydrogen) element of the Space Shuttle system. The External Tank serves two functions: to carry the fuel and oxidizer that feeds the main engines during ascent, and to act as the structural "backbone" to which the Orbiter and Solid Rocket Boosters are attached. Because the liquid hydrogen and liquid oxygen need to be stored at temperatures of hundreds of degrees below zero, the External Tank is covered with foam insulation to keep the propellants cold on the launch pad and during ascent and prevent formation of ice from atmospheric condensation. After the main engines are shut down at an altitude of about 70 miles above Earth, the External Tank is jettisoned, reenters the atmosphere at high velocity, and breaks up harmlessly over a remote ocean area.

Two Reusable Solid Rocket Boosters provide the main thrust that lifts the Space Shuttle off the launch pad up to an altitude of about 150,000 feet. Each is composed of three major assemblies: a forward nose cone, a four-segment Reusable Solid Rocket Motor, and an aft nozzle. The Reusable Solid Rocket Boosters for the Space Shuttle are the largest ever flown, and are designed for reuse. Each is 149 feet long, 12 feet in diameter, and weighs approximately 1.3 million pounds when loaded with propellant. The sea-level thrust of each booster is approximately 3.3 million pounds. They are fired after the thrust level of the three main engines is verified during the first few seconds of the ignition sequence. Together, they provide about 71 percent of the total thrust at liftoff.

Transition and Retirement

NASA continues to ensure a smooth transition from the Space Shuttle to the next generation of exploration vehicles. Appropriate Space Shuttle flight and ground hardware, technology, people and practices are being identified for transfer, retirement, or reassignment. NASA's Human Space Flight Transition Plan is guided by three fundamental principles: (1) emphasize safety and mission success; (2) complete assembly of the International Space Station (ISS) by the end of 2010 using as few Space Shuttle flights as possible; and (3) support Constellation Systems development objectives without interfering with Space Shuttle safety and mission success. The goals of Human Space Flight Transition are to: (1) evolve from current operations to future operations; (2) evolve the workforce, ensuring that NASA has the right levels and mix of skills for Space Shuttle, International Space Station and Constellation; (3) achieve multi-program objectives at the best value to the Agency; and (4) conduct an efficient and safe closeout of the SSP through the transfer of assets needed for follow -on programs and decommissioning and disposing of the rest.

Program Commitments

Commitment/Output FY 2010	Program/Project	Changes from FY 2009 PB Request
Safely complete manifest and retire by Dec 2010.	The Space Shuttle Program	Added an additional flight for AMS Payload.

Implementation Schedule

Project	Schedule by Fiscal Year																Phase Dates		
	Prior	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22		Beg	End
Program Integration																	Tech Form Dev Ops Res	Dec-04	Dec-10
Flight and Ground Operations																	Tech Form Dev Ops Res	Dec-04	Dec-10
Flight Hardware																	Tech Form Dev Ops Res	Dec-04	Dec-10

Tech & Adv Concepts (Tech)
Formulation (Form)
Development (Dev)
Operations (Ops)
Research (Res)
Represents a period of no activity for the Project

Program Management

The Space Shuttle Program Manager reports to the Associate Administrator for Space Operations at NASA Headquarters.

Project	Management Responsibility	NASA Center Performers	Cost-Sharing Partners
Program Integration	Johnson Space Center	Johnson Space Center	n/a
Flight and Ground Operations	Kennedy Space Center	Kennedy Space Center and Johnson Space Center	n/a
Flight Hardware	Johnson Space Center	Johnson Space Center and Marshall Space Flight Center	n/a

Acquisition Strategy

The Space Program Operations Contract (SPOC) prime contractor is United Space Alliance. Other prime contractors providing flight hardware are ATK Thiokol (Reusable Solid Rocket Motor), Lockheed Martin (External Tank), and Pratt & Whitney Rocketdyne (Space Shuttle Main Engines).

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Theme Overview

The ISS orbits the Earth 16 times a day at an altitude that ranges from 230 to 286 miles and at a speed of 17,500 miles per hour. The ISS is a research and development (R&D) test bed. It is an experiment in the design, development and assembly of an orbital space facility. It serves as a habitat for its crew, a command post for orbital operations, and a port for the rendezvous and berthing of smaller orbiting vehicles. It functions as an orbital microgravity and life sciences laboratory, a test bed for new technologies in areas like life support and robotics, and a platform for astronomical and Earth observations. ISS has been continuously crewed since early-2001. Through 2008, there have been over 80 flights to the ISS, including flights for assembly, crew rotation, and logistical support. When assembly is complete in 2010, the ISS will be composed of approximately 1,000,000 pounds of hardware brought to orbit in approximately 40 separate launches over the course of more than a decade.

The ISS Program represents an unprecedented level of international cooperation. The ISS International Partnership is composed of NASA, the Russian Federal Space Agency (Roskosmos), the Canadian Space Agency (CSA), the European Space Agency (ESA), and the Japanese Aerospace Exploration Agency (JAXA). International participation in the program has significantly enhanced the capabilities of the ISS.

NASA has secured partnerships with other United States (US) government agencies and private firms to utilize a portion of the ISS as a National Lab, as designated by the NASA Authorization Act of 2005. NASA's plan for the ISS National Laboratory, the National Lab Report, was submitted to Congress in May 2007. Approximately 50 percent of planned US utilization resources on ISS could be available for non-NASA use. Firm interest in ISS use has been demonstrated in the areas of education, human, plant and animal biotechnologies, aerospace technologies, and defense sciences research. NASA has signed Memoranda of Understanding (MOUs) for use of the ISS with the National Institutes of Health and the US Department of Agriculture, and has pre-existing agreements with Department of Energy, Department of Defense and Veterans Affairs. In addition, NASA issued an announcement of "Opportunity for Use of the ISS by Non-Government Entities for R&D and Industrial Processing Purposes" on August 14, 2007, and entered into Space Act Agreements (SAA) with 3 private firms and a university in 2008.

FY 2010 Budget Request

Budget Authority ($ millions)	FY 2008 Actual	FY 2009 Enacted	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
FY 2010 President's Budget Request	**1,685.5**	**2,060.2**	**2,267.0**	**2,548.2**	**2,651.6**	**2,568.9**	**2,405.9**
International Space Station Program	1,685.5	2,060.2	2,267.0	2,548.2	2,651.6	2,568.9	2,405.9
FY 2009 President's Budget Request	**1,813.2**	**2,060.2**	**2,277.0**	**2,176.4**	**2,448.2**	**2,143.1**	**--**
International Space Station Program	1,813.2	2,060.2	2,277.0	2,176.4	2,448.2	2,143.1	--
Total Change from FY 2009 Request	**-127.6**	**0.0**	**-10.0**	**371.8**	**203.4**	**425.7**	**--**

Plans for FY 2010

International Space Station Program

In FY 2010, NASA will complete assembly of the ISS, having fulfilled its international partner agreements to launch and accommodate their modules. Logistics supply will continue with Utilization Logistics Flight (ULF) 3, which will deliver "Expedite the Processing of Experiments to Space Station" (ExPRESS) Logistics Carriers (ELC) 1 and 2. The Cupola and Node 3 will be launched on Flight 20 A. Logistics and resupply continues with Flight 19A which brings the Multi-Purpose Logistics Module (MPLM) and the Lightweight Multi-Purpose Experiment Support Structure (MPESS) Carrier (LMC) to ISS. The next flight, ULF4, will bring a Russian Mini Research Module -1 (MRM-1), another laboratory to perform research in space, and more logistics on the Integrated Cargo Carrier - Vertical Light Deployable (ICC-VLC). Flight ULF 5 brings additional utilization and logistics via an MPLM and an external carrier, ELC 3. The final Shuttle mission to the ISS, ULF 6, will deliver the Alpha Magnetic Spectrometer (AMS) and an external carrier, ELC 4, with spares.

By the end of FY 2010, ISS assembly and outfitting will be complete and resupply by the Space Shuttle will end. The ISS will be a fully functioning laboratory in space.

Relevance

Relevance to national priorities, relevant fields, and customer needs:

The ISS objective is to support scientific research for human space exploration and other activities requiring the unique attributes of humans in space. Consistent with the US Space Exploration Policy, ISS research is focused on science and technology development that will prepare human explorers and spacecraft to travel beyond low-Earth orbit (LEO). Research aboard the ISS is critical to understand the effects of space environments on the human body and develop mitigation techniques, minimize the logistical burden of supporting humans far from Earth, address remote medical emergencies, and demonstrate enabling technologies for human exploration.

