Inspector General

Overview

The NASA Office of Inspector General (OIG) budget request for Fiscal Year 2006 is $32.4 million. The request supports our mission to prevent and detect crime, fraud, waste, abuse, and mismanagement while promoting economy, effectiveness, and efficiency within the Agency. This request represents the OIG resources needed at NASA Headquarters and field offices to fulfill the OIG mission. Recognizing that the number of identified audits, investigations, inspections, assessments, and other activities significantly exceed the available resources; continuous adjustments of priorities will be necessary to ensure that a balanced coverage of NASA's programs and operations is maintained, critical and sensitive matters are promptly evaluated and investigated, and that all OIG customers receive timely, accurate, and complete responses.

The OIG, Office of Audits (OA) conducts independent, objective audits and reviews of NASA and NASA contractor programs and projects to improve NASA operations as well as a broad range of professional audit and advisory services. It also comments on NASA policies and is responsible for the oversight of audits performed under contract or by other Federal agencies. The OA helps NASA accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the economy, efficiency and effectiveness of NASA operations.

The OIG Office of Investigations (OI) identifies, investigates, and refers for prosecution cases of crime, waste, fraud, and abuse in NASA programs and operations. The OIG's Federal law enforcement officers investigate false claims, false statements, conspiracy, theft, mail fraud, and violations of Federal laws, such as the *Procurement Integrity Act* and the *Anti-Kickback Act*. Through its investigations, the OI also seeks to prevent and deter crime at NASA. The OI Computer Crimes unit has solved cases involving extortion of NASA and contractor personnel, loss of communications services, and the use of NASA-funded networks to further criminal enterprises including the compromise of advanced technologies and industrial espionage.

NASA's OIG FY 2006 request is broken out as follows:

- 82.7 percent of the proposed budget is dedicated to personnel and related costs, including salaries, benefits, monetary awards, worker's compensation, transportation subsidies and training, as well as the government's contributions for Social Security, Medicare, health and life insurance, retirement accounts, matching contributions to Thrift Savings Plan accounts, the required 25 percent law enforcement availability pay for criminal investigators, and permanent change of station costs.
- 4.0 percent of the proposed budget is dedicated to travel, including the cost of transportation, per diem at current rates, and related expenses. The OIG staff is located at 14 offices in or near NASA installations and contactor facilities.
- 13.3 percent of the proposed budget is dedicated to operations and equipment, including government vehicles, special equipment for criminal investigators, and information technology equipment unique to the OIG. The Agency's annual financial audit is included in this funding.

Budget Authority ($ in millions)	FY 2004	FY 2005	FY 2006
Personnel and Related Costs	23.0	25.5	26.8
Travel	1.2	1.2	1.3
Operations and Equipment	2.9	4.6	4.3
Total	**27.1**	**31.3**	**32.4**

National Aeronautics and Space Administration Proposed Appropriation Language

SCIENCE, AERONAUTICS AND EXPLORATION

(INCLUDING TRANSFER OF FUNDS)

For necessary expenses, not otherwise provided for, in the conduct and support of science, aeronautics and exploration research and development activities, including research, development, operations, support and services; maintenance; construction of facilities including repair, rehabilitation, revitalization, and modification of facilities, construction of new facilities and additions to existing facilities, facility planning and design, and restoration, and acquisition or condemnation of real property, as authorized by law; environmental compliance and restoration; space flight, spacecraft control and communications activities including operations, production, and services; program management; personnel and related costs, including uniforms or allowances therefore, as authorized by 5 U.S.C. 5901-5902; travel expenses; purchase and hire of passenger motor vehicles; not to exceed $35,000 for official reception and representation expenses; and purchase, lease, charter, maintenance and operation of mission and administrative aircraft, $**[**7,742,550,000**]** *9,661,000,000*, to remain available until September 30, **[**2006**]** *2007*, of which amounts as determined by the Administrator for salaries and benefits; training, travel and awards; facility and related costs; information technology services; science, engineering, fabricating and testing services; and other administrative services may be transferred to ``Exploration Capabilities'' in accordance with section 312(b) of the National Aeronautics and Space Act of 1958, as amended by Public Law 106-377. *(Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2005.)*

EXPLORATION CAPABILITIES

(INCLUDING TRANSFER OF FUNDS)

For necessary expenses, not otherwise provided for, in the conduct and support of exploration capabilities research and development activities, including research, development, operations, support and services; maintenance; construction of facilities including repair, rehabilitation, revitalization and modification of facilities, construction of new facilities and additions to existing facilities, facility planning and design, and acquisition or condemnation of real property, as authorized by law; environmental compliance and restoration; space flight, spacecraft control and communications activities including operations, production, and services; program management; personnel and related costs, including uniforms or allowances therefore, as authorized by 5 U.S.C. 5901-5902; travel expenses; purchase and hire of passenger motor vehicles; not to exceed $35,000 for official reception and representation expenses; and purchase, lease, charter, maintenance and operation of mission and administrative aircraft, $**[**8,425,850,000**]***6,763,000,000*, to remain available until September 30, **[**2006**]** *2007*, of which amounts as determined by the Administrator for salaries and benefits; training, travel and awards; facility and related costs; information technology services; science, engineering, fabricating and testing services; and other administrative services may be transferred to ``Science, aeronautics and exploration'' in accordance with section 312(b) of the National Aeronautics and Space Act of 1958, as amended by Public Law 106-377. *(Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 2005.)*

Proposed Appropriation Language

OFFICE OF INSPECTOR GENERAL

For necessary expenses of the Office of Inspector General in carrying out the Inspector General Act of 1978, as amended, $**[**31,600,000**]** *32,400,000*.

ADMINISTRATIVE PROVISIONS

Notwithstanding the limitation on the availability of funds appropriated for ``Science, aeronautics and exploration'', or ``Exploration capabilities'' by this appropriations Act, when any activity has been initiated by the incurrence of obligations for construction of facilities or environmental compliance and restoration activities as authorized by law, such amount available for such activity shall remain available until expended. This provision does not apply to the amounts appropriated for institutional minor revitalization and construction of facilities, and institutional facility planning and design.

Notwithstanding the limitation on the availability of funds appropriated for ``Science, aeronautics and exploration'', or ``Exploration capabilities'' by this appropriations Act, the amounts appropriated for construction of facilities shall remain available until September 30, **[**2007**]** *2008*.

The unexpired balances of prior appropriations to National Aeronautics and Space Administration for activities for which funds are provided under this Act may be transferred to the new account established for the appropriation that provides such activity under this Act. Balances so transferred may be merged with funds in the newly established account and thereafter may be accounted for as one fund under the same terms and conditions but shall remain available for the same period of time as originally appropriated.

From amounts made available in this Act for these activities, subject to **[**the**]** operating plan **[**procedures of**]** *notification to* the House and Senate Committees on Appropriations, the Administrator may transfer amounts between the ``Science, aeronautics, and exploration'' account and the ``Exploration capabilities'' account.

Funds for announced prizes otherwise authorized shall remain available, without fiscal year limitation, until the prize is claimed or the offer is withdrawn. **[**Funding shall not be made available for Centennial Challenges unless authorized.**]**

GENERAL PROVISIONS

Sec. 414 "Notwithstanding 40 U.S.C. Sections 524, 571, and 572, the Administrator of National Aeronautics and Space Administration may sell the National Aeronautics and Space Administration-owned Property on the Camp Parks Military Reservation, Alameda County, California and credit the net proceeds of such sales as offsetting collections to its Science, Aeronautics, and Exploration account. Such funds shall be available until expended to be used to replace the facilities at Camp Parks that are still required and/or to improve other National Aeronautics and Space Administration-owned facilities."

Supporting Data: Reconciliation of Appropriations to Budget Requests

(In Millions of Real Year Dollars)	TOTAL	Science, Aeronautics and Exploration	Space Flight Capabilities	Inspector General
FISCAL YEAR 2004 REQUEST	**15,469.3**	**7,660.9**	**7,782.1**	**26.3**
Total FY 2004 Omnibus Appropriations Act, P.L. 108-199 (including application of a 0.59% rescission)	-91.3	169.3	-261.4	0.8
Transfers by NASA	0.0	42.4	-42.4	—
TOTAL FY 2004 BUDGET PLAN	**15,378.0**	**7,872.6**	**7,478.3**	**27.1**

(In Millions of Real Year Dollars)	TOTAL	Science, Aeronautics and Exploration	Exploration Capabilities	Inspector General
FISCAL YEAR 2005 REQUEST	**16,244.0**	**7,760.0**	**8,456.4**	**27.6**
Emergency Supplemental Appropriations for Hurricane Disasters Assistance Act, 2005, included as part of the FY 2005 Military Construction Appropriations Act (P.L. 108-132)	126.0	—	126.0	—
FY 2005 Consolidated Appropriations Act, P.L. 108-447 (including application of a 0.80% rescission)	-173.6	-81.9	-95.4	3.7
Transfers by NASA (as of January 2005)	0.0	2.7	-2.7	—
TOTAL FY 2005 BUDGET PLAN	**16,196.4**	**7,680.9**	**8,484.2**	**31.3**

Supporting Data: FY 2004 Appropriation by Budget Line Item

FY 2004 APPROPRIATION STRUCTURE	Request	9/28/2004 Operating Plan
SCIENCE, AERONAUTICS and EXPLORATION	**7,660.9**	**7,872.6**
Space Science	4,007.1	3,992.0
Earth Science	1,552.2	1,607.8
Biological and Physical Research	972.7	985.6
Aeronautics	959.1	1,056.8
Education Programs	169.8	230.4
SPACE FLIGHT CAPABILITIES	**7,782.1**	**7,478.3**
Space Station	1,707.1	1,363.7
Space Shuttle	3,968.4	4,060.9
Space and Flight Support	434.3	465.5
Crosscutting Technology	1,672.3	1,588.2
INSPECTOR GENERAL	**26.3**	**27.1**
TOTAL AGENCY	**15,469.3**	**15,378.0**

Note: May not add due to rounding

Reimbursable Estimate by Appropriation

Budget Authority ($ in millions)	FY 2004	FY 2005	FY 2006
Human Space Flight	43.0	—	—
Science, Aeronautics and Technology	152.0	—	—
Science, Aeronautics and Exploration	550.0	664.0	485.0
Exploration Capabilities	138.0	617.0	398.0
Total	**8830**	**12810**	**8830**

Distribution of Funds by Installation

(In millions of dollars)		FY 2005	FY 2006
Ames Research Center	Direct Personnel	107	111
	Direct Travel	5	5
	Center G& A	120	191
	Service Pools	51	37
	Program CoF	0	0
	Total	**283**	**344**
	FTEs	1,375	1,297
Glenn Research Center	Direct Personnel	144	147
	Direct Travel	5	5
	Center G& A	106	161
	Service Pools	77	64
	Program CoF	0	0
	Total	**332**	**377**
	FTEs	1,875	1,775
Langley Research Center	Direct Personnel	131	135
	Direct Travel	7	7
	Center G& A	120	195
	Service Pools	111	86
	Program CoF	0	0
	Total	**368**	**423**
	FTEs	2,109	2,046
Dryden Flight Research Center	Direct Personnel	38	36
	Direct Travel	2	2
	Center G& A	37	40
	Service Pools	31	29
	Program CoF	0	0
	Total	**108**	**107**
	FTEs	568	527

Supporting Data: Distribution of Funds by Installation

Goddard Space Flight Center	Direct Personnel	232	243
	Direct Travel	9	9
	Center G& A	195	214
	Service Pools	76	76
	Program CoF	0	15
	Total	**511**	**557**
	FTEs	3,416	3,379
Marshall Flight Center	Direct Personnel	162	155
	Direct Travel	5	5
	Center G& A	181	226
	Service Pools	95	83
	Program CoF	18	52
	Total	**461**	**521**
	FTEs	2,657	2,509
Stennis Space Center	Direct Personnel	17	13
	Direct Travel	1	1
	Center G& A	47	40
	Service Pools	23	22
	Program CoF	3	7
	Total	**90**	**83**
	FTE’s	311	280
Johnson Space Center	Direct Personnel	284	311
	Direct Travel	14	15
	Center G& A	192	207
	Service Pools	186	198
	Program CoF	1	4
	Total	**678**	**735**
	FTEs	3,234	3,270

Supporting Data: Distribution of Funds by Installation

Kennedy Space Center	Direct Personnel	113	122
	Direct Travel	6	6
	Center G&A	242	232
	Service Pools	105	111
	Program CoF	33	39
	Total	**498**	**510**
	FTEs	2,125	2,144
Jet Propulsion Laboratory	N/A since FFRDC		

Supporting Data: Civil Service Distribution

Civil Service Distribution of Full Time Equivalents

The civil service workforce is the underpinning for the successful accomplishment of the Nation's civil aeronautics and space programs. These are the people who plan the programs; conduct and oversee the research; select and monitor the contractors; manage the various research, development, and test activities; and oversee all of NASA's operations. A key dimension of the reinvention of NASA has been the restructuring of the civil service workforce to deliver a space and aeronautics program that is balanced, relevant, and at the forefront of technology development.

NASA's primary goals for its civil service workforce are to:

- Acquire and maintain a civil service workforce reflecting the cultural diversity of the Nation; and
- Provide a workforce, sized and skilled as needed, to accomplish NASA's research, development, and operational missions with innovation, excellence, and efficiency.

Civil Service Distribution Detail

Full Time Equivalents (FTEs)	FY 2004	FY 2005	FY 2006
Ames Research Center	1,444	1,375	1,297
Dryden Flight Research Center	567	568	527
Glenn Research Center	1,905	1,875	1,775
Goddard Space Flight Center	3,260	3,416	3,379
Headquarters	1,317	1,557	1,571
Johnson Space Center	2,994	3,234	3,270
Kennedy Space Center	1,867	2,125	2,144
Langley Research Center	2,286	2,109	2,046
Marshall Space Flight Center	2,699	2,657	2,509
Stennis Space Center	294	311	280
Total	**18,633**	**19,227**	**18,798**

Supporting Data: Consulting Services

Summary of Consulting Services

NASA uses paid experts and consultants to provide NASA with advice and expert input in addition to or beyond that available from its in-house civil service workforce. NASA also uses experts and consultants to provide expert advice and input on the selection of experiments for future space missions. The use of these experts and consultants, in addition to NASA civil service personnel, provides the Agency with an independent view that assures the selection of experiments likely to have the greatest scientific merit. Other individuals are used to provide independent analysis of technical and functional problems in order to give top management the widest possible range of views before making major decisions.

NASA-established management controls assure that consulting services arrangements are both justified and approved at top management levels before any action is taken.

Expert/Consultants (Total NASA)	FY 2004	FY 2005	FY 2006
Number of Paid Experts and Consultants	39	50	50
Annual FTE Usage	4	4	4
Salaries	$449,800	$458,796	$467,972
Total Salary and Benefits Costs	$484,210	$493,894	$503,772
Travel Costs	$463,509	$477,414	$491,737
Total Costs	**$947,719**	**$971,308**	**$995,509**

Supporting Data: Construction of Facilities

Summary of Resources Included in Budget Request

In Millions of Dollars	FY 2004	FY 2005	FY 2006
Total Construction of Facilities	**240.4**	**202.5**	**292.7**
Science, Aeronautics and Exploration Programs*	—	—	35.0
Exploration Capabilities Programs*	55.0	54.8	75.8
Non-Programmatic Programs (included within G&A)	185.4	147.7	181.9

* FY 2004 data shown mapped to the new FY 2005/2006 appropriation accounts.

The Construction of Facilities (CoF) program ensures that the facilities critical to achieving NASA's space and aeronautics programs are the right size and type, and that they are safe, secure, environmentally sound, and operated efficiently and effectively. It also ensures that NASA installations conform to requirements and initiatives for the protection of the environment and human health. NASA facilities are essential to the Agency and facility revitalization is needed to maintain infrastructure that is safe and capable of supporting NASA's missions. The facilities being revitalized or constructed in this program are expected to remain active in the long term and are consistent with current and anticipated Agency roles and missions, although some adjustments may be required to reflect recommendations of the Real Property Mission Analysis (RPMA), which should be complete in 2005. The RPMA is an independent, top-down, Mission-driven process to: identify the physical plants needed to support NASA's Mission and programs, identify shortages and excesses, and make recommendations regarding the disposition of excesses to ensure that NASA owns and maintains only essential real property.

Funding for construction projects required for specific programs is included in the appropriate budget line item within each Mission Directorate. Non-Programmatic CoF projects are required for components of NASA's basic infrastructure and institutional facilities. Funding for Non-Programmatic CoF projects identified to specific Centers has been included in that Center's General and Administrative (G&A) rate, and agency-wide initiatives are included as part of Corporate G&A. Descriptions and cost estimates of both non-programmatic and programmatic (or "program direct") projects are provided to show a complete picture of NASA's budget requirement for facilities revitalization and construction.

The institutional facility projects requested for FY 2006 continue the vital rehabilitation, modification, and repair of facilities to renew and help preserve and enhance the capabilities and usefulness of existing facilities and ensure the safe, economical, and efficient use of NASA's physical plants. The projects repair and modernize deteriorating and obsolete building and utility systems that have reached or exceeded their normal design life, are no longer operating effectively or efficiently, and cannot be economically maintained. These projects include mechanical, structural, cooling, steam, electrical distribution, sewer, and storm drainage systems. Some projects replace substandard facilities in cases where it is more economical to demolish and rebuild than it is to restore. Projects between $0.5 million and $5.0 million are included as Minor Revitalization and Construction projects, and projects with an estimated cost of at least $5.0 million are budgeted as Discrete projects. (Projects less than $0.5 million are accomplished by routine day-to-day facility maintenance and repair activities provided for in direct program and Center operating budgets.) Should residual resources become available from any Minor Revitalization or Discrete project, they will be used for urgently needed facility revitalization requirements and Congress will be notified before work is initiated for any such Discrete projects. Funds requested for Facility Planning and Design (FP&D) cover: advance planning and design requirements for future projects; preparation of facility project design drawings and bid specifications; master planning; facilities studies; engineering reports and studies; and critical functional leadership activities directed at increasing the rate of return of constrained Agency resources while keeping the facility infrastructure safe, reliable, and available.

Summary of FY 2006 "Program-Direct" CoF Projects

In Millions of Dollars	FY 2004	FY 2005	FY 2006
SCIENCE, AERONAUTICS & EXPLORATION COF PROJECTS	**0.0**	**0.0**	**35.0**
SCIENCE	0.0	0.0	35.0
Construct Space Science Building, Phase 1 (GSFC)	—	—	15.0
Construct Flight Project Center, Phase 1 (JPL)	—	—	20.0
EXPLORATION CAPABILITIES COF PROJECTS	**55.0**	**54.8**	**75.8**
SPACE OPERATIONS (SPACE SHUTTLE)	53.9	53.6	74
Repairs to Launch Complex LC-39B (KSC)	—	—	22.8
Repairs to Vehicle Assembly Building (KSC)	—	23.5	9.4
Repairs to Launch Complex LC-39A (KSC)	19.8	—	—
Replace Roof, Vehicle Assembly Building (KSC)	17.0	—	—
Minor Revitalization of Facilities at Various Locations (less than $5M per project)	14.6	25.8	40.5
Facility Planning and Design	2.5	4.3	1.3
SPACE OPERATIONS (SPACE & FLIGHT SUPPORT)	1.1	1.2	1.8
Minor Revitalization of Facilities at Various Locations (less than $5M per project)	.9	.9	1.5
Facility Planning and Design	0.2	0.3	0.3

Summary of FY 2006 Non-Programmatic CoF Projects

In Millions of Dollars	FY 2004	FY 2005	FY 2006
NON-PROGRAMMATIC PROJECTS*	**185.4**	**147.7**	**181.9**
Rehabilitate Electrical Distribution System (ARC)	—	—	5.0
Repair Emergency Chiller System, Building 24 (GSFC)	—	—	5.7
Construct Administrative and Education Complex, Phase 1 (JPL)	—	—	22.5
Seismic Upgrade of Telecommunications Building, B238 (JPL)	—	—	6.0
Renovation of Operations and Checkout Building (KSC)	—	—	5.4
Upgrade Electrical Power Distribution (LaRC)	—	—	6.7
Seismic Upgrade of Building B180 (JPL)	—	5.0	—
Construct Replacement for Fire Station No. 2 at Shuttle Landing Facility (KSC)	—	6.4	—
Consolidate Business Functions into Building 1194 (LaRC)	—	9.5	—
Construct First Response Facility (SSC)	—	6.0	—
Construct Astronaut Quarantine Facility (JSC)	1.2	—	—
Rehabilitate and Upgrade Electrical and Mechanical Systems (24) (JSC)	5.5	—	—
Repair/Replace 350psig Steam Distribution System, Utility Tunnel No. 4 (LaRC)	9.2	—	—
Construct Replacement Office Building, 4600 Area (MSFC)	15.7	—	—

Supporting Data: Construction of Facilities

In Millions of Dollars	FY 2004	FY 2005	FY 2006
NON-PROGRAMMATIC PROJECTS* continued			
Development of Stennis Visitor Center (SSC)	0.9	—	—
Construct Consolidated Engineering Building (WFF)	9.0	—	—
Minor Revitalization and Construction at Various Locations (less than $5M per project)	117.0	94.2	105.1
Facility Planning and Design	17.0	16.6	16.5
Demolition of Facilities	9.9	10.0	9.0

Note: Funding for Non-Programmatic CoF identified to specific Centers has been included in that Center's G&A rate and Agency-wide initiatives are included within Corporate G&A.