NASA and the International Partners are applying the information learned to plan for future human and robotic missions. Techniques demonstrated in robotics, assembly, and maintainability on the ISS will guide development of next-generation space vehicles that will fly farther, faster, and for longer duration. Research conducted on ISS in its role as a national laboratory by other US government agencies, private firms and universities will yield important new data applicable to their respective missions. The ISS also promotes the commercial space transportation industry by providing a market to supply needed crew supplies and logistics. The ISS partnership also provides a successful example of peaceful and constructive international cooperation that provides tangible benefits here on earth.

Relevance to the NASA Mission and Strategic Goals:

This Theme supports Strategic Goal 2 of NASA's Strategic Plan which states: "Complete the International Space Station consistent with NASA's international commitments and use the Station as a National Laboratory for scientific research, engineering development and operational experience for exploration." The ISS Theme supports the US Space Exploration Policy "to advance U.S. scientific, security, and economic interest through a robust space exploration program," by completing assembly of the ISS by the end of the decade, focusing NASA research and use of the ISS on supporting space exploration goals, and conducting ISS activities in a manner consistent with international commitments.

Relevance to education and public benefits:

The benefits of ISS research cross all areas of American life, including public health, energy, environment, education, and promoting international cooperation. Specific examples include new uses of ultrasound technology, embedded Web technology to allow remote monitoring and control of devices through a computer and Web browser, and work to help researchers understand and mitigate muscle, balance, and bone problems.

Research performed on the ISS will contribute to a broader understanding of injury and disease in support of Earth-based medical applications. For example, a new vaccine for salmonella-induced infectious disease has been developed on the ISS and will be entering human trials under Food and Drug Administration (FDA) approval. The ISS, an exploration research and technology test bed, will be used to develop and demonstrate, among other things, closed loop life support systems and remote medical care capabilities. Both technologies can be used to benefit people here on Earth. For example, water recycling technology is being used to provide potable water to places devastated by natural disasters. NASA will also demonstrate technologies on the ISS necessary for future space systems such as thermal control, environmental control, and power generation. As an earth observing platform, the onboard crew utilizes the ISS as an excellent platform to monitor and record natural and human-driven changes and events on earth.

Performance Achievement Highlights:

In November 2008, ULF2 was launched with the equipment necessary to double the crew size of the ISS. A Galley, Crew Quarters, Waste and Hygiene Compartment, and a Water Recovery System were delivered. The Water Recovery System brings with it the capability to recycle urine and condensate into drinking and coolant water. This capability is critical to weaning the ISS from dependence on the Space Shuttle for water resupply. Once the equipment is operational the ISS will be able to support 6 crewmembers. Spring of 2009 is the target for beginning 6 crew operations on the ISS. In addition, the crew performed 4 space walks to restore functionality to the Starboard Solar Array and increase the available power on the ISS. To add to the significance of this mission, on November 20, 2009 the ISS celebrated its 10th anniversary of on-orbit operations.

In FY 2009, NASA continues ISS assembly. The truss and solar array assembly is complete with delivery of the S6 Solar Array on Flight 15A, bringing the ISS to its full power capability. The final JAXA segments, Exposed Facility (EF) and the Experiment Logistics Module-Exposed Section (ELM-ES) will be delivered on Flight 2J/A completing JAXA's laboratory complex on the ISS. Flight 17A will deliver pressurized cargo via a MPLM. JAXA will also launch the first H-II Transfer Vehicle (HTV), which will contribute to the effort of resupplying the ISS when the Space Shuttle retires. The ISS program will continue processing activities, ground testing, and integration of flight hardware for future missions, while operating and monitoring the health of the vehicle systems, and conducting operations on 30 to 40 research experiments. During this period ISS crews are supported by re-supply and crew rotation using the Space Shuttle, and Russian Progress and Soyuz vehicles. Ground training is ongoing for future flight crews, and ISS will continue to conduct ISS-based Extravehicular Activities (EVAs) for ISS maintenance, science, and assembly. More detailed information maybe found at http://www.nasa.gov/mission_pages/station/main/index.html.

Independent Reviews:

Review Type	Performer	Last Review	Purpose/Outcome	Next Review
Other	ISS Advisory Committee	10/2008	Assess ISS operational readiness to support new crew, assess Russian flight team preparedness to accommodate the Expedition 15 mission, and assess health and flight readiness of Expedition 15 crew.	Ongoing
Other	NASA Advisory Council (NAC)	04/2009	Provides independent guidance for the NASA Administrator. The NAC was briefed by the JSC Safety and Mission Assurance Office on NASA Lessons Learned program. The Space Operations committee made two recommendations on NASA utilization of known Lessons Learned, including expanding the teaching aspect.	07/2009
Other	ASAP	04/2009	Provides independent assessments of safety to the NASA Administrator. No recommendations nor inquiries issued relating to the ISS.	07/2009
Other	Program Implementatio n Review	08/2008	Provides an independent review of ongoing ISS and SSP operations.	2010

Mission Directorate:	Space Operations
Theme:	International Space Station
Program:	International Space Station Program

FY 2010 Budget Request

Budget Authority ($ millions)	FY 2008 Actual	FY 2009 Enacted	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
FY 2010 President's Budget Request	1,685.5	2,060.2	2,267.0	2,548.2	2,651.6	2,568.9	2,405.9
ISS Operations	1,603.2	1,755.4	1,639.0	1,717.3	1,513.9	1,437.8	1,449.0
ISS Cargo Crew Services	82.3	304.8	628.0	830.9	1,137.7	1,131.1	956.9
FY 2009 President's Budget Request	1,813.2	2,060.2	2,277.0	2,176.4	2,448.2	2,143.1	--
ISS Operations	1,713.1	1,755.4	1,750.2	1,754.2	1,697.2	1,528.5	--
ISS Cargo Crew Services	100.1	304.8	526.8	422.2	751.0	614.6	--
Changes from FY 2009 Request	-127.6	0.0	-10.0	371.8	203.4	425.7	--

Project Descriptions and Explanation of Changes

Operations

The ISS Program brings together international flight crews; globally distributed launch, operations, training, engineering, and development facilities; communications networks; and the international scientific research community. Operating ISS is even more complicated than many other space flight endeavors because it is an international program. Each ISS partner has the primary responsibility to manage and run the hardware it provides, but the various elements provided by the partners are not independent and they must be operated as an integrated system.

ISS Operations encompasses several key functions necessary to plan, control and execute the ISS. ISS Systems Engineering, Analysis and Integration function entails optimization of the system architecture, integrated system performance and verification analyses, assembly sequence, vehicle configuration, interface requirements, and mission design. The Spacecraft function is responsible for developing and sustaining the on-orbit ISS. The Safety & Mission Assurance function implements safety, reliability, maintainability, and quality assurance requirements to ensure that all significant risks are reviewed, tracked, and mitigated so that ISS is safe, reliable, and maintainable.

Multi-User Systems Support (MUSS) is responsible for management of the ISS integrated research plan and utilization resources. MUSS manages all payload operations activities. With the completed delivery of IP elements and the establishment of six-person crew capability, ISS research opportunities will be expanded to conduct research in life sciences, materials sciences, fluid physics, as well as its primary focus to serve as a test bed for future exploration missions in a weightless environment.

Space Flight Crew Operations provides trained crew members for all of NASA human space flight endeavors. In FY 2010, ISS related Flight Crew Operations were consolidated into the Human Space Flight Operations line item. Other key ISS operational activities include Mission Integration and Operations, Medical Support, and Launch Site Processing. Prior to launch, NASA and the IPs will complete building, conduct testing, and perform integration of each element into the Shuttle orbiters at the Kennedy Space Center for launch to orbit. For FY 2010, NASA will perform those activities for the ELCs, Cupola, Node 3, MPLM's, LMC, the IC-VLD, and MRM.

ISS Cargo Crew Services

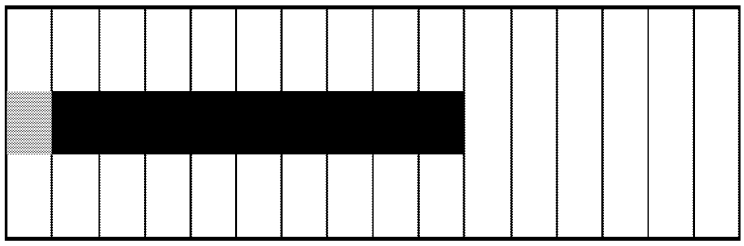
The ISS Cargo Crew Services budget consists of International Partners and commercial purchases. NASA has contracted with Roskosmos to purchase cargo transportation through 2011 and crew transportation through spring of 2012. The ISS Program plans to purchase crew transportation services from international partners as needed until a domestic capability is available. NASA has also contracted with domestic companies to provide cargo supply and return services beginning in 2011 via the Commercial Resupply Services (CRS) contract. NASA does not plan to purchase any cargo services from its International Partners after 2011.