Discrete Projects within the Science, Aeronautics and Exploration Account

Space Science Program

Project Title: Construct Space Science Building

Location: Goddard Space Flight Center (GSFC), Greenbelt, MD

Mission Directorate: Science

FY 2006 Estimate: $15.0M

This project will construct a new 235,000 square-foot laboratory and office building at the Greenbelt site. The facility will provide a state-of-the-art laboratory, support, and office space for 750 scientists. The new facility will consolidate science work groups and is expected to increase work efficiency and scientific collaboration. The new facility will replace the 44-year-old Research Projects Laboratory building and the 37-year-old Space Science Data Center building. These facilities must be replaced because the electrical and mechanical systems have become unreliable; impacting science functions. The buildings require extensive repairs, and have high energy and operating costs. The new Space Science Building will incorporate energy-reducing and environmentally-friendly features that will reduce overall operating costs and generate a cost savings over the life of the facility. This is the first of three phases with a total estimated cost of $65 million for the project with completion planned in FY 2008.

Project Title: Construct Flight Project Center

Location: Jet Propulsion Laboratory (JPL), Pasadena CA

Mission Directorate: Science

FY 2006 Estimate: $20.0M

This project will construct a new 17,000 square-meter six-story building to provide office space plus conference and support facilities for approximately 625 people. The new facility will co-locate the program and project staffs for flight projects into a single building. The building will contain a separate 400 fixed-seat sloped-floor Project Review Center to host large project reviews and JPL institutional meetings, as well as a 200 moveable-seat flat-floor conference room that will be divisible into four 50 seat conference rooms. Expensive off-site leased space will be vacated and the need for additional off-site leases will be avoided. Six 1940's vintage buildings and 44 wooden trailers will be demolished. The Center will provide the means to collocate essential flight project personnel into a single location for a true teaming environment. This will: increase project development efficiency; enhance communications; allow sharing of common resources; enable more efficient dissemination

of lessons learned among projects; and enhance the ability of experts to support multiple program/project functions. This is the first of two phases with a total estimated cost of $41 million with completion planned in FY 2007.

Discrete Projects within the Exploration Capabilities Account

Space Shuttle Program

Project Title: Repairs to Launch Complex LC-39B

Location: Kennedy Space Center (KSC), Merritt Island, FL

Mission Directorate: Space Operations

FY 2006 Estimate: $22.8M

This project provides for the complete repair and refurbishment of Launch Complex 39B (LC-39B). LC-39B consists of the Fixed Service Structure (FSS) tower, which is approximately 300 feet tall and 40 feet square with a central core containing two elevators, and the Rotating Service Structure (RSS) tower, which is approximately 130 feet tall and 52 feet square. The Orbiter Weather Protection (OWP) system, and Payload Change-out Room (PCR) are integral parts of these tower structures. This project removes and replaces corrosion damaged structural members and connections on the FSS and on the RSS at LC-39B. RSS drive truck assemblies and rail systems will be repaired. Existing deteriorated panels on the PCR will be replaced with corrugated stainless steel sandwich insulated panels. Mechanical and electrical wall penetrations will be removed and rerouted through new centralized bulkhead plates. Orbiter Weather Protection will be upgraded to harden enclosures against weather and launch environments. New controls will be installed to operate weather curtains and struts. The project will perform corrosion control and seal the LC-39B structure with inorganic zinc coating. The project also includes modifications to improve safe access for operations, maintenance, future inspections and corrosion protection where practical. All abandoned equipment, structural elements, supports, lines, and associated hardware shall be removed. Mechanical, electrical and control systems will be upgraded. An enhanced wash-down system will be installed to protect the Orbiter from environmental contaminants while on the launch pad. The flame deflector and flame trench will be refurbished. Concrete surfaces, slopes and concrete structural beams on LC-39B will be repaired, reinforced and sealed. Other associated minor repairs, modification and upgrades will be accomplished as required.

Project Title: Repairs to Vehicle Assembly Building

Location: Kennedy Space Center (KSC), Merritt Island, FL

Mission Directorate: Space Operations

FY 2006 Estimate: $9.4M

This project will repair and refurbish several of the Vehicle Assembly Building (VAB) systems and mechanisms. Secondary power systems and switch-gear will be revitalized. Fire extinguishing systems for the extensible platform in high-bay 3 will be upgraded. VAB systems are significantly deteriorated as a result of 40 years of operational use and the corrosive environment at the Kennedy Space Center. VAB mechanical and electrical systems have become unreliable. In some cases, system components are obsolete and replacement parts are no longer available. Failure to complete VAB repairs could lead to loss of flight hardware in VAB, and increased risk of injury to personnel. This is the third phase of a five-phase program of VAB system revitalization, and is estimated to cost a total of $73 million and be completed in 2008.

FY 2006 Non-Programmatic Construction of Facilities

In Millions of Dollars	FY 2004	FY 2005	FY 2006
Total Non-Programmatic Construction of Facilities	**185.4**	**147.7**	**181.9**
Discrete Projects	41.5	26.9	51.3
Minor Revitalization and Construction	117.0	94.2	105.1
Facility Planning and Design	17.0	16.6	16.5
Demolition	9.9	10.0	9.0

Non-Programmatic Discrete Projects

Project Title: Rehabilitate Electrical Distribution System

Location: Ames Research Center (ARC), Moffett Field, CA

FY 2006 Estimate: $5.0M

This project will modernize and repair the Center's primary electrical distribution system as part of a phased program to improve reliability. Medium voltage switchgear and transformers will be replaced with new medium voltage switchgear, circuit breakers, and transformers. New microprocessor-based protective relays, and current and potential transformers will be used to allow connection to the new Ames Power Monitoring System. The existing 1945 vintage, Center-wide electrical system is worn out and unreliable. As a result, Ames has experienced increasing instances of power interruptions that have adversely impacted critical research. The old switchgear is unsafe to operate, and it is difficult to maintain because replacement parts are no longer available. This is the fifth of approximately twelve phases estimated to cost a total of $63 million with completion planned in FY 2014.

Project Title: Repair Emergency Chiller System, Building 24

Location: Goddard Space Flight Center (GSFC), Greenbelt, MD

FY 2006 Estimate: $5.7M

This project replaces chillers, cooling towers, heat exchangers and associated mechanical and electrical equipment of the emergency chilled water system, located in Building 24. Replacing the equipment while maintaining emergency chiller service will require installation of new equipment in a 2,000 square foot building extension. The Emergency Chilled Water System comprises part of the Goddard critical infrastructure. The system provides emergency chilled water to critical facilities at the Greenbelt site in the event of a power failure. The chillers provide cooling for computers supporting Hubble Space Telescope service, testing and emergency control as well as operations and data acquisition for: Solar and Heliospheric Observatory (SOHO), High Energy X-Ray Timing Experiment (XTE), Microwave Anisotropy Probe (MAP), and other missions. The emergency chilled water system also provides cooling to computers supporting NASA-wide voice distribution for manned space missions. Failure of the emergency chilled water system would put these programs at risk during a power failure. The current chillers and equipment are 21 years old and have experienced multiple failures in the past two years. Replacement is necessary to provide reliable emergency chilled water to critical systems in the case of a power failure. This is the first of two phases to complete the project in FY 2007. The total estimated cost for both phases is $9 million.

Project Title: Construct Administrative and Education Center Complex

Location: Jet Propulsion Laboratory (JPL), Pasadena, CA

FY 2006 Estimate: $22.5M

This project replaces the current Administration Building (Building 180) and visitor control and education facilities with a new Administrative and Education Center Complex. This project will provide office, conference, and support facilities for approximately 220 people currently housed in Building 180. A new 4,200 square-meter (45,000 square feet) Education Center will be constructed to include a sloped-floor theater/auditorium, three conference rooms, a two-story exhibit hall, a visitor badging lobby, a video/teleconference room, a conference/demonstration room, a teaching resource classroom, and a one-story exhibit space. Parking spaces to support the new complex are included. Building 180 is deficient in its ability to resist a major seismic event. It is more economical to replace than to upgrade the building for seismic safety due to the inherent design of the structure, inefficiency in space utilization, extent of asbestos fireproofing, age of the building and its support systems, and non-conformance with contemporary life-safety and accessibility codes and regulations. The Education Center will support JPL's role in carrying out the initiatives of NASA's Office of Education by providing space and facilities for conferences, data and images distribution, exhibits and displays, public outreach events, and other meetings that bring members of the educational community, the media, and the general public to JPL. This is consistent with part of NASA's Mission to educate the public. This is the first of two phases with an estimated total construction cost of $49 million. Completion is planned for FY 2007

Project Title: Seismic Upgrade of Telecommunications Building, B238

Location: Jet Propulsion Laboratory (JPL), Pasadena, CA

FY 2006 Estimate: $6.0M

This project upgrades the Telecommunications Building to increase its ability to withstand a major seismic event. The building's structural framing will be strengthened to meet current life-safety standards for structures in this high seismic zone. The strengthening will consist of new perimeter steel braced frames to be attached to the existing exterior floor beams and its footings will be tied into the existing building foundations. Asbestos abatement will be done in areas affected by this repair work. A detailed structural analysis revealed that the building does not satisfy current life-safety provisions for this type of structure in a high seismic zone.

Project Title: Renovation of Operations and Checkout Building

Location: Kennedy Space Center (KSC), Merritt Island, FL

FY 2006 Estimate: $5.4M

This project revitalizes the Operations and Checkout Building for indoor air quality, energy efficiency and life safety compliance in various locations. The revitalization will consist of installing a sprinkler system, energy-efficient office lighting, complete updating of the Heating, Ventilation, and Air Conditioning (HVAC) systems and demolishing the existing HVAC ductwork that contributes to poor indoor air quality. Asbestos abatement will also be included. Other facility systems include HVAC controls, lighting and fire protection. This phase will include the demolition and renovation of a portion of the North Wing. In addition, this project will upgrade employees' office areas, including power, communications and data systems. A critical need exists at the Kennedy Space Center to revitalize substandard housing affecting the health, safety and welfare of personnel. The deteriorated substandard housing is contributing to costly maintenance needs, highly inefficient energy consumption and unhealthy working environments. The facility has not been updated to

current Florida Building Codes, Florida Fire Prevention Codes, or National Fire Protection Association Life Safety Standards. This project will relieve personnel of the health dangers associated with poor Indoor Air Quality and Building Related Illnesses. An increase in space utilization will be realized. This is the first of six phases with a total estimated construction cost of $37 million and completion planned for FY 2011.

Project Title: Upgrade Electrical Power Distribution

Location: Langley Research Center (LaRC), Hampton, VA

FY 2006 Estimate: $6.7M

This project replaces old electrical equipment including transformers and switchgear. The switchgear is 1950's and 1960's vintage technology and is failing. The transformers are more than 20 years old and past their useful life. Operations and maintenance costs to keep this outdated system running are high and continually increasing. This is the first of seven phases. The total estimated cost of all phases is $33.5 million. Completion of this project is planned for FY 2010.

Minor Revitalization and Construction of Facilities (projects less than $5.0M each)

	Institutional Support	Exploration Capabilities
FY 2006 Estimate (Millions of Dollars)	105.1	42.0
Ames Research Center	6.5	
Dryden Flight Research Center	2.9	
Glenn Research Center	7.6	
Goddard Space Flight Center	10.3	
Jet Propulsion Laboratory	12.6	
Johnson Space Center	19.7	3.5
Kennedy Space Center	12.3	4.9
Langley Research Center	11.9	
Marshall Space Flight Center	12.9	26.5
Stennis Space Center	8.4	7.1

This request includes facility revitalization and construction needs greater than $0.5 million but less than $5.0 million per project. Projects $0.5 million and less are normally accomplished by routine day-to-day facility maintenance and repair activities provided for in direct program and Center operating budgets. Proposed FY 2006 Non-Programmatic projects total $105.1 million for components of the basic infrastructure and institutional facilities, and $42.0 million for specific Exploration Capabilities projects. These resources provide for revitalization and construction of facilities at NASA field installations and government-owned industrial plants supporting NASA activities. Revitalization and modernization projects provide for the repair, modernization, and/or upgrade of facilities and collateral equipment. Repair projects restore facilities and components to a condition substantially equivalent to the originally intended and designed capability. Repair and modernization work includes the substantially equivalent replacement of utility systems and collateral equipment necessitated by incipient or actual breakdown. It also includes major preventive measures that are normally accomplished on a cyclic schedule and those quickly needed out-of-cycle based on adverse condition information revealed during predictive testing and inspection efforts. Modernization and upgrade projects include both restoration of current functional

capability and enhancement of the condition of a facility so that it can more effectively accomplish its designated purpose or increase its functional capability or so that it can meet new building, fire, and accessibility codes.

The minor revitalization and construction projects that comprise this request are of the highest priority, based on relative urgency and expected return on investment. The titles of the projects are designed to identify the primary intent of each project and may not always capture the entire scope or description of each project. Also, during the year, some rearrangement of priorities may be necessary which may cause a change in some of the items to be accomplished.

Non-Programmatic Minor Revitalization Programs: $105.1 million

A. Ames Research Center (ARC), $6.5 million for the following:

1. Legionella Mitigation, Buildings N10, N200, N207A, N212, N230, N238, and N248
2. Modify Fire Exits and Safety Egress, Buildings N226, N244, N248, and N16
3. Seismic Upgrades, Buildings N201, N223, N240
4. Rehabilitate and Modify 20 MW Power Supply, Phase IV
5. Rehabilitate and Modify Fire Suppression System, Buildings N200, N226, N244, N256, N16
6. Rehabilitate and Modify Fire Suppression System, Buildings N207, N247, N260, N261, N10, N510

B. Dryden Flight Research Center (DFRC), $2.9 million for the following:

1. Repair Primary Electrical Distribution Systems, Phase 4
2. Repair Hangar B-4826

C. Glenn Research Center (GRC), $7.6 million for the following:

1. Repair Parking Lots and Roads, Various Locations, Phase 2
2. Rehabilitate Engineering Building 7141, Plum Brook Station, Phase 2
3. Modify Fire Alarms and Sprinklers for Life Safety, Various Buildings
4. Repair Water System, Plum Brook Station, Phase 2

D. Goddard Space Flight Center (GSFC), $10.3 million for the following:

1. Modify Various Buildings for Accessibility, Wallops Flight Facility (WFF)
2. Safety Upgrades to Runway 10-28, Phase 2, WFF
3. Modernize Magnetic Test Facility, Area 300
4. Upgrade Information Technology Facilities Environmental Control, Building 5, Phase 2
5. Site Utilities for Implementation of Master Plan
6. Repair Roofs, Various Buildings
7. Replace Septic Systems, WFF

E. Jet Propulsion Laboratory (JPL), $12.6 million for the following:

1. Repair Spacecraft Assembly Facility, B179, Phase 1
2. Replace Obsolete Power Control Center, Building 230
3. Remodel Cafeteria Building 303
4. Purchase and Improve Forestry Camp Road
5. Replace Liquid Nitrogen Storage Tanks, Phase 2
6. Upgrade HVAC Systems in Buildings 168 and 169

F. Johnson Space Center (JSC), $19.7 million for the following:

1. Replace Roofs, Various Buildings (7, 15)
2. Upgrade Central Plant and Rehabilitate Plant Equipment (24)
3. Refurbish Public Affairs Facility (2 North)
4. Upgrade/Rehabilitate Electrical Substation & Distribution Sys, Sony Carter Training Facility
5. Repair Sanitary Sewer System, Ellington Field
6. Repair Sprinkler and Fire Alarm Systems, Phase 1
7. Rehabilitate Mission Simulation Development Facility (35)
8. Rehabilitate Exchange Facilities, Phase II (3, 11, 207)
9. Replace Roofs, Various Buildings (13)
10. Replace Loggia Ledge Coatings, Various Buildings
11. Upgrade Domestic Water Systems, Various Buildings
12. Repair Site Roofs, White Sands Test Facility, Phase 2

G. Kennedy Space Center (KSC), $12.3 million for the following:

1. Repair Industrial Area Support Building, M6-493
2. Upgrade Facilities for Disabled Access, Various Locations
3. Replace Life Support Facility
4. Revitalize and Upgrade KSC Water and Waste Water Systems, Various Locations
5. Replace Critical Transformers, Industrial and LC-39 Areas, Phase 2
6. Replace High Voltage Substations at M7-505
7. Install Optical Fire Detection Systems, Various Locations
8. Revitalize Cable and Duct Distribution, Industrial Area, Phase 3
9. Upgrade Primary Power System, M6-0409

H. Langley Research Center (LaRC), $11.9 million for the following:

1. Upgrade Facilities for Disabled Access, Various Locations, Phase 2
2. Rehabilitate Building 1192 D & E
3. Rehabilitate Elevators, Various Facilities
4. Refurbish Building 645A
5. Enhanced High Pressure Air Capability for National Transonic Facility, B1236
6. Repair Steam Condensate Return System in Tunnels

I. Marshall Space Flight Center (MSFC), $12.9 million for the following:

1. Replace HVAC and Electrical Equipment (4570)
2. Replace Asbestos Siding and Provide Energy/Safety Upgrades to Building Systems (4705), Phase 1
3. Replace & Upgrade Control Systems for Bridge Cranes (Site Wide), Phase 4
4. Energy Upgrades to Central Chiller Plant (4473)
5. Construct Additional Bays, Phase 1

J. Stennis Space Center, $8.4 million for the following:

1. Relocation of Stennis Visitors Center
2. Repair 120/208V Power Distribution, Sitewide Phase 2
3. Repairs to Roofing (1103, 1105, 2201, 8110)
4. Repairs to Administration Area Heating System
5. Restoration of Fire Alarm Systems, Phase 5
6. Repairs to 13.8kV Unit Substations in the Test Complex

Exploration Capabilities Minor Revitalization Programs: $42.0 million

A. Johnson Space Center (JSC), $3.5 million for the following:

1. Replace Fire Detection System, Building 30S (Shuttle)
2. Rehabilitate Small Altitude Simulation System Steam Line, 300 and 400 Areas, WSTF (Shuttle)

B. Kennedy Space Center (KSC), $4.9 million for the following:

1. Renovate HVAC System Building 836, Vandenberg Launch Site (Space and Flight Support)
2. Upgrade OPF-1 & 2 Fire Extinguishing (Firex) Water Systems (Shuttle)
3. Refurbish Roll up Doors, Rotating Payload Servicing Facility (RPSF) Surge Building

C. Marshall Space Flight Center (MSFC), $26.5 million for the following:

1. Rehabilitate Controls, Cranes & Trolleys, Building 103, Phase 1, Michoud Assembly Facility (MAF) (Shuttle)
2. Replace Roof, Building 303, MAF (Shuttle)
3. Rehabilitate Waste Water Process Tanks, Phase 1, MAF (Shuttle)
4. Replace Air Handling Units (AHUs) 14, 17, 20, 25 & 26, Building 114, MAF (Shuttle)
5. Enhance Chemical Clean Line Facility, Building 103, MAF (Shuttle)
6. Replace Substation #46 & MCC, Building 131, MAF (Shuttle)
7. Install Closed Loop Chilled Water System, Building 103, Phase 2, MAF (Shuttle)
8. Replace Fire Alarm Systems, Phase 2, MAF (Shuttle)
9. Rehabilitate Cranes & Trolleys / Controls, Building 103, Phase 2, MAF (Shuttle)
10. Rehabilitate North Mezzanine, Building 103, MAF (Shuttle)
11. Replace Breathing /Air Compressors, Building 318, MAF (Shuttle)
12. Repair Roads and Parking Lots, Mars Drive and Building 103/318/350/351, MAF (Shuttle)

D. Stennis Space Center (SSC), $7.1 million for the following:

1. Repair and Modernize SSME A-2 Test Stand, Phase 6 (Shuttle)
2. Refurbish High Pressure Industrial Water Pumps, Phase 3 (Shuttle)
3. Repairs to Cryogenic Barge Docks, Mooring Dolphins and Rolling Devices, (Shuttle)
4. Upgrades to Shuttle Infrastructure; Electrical Distribution (Shuttle)

Facility Planning and Design (FP&D)

Cognizant Office: Office of Infrastructure, Management and Headquarters Operations

FY 2006 Estimate: $16.5M

These funds are required to provide for: advance planning and design activities; special engineering studies; facility engineering research; preliminary engineering efforts required to initiate design-build projects; preparation of final designs, construction plans, specifications, and associated cost estimates; and participation in facilities-related professional engineering associations and organizations. These resources provide for project planning and design activities associated with non-programmatic construction projects. Project planning and design activities for construction projects required to conduct specific Exploration Capabilities or Science, Aeronautics and Exploration programs or projects are included in the appropriate budget line item. Other activities

funded include: master planning; value engineering studies; design and construction management studies; facility operation and maintenance studies; facilities utilization analyses; engineering support for facilities management systems; and capital leveraging research activities.