Program Commitments

Commitment/Output FY 2010	Program/Project	Changes from FY 2009 PB Request
ISS Assembly complete by 2010	International Space Station (ISS)	None

Mission Directorate:	Space Operations
Theme:	International Space Station
Program:	International Space Station Program

Implementation Schedule

Project	Schedule by Fiscal Year																Phase Dates		
	Prior	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22		Beg	End
ISS* *Potential continuation of ISS operations after 2016 will be reviewed this summer as an element of the NASA human space flight review																	Tech Form Dev Ops Res	Oct-93 Oct-07	Sep-07 Sep-16

Tech & Adv Concepts (Tech)
Formulation (Form)
Development (Dev)
Operations (Ops)
Research (Res)
Represents a period of no activity for the Project

Program Management

The ISS Program Manager reports to the Associate Administrator for Space Operations at NASA Headquarters.

Project	Management Responsibility	NASA Center Performers	Cost-Sharing Partners
On-orbit assembly and operations	NASA Johnson Space Center	NASA Johnson Space Center	Russian Federal Space Agency, European Space Agency, Japan Aerospace Exploration Agency, Canadian Space Agency, and Italian Space Agency (ASI).

Acquisition Strategy

NASA extended the Boeing US On-Orbit Segment (US0S) contract until September 30, 2010. NASA also exercised the first option under the Cargo Mission Contract (CMC), the Program Integration Contract (PIC) and the Mission Integration Contract (MIC) until September 2009. The government has issued a competitive request for proposal for the PIC services beyond 2009. A contract strategy is in work for the extension of the other contracts and should be released in spring 2009.

NASA awarded commercial cargo transportation services to Space Exploration Technologies Corporation (Space X) and Orbital Sciences Corporation through the CRS contract on December 23, 2008. Cargo services are expected to begin in 2011 with initial start of activities in the 2nd or 3rd quarter of FY 2009. The service period is through 2016. NASA has also extended its contract with Roskosmos to purchase crew transportation through spring of 2012 and plans to continue to purchase Russian crew transportation services until commercial crew capability or Ares I/Orion is operational.

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Theme Overview

As explorers, pioneers and innovators, NASA boldly expands frontiers to inspire and serve America and to benefit the quality of life on Earth. Space and Flight Support enables exploration and science through multiple capabilities.

One such capability is the Space Communications and Navigation (SCaN) Program, a vital element of the underlying support structure needed to conduct exploration and science. Whether NASA missions are providing data about our home planet, focusing science instruments on cosmic phenomena or exploring far regions in space, reliable communication with Earth-based control centers is critical to mission success. As new spacecraft with different objectives and advanced technology are launched, the communication needs of flight missions change. In response, NASA modifies and evolves its space communications capabilities to ensure Agency mission needs are fulfilled.

In addition, NASA has assigned responsibility for understanding the full range of civil space launch needs to the Launch Services Program (LSP). LSP works closely with other government agencies and the launch industry, seeking to ensure that safe, reliable, on-time and cost-effective commercial launch opportunities are available on a wide range of launch systems.

The Rocket Propulsion Test (RPT) Program reviews, approves and provides direction on rocket propulsion test assignments, capital asset improvements, test facility modernization and refurbishments, integration for multi-site test activities, identification and protection of core capabilities and the advancement and development of test technologies.

Also, the care of the Astronaut Corps is the responsibility of space medical operations at the Johnson Space Center. A portion of the responsibilities for that care is managed within the Crew Health and Safety (CHS) Program. CHS enables healthy and productive crew during all phases of space flight missions; implementation of a comprehensive health care program for astronauts; and the prevention and mitigation of negative long-term health consequences of spaceflight.

Finally, Human Space Flight Operations currently has one project, the Space Flight Crew Operations (SFCO) that provides trained crew members for all NASA human space flight endeavors and brings expertise to help resolve issues within the programs. SFCO is responsible for all JSC aircraft operations including aircrew training.

FY 2010 Budget Request

Budget Authority ($ millions)	FY 2008 Actual	FY 2009 Enacted	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
FY 2010 President's Budget Request	**446.2**	**722.8**	**751.5**	**732.7**	**745.9**	**749.7**	**748.9**
Space Communications and Navigation	303.9	582.9	496.6	506.9	520.3	524.0	524.0
Human Space Flight Operations	0.0	0.0	114.7	88.5	88.6	88.7	89.0
Launch Services	91.8	89.6	85.9	84.1	83.9	83.9	82.8
Rocket Propulsion Test	41.9	41.8	45.8	44.6	44.5	44.5	44.5
Crew Health & Safety	8.7	8.6	8.6	8.5	8.5	8.5	8.5
FY 2009 President's Budget Request	**446.3**	**732.8**	**612.1**	**628.0**	**641.7**	**645.4**	**--**
Space Communications and Navigation	303.9	582.9	475.2	491.3	504.8	508.5	--
Launch Services	91.7	99.6	84.0	83.4	83.8	83.8	--
Rocket Propulsion Test	41.9	41.8	44.3	44.7	44.6	44.6	--
Crew Health & Safety	8.7	8.6	8.6	8.5	8.5	8.5	--
Total Change from FY 2009 Request	**0.0**	**-10.0**	**139.4**	**104.8**	**104.2**	**104.4**	**--**

Plans for FY 2010

Space Communications and Navigation

In FY 2010, the SCaN Program will continue to successfully provide space communications and navigation capabilities to all missions and continue to define Lunar communications requirements. SCaN will also continue to advance cross support opportunities with international space agencies through the definition and adoption of common standards and protocols, as well as, continue demonstration of new technologies, such as the Optical Communications Flight Demonstration Project.

Human Space Flight Operations

In FY 2010, NASA consolidated the Flight Crew Operations Directorate projects funding from Exploration Systems Mission Directorate and Space Operations Mission Directorate under the Human Space Flight Operations program. The consolidated Flight Crew Operations Directorate is now Space Flight Crew Operations, which is currently the only project funded under the Human Space Flight Operations program. The Space Flight Crew Operations provides trained crew members for all of NASA human space flight endeavors.

For FY 2010, the Space Flight Crew Operations will support up to six human space flights on the Space Shuttle to the International Space Station, as well as long-duration crew on ISS and crew expertise to Constellation development.

Launch Services

LSP has planned four NASA launches for FY 2010 including: 1) Glory, which will be launched on a Taurus XL; 2) Solar Dynamics Observatory (SDO) launched on an Atlas V; 3) Widefield Infrared Survey Explorer (WISE) launched on a Delta II, and 4) Aquarius mission also launched on a Delta II. LSP will also provide advisory expertise and services to SpaceX's second and third demo flights under the Commercial Orbital Transportation Services (COTS) Project and the Geostationary Operational Environmental Satellite (GOES-P) under the NOAA/GOES Program.

Rocket Propulsion Test

RPT will continue to provide test facility management, and provide maintenance, sustaining engineering, operations, and facility modernization projects necessary to keep the test-related facilities in the appropriate state of operational readiness. RPT has established testing requirements for the Exploration program which will be used to identify excess and "at-risk" test facilities and will support decisions relative to test asset consolidation initiatives.

Crew Health & Safety

CHS will continue to help develop and refine a standardized battery of clinical and physiological tests for all crew members. The Crew Health Surveillance special projects will focus on developing and refining medical standards that are critical to meet the needs of exploration timelines. Similarly, real-time mission evaluation will continue to help define and deliver medical operations hardware for current programs and meet the needs of known architectures.

Relevance

Relevance to national priorities, relevant fields, and customer needs:

SFS programs provide the enabling capabilities required to advance space exploration and expand scientific knowledge of Earth and the universe. Without these capabilities NASA could not perform any of its missions.

SCaN provides the ability to conduct space communications and navigation with both human and robotic spacecraft. Capable and dependable communications are vital for the success of human and robotic space missions.

The LSP project is responsible for enabling access to space for NASA and other select government missions. LSP is responsible for a wide range of activities critical to fulfilling the U.S. Space Exploration Policy and provides safe, reliable, cost-effective, and on-time commercial launch services for NASA and NASA-sponsored payloads using expendable launch vehicles (ELVs).