Demolition of Facilities

Cognizant Office: Office of Infrastructure, Management and Headquarters Operations

FY 2006 Estimate: $9.0M

The amount requested is required to fund major demolition projects Agency-wide. NASA owns over 2,800 buildings, and over 2,600 other structures, totaling almost 44 million square feet with a current replacement value of over $20 billion. About two million square feet of these facilities are "mothballed" or "abandoned," another million square feet are to be closed in the next four years, and possibly more will be identified for closure due to an upcoming NASA Real Estate Strategic Review. Closed facilities are a drain on NASA resources, deteriorate into eyesores and possible safety hazards, and should be demolished.

Supporting Data: Integrated Financial Management Program

Purpose

The goal of the Integrated Financial Management Program (IFMP) is to improve the financial, physical, and human resources management processes throughout the Agency. IFMP will re-engineer NASA's business infrastructure in the context of industry "best practices" and implement enabling technology to provide the necessary management information to support the Agency's Strategic Plan implementation.

Overview

Several projects are currently being managed by IFMP. The Core Financial Project, NASA's first fully integrated financial management system, was implemented in FY 2003 at all ten Centers. This system provides Agency-wide visibility of financial information to facilitate the decision-making process, thereby improving information exchange with customers and stakeholders. This system supports the Agency's implementation of full cost accounting, and the Agency's goal of "getting to Green" in Financial Performance within the President's Management Agenda (PMA). The Resume Management (RM) Project, implemented in FY 2002, introduced a new process and system that has changed how Human Resources offices fulfill their recruiting and staffing responsibilities. In 2004, we began modifying the RM system to support the e-Gov initiative, Recruitment One Stop. The Position Description Management Project, completed in September 2002, enables users to rapidly prepare and classify Position Descriptions (PDs). The Travel Management Project, completed in FY 2003 implemented a standardized, integrated travel management system that provides electronic routing, e-mail, and timely travel information. The Agency will be migrating to the eGov travel initiative beginning in FY 2006. Future projects include Project Management Information Improvement, Labor Distribution, Integrated Asset Management (IAM), Contract Management Module (CMM), and an upgrade to the existing financial system. The budget runout has been modified to focus on the development and implementation costs of the program. In the FY 2006 budget, deployment of all modules was planned to be completed in FY 2007, however, subsequent Agency requirements, priorities, and funding reductions are expected to impact the schedule and extend the implementation. The funds to cover the FY 2007 and out costs were initially budgeted to support the transfer of IFMP to the NASA Shared Services Center for sustainment. These funds are within the Corporate G&A funding levels and, therefore, do not represent additional costs to the Agency. With respect to GAO reports related to NASA's Integrated Financial Management Program, actions have been completed for most of the GAO's recommendations, and the Agency has corrective action plans in place for open recommendations.

Program Management

IFMP program authority resides in the Office of the Administrator, with Program Executive Officer Patrick Ciganer. IFMP program management resides within the Office of the Chief Financial Officer, with Program Director Bobby German. The Agency Program Management Council (PMC) has governing responsibility.

This program is in full compliance with NPG 7120.

Technical Commitment

The initial baseline for IFMP technical commitment was made in February 2002. The baseline was updated in the FY 2005 President's Budget.

Technical Specifications	FY 2005 President's Budget	Performance Measures
1. Provide timely, consistent, and reliable information for management decisions.	1. Provide consistent, timely, and reliable financial data to Agency, Directorate, Center, Program, Project and functional managers to support decision making; 2. Provide on-line access to program and project data to the Agency Directorates and Centers; 3. Implement standardized, reengineered processes across functions and systems throughout the Agency.	*Number of Days between periodic closings and availability of financial data to internal customers. *Percent of users having on-line, real time access to financial data necessary to function.
2. Improve NASA's accountability and enable full cost management.	1. Provide financial data for the purpose of determining the cost of providing specific Agency programs and projects; 2. Improve financial data consistency.	*Number of Days between periodic closings and availability of financial data to internal customers. *Percent of users having on-line, real time access to financial data necessary to function.
3. Achieve efficiencies and operate effectively.	1. Streamline and standardize financial business processes across NASA to operate more effectively; 2. Provide tools to utilize admin and tech work force more effectively; 3. Provide an automated audit trail for financial data.	*Number of applications or systems required to conduct process; for Core Financial the number of legacy systems shutdown with processes transitioned to SAP R/3.
4. Exchange information with customers and stakeholders.	1. Provide consistent, timely, and reliable financial data to NASA's external customers; 2. Improve exchange of financial data among internal customers.	*Number of applications or systems required to conduct process; for Core Financial the number of legacy systems shutdown with processes transitioned to SAP R/3.
5. Attract and retain a world-class workforce.	1. Provide tools to users that enable them to do their jobs more effectively; 2. Provide increased opportunities for sharing of data, practices and teaming across Centers.	*Percent of users having on-line, real time access to financial data necessary to function.

*IFMP benefits a broad range of NASA processes and programs and is principally aligned with the Implementing Strategy-1: achieve management and institutional excellence comparable to NASA's technical excellence, as defined in the NASA 2003 Strategic Plan. Each module project defines its functional drivers, which demonstrate how the project supports accomplishment of the Agency business drivers or technical specifications.

Acquisition Strategy and Performing Organizations

Multiple contracts are being utilized to support IFMP, all of which are using GSA Schedule contract vehicles. These contracts support IFMP as a whole, as well as the specific module projects across the various Centers.

Changes since FY 2005 President's Budget: Implementation contractor and Program Management contractor selected. Also, selected software and services provider for Contract Management.

Agreements

Internal: The program relies on support from each of the ten NASA Centers. Agreements and Commitments are signed with each Center responsible official prior to beginning implementation work at the Center.

Changes since FY 2005 President's Budget: *External*: Implemented agreement with Department of Interior for interface and support for ePayroll.

Supporting Data: Integrated Financial Management Program

Independent Reviews

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Independent Annual Review	IPAO	19-Nov-02	March 2005	To validate performance of program and project commitments.
Annual Financial Audit	Ernst & Young	November 2004	November 2005	Audit NASA's annual Financial Statements, IT configuration and controls, and Federal Financial Management Improvement Act system compliance.

Budget/Life Cycle Cost (Implementation)

Budget Authority ($ millions)	Prior	FY04	FY05	FY06	FY07	FY08	FY09	FY10	Total	Comments
FY 2006 President's Budget	236.6	139.8	74.3	76.9	62.5	72.5	41.9	41.9	746.4	
Changes since FY 05 PBS	0.0	22.9	-41.5	-7.8	62.5	72.5	41.9	41.9	192.4	Reason for Change: G&A increase in FY04. Reductions in FY05 & FY06 due to revised program schedule. Increases starting in FY07 have equivalent offsets in sustaining costs under the NSSC budget, and do not represent additional costs to the Agency.
FY 2005 President's Budget	236.6	116.9	115.8	84.7	0.0	0.0	0.0	0.0	554.1	
Numbers may not add due to rounding										
Indicates changes since the previous year's President's Budget Submit										

National Institute of Aerospace (NIA)

The National Institute of Aerospace (NIA) is a research and education institute initiated by NASA Langley Research Center (LaRC) to ensure a national capability to support NASA's Mission by expanding collaboration with academia and leveraging expertise inside and outside NASA. A nationwide competitive procurement process resulted in the selection of a consortium that created the non-governmental, non-profit NIA. The consortium includes the American Institute of Aeronautics and Astronautics Foundation, the Georgia Institute of Technology, the North Carolina Agricultural and Technical State University, the North Carolina State University, the University of Maryland, the University of Virginia, the Virginia Polytechnic Institute and State University, and the Hampton University as full members, and the Old Dominion University and the College of William and Mary as affiliate members. The NIA has been operational since January 3, 2003 and is, currently staffed with 36 research scientists, 12 faculty members, 30 fulltime graduate students and 22 administrative staff.

The NIA is a strategic partner conducting leading edge research working in collaboration with LaRC. The technical scope of the NIA is the research and development of aerospace vehicle technologies, atmospheric sciences, and the commercialization of intellectual property created by the NIA. In synergy with the research programs at LaRC, the NIA also has a science and engineering graduate education capability, offering 110 graduate engineering courses and seven graduate degrees, provided by its university partners.

One of the innovative aspects of the NIA is the use of information technology to create both a virtual collaborative research environment and a distance-learning educational capability leveraging the unique facilities and laboratories of LaRC and the partners. The NIA has also established a permanent location, housed in commercial rental office space, in close proximity to LaRC to enhance collaboration with LaRC research personnel and to facilitate access to the extensive world-class experimental facilities located at LaRC.

NASA will provide $5 million per year for five years to sponsor a “core” program. The “core” program includes support to establish the initial research and education infrastructure of the NIA and to fund the Distinguished Professor program. The Distinguished Professor program is a resident scholar program intended to attract gifted researchers to the NIA. After the first five years, the NIA will develop a broader customer base and become self-sufficient, receiving no “core” funding from NASA. The only NASA funds it will receive will be from those specific programs and projects that require the NIA’s services. Anticipated funding by NASA to the NIA and University cost-sharing is given below.

Budget Authority ($ in millions)	FY 2004 Actuals	FY 2005 Estimates	FY 2006 Budget
NASA Funding*	**20.7	21.0	**** TBD
University Cost-Sharing	***1.2	1.2	1.2
Total Program Funding	21.9	22.2	**** TBD

* FY 2004 is actual funding; FY 2005 is an estimate and a majority of the actual funding will be determined based on program requirements.

** Includes $5M Congressional Interest Items

*** FY 2004 University Cost-Sharing is an estimate; the actual is unavailable from the NIA at the time of this submission.

**** FY 2006 Estimates are not completed at this time.

Full Cost Budgeting

For the third consecutive year, NASA has formulated its budget in "Full Cost" advancing the methods first utilized two years ago. NASA has operated in a total full cost environment since its implementation on October 1, 2003. Since then, managers have been managing programs in terms of their total costs.

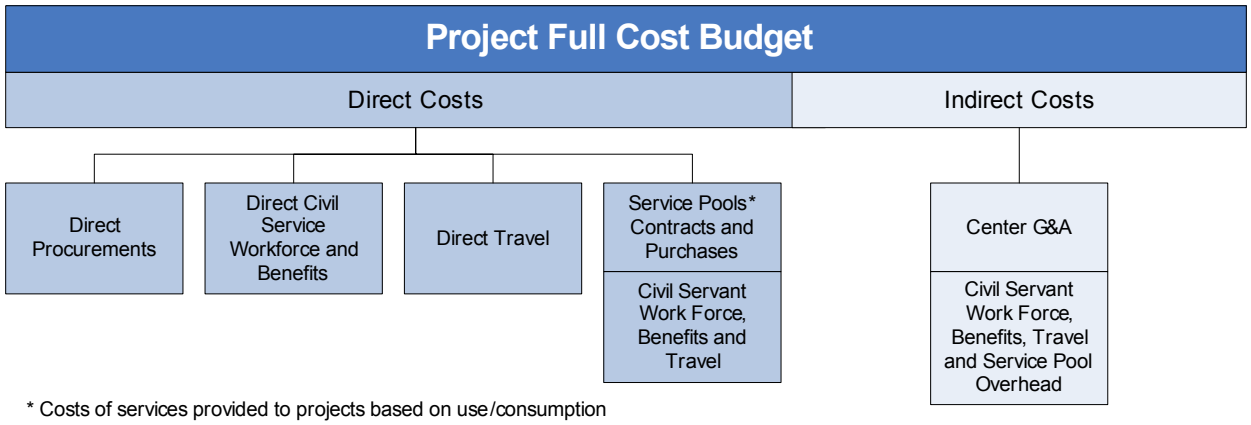
"Full cost" means that each program's budget estimate includes all of the program's direct and indirect costs, including all civil service salaries and infrastructure costs. Full cost budgeting directly links each program with all the resources it benefits from or consumes. This linkage is designed to provide accurate estimates and actual cost information, enabling managers to assess resources in terms of their financial cost and value to the program. Full cost budgeting also allows managers to better hold accountable those managing the resources.

Implementing full cost has been crucial to NASA's success to integrate budget and performance as called for in the President's Management Agenda (PMA). NASA was the first agency to receive the coveted "green" rating in this area. In response to NASA implementing the Vision for Space Exploration, the Agency has recently adapted a new budget data structure that will better facilitate full cost practices. First, budgetary reporting elements are organized according to a hierarchy: (from highest to lowest) Mission Directorate, Theme, Program and Project. Secondly, Programs and Projects are clearly distinguished from each other and managed accordingly. Projects roll up into Programs; Programs roll up into Themes; and Themes into Mission Directorates. Moreover, the Projects and Programs are scrutinized for compliance with the NASA Procedural Requirement 7120.5C "NASA Program and Project Management Processes and Requirements" document.

Full Cost: Cost Elements and Classifications

In full cost, each Project's budget includes direct costs and indirect costs. Direct costs consist of those costs that can be obviously and cleanly linked to a Project—these are the costs that are "directly" controlled by a Project Manager. Indirect costs are those costs that cannot be clearly or expeditiously linked to a Project; they are instead linked through an allocation. Indirect costs include overhead for internal service pools and General and Administrative (G&A) costs incurred by NASA Centers. The full cost of a project is the sum of these costs. Figure 1 depicts in detail the cost components for each NASA full cost project.

Figure 1: Components of NASA's Full Cost Budget



Descriptions of each cost element:

Direct Costs

Direct Procurements: The procurements that are directly controlled and acquired by the Project Manager. These costs are linked to a project at the time the costs are incurred. They include purchased goods and services, contracted support, and materials.

Direct Civil Service Workforce and Benefits: The costs associated with the Civil Service employees that charge their time to the Project. This includes their base pay as well as fringe benefits. These costs are incurred on a two-week cycle and linked to the Project at that time.

Direct Travel: The costs associated with personnel traveling for activities in support of the Project. These costs are linked to the project at the time the costs are incurred.

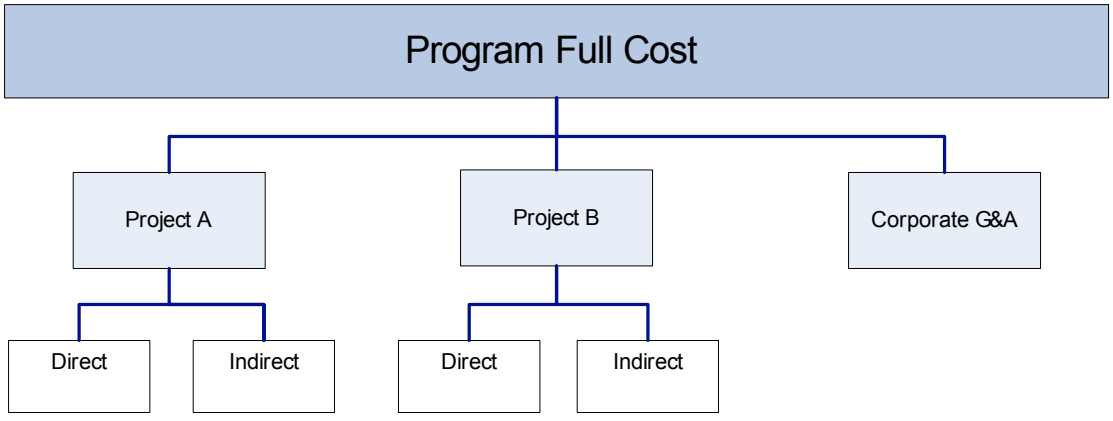
Service Pools: The costs of services consumed by the Project, in which the level of service is directly controlled by the Project Manager. These costs are linked back to the Project (usually on a monthly basis) in a fair, equitable manner based on pre-determined metrics, identifying the degree to which Projects benefit from the pool's services. Service pool costs include the salaries and benefits of civil servants working for the pool, as well as their travel. There are six standard service pools established for use by NASA Centers: Facilities and Related Services; Information Technology; Science and Engineering; Fabrication; Test Services; and Wind Tunnel Services.

Indirect Costs

Center G&A Costs: The costs associated with Center services such as legal, financial, medical, security, environmental, media, logistics, public affairs, human resources, administration, financial, and procurement, as well as any Center investments. These are Center costs that cannot be allocated to specific projects based on consumption. These costs are linked to each Project based on the amount of civil servants and on-site contractors working directly to support the Project. Center G&A costs include the salaries and benefits of Center civil servants in G&A functions, as well as their travel.

Corporate G&A Costs: The costs associated with NASA Headquarters and Agency-wide activities (including costs of Corporate G&A functions performed at NASA Centers on behalf of the Agency). Corporate functions include the NASA Administrator's office, Mission Directorate management, Headquarters operations, and the Mission Support Offices that govern Agency-wide matters, such as public affairs, procurement, finance, and human resources policy and practice. Corporate G&A costs are assessed to Programs based on their share of NASA's total cost (including service pool costs and Center G&A). Figure 2 illustrates the Program's Full Cost Budget elements.

Figure 2: Program's Full Cost Budget Elements



President's Management Agenda Update

President's Management Agenda

NASA has made significant progress in improving the quality of our management by implementing the President's Management Agenda (PMA). This is an effort to improve the way that government manages in five key areas across all federal agencies: Human Capital, Financial Management, E-Government, Competitive Sourcing, and Budget and Performance Integration. NASA, like several other agencies, is also working toward improvement in a new PMA initiative: Federal Real Property Management. The President's Management Agenda provides the central focus for all management reform efforts across the Agency, including our Freedom to Manage initiatives. NASA has established a highly integrated, disciplined process for "getting to green," with weekly status reports to the Administrator by each of our PMA area champions.

NASA is a leading agency in the implementation of the PMA. This is evidenced by the fact that NASA is one of the few federal agencies to have achieved at least three "green" status ratings, in the PMA areas of Human Capital, E-Government and Budget and Performance Integration. In addition, NASA was recently honored in December 2004 with the receipt of a President's Quality Award (PQA) in Competitive Sourcing. This is the second PQA NASA has received. Previously, NASA received an honorable mention for Budget and Performance Integration efforts in FY 2003 – the only such award for Budget and Performance Integration.

NASA's progress in strengthening our management foundation and agency credibility in PMA has positioned the agency to effectively implement *The President's Vision for U.S. Space Exploration,* unveiled in January 2004.

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

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

Human Capital

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

Competitive Sourcing

NASA has a competitive sourcing plan and has announced two standard competitions involving more than 230 positions. Additionally, an integral part of NASA's competitive sourcing plan are science competitions in which NASA scientists compete against those in academia, industry

and other government agencies for research opportunities. It is anticipated that more than 400 FTE will annually be exposed to competition through this process.

Financial Performance

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

E-Government

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

Budget & Performance Integration

NASA used performance information and full-cost considerations to develop the FY 2004, FY 2005 and FY 2006 budget requests and to inform the Agency's management decisions. NASA is the first government agency to have achieved green for this initiative.

Federal Real Property Management

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

FY 2005 Performance Plan Update

In 2004, NASA transformed its organization in order to better achieve *The Vision for Space Exploration*. As a result of this Vision for the Agency, NASA has identified 18 new Strategic Objectives that define what the Agency has been asked to accomplish. These Objectives replace the existing Objectives from the 2003 Strategic Plan, and provide the first step in the development of the new NASA strategic plan for 2006. This FY 2005 Performance Plan Update re-maps the original FY 2005 commitment for annual performance goals into the new Strategic Objectives. With only a few exceptions, this update reflects the original plan as committed in the FY 2005 Budget request. The exceptions are identified in the list of goals that have been deleted due to termination of projects not required to support the new exploration activities.

NASA Objective 2: Conduct robotic exploration of Mars to search for evidence of life, to understand the history of the solar system, and to prepare for future human exploration.

Outcome 2.1: Characterize the present climate of Mars and determine how it has evolved over time.

5MEP5 Successfully complete the Mission Concept Review and PMSR for the 2009 Mars Telesat Orbiter (NOTE: this APG supports all MEP research focus areas).

5MEP7 Successfully demonstrate progress in characterizing the present climate of Mars and determine how it has evolved over time. Progress towards achieving outcomes will be validated by external review.

Outcome 2.2: Understand the history and behavior of water and other volatiles on Mars.

5MEP1 Successfully complete Assembly, Test, and Launch Operations (ATLO) for the Mars Reconnaissance Orbiter mission.

5MEP2 Successfully launch the Mars Reconnaissance Orbiter.

5MEP8 Successfully demonstrate progress in investigating the history and behavior of water and other volatiles on Mars. Progress towards achieving outcomes will be validated by external review.

Outcome 2.3: Understand the chemistry, mineralogy, and chronology of Martian materials.

5MEP9 Successfully demonstrate progress in studying the chemistry, mineralogy, and chronology of Martian materials. Progress towards achieving outcomes will be validated by external review.

Outcome 2.4: Determine the characteristics and dynamics of the interior of Mars.

5MEP10 Successfully demonstrate progress in determining the characteristics and dynamics of the interior of Mars. Progress towards achieving outcomes will be validated by external review.

Outcome 2.5: Understand the character and extent of prebiotic chemistry on Mars.

5MEP4 Successfully complete the Preliminary Mission System Review (PMSR) for the 2009 Mars Science Laboratory (MSL) Mission.

5MEP6 Successfully complete Preliminary Design Review (PDR) for Laser Communication Demonstration (NOTE: this APG supports all Mars Exploration research focus areas).

5MEP11 Successfully demonstrate progress in investigating the character and extent of prebiotic chemistry on Mars. Progress towards achieving outcomes will be validated by external review.

Outcome 2.6: Search for chemical and biological signatures of past and present life on Mars.