The RPT capabilities continue to support safe operation of the Space Shuttle, implement the U.S. Space Exploration Policy, and provide test facilities for use by other DOD and commercial programs. Capabilities include rocket propulsion test facilities, associated infrastructure and systems, and the core skilled workforce necessary to operate and maintain these assets for Ares and other future propulsion projects.

CHS provides enhancements to the health care provision environment both in space and on the ground for the Astronaut Corps. CHS contributes to the medical and health certification of astronauts before flight and the provision of care throughout their careers.

Relevance to the NASA Mission and Strategic Goals:

The Space and Flight Support (SFS) Theme supports the U.S. Space Exploration Policy by providing unique operational capabilities for space communications and navigation, launch services, and rocket propulsion tests, as well as managing the health care of the Astronaut Corps. The services provided are critical for enabling the conduct of space exploration, aeronautical research, and biological and physical research and are provided to a wide range of customers, including NASA scientists and engineers, other federal agencies, universities, foreign governments, and industry interests.

The SFS Theme supports the following Goals in the 2006 NASA Strategic Plan:

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.

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

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

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

Relevance to education and public benefits:

The benefits of SFS to education and the public includes the return of scientific and educational data from space to Earth; the safe launching of expendable launch vehicles necessary for research; the assurance that rocket systems have been adequately tested; and the testing and implementation of various human health and illness prevention measures. A space program properly supported by this Theme will produce research data that can be used to generate new scientific knowledge through the study of heliophysics, astrophysics, solar system exploration, Earth science, biological and physical research, and more.

Performance Achievement Highlights:

- Deep Space Network, Near Earth Network, and Space Network all exceeded proficiency and availability metrics as all Networks achieved 98% proficiency for delivery of Space Communications services.

- SCaN continued to work with the Space Operations, Exploration Systems, and Science Mission Directorates to ensure that NASA communication and navigation needs were met. As part of this effort, the program worked with the commercial sector to obtain and maintain reliable technologies at competitive prices for several projects: the Communication Navigation and Networking Reconfigurable Testbed (CoNNeCT), a joint government and commercial project investigating reprogrammable (software-defined) radio technology for use during space exploration missions; the Tracking and Data Relay Satellite System (TDRSS) Continuation project, which will sustain the TDRS system with two new satellites designed to serve Science and Exploration System goals; and the Near Earth Network, which provides services for orbiting satellites and the Shuttle.

- SCaN successfully completed demonstration of antenna arraying with two separate TDRS spacecraft. SCaN initiated the Lunar Atmosphere and Dust Environment Explorer (LADEE) optical communications demonstration program and successfully developed strategy with international space agencies for development of a future interoperable space internetworking environment.

-The Launch Services Program (LSP) continues to open the bidding process to a larger number of launch providers, in an effort to help the emerging commercial space sector gain experience to successfully compete for future missions. In March 2008, LSP established the NASA Launch Services (NLS) Contract Follow-on Procurement Development Team (PDT). In April 2008, the PDT released a Request for Information (RFI) to the launch service provider community with a Small and Medium Class mission model. Responses have been received and assessed. These responses, together with input from our current contracted launch service providers and our customers, have been evaluated, and a philosophy for the follow-on contract mechanism to the NLS contract has been proposed. Space Exploration Technologies (SpaceX) was placed onto the NLS contract in April 2008, to include Falcon 1 and Falcon 9 launch services. LSP has also entered into unfunded Space Act Agreements with companies that are actively funding new launch vehicles. The companies will share information with LSP that could aid in future certification efforts in return for LSP's advice and guidance on the development of the launch vehicle.

See Strategic Goals 3, 4, 5, and 6 in the FY 2008 Performance and Accountability Report at http://www.nasa.gov/news/budget/index.html.

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Mission Directorate:	Space Operations
Theme:	Space and Flight Support (SFS)
Program:	Space Communications and Navigation

FY 2010 Budget Request

Budget Authority ($ millions)	FY 2008 Actual	FY 2009 Enacted	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
FY 2010 President's Budget Request	303.9	582.9	496.6	506.9	520.3	524.0	524.0
Space Communications Networks	56.5	363.5	427.2	423.0	440.8	431.1	444.3
Space Communications Support	97.4	65.4	43.4	64.9	56.9	79.5	79.7
TDRS Replenishment	150.0	154.0	26.0	19.0	22.6	13.4	0.0
FY 2009 President's Budget Request	303.9	582.9	475.2	491.3	504.8	508.5	--
Space Communications Networks	90.7	363.5	385.5	409.8	420.2	423.7	--
Space Communications Support	63.9	65.4	63.7	62.5	62.0	71.4	--
TDRS Replenishment	149.3	154.0	26.0	19.0	22.6	13.4	--
Changes from FY 2009 Request	0.0	0.0	21.4	15.5	15.5	15.5	--

Mission Directorate:	Space Operations
Theme:	Space and Flight Support (SFS)
Program:	Space Communications and Navigation

Program Overview

Today's spacecraft are increasingly more powerful, complex, and capable of acquiring increasing amounts of mission data. They can also employ artificial intelligence enabling autonomous decisions. However complex and sophisticated these machines have become, two key functions have not changed: the need to communicate with Earth and to navigate in space. A failure of space communications and navigation on the spacecraft or on Earth could result in a complete loss of a mission. Hence, space communications and navigation is a fundamental capability of missions that depends on a high quality of hardware and software present on the spacecraft and the ground.

NASA's space communications and navigation capabilities rely on ground-based and space-based assets that enable near Earth and deep space missions, as well as those of the other U.S. agencies and of our international partners. These national assets are managed as dedicated projects within the Space Communications and Navigation (SCaN) program. The SCaN program manages these assets for the Agency and provides a cost efficient approach to effectively meeting all missions needs throughout all stages of their life.

SCaN is also responsible for all Spectrum Management and Data Standards policy, oversight and management for the Agency. It represents NASA before all domestic and international regulatory or technical bodies dealing with Spectrum and/or Data Standards, thus providing NASA with an integrated approach to promoting and safeguarding its SCaN equities and interests. Additionally, SCaN leads all NASA activities associated with present and future navigation technology and capabilities such as supporting spacecraft tracking and position determination.

These seemingly disparate functions: sustainment of existing assets, technology development, spectrum management, and international standards, are integrated through a robust System Engineering and Integration (SE&I) activity to assure uninterrupted SCaN capabilities and avoiding loss or any impact to science or exploration missions. In addition, SE&I also conducts long-range planning based on projected mission needs and identifies technical performance targets for new technologies such as Disruption Tolerant Networking (DTN), Optical Communications, and Communication Navigation and Networking Reconfigurable Testbed (CoNNeCT).

By planning, developing, operating, and maintaining space and ground networks of tracking and data systems, SCaN supports the Nation's space missions, both crewed and robotic, from low Earth orbit to the fringes of the solar system.

For more information, please see https://www.spacecomm.nasa.gov/spacecomm/.

Plans For FY 2010

The SCaN Program will release the Space Network Ground Segment Sustainment (SGSS) request for proposal (RFP) with a target contract award by early 2010. SCaN will also conduct the SGSS Mission Definition Review. SCaN will conduct the Tracking and Data Relay Satellite (TDRS-K/L) Critical Design Review, Mission Operations Review, Ground Test Readiness Review, and the Ground Terminal Pre-Ship Review. SCaN will also conduct the Communication Navigation and Networking Re-Configurable Testbed (CoNNeCT) Flight Readiness Review, as well as, conduct the Disruption Tolerant Networking (DTN) second ISS demonstration flight. Also, SCaN will continue development of an optical terminal and ground-based receiver that will demonstrate the utility of high rate Optical Communications on the LADEE spacecraft in the 2012 timeframe.

Project Descriptions and Explanation of Changes

Space Communications Networks

Deep Space Network (DSN): The DSN consists of three facilities spaced approximately 120 degrees apart on the globe to enable continuous communications to spacecraft as the Earth rotates. The facilities are located in Spain, Australia, and California. DSN stations are NASA-owned assets managed by the DSN Project Office at the Jet Propulsion Laboratory. In addition, SCaN utilizes Construction of Facilities (CoF) funding to provide minor revitalization of the three DSN facilities. In FY 2010, $4.3M is requested to provide essential modification and replacement of the power distribution systems in Australia. The minor revitalization provides continuing support to missions exploring regions beyond Earth orbit, including planetary exploration missions to Mars and beyond. Also, $6.8M of discrete funding is requested in FY 2010 for construction of a new 34-Meter Beam Waveguide Antenna, DSS-35, in Australia. For a list of the CoF projects, see the Cross-Agency Support Appropriation.

Near Earth Network (NEN): The NEN consists of globally distributed tracking stations that are strategically located to maximize the communications service coverage provided to flight missions. The stations are located in Norway and Alaska, with additional antennas located at Wallops Island, VA and Merritt Island, FL. The NEN Project Office at GSFC manages the network, which includes both commercially owned assets and NASA facilities. The NEN provides communications services to a variety of missions in certain orbital and suborbital locations, including Low Earth Orbit (LEO), Geosynchronous Earth Orbit (GEO), lunar, and highly elliptical orbits.

Space Network (SN): The SN consists of the Tracking and Data Relay Satellite System (TDRSS) and a set of supporting ground terminal systems located at White Sands, NM and Guam. The ground terminals transmit signals to and from the TDRSS, which in turn relays those signals to and from flight missions. The SN predominantly supports LEO missions with global coverage, but it can also support launch vehicles and provide communications services to researchers in remote locations on Earth, such as the South Pole.

SN Ground Segment Sustainment (SGSS): SGSS is responsible for replacing outdated equipment and standardizing systems at all SN ground locations, including White Sands and the Guam Remote Ground Terminal (GRGT). After replacement, ground system equipment at every SN ground station will be capable of supporting any spacecraft in the TDRSS fleet. A key objective of SGSS is to establish the capabilities required to support the Ares and Orion Constellation vehicles.

NASA Integrated Services Network (NISN): This network has commercial service backbones providing point-to-point terrestrial signal transport services and routing network services. Management responsibility for this project has moved to the Office of the Chief Information Officer.

Tracking and Data Relay Satellite (TDRS) Replenishment

The TDRS Replenishment Project is responsible for the acquisition of two new Tracking and Data Relay Satellites, TDRS-K and TDRS-L, to replenish the aging fleet of communications spacecraft in the SN. The TDRS K and L Project Office at GSFC is managing the procurement, which includes on-orbit delivery, acceptance of two spacecraft (TDRS-K to be launched in 2012, followed by launch of TDRS-L in 2013), and modification of ground system equipment at the White Sands Complex (WSC) in White Sands, New Mexico.

Space Communications Support

Space Communications Support manages cross-cutting communication functions, which are responsible for defining and protecting the integrity of the overall SCaN architecture, including identifying, assessing, and establishing policy or response to external policies. These functions include Spectrum Management, Systems Planning, and Optical Communications.

Spectrum Management ensures the availability and allocation of radio frequency spectrum for all Agency programs to support the operation of navigation systems, space and ground based radio transmission, and mission sensor operations.

Systems Planning develops a communications and navigation architecture to support Exploration and Science Programs through 2030. This includes Space Data Standards, which pursues the implementation of national and international space data standards with the aim of improved interoperability; Technology, which aims to predict the needs of future communications missions in a manner that will yield initiatives with performance enhancements with reduced costs; and Systems Engineering, which coordinates all SCaN systems engineering activities and manages the requirements that enable NASA to fulfill its space communications and navigation needs for future missions. In addition, SCaN provides subject matter expertise to the NASA Deputy Administrator for the Deputy Secretary-level Positioning, Navigation, and Timing (PNT) Executive Committee that manages the U.S. Global Positioning System (GPS). GPS is a critical infrastructure component for NASA human spaceflight and science, and enables greater autonomous navigation of spacecraft while reducing the operational and cost burdens of traditional two-way ranging and tracking.

Optical Communications will continue the demonstration of the new optical technology that will provide NASA with a high rate communication technique for deep space mission data with an objective of at least a 10-fold increase in the available radio frequency (RF) data rate. This revolutionary technology will provide higher data rates for less spacecraft space, weight, and power burden compared to RF technology. Higher data rates will allow more science spacecraft to share the same Earth-based optical receivers, and enable greater science return over spacecraft life, thus gaining higher mission utilization. The implementation approach will begin with three Near Earth flight demonstrations of optical terminals as co-payloads with Lunar science mission instruments.

Program Commitments

Commitment/Output FY 2010	Program/Project	Changes from FY 2009 PB Request
Achieve less than 3% of lost operating time on NISN available services.	NASA Integrated Services Network, NISN	None
Achieve at least 98% Network proficiency for delivery of Space Communications services.	Space Network, Deep Space Network, and Near Earth Network	None

Mission Directorate:	Space Operations
Theme:	Space and Flight Support (SFS)
Program:	Space Communications and Navigation

Implementation Schedule

Project	Schedule by Fiscal Year																Phase Dates		
	Prior	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22		Beg	End
Space Communications and Navigation Operations																	Tech Form Dev Ops Res	Oct-05	Oct-20
Space Communications and Navigation Non Operations, TDRS Replenishment																	Tech Form Dev Ops Res	Oct-06 Oct-09	Sep-09 Sep-12

Tech & Adv Concepts (Tech)
Formulation (Form)
Development (Dev)
Operations (Ops)
Research (Res)
Represents a period of no activity for the Project

Program Management

The Deputy Associate Administrator for Space Communications and Navigation (SCaN) reports to the Associate Administrator for Space Operations at NASA Headquarters. SCaN projects are managed from NASA Headquarters.

Project	Management Responsibility	NASA Center Performers	Cost-Sharing Partners
SN Ground Segment Sustainment	Space Communications and Navigation Program Office - NASA Headquarters	Goddard Space Flight Center	Other Government Agencies
Space Communications Support	Space Communications Program Office - NASA Headquarters	Glenn Research Center, Goddard Space Flight Center, Jet Propulsion Laboratory, Johnson Space Center	N/A
Deep Space Network	Space Communications and Navigation Program Office - NASA Headquarters	Jet Propulsion Laboratory	N/A
TDRS Replenishment	Space Communications and Navigation Program Office - NASA Headquarters	Goddard Space Flight Center, Kennedy Space Center	Non-NASA Partner Agency
Optical Communications	Space Communications and Navigation Program Office - NASA Headquarters	Goddard Space Flight Center, Jet Propulsion Laboratory	N/A
NASA Integrated Services Network	Space Communications and Navigation Program Office - NASA Headquarters	Goddard Space Flight Center, Marshall Space Flight Center	N/A
Near Earth Network	Space Communications and Navigation Program Office - NASA Headquarters	Goddard Space Flight Center	N/A
Network Integration and Engineering	Space Communications and Navigation Program Office - NASA Headquarters	Goddard Space Flight Center, Glenn Research Center, Jet Propulsion Laboratory	N/A
Space Network	Space Communications and Navigation Program Office - NASA Headquarters	Goddard Space Flight Center	Other Government Agencies

Acquisition Strategy

NASA owns a large, established base of space communications assets located nationally, internationally, and in orbit near Earth and Mars. The SCaN Program conducts acquisition planning with the objective of preserving the governments past investments, and altering capability or capacity in response to mission needs and NASA SCaN architecture goals.

NASA conducts major SCaN acquisitions on a competitive basis. To meet mission support objectives and achieve best value for NASA, mission suitability and cost criteria are appropriately weighted and evaluated for competitively awarded acquisitions. When feasible, NASA pursues commercially available space communications services and products in preference to developing NASA-owned systems. NASA may also consider unique technical capabilities and maintenance of core competency in the NASA work force during the "make versus buy" decision process. To further achieve best value for NASA and the U.S. Government, the Agency may place task orders on Government Wide Acquisition Contracts (GWAC).

NASA will require several major procurements to support future Agency SCaN requirements. Flight systems and associated ground terminals will be required at several locations in the Solar System. The type of contract depends upon the maturity of the technology and the associated mission risk. In general, lower risk radio frequency relay spacecraft near the Earth are acquired under "fixed price" terms with delivery on-orbit. Relay satellites at distant locations or acquisitions involving new technology, such as optical space communications, may be acquired under "cost plus award fee" terms.

Independent Reviews

Review Type	Performer	Last Review	Purpose/Outcome	Next Review
Performance	National Research Council	01/2006	SOMD Space Communications Independent Evaluation by National Research Council (NRC) was completed in September 2006 with the final report delivered the first quarter of CY 2007. This report validated the need to centralize management of all NASA space communications, formalized in a detailed program plan.	N/A

Mission Directorate:	Space Operations
Theme:	Space and Flight Support (SFS)
Program:	Space Communications and Navigation
Project In Formulation:	TDRS Replenishment

FY 2010 Budget Request

Budget Authority ($ millions)	FY 2008 Actual	FY 2009 Enacted	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
FY 2010 President's Budget Request	150.0	154.0	26.0	19.0	22.6	13.4	0.0
FY 2009 President's Budget Request	149.3	154.0	26.0	19.0	22.6	13.4	--
Total Change from 2009 President's Budget Request	0.7	0.0	0.0	0.0	0.0	0.0	--

Project Purpose

The existing fleet of the Tracking and Data Relay Satellite System (TDRSS) supports tracking, data, voice, and video services to the International Space Station (ISS), Space and Earth science missions, as well as other government agency users. The total mission load is predicted to increase, which will require additional satellites to be added to the fleet.