5MEP3 Complete science instrument selections for the 2009 Mars Science Laboratory (MSL).

5MEP12 Successfully demonstrate progress in searching for chemical and biological signatures of past and present life on Mars. Progress towards achieving outcomes will be validated by external review.

Outcome 2.7: Identify and understand the hazards that the Martian environment will present to human explorers.

5MEP13 Successfully demonstrate progress in identifying and studying the hazards that the Martian environment will present to human explorers. Progress towards achieving outcomes will be validated by external review.

Outcome 2.8: Inventory and characterize Martian resources of potential benefit to human exploration of Mars.

5MEP14 Successfully demonstrate progress in inventorying and characterizing Martian resources of potential benefit to human exploration of Mars. Progress towards achieving outcomes will be validated by external review.

NASA Objective 3: Conduct robotic exploration across the solar system for scientific purposes and to support human exploration. In particular, explore Jupiter's moons, asteroids and other bodies to search for evidence of life, to understand the history of the solar system, and to search for resources.

Outcome 3.1: Understand the initial stages of planet and satellite formation.

5SSE2 Complete integration and testing for New Horizons/Pluto.

5SSE4 Release a NASA Research Announcement (NRA) for In Space Power and Propulsion technology development activities (NOTE: this APG could potentially support multiple SSE research focus areas).

5SSE7 Successfully demonstrate progress in understanding the initial stages of planet and satellite formation. Progress towards achieving outcomes will be validated by external review.

Outcome 3.2: Understand the processes that determine the characteristics of bodies in our solar system and how these processes operate and interact.

5SSE8 Successfully demonstrate progress in studying the processes that determine the characteristics of bodies in our solar system and how these processes operate and interact. Progress towards achieving outcomes will be validated by external review.

Outcome 3.3: Understand why the terrestrial planets are so different from one another.

5SSE9 Successfully demonstrate progress in understanding why the terrestrial planets are so different from one another. Progress towards achieving outcomes will be validated by external review.

Outcome 3.4: Learn what our solar system can tell us about extra-solar planetary systems.

5SSE10 Successfully demonstrate progress in learning what our solar system can tell us about extra-solar planetary systems. Progress towards achieving outcomes will be validated by external review.

Outcome 3.5: Determine the nature, history, and distribution of volatile and organic compounds in the solar system.

5SSE3 Select the next New Frontiers mission (NOTE: this APG could potentially support multiple SSE research focus areas).

5SSE11 Successfully demonstrate progress in determining the nature, history, and distribution of volatile and organic compounds in the solar system. Progress towards achieving outcomes will be validated by external review.

Outcome 3.6: Identify the habitable zones in the solar system.

5SSE12 Successfully demonstrate progress in identifying the habitable zones in the solar system. Progress towards achieving outcomes will be validated by external review.

Outcome 3.7: Identify the sources of simple chemicals that contribute to pre-biotic evolution and the emergence of life.

5SSE13 Successfully demonstrate progress in identifying the sources of simple chemicals that contribute to prebiotic evolution and the emergence of life. Progress towards achieving outcomes will be validated by external review.

Outcome 3.8: Study Earth's geologic and biologic records to determine the historical relationship between Earth and its biosphere.

5SSE14 Successfully demonstrate progress in studying Earth's geologic and biologic records to determine the historical relationship between Earth and its biosphere. Progress towards achieving outcomes will be validated by external review.

Outcome 3.9: By 2008, inventory at least 90 percent of asteroids and comets larger than one kilometer in diameter that could come near Earth.

5SSE5 Successfully demonstrate progress in determining the inventory and dynamics of bodies that may pose an impact hazard to Earth. Progress towards achieving outcomes will be validated by external review.

Outcome 3.10: Determine the physical characteristics of comets and asteroids relevant to any threat they may pose to Earth.

5SSE1 Successfully launch Deep Impact.

5SSE6 Successfully demonstrate progress in determining the physical characteristics of comets and asteroids relevant to any threat they may pose to Earth. Progress towards achieving outcomes will be validated by external review.

NASA Objective 4: Conduct advanced telescope searches for Earth-like planets and habitable environments around the stars.

Outcome 4.1: Learn how the cosmic web of matter organized into the first stars and galaxies and how these evolved into the stars and galaxies we see today.

5ASO4 Demonstrate James Webb Space Telescope (JWST) primary mirror technology readiness by testing a prototype in a flight-like environment.

5ASO5 Successfully demonstrate progress in learning how the cosmic web of matter organized into the first stars and galaxies and how these evolved into the stars and galaxies we see today. Progress towards achieving outcomes will be validated by external review.

Outcome 4.2: Understand how different galactic ecosystems of stars and gas formed and which ones might support the existence of planets and life.

5ASO6 Successfully demonstrate progress in understanding how different galactic ecosystems of stars and gas formed and which ones might support the existence of planets and life. Progress towards achieving outcomes will be validated by external review.

Outcome 4.3: Learn how gas and dust become stars and planets.

5ASO7 Successfully demonstrate progress in learning how gas and dust become stars and planets. Progress towards achieving outcomes will be validated by external review.

Outcome 4.4: Observe planetary systems around other stars and compare their architectures and evolution with our own.

5ASO3 Demonstrate system-level instrument pointing precision consistent with SIM's flight system basic performance requirements, as specified in program plan.

5ASO8 Successfully demonstrate progress in observing planetary systems around other stars and comparing their architectures and evolution with our own. Progress towards achieving outcomes will be validated by external review.

Outcome 4.5: Characterize the giant planets orbiting other stars.

5ASO9 Successfully demonstrate progress in characterizing the giant planets orbiting other stars. Progress towards achieving outcomes will be validated by external review.

Outcome 4.6: Find out how common Earth-like planets are and see if any might be habitable.

5ASO2 Successfully complete the Kepler mission Preliminary Design Review (PDR).

5ASO10 Successfully demonstrate progress in finding out how common Earth-like planets are and seeing if any might be habitable. Progress towards achieving outcomes will be validated by external review.

Outcome 4.7: Trace the chemical pathways by which simple molecules and dust evolve into the organic molecules important for life.

5ASO1 Deliver the SOFIA Airborne Observatory to Ames Research Center for final testing.

5ASO11 Successfully demonstrate progress in tracing the chemical pathways by which simple molecules and dust evolve into the organic molecules important for life. Progress towards achieving outcomes will be validated by external review.

Outcome 4.8: Develop the tools and techniques to search for life on planets beyond our solar system.

5ASO12 Successfully demonstrate progress in developing the tools and techniques to search for life on planets beyond our solar system. Progress towards achieving outcomes will be validated by external review.

NASA Objective 5: Explore the universe to understand its origin, structure, evolution, and destiny.

Outcome 5.1: Search for gravitational waves from the earliest moments of the Big Bang.

5SEU4 Successfully demonstrate progress in search for gravitational waves from the earliest moments of the Big Bang. Progress towards achieving outcomes will be validated by external review.

Outcome 5.2: Determine the size, shape, and matter-energy content of the universe.

5SEU5 Successfully demonstrate progress in determining the size, shape, and matter-energy content of the universe. Progress towards achieving outcomes will be validated by external review.

Outcome 5.3: Measure the cosmic evolution of dark energy.

5SEU6 Successfully demonstrate progress in measuring the cosmic evolution of the dark energy, which controls the destiny of the universe. Progress towards achieving outcomes will be validated by external review.

Outcome 5.4: Determine how black holes are formed, where they are, and how they evolve.

5SEU7 Successfully demonstrate progress in determining how black holes are formed, where they are, and how they evolve. Progress towards achieving outcomes will be validated by external review.

Outcome 5.5: Test Einstein's theory of gravity and map space-time near event horizons of black holes.

5SEU8 Successfully demonstrate progress in testing Einstein's theory of gravity and mapping space-time near event horizons of black holes. Progress towards achieving outcomes will be validated by external review.

Outcome 5.6: Observe stars and other material plunging into black holes.

5SEU9 Successfully demonstrate progress in observing stars and other material plunging into black holes. Progress towards achieving outcomes will be validated by external review.

Outcome 5.7: Determine how, where, and when the chemical elements were made, and trace the flows of energy and magnetic fields that exchange them between stars, dust, and gas.

5SEU10 Successfully demonstrate progress in determining how, where, and when the chemical elements were made, and tracing the flows of energy and magnetic fields that exchange them between stars, dust, and gas. Progress towards achieving outcomes will be validated by external review.

Outcome 5.8: Explore the behavior of matter in extreme astrophysical environments, including disks, cosmic jets, and the sources of gamma-ray bursts and cosmic rays.

5SEU1 Complete the integration and testing of the Gamma-ray Large Area Space Telescope (GLAST) spacecraft bus.

5SEU11 Successfully demonstrate progress in exploring the behavior of matter in extreme astrophysical environments, including disks, cosmic jets, and the sources of gamma-ray bursts and cosmic rays. Progress towards achieving outcomes will be validated by external review.

Outcome 5.9: Discover how the interplay of baryons, dark matter, and gravity shapes galaxies and systems of galaxies.

5SEU12 Successfully demonstrate progress in discovering how the interplay of baryons, dark matter, and gravity shapes galaxies and systems of galaxies. Progress towards achieving outcomes will be validated by external review.

NASA Objective 6: Return the Space Shuttle to flight and focus its use on completion of the International Space Station, complete assembly of the ISS, and retire the Space Shuttle in 2010, following completion of its role in ISS assembly. Conduct ISS activities consistent with U.S. obligations to ISS partners.

Outcome 6.1: Assure public, flight crew, and workforce safety for all Space Shuttle operations, and safely meet the manifest and flight rate commitment through completion of Space Station assembly.

5SSP1 Achieve zero Type-A (damage to property at least $1M or death) or Type-B (damage to property at least $250K or permanent disability or hospitalization of three or more persons) mishaps in FY 2005.

5SSP2 Achieve an average of eight or fewer flight anomalies per Space Shuttle mission in FY 2005.

5SSP3 Achieve 100 percent on-orbit mission success for all Shuttle missions launched in FY 2005. For this metric, mission success criteria are those provided to the prime contractor (SFOC) for purposes of determining successful accomplishment of the performance incentive fees in the contract.

Outcome 6.2: Provide safe, well-managed and 95 percent reliable space communications, rocket propulsion testing, and launch services to meet Agency requirements.

5SFS8 Establish the Agency-wide baseline space communications architecture, including a framework for possible deep space and near Earth laser communications services.

5SFS15 Maintain NASA success rate at or above a running average of 95% for missions on the FY 2005 Expendable Launch Vehicle (ELV) manifest.

5SFS16 Achieve at least 95% of planned data delivery for the International Space Station, each Space Shuttle mission, and low-Earth orbiting missions in FY 2005.

5SFS19 Define and provide space transportation requirements for future human and robotic exploration and development of space to all NASA and other government agency programs pursuing improvements in space transportation.

NASA Objective 7: Develop a new crew exploration vehicle to provide crew transportation for missions beyond low Earth orbit. First test flight to be by the end of this decade, with operational capability for human exploration no later than 2014.

Outcome 7.1: By 2014, develop and flight-demonstrate a human exploration vehicle that supports safe, affordable and effective transportation and life support for human crews traveling from the Earth to destinations beyond LEO.

5TS1 Conduct a detailed review of previous vehicle programs to capture lessons-learned and appropriate technology maturation; incorporate results into the human exploration vehicle requirements definition process.

5TS2 Develop and obtain approval for human exploration vehicle Level 1 and Level 2 Requirements and the resulting Program Plan.

5TS3 Complete preliminary conceptual design(s) for the human exploration vehicle, in conjunction with definition of an integrated exploration systems architecture.

5TS4 Develop launch vehicle Level 1 Requirements for human-robotic exploration within an integrated architecture, and define corresponding programs to assure the timely availability of needed capabilities, including automated rendezvous, proximity operations and docking, modular structure assembly, in space refueling, and launch vehicle modifications and developments.

5TS5 Conduct a preliminary conceptual design study for a human-robotic Mars exploration vehicle, in conjunction with definition of an integrated exploration systems architecture.

NASA Objective 8: Focus research and use of the ISS on supporting space exploration goals, with emphasis on understanding how the space environment affects human health and capabilities, and developing countermeasures.

Outcome 8.1: By 2010 complete assembly of the ISS, including U.S. components that support U.S. space exploration goals and those provided by foreign partners.

5ISS5 Obtain agreement among the International Partners on the final ISS configuration.

Outcome 8.2: Annually provide 90 percent of the optimal on-orbit resources available to support research, including power, data, crew time, logistics, and accommodations.

5ISS1 In concert with the ISS International Partners, extend a continuous two-person (or greater) crew presence on the ISS through the end of FY 2004.

5ISS2 Achieve zero Type-A (damage to property at least $1M or death) or Type-B (damage to property at least $250K or permanent disability or hospitalization of 3 or more persons) mishaps in FY 2005.

5ISS3 Based on the Space Shuttle return-to-flight plan, establish a revised baseline for ISS assembly (through International Core Complete) and research support.

5ISS4 Provide at least 80% of up-mass, volume and crew-time for science as planned at the beginning of FY 2005.

5ISS6 Continuously sustain a crew to conduct research aboard the ISS.

Outcome 8.4: By 2006, each Research Partnership Center will establish at least one new partnership with a major NASA R&D program to conduct dual-use research that benefits NASA, industry, or academia.

5RPFS4 Promote availability of RPC-built spaceflight hardware throughout NASA utilizing the new database.

5RPFS5 Implement hardware sharing system.

5RPFS6 Identify and develop a working relationship with at least one new non-SPD user of RPC-built spaceflight hardware.

Outcome 8.5: By 2008, develop and test the following candidate countermeasures to ensure the health of humans traveling in space: bisphosphonates, potassium citrate, and mitodrine.

5BSR7 Increase the use of space flight analogs on the ground to better define hypotheses for flight experiments.

5BSR8 Publish final results of Bioastronautics experiments conducted during ISS increment 8 and preliminary results from Increments 9 and 10.

5BSR9 Maintain productive peer-reviewed research program in Biomedical Research and Countermeasures including a National Space Biomedical Research Institute that will perform team-based focused countermeasure-development research.

5BSR10 Under the Human Research Initiative (HRI) increase the number of investigations addressing biomedical issues associated with human space exploration.

5BSR11 Conduct scientific workshops to fully engage the scientific community in defining research strategies for addressing and solving NASA's biomedical risks.

5SFS20 Certify the medical fitness of all crew members before launch.

Outcome 8.6: By 2008, reduce the uncertainties in estimating radiation risks by one-half.

5BSR12 Expand the space radiation research science community to involve cutting edge researchers in related disciplines by soliciting, selecting, and funding high quality research.

5BSR13 Use 1000 hours/yr of beam time at the National Space Radiation Laboratory (NSRL) at Brookhaven National Laboratory (BNL) to measure survival, genetic mutation (mutagenesis) and chromosome aberrations in cells and tissues to improve understanding of the biological effects of the space radiation environment.

5BSR14 Integrate research data collected over the past two years at NSRL, with existing database to develop more accurate predictions resulting in improved biological strategies for radiation risk reduction.

Outcome 8.7: By 2010, identify and test technologies to reduce total mass requirements for life support by two thirds using current ISS mass requirement baseline.

5BSR17 Demonstrate, through vigorous research and technology development, a 55% reduction in the projected mass of a life support flight system compared to the system base-lined for ISS.

Outcome 8.8: By 2008, develop a predictive model and prototype systems to double improvements in radiation shielding efficiency.

5PSR9 Continue accumulating data on radiation effects on materials properties and initiate the assessment of the performance of multifunctional materials.

NASA Objective 11: Develop and demonstrate power generation, propulsion, life support, and other key capabilities required to support more distant, more capable, and/or longer duration human and robotic exploration of Mars and other destinations.

Outcome 11.3: By 2015, identify, develop, and validate human-robotic capabilities required to support human-robotic lunar missions.

5HRT1 Establish an integrated, top-down strategy-to-task technology R&D planning process to facilitate the development of human-robotic exploration systems requirements.

5HRT2 Execute two systems-focused Quality Function Deployment exercises through an Operational Advisory Group (including both technologists and operators) to better define systems attributes necessary to accomplish human-robotic exploration operational objectives.

5HRT3 Execute selected R&D-focused Quality Function Deployment exercises through an external/internal Technology Transition Team to review candidate human-robotic exploration systems technologies, and provide detailed updates to human-robotic technology road maps.

5HRT4 Test and validate preferred engineering modeling and simulation computational approaches through which viable candidate architectures, systems designs and technologies may be identified and characterized. Select one or more approaches for ongoing use in systems/technology road mapping and planning.

5LE1 Identify and define preferred human-robotic exploration systems concepts and architectural approaches for validation through lunar missions.

5LE2 Identify candidate architectures and systems approaches that can be developed and demonstrated through lunar missions to enable a safe, affordable and effective campaign of human-robotic Mars exploration.

5LE6 Identify preferred approaches for development and demonstration during lunar missions to enable transformational space operations capabilities.

5LE7 Conduct reviews with international and U.S. government partners, to determine common capability requirements and opportunities for collaboration.

Outcome 11.4: By 2015, identify and execute a research and development program to develop technologies critical to support human-robotic lunar missions.

5HRT5 Identify and analyze viable candidates and identify the preferred approach to sustained, integrated human-robotic solar system exploration involving lunar/planetary surfaces and small bodies, and supporting operations. Validate a focused technology R&D portfolio that addresses the needs of these approaches and identifies existing gaps in technological capabilities.

5HRT6 Establish and obtain approval for detailed R&D requirements, roadmaps and program planning in key focused technology development areas, including self-sufficient space systems; space utilities and power; habitation and bioastronautics; space assembly, maintenance and servicing; space transportation; robotic networks; and information technology and communications.

5LE3 Establish a baseline plan and Level 1 requirements to utilize the robotic lunar orbiter(s) and robotic lunar surface mission(s) to collect key engineering data and validate environmental characteristics and effects that might affect later robotics, astronauts and supporting systems.

5LE4 Identify candidate scientific research and discovery opportunities that could be pursued effectively during robotic lunar missions.

5LE5 Establish a viable investment portfolio for development of human support systems, including human/machine extravehicular activity (EVA) systems, locally autonomous medical systems and needed improvements in human performance and productivity beyond low Earth orbit (LEO).

Outcome 11.5: By 2016, develop and demonstrate in-space nuclear fission-based power and propulsion systems that can be integrated into future human and robotic exploration missions.

5HRT7 Develop Level 1/ Level 2 requirements for nuclear power and propulsion systems in support of selected human and robotic exploration architectures and mission concepts.

5HRT8 Complete a validated road map for nuclear power and propulsion R&D, and related vehicle systems technology maturation.

5HRT9 Formulate a demonstration mission plan for Jupiter Icy Moons Orbiter that will test and validate nuclear power and propulsion systems for future human-robotic exploration missions.

Outcome 11.6: Develop and deliver one new critical technology every two years in each of the following disciplines: in-space computing, space communications and networking, sensor technology, modular systems, robotics, power, and propulsion.

5HRT15 Complete an Advanced Space Technology Program technology roadmap that interfaces appropriately with the technology planning of NASA's Mission Directorates.

5HRT16 Deliver at least one new critical technology in each key area (including: in-space computing, space communications and networking, sensor technology, modular systems, and engineering risk analysis) to NASA's Mission Directorates, for possible test and demonstration.

5HRT17 Prepare and announce the Centennial Challenge Cycle 2 major award purses, including competition rules, regulations, and judgment criteria.

Outcome 11.7: Promote and develop innovative technology partnerships, involving each of NASA's major R&D programs, among NASA, U.S. industry, and other sectors for the benefit of Mission Directorate needs.

5HRT12 Establish three partnerships with U.S. industry and the investment community using the Enterprise Engine concept.

5HRT13 Develop 12 industry partnerships, including the three established using the Enterprise Engine, that will add value to NASA Mission Directorates.

Outcome 11.8: Annually facilitate the award of venture capital funds or Phase III contracts to no less than two percent of NASA-sponsored Small Business Innovation Research Phase II firms to further develop or produce their technology for industry or government agencies.

5HRT14 Achieve through NASBO, the award of Phase III contracts or venture capital funds to no less than two SBIR firms to further develop or produce their technology through industry or government agencies.

Outcome 11.10: By 2005, demonstrate two prototype systems that prove the feasibility of resilient systems to mitigate risks in key NASA mission domains. Feasibility will be demonstrated by reconfigurability of avionics, sensors, and system performance parameters.

5HRT10 Develop prototype design and organizational risk analysis tools to do risk identifications, assessments, mitigation strategies, and key trade-off capabilities not only between risks, but between risks and other mission design criteria.

5HRT11 Develop a robust software tool for accident investigation that can help identify the causes of spacecraft, airplane, and/or other mission hardware accidents.

NASA Objective 12: Provide advanced aeronautical technologies to meet the challenges of next generation systems in aviation, for civilian and scientific purposes, in our atmosphere and in atmospheres of other worlds.

Outcome 12.1: By 2005, research, develop, and transfer technologies that would enable the reduction of the aviation fatal accident rate by 50 percent from the FY 1991-1996 average.