The existing fleet is aging and reliability analysis predicts a shortage of flight assets to support NASA missions and the user community by 2011. As a result, NASA began in FY 2007 the acquisition of two additional spacecraft, TDRS-K and TDRS-L, to be launched in 2012 and 2013 respectively. By adding these two spacecraft to the TDRSS fleet, continuity of service will be insured for NASA and other government agency user missions through approximately 2016.

The TDRS Replenishment Project supports the Agency's goal to establish a lunar return program having the maximum possible utility for later missions to Mars and other destinations. It accomplishes this by implementing the space communications and navigation architecture responsive to Science and Exploration mission requirements and implementing technology initiatives consistent with approved baseline space communications and navigation architecture.

Project Preliminary Parameters

The TDRS system consists of in-orbit telecommunications satellites stationed at geosynchronous altitude and associated ground stations located at White Sands, New Mexico and Guam. This system of satellites and ground stations comprises the Space Network that provides mission services for near -Earth user satellites and orbiting resources, with many near-Earth spacecraft being totally dependent upon it for performance. The TDRSS constellation includes the first-generation satellites (TDRS 1-6), the replacement satellite (TDRS 7), and the second-generation satellites (TDRS 8, 9, and 10).

Mission Directorate:	Space Operations
Theme:	Space and Flight Support (SFS)
Program:	Space Communications and Navigation
Project In Formulation:	TDRS Replenishment

Estimated Project Deliverables

The TDRS-K and TDRS-L spacecraft will be fully compatible with and capable of functioning as part of the TDRS System as implemented and operated by the White Sands Complex (WSC) and Guam ground terminals. Requirements will include: design, development, fabrication, integration, test, on-orbit delivery, and launch services. Launch dates for TDRS-K and TDRS-L will be in 2012 and 2013 respectively. The spacecraft are required to have an operational life of 11 years. The basic requirement will also include modification of the WSC Space-to-Ground Link Terminals to provide compatibility with the new spacecraft, while preserving compatibility with the existing TDRS fleet.

Project Element	Provider	Description	FY 2009 PB Request	FY 2010 PB Request
TDRS Replenishment	NASA	Aging hardware replacement	NASA committed $450M through FY 2013	No Change

Estimated Project Schedule

Milestone Name	Formulation Agreement Estimate	FY 2009 PB Request	FY 2010 PB Request
Formulation			
Mission Operations Review	Quarter 2, FY 2010	N/A	N/A
Ground Test Readiness Review	Quarter 3, FY 2010	N/A	N/A
Ground Terminal Pre-Ship Review	Quarter 3, FY 2010	N/A	N/A

Project Management

The Deputy Associate Administrator for Space Communications and Navigation reports to the Associate Administrator for Space Operations at NASA Headquarters.

Project Element	Project Management Responsibility	NASA Center Performers	Cost-Sharing Partners
TDRS Replenishment	Space Communications and Navigation (SCAN) Office	Headquarters SCaN Program Office	GSFC, KSC, and Non-NASA Agencies

Acquisition Strategy

The Acquisition Strategy for this procurement uses a Firm Fixed Price with Incentive Fee contract.

Mission Directorate:	Space Operations
Theme:	Space and Flight Support (SFS)
Program:	Space Communications and Navigation
Project In Formulation:	TDRS Replenishment

Project Risk Management

Title	Risk Statement	Risk Management Approach and Plan
TDRS-K and TDRS-L Obsolescence Risk Management	Aging spacecraft requires replacement hardware by 2013. The mission load is predicted to exceed current capacity and will need additional spacecraft to provide enough capacity.	The project has awarded a Firm Fixed Price with Incentive Fee contract as of December 2007. Spacecraft will launch in 2012 and 2013.

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Mission Directorate:	Space Operations
Theme:	Space and Flight Support (SFS)
Program:	Human Space Flight Operations

FY 2010 Budget Request

Budget Authority ($ millions)	FY 2008 Actual	FY 2009 Enacted	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
FY 2010 President's Budget Request	**0.0**	**0.0**	**114.7**	**88.5**	**88.6**	**88.7**	**89.0**
Space Flight Crew Operations	**0.0**	**0.0**	**114.7**	**88.5**	**88.6**	**88.7**	**89.0**
Changes from FY 2009 Request	**0.0**	**0.0**	**114.7**	**88.5**	**88.6**	**88.7**	**--**

Program Overview

As the Space Shuttle program (SSP) comes to closure in FY 2010 with the accompanying completion of the International Space Station (ISS), there are a number of unique human spaceflight capabilities and facilities that have primarily supported the Space Shuttle and ISS assembly which NASA will continue to need in order to support human space flight operations into the future. These capabilities are required for continued support of the International Space Station and future support of the Constellation program.

NASA established the Human Space Flight Operations (HSFO) line item beginning in FY 2010 as a single integrated program that will consolidate these capabilities to support multiple agency programs. As a first step, NASA consolidated the funding for Flight Crew Operations Directorate (FCOD) from Exploration Systems Mission Directorate (ESMD) and Space Operations Mission Directorate (SOMD) under this line item. The consolidated project is now known as Space Flight Crew Operations (SFCO) and is currently the only project funded under the HSFO program. NASA will continue to assess and define projects that support human space flight for inclusion in this program in future budget submissions as these capabilities are identified. The projects that will be included will be those deemed to be discrete multi-program functions that support the Agency's HSFO requirements regardless of the vehicle being supported. This proposed approach will allow these capabilities to be reshaped for the future as the agency's needs change. In all cases, the projects would provide program support, including technical input, via boards and panels; requirements, concept and design support; hardware development and testing support; mission support; and essential training.

Plans For FY 2010

For FY 2010, the SFCO will support up to six human space flights on the Space Shuttle to the ISS and provide support and training for crew members preparing for future flights to the ISS. In addition, SFCO provides technical and safety panel support to the Constellation program, participates on the CEV cockpit design review team, and provides early template astronaut flight readiness training requirements.

Project Descriptions and Explanation of Changes

Human Space Flight Operations

In FY 2010, the SFCO project is the only funded project under this program. The SFCO project provides trained crew members for all of NASA human space flight endeavors and to bring experienced crew member expertise to help resolve operations or development issues within the human space flight programs. SFCO is responsible for all JSC aircraft operations including aircrew training.

Program Management

HSFO's program manager reports to the Associate Administrator for the Space Operations Mission Directorate at NASA Headquarters.

Acquisition Strategy

The contracts supporting the Space Flight Crew Operations project are the Aircraft Maintenance and Modification Program (AMMP) provided by the Computer Services Corp. and the Aircraft Simulation Program (ASP) contract with Lockheed Martin.

Mission Directorate:	Space Operations
Theme:	Space and Flight Support (SFS)
Program:	Launch Services

FY 2010 Budget Request

Budget Authority ($ millions)	FY 2008 Actual	FY 2009 Enacted	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
FY 2010 President's Budget Request	91.8	89.6	85.9	84.1	83.9	83.9	82.8
Launch Services	91.8	89.6	85.9	84.1	83.9	83.9	82.8
FY 2009 President's Budget Request	91.7	99.6	84.0	83.4	83.8	83.8	--
Launch Services	91.7	99.6	84.0	83.4	83.8	83.8	--
Changes from FY 2009 Request	0.0	-10.0	1.8	0.7	0.1	0.2	--

Program Overview

Assuring reliable and cost-effective access to space for missions is critical to achieving the U.S. Space Exploration Policy. NASA has assigned responsibility for understanding the full range of civil space launch needs to the Space Operations Mission Directorate Launch Services Program. The Launch Services Program, which works closely with other government agencies and the launch industry, seeks to ensure that the most safe, reliable, on-time, cost-effective commercial launch opportunities are available on a wide range of launch systems. A key challenge for the program is matching the launch capabilities to the needs of the different civil government customers. These customers seek to: understand Earth processes, including the use of weather satellites; explore the solar system with planetary probes, Mars rovers, and orbiters; understand the universe primarily through the use of space-based telescopes; and enhance life on Earth by understanding the Earth-Sun system using various scientific missions. The program purchases fixed-price launch services from domestic suppliers and provides oversight to ensure that these valuable, one-of-a-kind missions safely leave Earth to explore this planet and the universe beyond. The program works with customers from universities, industry, government agencies, and international partners from the earliest phase of a mission. The funding provides the capability for NASA to maintain critical skills that provide technical management of launch services on the full fleet of existing and new launch systems. For more information, please see http://www.nasa.gov/centers/kennedy/launchingrockets/index.html.

The Launch Services Program budget also supports integration activities for the Alpha Magnetic Spectrometer scientific instrument comprised of a 16-nation international particle physics and astrophysics experiment planned for the ISS that will look for dark matter, anti-matter, and strange matter. This experiment is sponsored by the Department of Energy and funded largely by International Partners.

Plans For FY 2010

There are four planned NASA launches for FY 2010 including Glory which will be launched on a Taurus XL; Solar Dynamics Observatory (SDO) on an Atlas V; and Widefield Infrared Survery Explorer (WISE) and Aquarius missions on a Delta II. The LSP will also provide advisory expertise and services to SpaceX's second and third demonstration flights under the COTS Project and the Geostationary Operational Environmental Satellite (GOES-P) under the NOAA/GOES Program. In addition to the processing, mission analysis, spacecraft integration and launch services of the above missions, LSP will continue the advanced planning and trade studies for launching future missions that will extend scientific knowledge and exploration capabilities, such as a mission to Jupiter, the next-generation Mars rover, and a mission to monitor climate trends and global biological productivity. LSP will also conduct advanced planning to support the evolving launch requirements for Moon and Mars exploration. Although NASA will begin to face challenges with all classes of launch services in 2010, LSP will continue to provide support for the development and certification of emerging Alternative Launch Providers.

Project Descriptions and Explanation of Changes

Launch Services Program

The primary elements of the Launch Services Program (LSP) are described below. LSP provides the acquisition of commercial services using primarily domestic launch vehicles and associated standard services and mission unique options. These services are contracted through LSP at the Kennedy Space Center. LSP provides acquisition and management of all program-related services; program-level financial management including the integration and insight of the launch services tasks across multiple Centers; and management of all program resource requirements. LSP provides the Contracting Officer Technical Representative function for launch service contracts, and support services contracts, ensuring consistency and best practices are followed. LSP assures NASA retains the technical, management, and acquisition skills necessary to meet customer demand by providing the necessary resources required to meet the Agency's various needs.

LSP provides mission integration, technical, and launch management functions. Manifesting and scheduling of payload launches are accomplished through the auspices of the Flight Planning Board. Through this process all space access requirements and priorities are assessed to develop flight planning manifests that best meet the requirements and capabilities of the Agency. LSP acquires launch services to meet the full range of customer requirements, ranging from finding space for small payloads to the launch of dedicated payloads on a range of launch vehicles. LSP also provides technical management of the launch service, including planning, execution, and support for flight project customer requirements. This element of the program provides for planning and implementation of mission-specific integration activities, coordination and approval of mission-unique launch vehicle hardware/software development, and provision of payload-processing accommodations. Additionally, LSP offers management of the launch campaign/countdown including coordination with other government agencies and the commercial sector.

LSP provides engineering services and analysis for launch vehicle certification at levels of detail commensurate with the mission risk tolerance. The program maximizes the mission success of commercially developed expendable launch services by employing a technical oversight approach that includes a combination of specified approvals and targeted insight. This element also provides for the coordination of mission-specific and fleet-wide launch vehicle analyses, hardware changes, and production oversight, assessments, and out-of-family anomaly resolution.

LSP Construction of Facility (COF) projects support repairs and modifications to existing buildings and launch pads on the Eastern and Western Coasts which sustain the processing, operations, and launch of NASA spacecrafts. A list of the total COF projects are included in the Cross Agency Support (CAS) section of this document.

Program Commitments

Commitment/Output FY 2010	Program/Project	Changes from FY 2009 PB Request
The Launch Services Program is planning for 18 Missions by 2014 and is providing an advisory role for 5 additional missions.	SMD - 16 Missions, and SOMD - 2 Missions	None

Program Management

The Launch Services Program Manager reports to the Assistant Associate Administrator for Launch Services, Space Operations Mission Directorate at NASA Headquarters.

Project	Management Responsibility	NASA Center Performers	Cost-Sharing Partners
Launch Services Acquisition and Management	Launch Services Program, Kennedy Space Center	Kennedy Space Center	Air Force, National Reconnaissance Office
Engine Assembly and Test	Launch Services Program, Kennedy Space Center	Stennis Space Center	Air Force, National Reconnaissance Office
Mission Planning and Integration	Launch Services Program, Kennedy Space Center	Kennedy Space Center	Science Mission Directorate, Exploration Systems Mission Directorate, Space Operations Mission Directorate, Missile Defense Agency, NOAA
Vehicle Production Insight	Launch Services Program, Kennedy Space Center	Marshall Space Flight Center	Air Force, National Reconnaissance Office

Acquisition Strategy

Under the NASA Launch Services (NLS) contracts with United Launch Alliance, Orbital Sciences Corporation (OSC), and Space Exploration Technologies, Inc. (SpaceX), the program acquires services associated with launches of Delta, Atlas, Pegasus, Taurus, and Falcon launch vehicles. Services are provided on a Firm-Fixed-Price / Indefinite-Delivery-Indefinite-Quantity (IDIQ) basis, and missions can be ordered under these contracts through June 2010. Missions not presently under contract are competed among existing NLS contractors through use of a Launch Service Task Order mechanism. In addition to the NLS contracts, the Glory mission is the only active one remaining under the Small Expendable Launch Vehicle Services contract with OSC.

The NLS solicitation contains a provision that permits technology infusion or improvements. New offerors may seek an NLS contract during open seasons that occur each year in February and August. The NLS contracts enable ordering of standard and non-standard services, as well as special studies and mission-unique modifications.

Integrated launch services are provided by the Analex Corporation through a hybrid fixed-price/cost contract which contains options to continue performance through September 2011. Payload processing for East Coast missions is provided by Astrotech Space Operations. West Coast payload processing is provided after a competitive selection by either Astrotech or Spaceport Systems International.

Independent Reviews

Review Type	Performer	Last Review	Purpose/Outcome	Next Review
Performance	IPAO Assessment	10/2006	This was a Non-Advocate Review (NAR) of LSP to present information to Agency decision-making councils. The IPAO Review Team found that LSP is a highly successful program compliant with Agency direction, policy and directives. The review further illustrated that LSP's 100 percent launch success record, together with sound cost management, and demonstrates exceptional performance.	2009

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Mission Directorate:	Space Operations
Theme:	Space and Flight Support (SFS)
Program:	Rocket Propulsion Test

FY 2010 Budget Request

Budget Authority ($ millions)	FY 2008 Actual	FY 2009 Enacted	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
FY 2010 President's Budget Request	41.9	41.8	45.8	44.6	44.5	44.5	44.5
Rocket Propulsion Testing	41.9	41.8	45.8	44.6	44.5	44.5	44.5
FY 2009 President's Budget Request	41.9	41.8	44.3	44.7	44.6	44.6	--
Rocket Propulsion Testing	41.9	41.8	44.3	44.7	44.6	44.6	--
Changes from FY 2009 Request	0.0	0.0	1.5	0.0	0.0	0.0	--

Program Overview

As the principal implementing authority for NASA's rocket propulsion testing, the Rocket Propulsion Test (RPT) Program reviews, approves, and provides direction on rocket propulsion test assignments, capital asset improvements, test facility modernizations and refurbishments, integration for multi-site test activities, identification and protection of core capabilities, and the advancement and development of test technologies.

RPT employs a collaborative approach to ensure rocket propulsion test activities are conducted in a manner that reduces cost, enhances safety, provides credible schedules, achieves technical objectives, and leverages the lessons learned. RPT reduces propulsion test costs through the safe and efficient utilization of rocket propulsion test facilities in support of NASA programs, commercial partners, and the Department of Defense, while eliminating unwarranted duplication. RPT sustains and improves Agency-wide rocket propulsion test core capabilities (both infrastructure and critical skills) and ensures appropriate levels of capability and competency are maintained.

The program strategy is to fund and maintain a core competency of skilled test and engineering crews and test stand facilities; consolidate and streamline NASA's rocket test infrastructure; establish and maintain world-class test facilities; modernize test facility equipment; provide non-project specific equipment and supplies; and develop effective facility/infrastructure maintenance strategies and performance. RPT provides critical institutional and program capabilities to support NASA's missions.

Further information on the RPT Program can be found at: https://rockettest.ssc.nasa.gov/.