5AT1 Evaluate and flight validate selected next generation cockpit weather information, communications, airborne weather reporting, turbulence prediction and warning technologies, Synthetic Vision System and Runway Incursion Prevention System display concepts. The flight demonstration will illustrate the increased safety of integrating selected concepts in support of fleet implementation decisions. (AvSSP)

5AT2 Demonstrate through applications and simulations safety-improvement systems that will illustrate the increased safety of integrating selected concepts in support of fleet implementation decisions. (AvSSP)

Outcome 12.2: Develop and validate technologies (by 2009) that would enable a 35 percent reduction in the vulnerabilities of the National Airspace System (as compared to the 2003 air transportation system).

5AT3 Create and establish a prototype data collection system for confidential, non-punitive reporting on aviation security by functional personnel in the aviation system.

5AT16 Develop a preliminary joint research plan with the Transportation Security Administration (TSA). (AvSSP)

Outcome 12.3: Develop and validate technologies that would enable a 10-decibel reduction in aviation noise (from the level of 1997 subsonic aircraft) by 2009.

5AT4 Using laboratory data and systems analysis, complete selection of the technologies that show the highest potential for reducing commercial air transportation noise by at least 50%. (Vehicle Systems)

Outcome 12.4: By 2010, flight demonstrate an aircraft that produces no CO_2 or NOx to reduce smog and lower atmospheric ozone.

5AT5 Demonstrate 70% reduction NOx emissions in full-annular rig tests of candidate combustor configurations for large subsonic vehicle applications. (Vehicle Systems)

5AT6 Based on laboratory data and systems analysis, select unconventional engine or power systems for technology development that show highest potential for reducing CO2 emissions and/or enabling advanced air vehicles for new scientific missions. (Vehicle Systems)

5AT7 Complete laboratory aerodynamic assessment of low-drag slotted wing concept. (Vehicle Systems)

5AT27 Demonstrate through sector testing a full scale CMC turbine vane that will reduce cooling flow requirements and thus fuel burn in future turbine engine system designs. (Vehicle Systems)

Outcome 12.5: By 2005, develop, demonstrate, and transfer key enabling capabilities for a small aircraft transportation system.

5AT10 Complete experimental validation of airborne systems with concept vehicle development.

Outcome 12.6: Develop and validate technologies (by 2009) that would enable a doubling of the capacity of the National Airspace Systems (from the 1997 NASA utilization).

5AT8 Complete development of WakeVAS concept of operations and downselect WakeVAS architecture.

5AT9 Complete human-in-the-loop concept and technology evaluation of shared separation. (Airspace Systems)

5AT11 Complete analysis of capacity-increasing operational concepts and technology roadmaps with VAST models, simulations, and Common Scenario Set. (Airspace Systems)

5AT12 Develop display guidelines that exploit new understanding of perceptual systems and cognitive and physiological determinants of human performance. (Airspace Systems)

5AT13 Establish the fluid dynamics mechanism for alleviating wake through experimental and computational fluid mechanics studies. (Airspace Systems)

5AT14 Complete System-Wide Evaluation and Planning Tool initial simulation and field demonstration. (Airspace Systems)

5AT15 Complete communications, navigation, and surveillance requirements analysis. (Airspace Systems)

5AT17 Complete NASA / Industry / DoD studies of heavy-lift Vertical Take Off and Landing (VTOL) configurations to provide strategic input for future decisions on commercial / military Runway Independent Vehicles. (Vehicle Systems)

5AT22 Using laboratory data and systems analysis, complete selection of the technologies that show the highest potential for reducing takeoff/landing field length while maintaining cruise Mach, low speed controllability and low noise. (Vehicle Systems)

Outcome 12.9: Develop technologies that would enable solar powered vehicles to serve as "sub-orbital satellites" for science missions.

5AT20 Complete flight demonstration of a second generation damage adaptive flight control system. (Vehicle Systems)

5AT21 Define requirements for a robust, fault-tolerant avionics architecture that supports fully autonomous vehicle concepts. (Vehicle Systems)

5AT24 Complete laboratory aerodynamic assessment of low-drag slotted wing concept. (Vehicle Systems)

5AT25 Based on laboratory data and systems analysis, select unconventional engine or power systems for technology development that show highest potential for reducing CO2 emissions and/or enabling advanced air vehicles for new scientific missions. (Vehicle Systems)

5AT26 Complete initial flight series for validation of improved HALE ROA aero-structural modeling tools used to reduce risk and increase mission success. (Vehicle Systems)

Outcome 12.10: By 2008, develop and demonstrate technologies required for routine Unmanned Aerial Vehicle operations in the National Airspace System above 18,000 feet for High-Altitude, Long-Endurance (HALE) UAVs.

5AT23 Demonstrate integrated technologies and policies for UAV flight operations above FL400. (Vehicle Systems)

Outcome 12.11: Reduce the effects of sonic boom levels to permit overland supersonic flight in normal operations.

5AT19 Complete supersonic inlet design requirements study that will identify technology gaps and priorities required for design of future efficient long range supersonic propulsion systems. (Vehicle Systems)

NASA Objective 13: Use NASA missions and other activities to inspire and motivate the Nation's students and teachers, to engage and educate the public, and to advance the scientific and technological capabilities of the nation.

Outcome 13.1: Make available NASA-unique strategies, tools, content, and resources supporting the K-12 education community's efforts to increase student interest and academic achievement in science, technology, engineering, and mathematics disciplines.

5ED1 Increase NASA student participation by 5% above baseline.

5ED2 Increase NASA teacher participation by 5% above baseline.

5ED3 Increase existing NASA-sponsored family involvement activities and existing and potential partners by 5% over baseline.

5ED4 25% of NASA elementary and secondary programs are aligned with state or local STEM educational objectives.

Outcome 13.2: Attract and prepare students for NASA-related careers, and enhance the research competitiveness of the Nation's colleges and universities by providing opportunities for faculty and university-based research.

5ED5 Establish a NASA-wide baseline of the diversity of NASA-supported students.

5ED6 Use existing higher education programs to assist and encourage first time faculty proposers for NASA research and development opportunities.

5ED7 Establish a baseline of institutions receiving NASA research and development grants and contracts that link their research and development to the institution's school of education.

5ED8 Establish a baseline of the number and diversity of students conducting NASA-relevant research.

Outcome 13.3: Attract and prepare underrepresented and underserved students for NASA-related careers, and enhance competitiveness of minority-serving institutions by providing opportunities for faculty and university- and college-based research.

5ED9 Increase NASA underrepresented/underserved student participation by 5% over baseline.

5ED10 Increase NASA underrepresented/underserved teacher/faculty participation in NASA STEM-related learning environments by 5% over baseline.

5ED11 Increase the numbers of underserved/underrepresented researchers and minority serving institutions competing for NASA research announcements by 5% above baseline.

5ED12 Establish a baseline of family involvement in underrepresented/underserved NASA-sponsored student programs.

Outcome 13.4: Develop and deploy technology applications, products, services, and infrastructure that would enhance the educational process for formal and informal education.

5ED13 Implement 1 new advanced technology application.

5ED14 Evaluate the 50 pilot NASA Explorer Schools, utilizing a design experiment approach.

5ED15 Develop a plan for establishing a technology infrastructure.

Outcome 13.5: Establish the forum for informal education community efforts to inspire the next generation of explorers and make available NASA-unique strategies, tools, content, and resources to enhance their capacity to engage in science, technology, engineering, and mathematics education.

5ED16 Implement Phase 1 of a plan to increase appreciation of the relevance and role of NASA science and technology.

5ED17 Develop a plan to assess and prioritize high-leverage and critical informal education programs and educational involvement activities.

5ED18 Develop a plan to assess current NASA professional development programs for relevance to the targeted informal learning environments.

5AT18 Partner with museums and other cultural organizations and institutions to engage non-traditional audiences in NASA missions.

5ESA11 Provide in public venues at least 50 stories on the scientific discoveries, the practical benefits, or new technologies sponsored by the Earth Science programs.

5ESS10 Post the most exciting imagery and explanations about Earth science on the Earth observations/Science Mission Directorate website.

5RPFS9 Expand outreach activities that reach minority and under-represented sectors of the public, through increased participation in conferences and community events that reflect cultural awareness and outreach. Each fiscal year, increase the previous year baseline by supporting at least one new venue that focuses on these public sectors.

NASA Objective 14: Advance scientific knowledge of the Earth system through space-based observation, assimilation of new observations, and development and deployment of enabling technologies, systems, and capabilities including those with the potential to improve future operational systems.

Outcome 14.3: Develop and implement an information systems architecture that facilitates distribution and use of Earth science data.

5ESA1 Crosscutting Solutions: Work within the Joint Agency Committee on Imagery Evaluation and the Commercial Remote Sensing Policy Working Group through partnerships with NIMA, USGS, NOAA, and USDA to verify/validate at least two commercial remote sensing sources/products for Earth science research, specifically with respect to land use/land cover observations for carbon cycle and water cycle research.

5ESA2 National Apps: Benchmark measurable enhancements to at least 2 national decision support systems using NASA results, specifically in the Disaster Management and Air Quality communities. These projects will benchmark the use of observations from 5 sensors from NASA research satellites.

5ESA3 Crosscutting Solutions: Expand DEVELOP (Digital Earth Virtual Environment and Learning Outreach Project) human capital development program to increase the capacity for the Earth science community at a level of 100 program graduates per year and perform significant student-led activities using NASA research results for decision support with representation in 30 states during the fiscal year.

5ESA4 Crosscutting Solutions: Benchmark solutions from at least 5 projects that were selected in FY03 REASoN program to serve national applications through projects that support decision support in areas such as agriculture, public health and water quality. These projects will benchmark use of observations from at least 5 sensors from NASA research satellites.

5ESA5 The DEVELOP (Digital Earth Virtual Environment and Learning Outreach Project) program will advance the capacity of our future workforce with students from at least 20 states working to develop and deliver benchmark results of at least 4 rapid prototype projects using NASA Earth science research results in decision support tools for state, local and tribal government applications.

5ESA6 Crosscutting Solutions: Benchmark solutions associated with at least 5 decision support systems that assimilate predictions from Earth system science models (e.g. GISS, GFDL, NCEP, SpoRT, and the Earth Science laboratories).

5ESA7 National applications: Benchmark enhancements to at least 2 national decision support systems using NASA results, specifically in the Disaster Management, Public Health, and Air Quality communities. These projects will benchmark the use of observations from 5 sensors from NASA research satellites.

5ESA8 Crosscutting Solutions: Verify and validate solutions for at least 5 decision support systems in areas of national priority associated with the FY03 selected REASoN projects.

5ESA9 Benchmark the use of predictions from 2 NASA Earth system science models (including the GISS 1200 and NCEP weather prediction) for use in national priorities, such as support for the Climate Change Science Program (CCSP) and Climate Change Technology Program (CCTP) and the NOAA National Weather Service.

5ESA10 Benchmark the use of observations and predictions of Earth science research results in 2 scenarios assessment tools, such as tools used by the Environmental Protection Agency (specifically in the Community Multi-scale and Air Quality (CMAQ) Improvement Program tools) and the Department of Energy.

Outcome 14.4: Use space-based observations to improve understanding and prediction of Earth system variability and change for climate, weather, and natural hazards.

5ESS1 Integrate satellite, suborbital, ground based observations, coupled with laboratory studies and model calculations to assess potential for future ozone depletion in the Arctic. Characterize properties and distributions of clouds and aerosols as they relate to the extinction of solar radiation in the atmosphere. Specific output: first release of validated Aura data. Progress toward achieving outcomes will be validated by external review.

5ESS2 Improve predictive capabilities of regional models using satellite-derived localized temperature and moisture profiles and ensemble modeling. Progress toward achieving outcomes will be validated by external review.

5ESS3 Reduce land cover errors in ecosystem and carbon cycle models, and quantify global terrestrial and marine primary productivity and its interannual variability. Specific output: Produce a multi-year global inventory of fire occurrence and extent. Progress toward achieving outcomes will be validated by external review.

5ESS4 Reduce land cover errors in ecosystem and carbon cycle models, and quantify global terrestrial and marine primary productivity and its interannual variability. Specific Output: Release first synthesis of results from research on the effects of deforestation and agricultural land use in Amazonia. Progress toward achieving outcomes will be validated by external review.

5ESS5 Reduce land cover errors in ecosystem and carbon cycle models, and quantify global terrestrial and marine primary productivity and its interannual variability. Specific output: Improve knowledge of processes affecting carbon flux within the coastal zone, as well as sources and sinks of aquatic carbon, to reduce uncertainty in North American carbon models. Progress toward achieving outcomes will be validated by external review.

5ESS6 Enhance land surface modeling efforts, which will lead to improved estimates of soil moisture and run-off. Specific output: launch Cloudsat. Progress toward achieving outcomes will be validated by external review.

5ESS7 Assimilate satellite/in situ observations into variety of ocean, atmosphere, and ice models for purposes of state estimation; provide experimental predictions on variety of climatological timescales; determine plausibility of these predictions using validation strategies. Specific output: documented assessment of relative impact of different climate forcings on long-term climate change and climate sensitivities to those various forcings.

5ESS8 Assimilate satellite/in situ observations into variety of ocean, atmosphere, and ice models for purposes of state estimation; provide experimental predictions on variety of climatological timescales; determine plausibility of these predictions using validation strategies. Specific output: An assimilated product of ocean state on a quarter degree grid.

5ESS9 Advance understanding of surface change through improved geodetic reference frame, estimates of mass flux from satellite observations of Earth's gravitational and magnetic fields, and airborne and spaceborne observations of surface height and deformation. Progress toward achieving outcomes will be validated by external review.

NASA Objective 15: Explore the Sun-Earth system to understand the Sun and its effects on Earth, the solar system, and the space environmental conditions that will be experienced by human explorers, and demonstrate technologies that can improve future operational systems.

Outcome 15.1: Develop the capability to predict solar activity and the evolution of solar disturbances as they propagate in the heliosphere and affect Earth.

5SEC2 Successfully complete Solar Dynamics Observatory (SDO) Critical Design Review (CDR).

5SEC3 Successfully complete THEMIS Critical Design Review (CDR).

5SEC6 Successfully demonstrate progress in developing the capability to predict solar activity and the evolution of solar disturbances as they propagate in the heliosphere and affect the Earth. Progress towards achieving outcomes will be validated by external review.

Outcome 15.2: Specify and enable prediction of changes to the Earth's radiation environment, ionosphere, and upper atmosphere.

5SEC4 Complete Announcement of Opportunity (AO) Selection for Geospace Missions far ultraviolet Imager.

5SEC7 Successfully demonstrate progress in specifying and enabling prediction of changes to the Earth's radiation environment, ionosphere, and upper atmosphere. Progress towards achieving outcomes will be validated by external review.

Outcome 15.3: Understand the role of solar variability in driving space climate and global change in Earth's atmosphere.

5SEC8 Successfully demonstrate progress in understanding the role of solar variability in driving space climate and global change in the Earth's atmosphere. Progress towards achieving outcomes will be validated by external review.

Outcome 15.4: Understand the structure and dynamics of the Sun and solar wind and the origins of magnetic variability.

5SEC1 Complete Solar Terrestrial Relations Observatory (STEREO) instrument integration.

5SEC9 Successfully demonstrate progress in understanding the structure and dynamics of the Sun and solar wind and the origins of magnetic variability. Progress towards achieving outcomes will be validated by external review.

Outcome 15.5: Determine the evolution of the heliosphere and its interaction with the galaxy.

5SEC10 Successfully demonstrate progress in determining the evolution of the heliosphere and its interaction with the galaxy. Progress towards achieving outcomes will be validated by external review.

Outcome 15.6: Understand the response of magnetospheres and atmospheres to external and internal drivers.

5SEC11 Successfully demonstrate progress in understanding the response of magnetospheres and atmospheres to external and internal drivers. Progress towards achieving outcomes will be validated by external review.

Outcome 15.7: Discover how magnetic fields are created and evolve and how charged particles are accelerated.

5SEC12 Successfully demonstrate progress in discovering how magnetic fields are created and evolve and how charged particles are accelerated. Progress towards achieving outcomes will be validated by external review.

Outcome 15.8: Understand coupling across multiple scale lengths and its generality in plasma systems.

5SEC13 Successfully demonstrate progress in understanding coupling across multiple scale lengths and its generality in plasma systems. Progress towards achieving outcomes will be validated by external review.

NASA Objective 17: Pursue commercial opportunities for providing transportation and other services supporting International Space Station and exploration missions beyond Earth orbit. Separate to the maximum extent practical crew from cargo.

Outcome 17.1: By 2010, provide 80 percent of optimal ISS up-mass, down-mass, and crew availability using non-Shuttle crew and cargo services.

5ISS7 Baseline a strategy and initiate procurement of cargo delivery service to the ISS.

NASA Objective 18: Use U.S. commercial space capabilities and services to fulfill NASA requirements to the maximum extent practical and continue to involve, or increase the involvement of, the U.S. private sector in design and development of space systems.

Outcome 18.1: On an annual basis, develop an average of at least five new agreements per NASA Field Center with the Nation's industrial and other sectors for transfer out of NASA developed technology.

5HRT18 Complete 50 technology transfer agreements with the U.S. private sector for the transfer of NASA technologies, through hardware licenses, software usage agreements, facility usage agreements or Space Act Agreements.

Efficiency Measures

Solar System Exploration

5SSE15 Complete all development projects within 110% of the cost and schedule baseline.

5SSE16 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

5SSE17 At least 80%, by budget, of research projects will be peer-reviewed and competitively awarded.

5LE8 The Robotic Lunar Exploration Program will distribute at least 80% of its allocated procurement funding to competitively awarded contracts.

The Universe

5ASO13 Complete all development projects within 110% of the cost and schedule baseline.

5ASO14 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

5ASO15 At least 80%, by budget, of research projects will be peer-reviewed and competitively awarded.

Earth-Sun System

5SEC14 Complete all development projects within 110% of the cost and schedule baseline.

5SEC15 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

5SEC16 At least 80%, by budget, of research projects will be peer-reviewed and competitively awarded.

Constellation Systems

5TS6 Distribute at least 80% of allocated procurement funding to competitively awarded contracts, including continuing and new contract activities.

Exploration Systems Research and Technology

5HRT15 Distribute at least 80% of allocated procurement funding to competitively awarded contracts, including continuing and new contract activities.

Human Systems Research and Technology

5BSR18 Complete all development projects within 110% of the cost and schedule baseline.

5BSR19 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

5BSR20 At least 80%, by budget, of research projects will be peer-reviewed and competitively awarded.

Aeronautics Technology

5AT28 This Theme will complete 90% of the major milestones planned for FY 2005.

Education Programs

5ED19 At least 80%, by budget, of research projects will be peer-reviewed and competitively awarded.

International Space Station

5ISS8 Complete all development projects within 110% of the cost and schedule baseline.

5ISS9 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

Space Shuttle

5SSP4 Complete all development projects within 110% of the cost and schedule baseline.

5SSP5 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

Space and Flight Support

5SFS21 Complete all development projects within 110% of the cost and schedule baseline.

5SFS22 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

Deleted Annual Performance Goals in FY 2005

The following goals have been deleted due to termination of projects not required to support NASA's new exploration activities.

5RPFS1 Implement SPD realignment plan by establishing three partnerships between SPD and other divisions of OBPR.

5RPFS2 Involve RPC industrial partners in at least one new project that directly benefits NASA's mission.

5RPFS3 Based on present manifest, begin on-orbit containerless processing of new ceramic materials using Space-DRUMS hardware installed on ISS.

5PSR1 Develop a multi-agency collaboration for research at the interface between the physical and life sciences, and enhance collaborative efforts with other agencies and the private sector on biotechnology, materials research, and optical diagnostics for health research.

5PSR2 Continue a productive ground and flight-based research program in Combustion, Fluid Physics, Biotechnology, and Materials science, and carry out the milestones for all ISS research projects.

5PSR3 Publish the results of STS-107 investigations based on available data in microgravity combustion research, and maintain a productive ground and flight-based program in fundamental and strategic combustion and reactive flows research.

5RPFS7 Develop a prototype system based on one new enabling technology to improve the safety of space transportation systems.

5BSR1 Solicit ground-based research on three widely studied model organisms.

5BSR2 Implement a tactical plan for plant research and solicit studies appropriate to that plan on at least two model plant species.

5BSR3 Solicit ground-based research on responses of cells and pathogens to space environments.

5BSR4 Initiate intra- and interagency programs to study microbial ecology and evolution.

5BSR5 Develop selected flight research experiments on two model organisms in coordination with research teams for identified flight opportunities.

5BSR6 Align reprioritized fundamental biology flight experiments with available hardware and hardware development.

5PSR4 Continue flight and ground-based research in colloidal physics and soft-condensed matter, and accomplish the project milestones for the ISS research program in fluid physics.

5PSR5 Continue the development of the ISS fundamental physics facility for low temperature and condensed matter physics, and maintain a productive ground-based research program in condensed matter physics.

5PSR6 Continue the development of the ISS laser cooling and atomic facility by accomplishing the project milestones, and maintain an innovative and outstanding ground research program in atomic and gravitational physics.

5PSR7 Continue the development of the ISS Biotechnology Facility and maintain a productive and innovative ground and space research program in cellular biotechnology and tissue engineering.

5RPFS8 Through collaboration with PAO, establish and sustain a series of media briefings highlighting OBPR research.

5BSR15 Maintain a completed, productive, peer-reviewed ground-based research program in appropriate fundamental biology disciplines to lay the groundwork for advanced understanding of the role of gravity in biological processes associated with the human health risk of space flight.

5BSR16 Initiate a nanosatellite program for in-situ analytical technology for producing the fundamental biological understanding necessary for countermeasure development.

5PSR8 Continue Strategic ground-based research in microgravity heat-exchange multi-phase systems and advance existing flight projects toward flight.

FY 2006 Performance Plan

With the release of the FY 2006 Budget request, NASA has identified 18 new Strategic Objectives that define what the Agency has been asked to accomplish in support of *The Vision for Space Exploration*. This table provides a summary of all of the commitments identified by each of the 12 Themes in the preceding sections.

NASA Objective 1: Undertake robotic and human lunar exploration to further science and to develop and test new approaches, technologies, and systems to enable and support sustained human and robotic exploration of Mars and more distant destinations. The first robotic mission will be no later than 2008.

Outcome 1.1: By 2008, conduct the first robotic lunar testbed mission.

6SSE1 Complete Lunar Reconnaissance Orbiter (LRO) Preliminary Design Review (PDR).

NASA Objective 2: Conduct robotic exploration of Mars to search for evidence of life, to understand the history of the solar system, and to prepare for future human exploration.

Outcome 2.1: Characterize the present climate of Mars and determine how it has evolved over time.

6SSE15 Successfully demonstrate progress in characterizing the present climate of Mars and determining how it has evolved over time. Progress toward achieving outcomes will be validated by external expert review.

Outcome 2.2: Understand the history and behavior of water and other volatiles on Mars.

6SSE16 Successfully demonstrate progress in understanding the history and behavior of water and other volatiles on Mars. Progress toward achieving outcomes will be validated by external expert review.

Outcome 2.3: Understand the chemistry, mineralogy, and chronology of Martian materials.

6SSE17 Successfully demonstrate progress in understanding the chemistry, mineralogy, and chronology of Martian materials. Progress toward achieving outcomes will be validated by external expert review.

6SSE23 Complete successful Martian orbit insertion for Mars Reconnaissance Orbiter (MRO).

Outcome 2.4: Determine the characteristics and dynamics of the interior of Mars.

6SSE18 Successfully demonstrate progress in determining the characteristics and dynamics of the interior of Mars. Progress toward achieving outcomes will be validated by external expert review.

Outcome 2.5: Understand the character and extent of prebiotic chemistry on Mars.

6SSE19 Successfully demonstrate progress in understanding the character and extent of prebiotic chemistry on Mars. Progress toward achieving outcomes will be validated by external expert review.

6SSE24 Complete 2009 Mars Telecommunications Orbiter (MTO) Preliminary Design Review (PDR).

Outcome 2.6: Search for chemical and biological signatures of past and present life on Mars.

6SSE20 Successfully demonstrate progress in searching for chemical and biological signatures of past and present life on Mars. Progress toward achieving outcomes will be validated by external expert review.

6SSE25 Complete Mars Science Laboratory Preliminary Design Review (PDR).

Outcome 2.7: Identify and understand the hazards that the Martian environment will present to human explorers.

6SSE21 Successfully demonstrate progress in identifying and understanding the hazards that the Martian environment will present to human explorers. Progress toward achieving outcomes will be validated by external expert review.

Outcome 2.8: Inventory and characterize Martian resources of potential benefit to human exploration of Mars.

6SSE22 Successfully demonstrate progress in inventorying and characterizing Martian resources of potential benefit to human exploration on Mars. Progress toward achieving outcomes will be validated by external expert review.

NASA Objective 3: Conduct robotic exploration across the solar system for scientific purposes and to support human exploration. In particular, explore Jupiter's moons, asteroids and other bodies to search for evidence of life, to understand the history of the solar system, and to search for resources.

Outcome 3.1: Understand the initial stages of planet and satellite formation.

6SSE7 Successfully demonstrate progress in understanding the initial stages of planet and satellite formation. Progress toward achieving outcomes will be validated by external expert review.

6SSE26 Successfully return Stardust science samples to Earth.

Outcome 3.2: Understand the processes that determine the characteristics of bodies in our solar system and how these processes operate and interact.

6SSE8 Successfully demonstrate progress in understanding the processes that determine the characteristics of bodies in our solar system and how these processes operate and interact. Progress toward achieving outcomes will be validated by external expert review.

Outcome 3.3: Understand why the terrestrial planets are so different from one another.

6SSE9 Successfully demonstrate progress in understanding why the terrestrial planets are so different from one another. Progress toward achieving outcomes will be validated by external expert review.

6SSE27 Successfully launch Dawn spacecraft.

6SSE28 Successfully complete MESSENGER flyby of Venus.

Outcome 3.4: Learn what our solar system can tell us about extra-solar planetary systems.

6SSE10 Successfully demonstrate progress in learning what our solar system can tell us about extra-solar planetary systems. Progress toward achieving outcomes will be validated by external expert review.

Outcome 3.5: Determine the nature, history, and distribution of volatile and organic compounds in the solar system.

6SSE11 Successfully demonstrate progress in determining the nature, history, and distribution of volatile and organic compounds in the solar system. Progress toward achieving outcomes will be validated by external expert review.

Outcome 3.6: Identify the habitable zones in the solar system.

6SSE12 Successfully demonstrate progress in identifying the habitable zones in the solar system. Progress toward achieving outcomes will be validated by external expert review.

Outcome 3.7: Identify the sources of simple chemicals that contribute to pre-biotic evolution and the emergence of life.

6SSE13 Successfully demonstrate progress in identifying the sources of simple chemicals that contribute to pre-biotic evolution and the emergence of life. Progress toward achieving outcomes will be validated by external expert review.

Outcome 3.8: Study Earth's geologic and biologic records to determine the historical relationship between Earth and its biosphere.

6SSE14 Successfully demonstrate progress in studying Earth's geologic and biologic records to determine the historical relationship between Earth and its biosphere. Progress toward achieving outcomes will be validated by external expert review.

Outcome 3.9: By 2008, inventory at least 90 percent of asteroids and comets larger than one kilometer in diameter that could come near Earth.

6SSE5 Successfully demonstrate progress in determining the inventory and dynamics of bodies that may pose an impact hazard to Earth. Progress toward achieving outcomes will be validated by external expert review.

Outcome 3.10: Determine the physical characteristics of comets and asteroids relevant to any threat they may pose to Earth.

6SSE6 Successfully demonstrate progress in determining the physical characteristics of comets and asteroids relevant to any threat they may pose to Earth. Progress toward achieving outcomes will be validated by external expert review.

NASA Objective 4: Conduct advanced telescope searches for Earth-like planets and habitable environments around the stars.

Outcome 4.1: Learn how the cosmic web of matter organized into the first stars and galaxies and how these evolved into the stars and galaxies we see today.

6UNIV17 Successfully demonstrate progress in learning how the cosmic web of matter organized into the first stars and galaxies and how these evolved into the stars and galaxies we see today. Progress toward achieving outcomes will be validated by external expert review.

6UNIV20 Complete James Webb Space Telescope (JWST) Mission Preliminary Design Review (PDR).

Outcome 4.2: Understand how different galactic ecosystems of stars and gas formed and which ones might support the existence of planets and life.

6UNIV1 Successfully demonstrate progress in understanding how different galactic ecosystems of stars and gas formed and which ones might support the existence of planets and life. Progress toward achieving outcomes will be validated by external expert review.

Outcome 4.3: Learn how gas and dust become stars and planets.

6UNIV2 Successfully demonstrate progress in learning how gas and dust become stars and planets. Progress toward achieving outcomes will be validated by external expert review.

6UNIV18 Complete Stratospheric Observatory for Infrared Astronomy (SOFIA) Airworthiness Flight Testing.

Outcome 4.4: Observe planetary systems around other stars and compare their architectures and evolution with our own.

6UNIV3 Successfully demonstrate progress in observing planetary systems around other stars and comparing their architectures and evolution with our own. Progress toward achieving outcomes will be validated by external expert review.

Outcome 4.5: Characterize the giant planets orbiting other stars.

6UNIV4 Successfully demonstrate progress in characterizing the giant planets orbiting other stars. Progress toward achieving outcomes will be validated by external expert review.

Outcome 4.6: Find out how common Earth-like planets are and see if any might be habitable.

6UNIV5 Successfully demonstrate progress in determining how common Earth-like planets are and whether any might be habitable. Progress toward achieving outcomes will be validated by external expert review.

6UNIV21 Begin Kepler Spacecraft Integration and Test (I&T).

Outcome 4.7: Trace the chemical pathways by which simple molecules and dust evolve into the organic molecules important for life.

6UNIV6 Successfully demonstrate progress in tracing the chemical pathways by which simple molecules and dust evolve into the organic molecules important for life. Progress toward achieving outcomes will be validated by external expert review.

Outcome 4.8: Develop the tools and techniques to search for life on planets beyond our solar system.

6UNIV7 Successfully demonstrate progress in developing the tools and techniques to search for life on planets beyond our solar system. Progress toward achieving outcomes will be validated by external expert review.

NASA Objective 5: Explore the universe to understand its origin, structure, evolution, and destiny.

Outcome 5.1: Search for gravitational waves from the earliest moments of the Big Bang.

6UNIV8 Successfully demonstrate progress in searching for gravitational waves from the earliest moments of the Big Bang. Progress toward achieving outcomes will be validated by external expert review.

Outcome 5.2: Determine the size, shape, and matter-energy content of the universe.

6UNIV9 Successfully demonstrate progress in determining the size, shape, and matter-energy content of the Universe. Progress toward achieving outcomes will be validated by external expert review.

Outcome 5.3: Measure the cosmic evolution of dark energy.

6UNIV10 Successfully demonstrate progress in measuring the cosmic evolution of dark energy. Progress toward achieving outcomes will be validated by external expert review.

Outcome 5.4: Determine how black holes are formed, where they are, and how they evolve.

6UNIV11 Successfully demonstrate progress in determining how black holes are formed, where they are, and how they evolve. Progress toward achieving outcomes will be validated by external expert review.

Outcome 5.5: Test Einstein's theory of gravity and map space-time near event horizons of black holes.

6UNIV12 Successfully demonstrate progress in testing Einstein's theory of gravity and mapping space-time near event horizons of black holes. Progress toward achieving outcomes will be validated by external expert review.

Outcome 5.6: Observe stars and other material plunging into black holes.

6UNIV13 Successfully demonstrate progress in observing stars and other material plunging into black holes. Progress toward achieving outcomes will be validated by external expert review.

Outcome 5.7: Determine how, where, and when the chemical elements were made, and trace the flows of energy and magnetic fields that exchange them between stars, dust, and gas.

6UNIV14 Successfully demonstrate progress in determining how, where, and when the chemical elements were made, and in tracing the flows of energy and magnetic fields that exchange them between stars, dust, and gas. Progress toward achieving outcomes will be validated by external expert review.

Outcome 5.8: Explore the behavior of matter in extreme astrophysical environments, including disks, cosmic jets, and the sources of gamma-ray bursts and cosmic rays.

6UNIV15 Successfully demonstrate progress in exploring the behavior of matter in extreme astrophysical environments, including disks, cosmic jets, and the sources of gamma-ray bursts and cosmic rays. Progress toward achieving outcomes will be validated by external expert review.

6UNIV19 Complete Gamma-ray Large Area Space Telescope (GLAST) Spacecraft Integration and Test (I&T).

Outcome 5.9: Discover how the interplay of baryons, dark matter, and gravity shapes galaxies and systems of galaxies.

6UNIV16 Successfully demonstrate progress in discovering how the interplay of baryons, dark matter, and gravity shapes galaxies and systems of galaxies. Progress toward achieving outcomes will be validated by external expert review.

NASA Objective 6: Return the Space Shuttle to flight and focus its use on completion of the International Space Station, complete assembly of the ISS, and retire the Space Shuttle in 2010, following completion of its role in ISS assembly. Conduct ISS activities consistent with U.S. obligations to ISS partners.

Outcome 6.1: Assure public, flight crew, and workforce safety for all Space Shuttle operations, and safely meet the manifest and flight rate commitment through completion of Space Station assembly.

6SSP1 Achieve zero Type A (damage to property at least $1M or death) or Type B (damage to property at least $250K or permanent hospitalization of three or more persons) mishaps in 2006.

Outcome 6.2: Provide safe, well-managed and 95 percent reliable space communications, rocket propulsion testing, and launch services to meet Agency requirements.

6SFS1 Establish the Agency-wide baseline space communications architecture, including a framework for possible deep space and near Earth laser communications services.

6SFS2 Maintain NASA success rate at or above a running average of 95 percent for missions on the FY 2005 Expendable Launch Vehicle (ELV) manifest.

6SFS3 Achieve at least 95 percent of planned data delivery for the International Space Station, each Space Shuttle mission, and low Earth orbiting missions for FY 2005.

6SFS4 Define and provide space transportation requirements for future human and robotic exploration and development of space to all NASA and other government agency programs pursuing improvements in space transportation.

NASA Objective 7: Develop a new crew exploration vehicle to provide crew transportation for missions beyond low Earth orbit. First test flight to be by the end of this decade, with operational capability for human exploration no later than 2014.

Outcome 7.1: By 2014, develop and flight-demonstrate a human exploration vehicle that supports safe, affordable and effective transportation and life support for human crews traveling from the Earth to destinations beyond LEO.

6CS1 Conduct the Earth Orbit Capability (Spiral 1) Systems Requirements Review to define detailed interface requirements for the Crew Exploration Vehicle, the Crew Launch Vehicle, and supporting ground and in-space systems.

6CS2 Competitively award contract(s) for Phase A and Phase B design and flight demonstration of the Crew Exploration Vehicle.

6CS3 Develop detailed Crew Launch Vehicle design and operational modifications to support human rating and exploration mission architecture requirements.

6CS4 Develop a plan for systems engineering and integration of the exploration System of Systems; clearly defining systems and organizational interfaces, management processes, and implementation plans.

NASA Objective 8: Focus research and use of the ISS on supporting space exploration goals, with emphasis on understanding how the space environment affects human health and capabilities, and developing countermeasures.

Outcome 8.1: By 2010 complete assembly of the ISS, including U.S. components that support U.S. space exploration goals and those provided by foreign partners.

6ISS1 Reach agreement among the International Partners on the final ISS configuration.

Outcome 8.2: Annually provide 90 percent of the optimal on-orbit resources available to support research, including power, data, crew time, logistics, and accommodations.

6ISS3 Provide 80 percent of FY 2006 planned on-orbit resources and accommodations to support research, including power, data, crew time, logistics and accommodations.

6ISS4 For FY 2006 ensure 90 percent functional availability for all ISS subsystems that support on-orbit research operations.

Outcome 8.3: Reduce crew downtime due to health-related reasons during space flight missions.

6SFS5 Achieve a 5 percent reduction in downtime.

Outcome 8.5: By 2008, develop and test the following candidate countermeasures to ensure the health of humans traveling in space: bisphosphonates, potassium citrate, and mitodrine.

6SFS6 Certify medical fitness of all crew members before launch.

6HSRT9 Complete renal stone countermeasure development.

6HSRT10 Start testing of bone and cardiovascular countermeasures in space.

Outcome 8.6: By 2008, reduce the uncertainties in estimating radiation risks by one-half.

6HSRT11 Deliver report from National Council on Radiation Protection and Measurements on lunar radiation protection requirements.

Outcome 8.7: By 2010, identify and test technologies to reduce total mass requirements for life support by two thirds using current ISS mass requirement baseline.

6HSRT13 Start validation testing of a spacecraft water purification system called the Vapor Phase Catalytic Ammonia Removal Unit.

6HSRT14 Define requirements for the Condensing Heat Exchanger Flight experiment focused on improving space condenser reliability.

6HSRT15 Complete and deliver for launch the ISS Fluids Integrated Rack.

6HSRT16 Complete and deliver for launch experiments to explore new lightweight heat rejection technologies.

6HSRT17 Start technology testing and assessment of the Solid Waste Compaction processor.

6HSRT18 Conduct next generation lithium hydroxide (LiOH) packaging tests to improve carbon dioxide removal efficiency.

6HSRT19 Conduct ground testing of the Sabatier unit to demonstrate reliability in recovering oxygen and water from carbon dioxide.

Outcome 8.8: By 2008, develop a predictive model and prototype systems to double improvements in radiation shielding efficiency.

6HSRT20 Complete physics database for shielding in region above 2 GeV per nucleon.

NASA Objective 9: Conduct the first extended human expedition to the lunar surface as early as 2015, but no later than 2020.

NASA Objective 10: Conduct human expeditions to Mars after acquiring adequate knowledge about the planet using robotic missions and after successfully demonstrating sustained human exploration missions to the Moon.

NASA Objective 11: Develop and demonstrate power generation, propulsion, life support, and other key capabilities required to support more distant, more capable, and/or longer duration human and robotic exploration of Mars and other destinations.

Outcome 11.1: By 2010, develop new, reliable spacecraft technologies to detect fire and monitor air and water for contamination.

6HSRT3 Demonstrate the ability of the advanced spacecraft air monitoring system to detect 90 percent of the high-priority air contaminants in ground testing.

6HSRT4 Demonstrate the ability of the hand-held water monitoring system to detect spacecraft water biocides and high-priority metal contaminants in ground testing.

6HSRT5 Support development of a new generation of reliable spacecraft smoke detectors by finishing measurements of ISS background particulates using the DAFT experiment and delivering for launch the Smoke and Aerosol Measurement Experiment (SAME).

Outcome 11.2: By 2010, develop methods to quantify material flammability and fire signatures in reduced gravity.

6HSRT6 Complete and deliver for launch the ISS Combustion Integrated Rack (CIR).

6HSRT7 Complete and deliver for launch the Droplet Flame Extinguishment in Microgravity Experiment aimed at quantifying fire suppressant effectiveness.

6HSRT8 Develop a revised space materials flammability characterization test method and update NASA-STD-6001 accordingly.

Outcome 11.3: By 2015, identify, develop, and validate human-robotic capabilities required to support human-robotic lunar missions.

6ESRT5 Validate the ESMD research and technology development needs and opportunities by implementing a Quality Function Deployment process, and use the results to guide ESR&T program investment decisions.

6ESRT6 Develop and analyze affordable architectures for human and robotic exploration system and mission options using innovative approaches such as modular systems, in-space assembly, pre-positioning of logistics, and utilization of in-situ resources.

Outcome 11.4: By 2015, identify and execute a research and development program to develop technologies critical to support human-robotic lunar missions.

6ESRT4 Design and test technologies for in situ resource utilization that can enable more affordable and reliable space exploration by reducing required launch mass from Earth, and by reducing risks associated with logistics chains that supply consumables and other materials. Technology development includes excavation systems, volatile material extraction systems, and subsystems supporting lunar oxygen and propellant production plants.

6ESRT7 Identify and define technology flight experiment opportunities to validate the performance of critical technologies for exploration missions.

Outcome 11.5: By 2016, develop and demonstrate in-space nuclear fission-based power and propulsion systems that can be integrated into future human and robotic exploration missions.

6PROM1 Following completion of the Prometheus Analysis of Alternatives, complete space nuclear reactor conceptual design.

6PROM2 Verify and validate the minimum functionality of initial nuclear electric propulsion (NEP) spacecraft capability.

6PROM3 Complete component level tests and assessments of advanced power conversion systems.

Outcome 11.6: Develop and deliver one new critical technology every two years in each of the following disciplines: in-space computing, space communications and networking, sensor technology, modular systems, robotics, power, and propulsion.

6ESRT1 Identify and test technologies to enable affordable pre-positioning of logistics for human exploration missions. Technology development includes high power electric thrusters and high efficiency solar arrays for solar electric transfer vehicles, and lightweight composite cryotanks and zero boil-off thermal management for in-space propellant depots.

6ESRT2 Identify and test technologies to enable in-space assembly, maintenance, and servicing. Technology development includes modular truss structures, docking mechanisms, micro-spacecraft inspector, intelligent robotic manipulators, and advanced software approaches for telerobotic operations.

6ESRT3 Identify and test technologies to reduce mission risk for critical vehicle systems, supporting infrastructure, and mission operations. Technology development includes reconfigurable and radiation tolerant computers, robust electronics for extreme environments, reliable software, and intelligent systems health management.

6ESRT8 Identify and test technologies to reduce the costs of mission operations. Technology development includes autonomous and intelligent systems, human-automation interaction, multi-agent teaming, and space communications and networking.

Outcome 11.7: Promote and develop innovative technology partnerships, involving each of NASA's major R&D programs, among NASA, U.S. industry, and other sectors for the benefit of Mission Directorate needs.

6ESRT9 Complete 50 technology transfer agreements with the U.S. private sector for transfer of NASA technologies, hardware licenses, software usage agreements, facility usage agreements or Space Act Agreements.

6ESRT10 Develop 40 industry partnerships that will add value to NASA missions.

6ESRT11 Establish at least twelve new partnerships with major ESMD R&D programs or other NASA organizations.

Outcome 11.8: Annually facilitate the award of venture capital funds or Phase III contracts to no less than two percent of NASA-sponsored Small Business Innovation Research Phase II firms to further develop or produce their technology for industry or government agencies.

6ESRT12 Award Phase III contracts or venture capital funds to 4 SBIR firms to further develop or produce technology for U.S. industry or government agencies.

Outcome 11.9: By 2010, develop and test Extravehicular Activity (EVA) space and surface suit technologies for use on crewed exploration missions.