Plans For FY 2010

Test facility management, maintenance, sustaining engineering, operations, and facility modernization projects required to keep the test-related facilities in the appropriate state of operational readiness will continue to be funded. Established testing requirements for the exploration program will be used to identify excess and "at-risk" test facilities and will support decisions relative to test asset consolidation initiatives. RPT's inventory of 32 test locations, ranging from active to mothballed facilities, will continue to be maintained at various states of operational readiness as required. Propulsion test technology development will also be continued.

The RPT Program will also continue to assist in the rocket propulsion testing requirements definition for low Earth orbit and in-space propulsion systems and related technologies.

Project Descriptions and Explanation of Changes

RPT

RPT represents the single point interface for NASA's rocket propulsion test facilities located at: Stennis Space Center (SSC), Marshall Space Flight Center (MSFC), Johnson Space Center-White Sands Test Facility (JSC-WSTF), and Glenn Research Center-Plum Brook Station (GRC-PBS). These facilities have a replacement value of greater than $2 billion. The RPT sustains and improves Agency-wide rocket propulsion test core competencies (both infrastructure and critical skills), ensures appropriate levels of capability and competency are maintained, and eliminates unwarranted duplication. The program strategy is to fund and maintain core competencies of skilled test and engineering crews and test stand facilities; consolidate and streamline NASA's rocket test infrastructure; establish and maintain world-class test facilities; modernize test facility equipment; provide non-project specific equipment and supplies; and develop effective facility/infrastructure maintenance strategies and performance. The RPT budget does not include resources to support the marginal costs of testing (e.g., direct labor, propellants, materials, program-unique facility modifications, etc.) since these activities are funded by programs as a direct cost when they utilize the RPT test stands. When NASA, DoD, and commercial partners use the RPT-supported test stands, they are responsible for program-specific facility modifications in addition to the active testing of the program-specific test article.

RPT Construction of Facility (CoF) supports a project to modify the fluid processing facility at Stennis Space Center. A list of the total CoF projects are identified in the CAS section of this document.

Program Commitments

Commitment/Output FY 2010	Program/Project	Changes from FY 2009 PB Request
Support continued commercial testing of RS-68 engine.	Pratt Whitney Rocketdyne/Air Force	None
Support continued testing of SSME, Shuttle Reaction Control System, and SRB Technology testing.	Space Shuttle Program	None
Support J-2X, Orion System, and ESMD Propulsion System technology development.	Constellation Program	None

Program Management

The Rocket Propulsion Testing Program Manager reports to the Assistant Associate Administrator for Launch Services, Space Operations Mission Directorate at NASA Headquarters.

Project	Management Responsibility	NASA Center Performers	Cost-Sharing Partners
Technical Services and Support	Stennis Space Center	Jacobs-Sverdrup, Mississippi Space Services, Plum Brook Operations Support Group	Rocket Propulsion Test Management Board Members: Stennis Space Center, Marshall Space Flight Center, Johnson Space Center, White Sands Test Facility, Glenn Research Center's Plum Brook Station, Kennedy Space Center (associate member), and Glenn Research Center (associate member). National Rocket Propulsion Test Management Board Department of Defense Members: Air Force Research Lab, Arnold Engineering Development Center, Redstone Technical Test Center, and Naval Air Warfare Center.

Acquisition Strategy

The Test Operations Contract (TOC) will be completing its final option contract period in September 2010. A new contract will be openly competed at that time.

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Mission Directorate:	Space Operations
Theme:	Space and Flight Support (SFS)
Program:	Crew Health & Safety

FY 2010 Budget Request

Budget Authority ($ millions)	FY 2008 Actual	FY 2009 Enacted	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014
FY 2010 President's Budget Request	8.7	8.6	8.6	8.5	8.5	8.5	8.5
Crew Health and Safety	8.7	8.6	8.6	8.5	8.5	8.5	8.5
FY 2009 President's Budget Request	8.7	8.6	8.6	8.5	8.5	8.5	--
Crew Health and Safety	8.7	8.6	8.6	8.5	8.5	8.5	--
Changes from FY 2009 Request	0.0	0.0	0.0	0.0	0.0	0.0	--

Program Overview

The health care of the NASA Astronaut Corps is the responsibility of Space Medical Operations at the Johnson Space Center. A portion of the responsibilities is managed within the Crew Health and Safety (CHS) Program. CHS enables healthy and productive crew during all phases of spaceflight missions and on the ground; implementation of a comprehensive health care program for astronauts; and the prevention and mitigation of negative long-term health consequences of space flight. The program works towards these goals by providing the means to capture and analyze the evidence base essential to identify health risks and apply this information to operational medicine. CHS also develops, assesses, and refines standards for clinical and physiological testing, in-flight health and performance, and environmental monitoring. Requirements for the medical care system are continually assessed and refined, modifications and enhancements identified, and development of capabilities undertaken when needed.

Plans For FY 2010

CHS will continue to help develop and refine a standardized battery of clinical and physiological tests for all crewmembers. Refinement of evidence-based information with the intent of applying this information to operational medicine continues. Crew Health Surveillance special projects will focus on developing and refining medical standards. This is critical to meet the needs of exploration timelines. Similarly, real-time mission evaluation will continue to help define and deliver medical operations hardware for current programs and meet the needs of known architectures. The Longitudinal Study of Astronaut Health will be enhanced with respect to data archiving and mining. This is crucial to being able to provide health information for current and future operational medical response, as well as for countermeasures development. Remote Medical Diagnostic and Informatics will design, implement, and maintain a comprehensive data management infrastructure. Modules for real-time collection of medically relevant mission data will continue to be added to the Mission Medical Information System this year. Additional tools will be implemented as operational needs and priorities are identified. NASA will continue adding all forms of clinical data to the Computerized Medical Information System, which is an electronic medical record used for real-time documentation of clinical care at the point of care. Finally, CHS will continue to develop and maintain environmental standards for all space exploration platforms.

Project Descriptions and Explanation of Changes

Crew Health and Safety

The Crew Health and Safety Program (CHS) medically prepares our astronauts for space flight, protects them from the hazards of space travel, and identifies methods that allow astronauts to improve their performance. CHS systematically identifies and assesses critical health and safety risks through projects such as Clinical Status Evaulation, Crew Health Surveillance, Real-Time Mission Evaluation, Longitudinal Study of Astronaut Health, Remote Medical Diagnostic and Informatics, Computerized Medical Information System, Clinical Care Capability Development Project, and Environmental Monitoring.

There were no changes in scope, schedule, or direct costs for FY 2008 and beyond.

Program Commitments

Commitment/Output FY 2010	Program/Project	Changes from FY 2009 PB Request
Analysis of Fitness-for-Duty Standards	Clinical Status Evaluation	None
Data Reports	LSAH	None
Database for Medical Requirements Data	Remote Medical Diagnostic & Informatics	None
Medical Hardware Certification Process Revision	Clinical Care Capability Development	None
Electronic Medical Record System	Computerized Medical Information System	None
Environmental Standards	Environmental Monitoring	None

Mission Directorate:	Space Operations
Theme:	Space and Flight Support (SFS)
Program:	Crew Health & Safety

Program Management

The Crew Health and Safety Program Manager reports to the Deputy Associate Administrator for Program Integration within Space Operations at NASA Headquarters.

Project	Management Responsibility	NASA Center Performers	Cost-Sharing Partners
Clinical Status Evaluation	JSC	JSC/Wyle	N/A
Crew Health Surveillance	JSC	JSC/Wyle	JSC/Wyle
Real-Time Mission Evaluation	JSC	JSC/Wyle	N/A
Longitudinal Study of Astronaut Health	JSC	JSC/Wyle	N/A
Remote Medical Diagnostic & Informatics	JSC	JSC/Wyle	N/A
Computerized Medical Information System	JSC	JSC/Wyle	N/A
Clinical Care Capability Development Project	JSC	JSC/Wyle	N/A
Environmental Monitoring	JSC	JSC/Wyle	N/A

Acquisition Strategy

No major acquisitions planned.

Independent Reviews

Review Type	Performer	Last Review	Purpose/Outcome	Next Review
Other	Institute of Medicine	03/2007	At the request of NASA, the Institute of Medicine established a committee and issued this report. The committee was charged with examining the process by which NASA establishes space flight health standards for human performance. It assured the transparency of the current process, as well as considering its validity and integrity, particularly related to ensuring worker safety and integrating stakeholder input.	TBD
Other	Institute of Medicine	07/2008	This report examines NASA's plans to assemble the available evidence on human health risks of spaceflight and to move forward in identifying and addressing gaps in research. The committee provided recommendations to strengthen the content, composition, and dissemination of the evidence books.	04/2009