6HSRT1 Complete the technology trade studies for both the in-space and surface EVA suits.

6HSRT2 Complete the system requirements review for both the in-space and surface exploration EVA suits.

NASA Objective 12: Provide advanced aeronautical technologies to meet the challenges of next generation systems in aviation, for civilian and scientific purposes, in our atmosphere and in atmospheres of other worlds.

Outcome 12.2: Develop and validate technologies (by 2009) that would enable a 35 percent reduction in the vulnerabilities of the National Airspace System (as compared to the 2003 air transportation system).

6AT1 Security system concepts defined that provide reduced vulnerability from intentional attacks, including protected asset flight system concept of operation, evaluation of information distribution vulnerabilities, evaluation of strategy for aircraft damage emulation, definition of fuel flammability needs, identification of key environmental background for on-board sensing, and requirements for processing of large security related databases. (AvSSP)

6AT2 Complete the assessment of the Security Program technology portfolio with regard to risks, costs, and benefits and project the impact of the technologies on reducing the vulnerability of the air transportation system. (AvSSP)

Outcome 12.3: Develop and validate technologies that would enable a 10-decibel reduction in aviation noise (from the level of 1997 subsonic aircraft) by 2009.

6AT8 Downselect components for noise reduction that will be validated in a relevant environment to verify their potential to achieve 4 dB noise reduction. (VSP)

Outcome 12.4: By 2010, flight demonstrate an aircraft that produces no CO_2 or NOx to reduce smog and lower atmospheric ozone.

6AT11 Complete trade study of unconventional propulsion concepts for a zero-emissions vehicle. (VSP)

Outcome 12.6: Develop and validate technologies (by 2009) that would enable a doubling of the capacity of the National Airspace Systems (from the 1997 NASA utilization).

6AT5 Conduct successful operational demonstration of multifacility time-based metering in complex airspace. (ASP)

6AT6 Complete development of system-wide evaluation and planning tool. (ASP)

6AT7 Successfully complete the SATS integrated technology demonstration and final assessment. (ASP)

Outcome 12.7: Develop and validate technologies (by 2010) that would enable a 70 percent reduction in the aircraft fatal accident rate (from the average of accident statistics for U.S. Civil Aviation for the period 1991 - 1996).

6AT3 Evaluate and prioritize NASA's aviation safety technology portfolio to determine the impact on the National Airspace System. (AvSSP)

6AT4 In partnership with the FAA, the Commercial Aviation Safety Team (CAST), and the aviation community, provide an initial demonstration of a voluntary aviation safety information sharing process. (AvSSP)

Outcome 12.8: Develop and validate technologies that would increase the capabilities of uninhabited aerial vehicles in terms of duration, altitude, autonomy, and payload.

6AT10 Demonstrate a HALE ROA reconfigurable flight control architecture. (VSP)

Outcome 12.10: By 2008, develop and demonstrate technologies required for routine Unmanned Aerial Vehicle operations in the National Airspace System above 18,000 feet for High-Altitude, Long-Endurance (HALE) UAVs.

6AT9 Propose policy changes to the FAA that would permit routine operation of HALE ROA above 40,000 feet. (VSP)

NASA Objective 13: Use NASA missions and other activities to inspire and motivate the Nation's students and teachers, to engage and educate the public, and to advance the scientific and technological capabilities of the Nation.

Outcome 13.1: Make available NASA-unique strategies, tools, content, and resources supporting the K-12 education community's efforts to increase student interest and academic achievement in science, technology, engineering, and mathematics disciplines.

6ED1 Conduct 12 Educator Astronaut workshops, involving approximately 240 educators. (Elementary/2nd-Ed)

6ED2 Select approximately 150 student experiments, involving approximately 1,500 students, to participate in the Flight Projects program. (Elementary/2nd-Ed)

Outcome 13.2: Attract and prepare students for NASA-related careers, and enhance the research competitiveness of the Nation's colleges and universities by providing opportunities for faculty and university-based research.

6ED3 Award approximately 1,500 competitive scholarships, fellowships, and research opportunities for higher education students and faculty in STEM disciplines. (Higher-Ed)

6ED4 Complete a retrospective longitudinal study of student participants to determine the degree to which participants entered the NASA workforce or other NASA-related career fields. (Higher-Ed)

6ED5 Collect, analyze, and report longitudinal data on student participants to determine the degree to which participants enter the NASA workforce or other NASA-related career fields. (Higher-Ed)

Outcome 13.3: Attract and prepare underrepresented and underserved students for NASA-related careers, and enhance competitiveness of minority-serving institutions by providing opportunities for faculty and university- and college-based research.

6ED6 Award approximately 1,100 competitive scholarships, internships, fellowships, and research opportunities for underrepresented and underserved students, teachers and faculty in STEM disciplines. (MUREP)

6ED7 Provide approximately 350 grants to enhance the capability of approximately 100 underrepresented and underserved colleges and universities to compete for and conduct basic or applied NASA-related research. (MUREP)

6ED8 Select and support 50 additional schools to participate in the NASA Explorer Schools program, maintaining the total number at 150. (MUREP)

Outcome 13.4: Develop and deploy technology applications, products, services, and infrastructure that would enhance the educational process for formal and informal education.

6ED9 Digitize and meta-tag up to 10 percent of NASA's approved learning materials to be delivered using technology-enabled learning systems. (e-Ed)

Outcome 13.5: Establish the forum for informal education community efforts to inspire the next generation of explorers and make available NASA-unique strategies, tools, content, and resources to enhance their capacity to engage in science, technology, engineering, and mathematics education.

6ED10 Award competitive grants to NASA Centers and informal education partners to conduct up to 15 Explorer Institute workshops. (Informal-Ed)

NASA Objective 14: Advance scientific knowledge of the Earth system through space-based observation, assimilation of new observations, and development and deployment of enabling technologies, systems, and capabilities including those with the potential to improve future operational systems.

Outcome 14.1: Transfer 30 percent of NASA developed research results and observations to operational agencies.

6ESS1 For current observations, reduce the cost of acquiring and distributing the data stream to facilitate adoption by the operational community.

6ESS20 Systematically continue to transfer research results from spacecraft, instruments, data protocols, and models to NOAA and other operational agencies as appropriate.

Outcome 14.2: Develop and deploy advanced observing capabilities to help resolve key Earth system science questions.

6ESS3 Keep 90 percent of the total on-orbit instrument complement functional throughout the year.

6ESS4 Mature two to three technologies to the point they can be demonstrated in space or in an operational environment and annually advance 25 percent of funded technology developments one Technology Readiness level (TRL).

6ESS22 Complete Global Precipitation Mission (GPM) Confirmation Review.

6ESS23 Complete Operational Readiness Review for the NPOESS Preparatory Project (NPP).

Outcome 14.3: Develop and implement an information systems architecture that facilitates distribution and use of Earth science data.

6ESS5 Increase the number of distinct users of NASA data and services.

6ESS6 Improve level of customer satisfaction as measured by a baselined index obtained through the use of annual surveys.

Outcome 14.4: Use space-based observations to improve understanding and prediction of Earth system variability and change for climate, weather, and natural hazards.

6ESS7 Demonstrate progress that NASA-developed data sets, technologies and models enhance understanding of the Earth system leading to improved predictive capability in each of the six science focus area roadmaps. Progress toward achieving outcomes will be validated by external review.

6ESS21 Benchmark the assimilation of observations and products in decision support systems serving applications of national priority. Progress will be evaluated by the Committee on Environmental and National Resources.

NASA Objective 15: Explore the Sun-Earth system to understand the Sun and its effects on Earth, the solar system, and the space environmental conditions that will be experienced by human explorers, and demonstrate technologies that can improve future operational systems.

Outcome 15.1: Develop the capability to predict solar activity and the evolution of solar disturbances as they propagate in the heliosphere and affect Earth.

6ESS8 Successfully demonstrate progress in developing the capability to predict solar activity and the evolution of solar disturbances as they propagate in the heliosphere and affect the Earth. Progress toward achieving outcomes will be validated by external expert review.

6ESS16 Successfully launch the Solar Terrestrial Relations Observatory (STEREO).

Outcome 15.2: Specify and enable prediction of changes to the Earth's radiation environment, ionosphere, and upper atmosphere.

6ESS9 Successfully demonstrate progress in specifying and enabling prediction of changes to the Earth's radiation environment, ionosphere, and upper atmosphere. Progress toward achieving outcomes will be validated by external expert review.

Outcome 15.3: Understand the role of solar variability in driving space climate and global change in Earth's atmosphere.

6ESS10 Successfully demonstrate progress in understanding the role of solar variability in driving space climate and global change in the Earth's atmosphere. Progress toward achieving outcomes will be validated by external expert review.

6ESS17 Complete the Solar Dynamics Observatory (SDO) spacecraft structure and begin Integration and Test (I&T).

Outcome 15.4: Understand the structure and dynamics of the Sun and solar wind and the origins of magnetic variability.

6ESS11 Successfully demonstrate progress in understanding the structure and dynamics of the Sun and solar wind and the origins of solar variability. Progress toward achieving outcomes will be validated by external expert review.

6ESS19 Publish Solar Sentinels Science Definition Team Report.

Outcome 15.5: Determine the evolution of the heliosphere and its interaction with the galaxy.

6ESS12 Successfully demonstrate progress in determining the evolution of the heliosphere and its interaction with the galaxy. Progress in achieving outcomes will be validated by external expert review.

Outcome 15.6: Understand the response of magnetospheres and atmospheres to external and internal drivers.

6ESS13 Successfully demonstrate progress in understanding the response of magnetospheres and atmospheres to external and internal drivers. Progress in achieving outcomes will be validated by external expert review.

6ESS18 Initiate Geospace ITM (Ionospheric and Thermospheric Mapper) Phase A studies.

Outcome 15.7: Discover how magnetic fields are created and evolve and how charged particles are accelerated.

6ESS14 Successfully demonstrate progress in discovering how magnetic fields are created and evolve and how charged particles are accelerated. Progress in achieving outcomes will be validated by external expert review.

Outcome 15.8: Understand coupling across multiple scale lengths and its generality in plasma systems.

6ESS15 Successfully demonstrate progress in understanding coupling across multiple scale lengths and its generality in plasma systems. Progress in achieving outcomes will be validated by external expert review.

NASA Objective 16: Pursue opportunities for international participation to support U.S. space exploration goals.

NASA Objective 17: Pursue commercial opportunities for providing transportation and other services supporting International Space Station and exploration missions beyond Earth orbit. Separate to the maximum extent practical crew from cargo.

Outcome 17.1: By 2010, provide 80 percent of optimal ISS up-mass, down-mass, and crew availability using non-Shuttle crew and cargo services.

6ISS2 Down select transportation service providers from FY 2005 ISS Cargo Acquisition RFP.

NASA Objective 18: Use U.S. commercial space capabilities and services to fulfill NASA requirements to the maximum extent practical and continue to involve, or increase the involvement of, the U.S. private sector in design and development of space systems.

Efficiency Measures

Solar System Exploration

6SSE29 Complete all development projects within 110% of the cost and schedule baseline.

6SSE30 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

6SSE31 Peer review and competitively award at least 80%, by budget, of research projects.

6SSE32 Reduce time within which 80% of NRA research grants are awarded, from proposal due date to selection, by 5% per year, with a goal of 130 days.

The Universe

6UNIV22 Complete all development projects within 110% of the cost and schedule baseline.

6UNIV23 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

6UNIV24 Peer review and competitively award at least 80%, by budget, of research projects.

6UNIV25 Reduce time within which 80% of NRA research grants are awarded, from proposal due date to selection, by 5% per year, with a goal of 130 days.

Earth-Sun System

6ESS24 Complete all development projects within 110% of the cost and schedule baseline.

6ESS25 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

6ESS26 Peer review and competitively award at least 80%, by budget, of research projects.

6ESS27 Reduce time within which 80% of NRA research grants are awarded, from proposal due date to selection, by 5% per year, with a goal of 130 days.

Constellation Systems

6CS5 Complete all development projects within 110% of the cost and schedule baseline.

6CS6 Increase annually the percentage of ESR&T and HSR&T technologies transitioned to Constellation Systems programs.

Exploration Systems Research and Technology

6ESRT13 Complete all development projects within 110% of the cost and schedule baseline.

6ESRT14 Peer review and competitively award at least 80%, by budget, of research projects.

6ESRT15 Reduce annually, the time to award competed projects, from proposal receipt to selection.

Prometheus Nuclear Systems and Technology

6PROM4 Complete all development projects within 110% of the cost and schedule baseline.

6PROM5 Reduce annually, the time to award competed projects, from proposal receipt to selection.

Human Systems Research and Technology

6HSRT21 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

6HSRT22 Increase annually, the percentage of grants awarded on a competitive basis.

6HSRT23 Peer review and competitively award at least 80%, by budget, of research projects.

6HSRT24 Reduce time within which 80% of NRA research grants are awarded, from proposal due date to selection, by 5% per year, with a goal of 130 days.

Aeronautics Technology

6AT12 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

6AT13 Increase the annual percentage of research funding subject to external peer review prior to award.

Education Programs

6ED11 Collect, analyze, and report the percentage of grantees that annually report on their accomplishments.

6ED12 Peer review and competitively award at least 80%, by budget, of research projects.

FY 2006 Performance Plan

International Space Station

6ISS5 Complete all development projects within 110% of the cost and schedule baseline.

6ISS6 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

Space Shuttle

6SSP2 Complete all development projects within 110% of the cost and schedule baseline.

6SSP3 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

Space and Flight Support

6SFS7 Complete all development projects within 110% of the cost and schedule baseline.

6SFS8 Deliver at least 90% of scheduled operating hours for all operations and research facilities.

6SFS9 Increase the throughput of the Space Network and NASA Wide Area Network per unit cost on an annual basis.

Document Format

Since the FY 2004 President's Budget submission, NASA has structured its budget by the major Themes, or portfolios, of the Agency. The format is designed to be easy to navigate and to present the costs and benefits of budget items consistently and clearly. The format also integrates the budget request and annual performance plan into one document. The FY 2006 President's Budget submission continues NASA's efforts to make the document increasingly clear and comprehensive.

Budget Levels

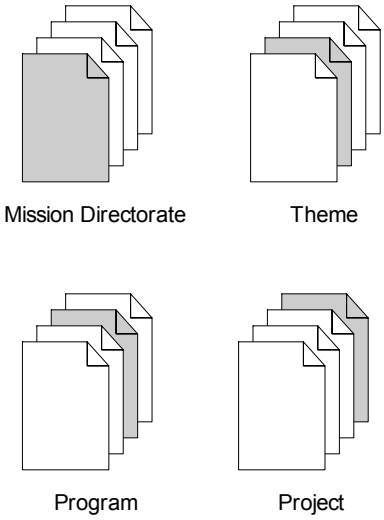
There are four budget levels. At the first level are the Mission Directorates, NASA's primary areas of activity. At the second are Themes, programmatic subdivisions of Mission Directorates that function as program "investment portfolios." At the third level, individual programs within the Themes are discussed. Projects are the fourth level. At each of the four budget levels, the document presents consistent types of information to allow comparison across the budget at that budget level and to facilitate document navigation.

Mission Directorates

Mission Directorate sections provide a summary of each Directorate's purpose, recent and planned accomplishments, and overviews of each of its Themes.

Themes

To facilitate evaluation of the Theme as an investment, this section presents the "business case" for each Theme by displaying the budget request and discussing it in terms of the President's Research and Development Investment Criteria for relevance, quality, and performance. Theme sections include data on the programs that comprise the Theme. Also included are the Theme's performance commitments—the outcomes and annual performance goals that the Theme will accomplish—and information on independent reviews.



Programs

Program descriptions include their plans for FY 2006, schedules of significant projects, major risks, formulation and development schedules, and key participants.

Projects

Additional information for major projects (in formulation or development phases) is provided in the Supplementary Information volume. This information is intended to augment the budget request with additional information including schedule milestones, major acquisitions, risks, and development life-cycle costs.

Acronyms

AA	Associate Administrator
AAA	Algorithms, Architectures, and Applications
AAH	Advanced Animal Habitat
AATT	Advanced Air Transportation Technologies
AC	Advanced Concepts
ACE	Advanced Composition Explorer
ACRT	Accelerated Crucible Rotation Techinque
ACS	Advanced Camera for Surveys (Hubble Space Telescope instrument)
AEDC	Arnold Engineering Development Center
AESP	Aerospace Education Services Program
AFRL	Air Force Research Laboratory
AHMS	Advanced Health Management System
AHST	Advanced Human Support Technology
AIA	Atmospheric Imaging Assembly (Solar Dynamic Observatory instrument)
AIM	Aeronomy of Ice in the Mesosphere
AIRS	Atmospheric Infrared Sounder
AIST	Advanced Information Systems Technology
AMMOS	Advanced Multi-Mission Operations System
AMR	Advanced Microwave Radiometer (Ocean Surface Topography Mission instrument)
AO	Announcement of Opportunity
AOA	Analysis of Alternatives
AOS	Airspace Operations Systems
APG	Annual Performance Goal
APL	Applied Physics Laboratory (Johns Hopkins University)
APS	Advanced Polarimeter Sensor (Glory instrument)
APT	Advanced Platform Technology
AR&D	Automated Rendezvous and Docking
ARC	Ames Research Center
ARMD	Aeronautics Research Mission Directorate
ARTCC	Air Route Traffic Control Center
AS	Airspace Systems
ASEB	Aeronautics and Space Engineering Board
ASI	Agenzia Spaziale Italiana (Italian Space Agency)
ASO	Astronomical Search for Origins (former NASA Theme)
ASP	Airspace Systems Program
AST	Advanced Space Transportation (Program)
ASVM	Aircraft and Systems Vulnerability Mitigation
AT	Aeronautics Technology (Theme)
ATAC	Air Transport Association of Canada
ATC	Air Traffic Control
ATCSCC	Air Traffic Control System Command Center
ATLO	Assembly, Test, Launch Operations
ATM	Air Traffic Management
ATMS	Advanced Technology Microwave Sounder (NPOESS Preparatory Project instrument)
ATS	Air Transportation System
AVC	Advanced Vehicle Concepts
AvSSP	Aviation Safety and Security Program
AWIPS	Advanced Weather Interactive Processing System
BAA	Broad Agency Announcement
BE	Beyond Einstein (Program)
BNL	Brookhaven National Laboratory
BOA	Basic Ordering Agreement
BPRAC	Biological and Physical Science Research Advisory Committee
BPRE	Biological and Physical Research Enterprise (former NASA Enterprise)
BPS	Biomass Production System
BR	Bioastronautics Research
BR&C	Biomedical Research and Countermeasures
BRP	Biological Research Project
BSM	Booster Separation Motors
BVT	Breakthrough Vehicle Technologies
CAASD	Center for Advanced Aviation System Development
CADRE	Crop Assessment Data Retrieval and Evaluation
CAIB	Columbia Accident Investigation Board
CALIPSO	Cloud–Aerosol Lidar and Infrared Pathfinder Satellite Observations
CAM	Centrifuge Accommodations Module
CAN	Cooperative Agreement Notice
CARA	California Association for Research in Astronomy
CARD	Cost Analysis Requirements Document
CAS	Commercial Advisory Subcommittee
CASA	Carnegie, Ames, Stanford Approach
CAST	Commercial Aviation Safety Team
CCAD	Center for Computer-aided Design
CCSP	Climate Change Science Program

Acronyms

CCU	Cell Culture Unit
CDC	Centers for Disease Control
CDE	Cosmic Dust Experiment (Aeronomy of Ice in the Mesosphere instrument)
CDR	Critical Design Review
CE&R	Concept Exploration and Refinement
CENR	Committee on Environment and Natural Resources Research
CEOS	Committee on Earth Observation Satellites
CEV	Crew Exploration Vehicle
CFO	Chief Financial Officer
CHIPS	Cosmic Hot Interstellar Plasma Spectrometer
CHS	Crew Health and Safety
CINDI	Coupled Ion Neutral Dynamics Investigation
CIPA	Curriculum Improvement Partnership Awards
CIPS	Cloud Imaging and Particle Size (Aeronomy of Ice in the Mesosphere instrument)
CIR	Combustion Integrated Rack
CIRA	Cooperative Institute for Research in the Atmosphere
CLV	Crew Launch Vehicle
CMAQ	Community Multiscale and Air Quality
CMB	Cosmic Microwave Background
CME	Coronal Mass Ejection
CNES	Centre Nationale D'Etudes Spatiale (French Space Agency)
CNS	Communication, Navigation, and Surveillance
CO2	Carbon Dioxide
CoF	Construction of Facilities
COMPLEX	Committee on Planetary and Lunar Exploration
CONAE	Argentina's National Committee of Space Activities
CONTOUR	Comet Nucleus Tour
COTF	Classroom of the Future
CPR	Cloud Profiling Radar (Cloudsat instrument)
CQUEST	Carbon Query and Evaluation Support Tools
CrIS	Cross-track Infrared Sounder (an NPOESS Preparatory Project instrument)
CRISM	Compact Reconnaissance Imaging Spectrometer (Mars Reconnaissance Orbiter instrument)
CSA	Canadian Space Agency
CSOC	Consolidated Space Operations Contract
CXO	Chandra X-ray Observatory
CY	Calendar Year
DAA	Deputy Associate Administrator
DAFT	Dust and Aerosol Measurement Facility Test
DARPA	Defense Advanced Research Projects Agency
DART	Demonstration of Autonomous Rendezvous Technology
DEVELOP	Digital Earth Virtual Environment and Learning Outreach Program
DFRC	Dryden Flight Research Facility
DHS	Department of Homeland Security
DI	Deep Impact
DLN	Digital Learning Network
DLR	Deutches Zentrum für Luft- und Raumfahrt (German Aerospace Center)
DoD	Department of Defense
DoE	Department of Energy
DORIS	Doppler Orbitography by Radiopositioning Integrated by Satellite (Ocean Surface Topography Mission instrument)
DoT	Department of Transportation
DPR	Dual-frequency Precipitation Radar (Global Precipitation Mission instrument)
DSMS	Deep Space Mission System
DSN	Deep Space Network
DST	Decision Support Tool
DPR	Dual-Frequency Precipitation Radar
EAS	Efficient Aircraft Spacing
EASI	Efficient Aerodynamic Shapes and Integration
ECLSS	Environmental Control and Life Support System
ECR	Environmental Compliance and Restoration
ECT	Enabling Concepts and Technologies
EDL	Entry, Descent, and Landing
EELV	Evolved Expendable Launch Vehicle
EFI	Electric Field Instrument (Thermal Emission Imaging System instrument)
EFMP	Efficient Flight Path Management
EFPM	Efficient Flight Path Management
EIS	Extreme-ultraviolet Imaging Spectrometer (Solar-B instrument)
ELV	Expendable Launch Vehicle
ELVIS	Expendable Launch Vehicle Integrated Support
EOS	Earth Observing System

Acronyms

EOSDIS	Earth Observing System Data and Information System
EPA	Environmental Protection Agency
EPMC	Enterprise Program Management Council
EPSCoR	Experimental Program to Stimulate Competitive Research
ESA	European Space Agency
ESE	Earth Science Enterprise (former NASA Enterprise)
ESMD	Exploration Systems Mission Directorate
ESMF	Earth Science Model Framework
ESR&T	Exploration Systems Research and Technology (Theme)
ESS	Earth-Sun System (Theme)
ESSD	Earth Sciences and Applications Division (former NASA Theme)
ESSP	Earth System Science Pathfinder
ESTO	Earth Science Technology Office
ESTP	Earth Science Technology Program
ET	External Tank
ETA	External Tank Assembly
ETF	Environmental Test Facility
ETM	Enhanced Thematic Mapper
ETU	Engineering Test Unit
EUMETSAT	European Organization for the Exploitation of Meteorological
EUV	Extreme Ultraviolet
EVA	Extravehicular Activity
EVE	Extreme-ultraviolet Variability Experiment (Solar Dynamics Observatory instrument)
EXPRESS	Expedite the Processing of Experiments to the Space Station
F&SD	Flight and Systems Demonstration
FAA	Federal Aviation Administration
FAD	Formulation Authorization Document
FAST	Fast Auroral Snapshot
FEMA	Federal Emergency Management Agency
FFP	Focal Plane Package (Solar-B instrument)
FFRDCs	Federally Funded Research and Development Centers
FGM	Fluxgate Magnetometer (Thermal Emission Imaging System instrument)
FGS	Fine Guidance Sensor
FIR	Fluids Integrated Rack
FPGA	Field Programmable Gate Array
FPP	Freon Pump Package
FR	Flight Rule
FSB	Fundamental Space Biology (former NASA Theme)
FUSE	Far Ultraviolet Spectroscopic Explorer
FY	Fiscal Year
GAJSC	General Aviation Joint Steering Committee
GALEX	Galaxy Evolution Explorer
GAO	Government Accountability Office
GASMAP	Gas Analyzer System for Metabolic Analysis Physiology
GBM	Gamma-ray Burst Monitor (Gamma-ray Large Area Telescope instrument)
GE	General Electric
GEC	Global Electrodynamics Connection
GHz	Gigahertz
GIS	Geographic Information System
GLAST	Gamma–ray Large Area Space Telescope
GLOBE	Global Learning and Observations to Benefit the Environment
GM	Geospace Missions
GM–ITM	Geospace Mission–Ionosphere–Thermosphere Mapper
GMI	GPM Microwave Imager (Global Precipitation instrument)
GO	Guest Observers
GOES	Geostationary Operational Environmental Satellite
GP–B	Gravity Probe–B
GPM	Global Precipitation Measurement
GPMC	Governing Program Management Council
GPS	Global Positioning System
GPSP	Global Positioning System Payload (Ocean Surface Topography Mission instrument)
GRACE	Gravity Recovery and Climate
GRB	Gamma Ray Burst
GRC	Glenn Research Center
GSFC	Goddard Space Flight Center
GSRP	Graduate Student Research Program
GSS	Ground Support Systems
GSSR	Goldstone Solar System Radar
H&RT	Human and Robotic Technology (former NASA Theme)
HABSOS	Harmful Algae Blooms Observing System
HALE	High-altitude, Long-endurance

Acronyms

HALE-ROA	High-altitude, Long-endurance Remotely Operated Aircraft
HAZUS	Hazards U.S.
HBCU	Historically Black Colleges and Universities
HETE–2	High Energy Transient Explorer
HMI	Helioseismic and Magnetic Imager (Solar Dynamic Observatory instrument)
HMP	Human Measures and Performance
HQ	NASA Headquarters
HRF	Human Research Facility
HRI	High Resolution Imager
HRT	High Resolution Tracker
HSI	Human Systems Integration
HSR&T	Human Systems Research and Technology (Theme)
HST	Hubble Space Telescope
I&T	Integration and Test
IAA	International Academy of Astronautics
IAIPT	Interagency ATM Integrated Product Team
IAT	Independent Assessment Team
IBPD	Integrated Budget and Performance Document
ICAO	International Civil Aviation Organization
IGA	Intergovernmental Agreement
IIR	Imaging Infrared Radiometer (Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations instrument)
IMAGE	Imager for Magnetopause–to–Aurora Global Exploration
IMP-8	Interplanetary Monitoring Platform 8
IMPACT	In-situ Measurements of Particles and CME Transients (Solar Terrestrial Relations Observatory investigation)
INTEGRAL	International Gamma Ray Astrophysics Laboratory
IPAO	Independent Program Assessment Office
IPO	Integrated Program Office
IPS	Intelligent Propulsion System
IRA	Institutional Research Awards
IRT	Independent Review Team
ISAS	Institute of Space and Astronautical Science
ISFS	Invasive Species Forecasting System
ISHM	Integrated System Health Management
ISOR	Independent Science and Operations Review
ISPP	In-space Propulsion Program
ISRO	Indian Space Research Orgisation
ISS	International Space Station
ISTP	Integrated Space Transportation Plan
ITAR	International Traffic in Arms Regulation
ITAS	Integrated Tailored Aerostructures
ITF	Integrated Training Facility
ITM	Ionspheric/Thermospheric/Mesospheric
ITTP	Innovative Technology Transfer Partnerships
IWGEO	Interagency Working Group on Earth Observations
JACIE	Joint Agency Committee for Imagery Evaluation
JAXA	Japanese Aerospace Exploration Agency
JDEM	Joint Dark Energy Mission
JEM	Japanese Experiment Module
JHU	John Hopkins University
JHU-APL	Johns Hopkins University–Applied Physics Laboratory
JIMO	Jupiter Icy Moons Orbiter
JPDO	Joint Planning and Development Office
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
JSRA	Joint Sponsored Research Agreement
JSRDA	Joint Sponsored Research and Development Agreement
JWG	Joint Working Group
JWST	James Webb Space Telescope
KI	Keck Interferometer
KSC	Kennedy Space Center
kW	Kilowatt
LANL	Los Alamos National Laboratory
LaRC	Langley Research Center
LASP	Laboratory for Atmospheric and Space Physics (University of Colorado, Boulder)
LAT	Large Area Telescope (Gamma-ray Large Area Telescope instrument)
LBTI	Large Binocular Telescope Interferometer
LCC	Life-cycle Cost
LDCM	Landsat Data Continuity Mission
LE	Lunar Exploration
LEAP	Low Emissions Alternative Power
LEO	Low Earth Orbit
LIDAR	Light Detection and Ranging
LiOH	Lithium Hydroxide

Acronyms

LISA	Laser Interferometer Space Antenna
LMA	Lockheed Martin Astronautics
LOA	Letter of Agreement
LOI	Lunar Orbit Injection
LRA	Laser Retroreflector Array (Ocean Surface Topography Mission instrument)
LRD	Launch Readiness Date
LSG	Life Sciences Glovebox
LTMPF	Low Temperature Microgravity Physics Facility
LTP	Learning Technologies Project
LWS	Living with a Star (Program)
MASTAP	Mathematics and Science Teacher Partnership Program
MAV	Mars Ascent Vehicle
MCC	Mission Control Center
MCR	Mission Confirmation Review
McTMA	Multi-center Traffic Management Advisor
MEP	Mars Exploration Program
MEPAG	Mars Exploration Program Analysis Group
MER	Mars Exploration Rover
MESSENGER	Mercury Surface, Space Environment, Geochemistry and Ranging
MGS	Mars Global Surveyor
MIDEX	Medium-size Explorer
MILA	Merritt Island Launch Annex
MIRI	Mid-infrared Instrument (James Webb Space Telescope instrument)
MISR	Multi-angle Imaging Spectroradiometer
MIT	Massachusetts Institute of Technology
MLCD	Mars Laser Communication Demonstration
MLP	Mobile Launch Platform
MMRTG	Multi-missions Radioisotope Thermoelectric Generators
MMS	Magnetospheric Multiscale
MO	Missions of Opportunity
MO&DA	Mission Operations and Data Analysis
MOA	Memorandum of Agreement
MODIS	Moderate-resolution Imaging Spectroradiometer
MOI	Mission Orbit Insertion
MOU	Memorandum of Understanding
MPIAT	Mars Program Independent Assessment Team
MPLM	Multi-purpose Logistic Module
MRO	Mars Reconnaissance Orbiter
MRR	Mission Requirement Request
MSFC	Marshall Space Flight Center
MSI	Minority-serving Institute
MSL	Mars Science Laboratory
MSMT	Mission and Science Measurement Technology
MSR	Mars Sample Return
MSRF	Materials Science Research Facility
MSRR	Materials Science Research Rack
MTO	Mars Telesat Orbiter
MUREP	Minority University Research and Education Program
MUSES - C	Mu Space Engineering Spacecraft-C
MUSS	Multi-user Systems and Support
MXER	Momentum Exchange/Electrodynamic Reboost
NAC	NASA Advisory Committee
NAPA	National Academy of Public Administration
NAR	Non–advocacy Review
NAS	National Airspace System
NASDA	National Space Development Agency of Japan
NAST	NPOESS Aircraft Sounder Testbed
NEA	NASA Educator Astronaut
NEAR	Near-Earth Asteroid Rendezvous
NEI	NASA Explorer Institute
NEMS	NASA Equipment Management System
NEO	Near-Earth Object
NEP	Nuclear Electric Propulsion
NEPA	National Environmental Policy Act
NEXT	Next-generation Electric Propulsion
NExTNAS	NASA Exploratory Technologies for the National Airspace System
NGLT	Next Generation Launch Technology
NIAC	NASA Institute of Advanced Concepts
NICMOS	Near Infrared Camera and Multi–object Spectrometer (Hubble Space Telescope instrument)
NIH	National Institutes of Health
NIMA	National Imagery and Mapping Agency
NIRCam	Near-infrared Camera (James Webb Space Telescope instrument)
NIRSpec	Near Infrared Spectrometer (James Webb Space Telescope instrument)
NISN	NASA Integrated Services Network

Acronyms

NIWA	National Institute for Water and Atmospheric Research
NLS	NASA Launch Services
NLT	NASA Learning Technologies
NMP	New Millennium Program
NOAA	National Oceanic and Atmospheric Administration
NOx	Nitrogen Oxide
NPOESS	National Polar–orbiting Operational Environmental Satellite System
NPG	Nuclear Power Generation
NPP	NPOESS Preparatory Project
NPR	NASA Procedural Requirement
NRA	NASA Research Announcement
NRC	Nuclear Regulatory Commission
NRO	National Reconnaissance Office
NRTS	Network Resources Training Site
NSBRI	National Space Biomedical Research Institute
NSCORS	NASA Specialized Centers of Research
NSF	National Science Foundation
NSRDB	National Solar Radiation Data Base
NSRL	NASA Space Radiation Laboratory
NTTC	National Technology Transfer Center
OBPR	Office of Biological and Physical Research
OBSS	Orbiter Boom Sensor System
OCO	Orbiting Carbon Observatory
ODA	Orbital Debris Assessment
OIG	Office of Inspector General
OLI	Operational Land Imager (Landsat Data Continuity Mission instrument)
OMB	Office of Management and Budget
OMI	Ozone Measuring Instrument
OMM	Orbiter Major Modifications
OMPS	Ozone Mapping and Profiler Suite (NPOESS Preparatory Project instrument)
OMU	Other Minority Universities
OPF	Orbiter Processing Facility
ORR	Operations Readiness Review
ORU	Orbital Replacement Unit
OSP	Orbital Space Plane
OSS	Office of Space Science (former NASA office)
OSTM	Ocean Surface Topography Mission
PAIR	Partnership Awards for the Integration of Research into Undergraduate Education
PART	Program Assessment Rating Tool
PBS	President's Budget Submit
PCA	Program Commitment Agreement
PCS	Physics of Colloids in Space
PDR	Preliminary Design Review
PDS	Passive Dosimeter System
PER	Pre–Environmental Review
PI	Principal Investigator
PIMC	Program Institutional Management Council
PKB	Pluto-Kuiper Belt (New Horizons)
PLASTIC	Plasma and Supra-thermal Ion and Composition (Solar Terrestrial Relations Observatory investigation)
PMC	Program Management Council
PMSR	Preliminary Mission System Review
POES	Polar Operational Environmental Satellites
POIC	Payloads Operations Information Center
POIF	Payloads Office Integration Function
PRU	Plant Research Unit
PSO	Primary Science Orbit
PSR	Physical Sciences Research
PSU	Pennsylvania State University
QAT	Quiet Aircraft Technology
RASC	Revolutionary Aero Space Concepts
RBM	Radiation Belt Mapper Mission
REASoN	Research, Education and Applications Solutions Network
RETScreen	Renewable Energy Technology (Renewable Energy Project Analysis Software)
RFP	Request for Proposal
RHESSI	Reuven Ramaty High Energy Solar Spectroscopic Imager
RLE	Robotic Lunar Exploration (Program)
ROA	Remotely Operated Aircraft
ROSES	Research Opportunities in Space and Earth Science
ROSS	Research Opportunities In Space Science
RPC	Research Partnership Center
RPCT	Radioisotope Power Conversion Technology
RPS	Radioisotope Power System
RPT	Rocket Propulsion Testing
RSA	Russian Space Agency

Acronyms

RSB	Rudder Speed Brake
RSDO	Rapid Spacecraft Development Office
RSRM	Reusable Solid Rocket Motor
RTF	Return to Flight
RXTE	Rossi X–ray Timing Explorer
S&MA	Safety and Mission Assurance
SAC-D	Satellite de Aplicaciones Cientificas–D (Argentina)
SAME	Smoke and Aerosol Measurement Experiment
SAMPEX	Solar Anomalous and Magnetospheric Particle Explorer
SAO	Smithsonian Astrophysical Observatory
SAR	Synthetic Aperture Radar
SATS	Small Aircraft Transportation System
SATSLab	Small Aircraft Transportation System Laboratory
SAU	Strategic Airspace Usage
SBIR	Small Business Innovative Research
SBT	Space–based Technology
SCM	Search Coil Magnetometer (Thermal Emission Imaging System instrument)
SDO	Solar Dynamics Observatory
SDR	System Design Review
SEC	Sun–Earth Connection (former NASA Theme)
SECAS	Sun–Earth Connection Advisory Subcommittee
SECCHI	Sun-Earth Connection Coronal and Heliospheric Investigation (Solar Terrestrial Relations Observatory investigation)
SELENE	Selenological and Engineering Explorer (Japan)
SERVIR	Central American Monitoring and Visualization System
SEU	Structure and Evolution of the Universe (former NASA Theme)
SFLC	Space Flight Leadership Council
SFOC	Space Flight Operations Contract
SFS	Space and Flight Support
SHARAD	Shallow Radar
SHARP	Summer High-school Apprenticeship Research Program
SHARPP	Solar Heliospheric Activity Research and Prediction Program
SIM	Space Interferometry Mission
SLAC	Stanford Linear Accelerator Center
SLEP	Shuttle Service Life Extension Program
SM 4	Servicing Mission 4
SMD	Science Mission Directorate
SMEX	Small Explorer
SMO	Systems Management Organization
SMPMC	Systematic Measurements Program Management Council
SMS	Science Measurement Systems
SN	Space Network
SOA	State of the Art
SOFIA	Stratospheric Observatory for Infrared Astronomy
SOFIE	Solar Occultation for Ice Experiment (Aeronomy of Ice in the Mesosphere instrument)
SOHO	Solar Heliospheric Observer
SOMD	Space Operations Mission Directorate
SORCE	Solar Radiation and Climate Experiment
SPD	Space Product Development
SPF	Software Production Facility
SPP	Science Power Platform
SPRL	Space Physics Research Laboratory
SRB	Solid Rocket Booster
SRG	Stirling Radioisotope Generator
SRR	Systems Requirement Review
SSB	Space Studies Board
SSBRP	Space Station Biological Research Project
SSC	Stennis Space Center
SScAC	Space Science Advisory Committee
SSE	Solar System Exploration (Theme)
SSES	Solar System Exploration Subcommittee
SSME	Space Shuttle Main Engines
SSMOC	SOFIA Science and Mission Operations Center
SSP	Space Shuttle Program
SSS	Sea Surface Salinity
SST	Solid State Telescope (Thermal Emission Imaging System instrument)
STEM	Science, Technology, Engineering, and Mathematics
STEREO	Solar Terrestrial Relations Observatory
STIS	Space Telescope Imaging Spectrograph (Hubble Space Telescope instrument)
STP	Solar Terrestrial Probes (Program)
STS	Space Transportation System
STScI	Space Telescope Science Institute

Acronyms

STSP	Science and Technology Scholarship Program
STTR	Small Business Technology Transfer Program
SVA	Strategic Vehicle Architecture
SVD	System Vulnerability Detection
SVS	Synthetic Vision System
SWEPT	System–wide Evaluation and Planning Tool
SWMF	Space Weather Modeling Framework
SWOT	Strengths, Weaknesses, Opportunities, and Threats
SwRI	Southwest Research Institute
TCAT	21st Century Aircraft Technology Project
TCU	Tribal Colleges and Universities
TDRS	Tracking and Data Relay Satellite
TDRSS	Tracking and Data Relay Satellite System
TFM	Traffic Flow Management
THEMIS	Thermal Emission Imaging System
TIM	Total Irradiance Monitor (Glory instrument)
TIMED	Thermosphere, Ionosphere, Mesosphere, Energetics and Dynamics
TMP	Technology Maturation Program
TOMS	Total Ozone Mapping Spectrometer
TOPEX	Ocean Topographic Experiment
TPF	Terrestrial Planet Finder
TRACE	Transition Region and Coronal Explorer
TRL	Technology Readiness Level
TRMM	Tropical Rainfall Measuring Mission
TSA	Transportation Security Administration
TWINS	Two Wide–angle Imaging Neutral–atom Spectrometers
UARC	Upper Atmosphere Research Collaboratory
UAV	Unmanned Aerial Vehicle
UEET	Ultra–efficient Engine Technology
UHF	Ultra High Frequency
ULF	Utilization and Logistics Flight
UNESCO	United Nations Educational, Scientific and Cultural Organization
URC	University Research Center
URETI	University Research Engineering, and Technology Institute
USAF	United States Air Force
USDA	United States Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey
USRA	Universities Space Research Association
USRP	Undergraduate Student Research Program
VAB	Vehicle Assembly Building
VAMS	Virtual Airspace Modeling and Simulation
VAS	Visible and Infrared Atmospheric Sounder (Geostationary Operational Environmental Satellite instrument)
VAST	Virtual Airspace Simulation Technology
VIIRS	Visible–infrared Imager Radiometer Suite (NPOESS Preparatory Project instrument)
VLTI	Very Large Telescope Interferomerter
VPCAR	Vapor Phase Catalytic Ammonia Removal
VSP	Vehicle Systems Program
WATR	Western Aeronautical Test Range
WAVES	Radio and Plasma Waves Instrument (Wind)
WFC 3	Wide Field Camera (Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations instrument)
WFS&C	Wave Front Sensing and Control (James Webb Space Telescope instrument)
WGA	Western Governors Association
WISE	Widefield Infrared Survey Explorer
WJHTC	William J. Hughes Technical Center
WMAP	Wilkinson Microwave Anisotropy Probe
WORF	Window Observational Research Facility
WPA	Water Processor Assembly
WRF	Weather Research Forecasting
WRS	Water Recycling System
WSOA	Wide Swatch Ocean Altimeter (Ocean Surface Topography Mission instrument)
WSTF	White Sands Test Facility
XMM	X-ray Multi-mirror Mission
XRT	X-ray Telescope (Solar-B instrument)