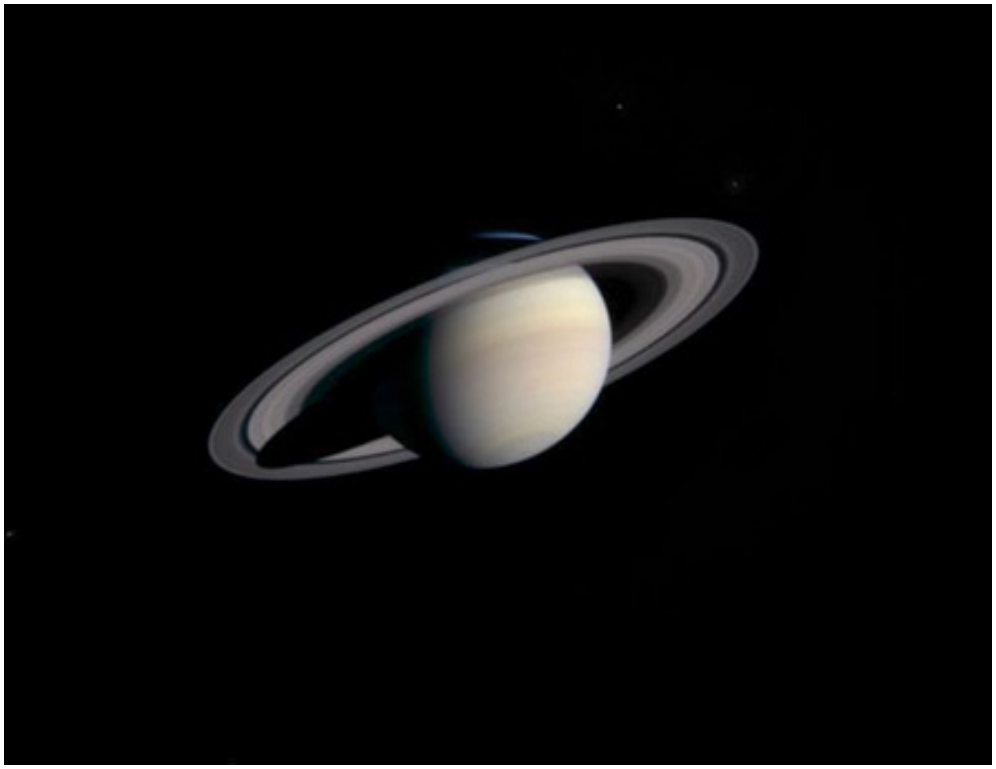
Theme: Solar System Exploration



Cassini, a robotic spacecraft launched in 1997 by NASA, is close enough now to resolve many rings and moons of its destination planet: Saturn. The spacecraft has now closed to within a single Earth-Sun separation from the ringed giant. In November 2003, Cassini snapped the contrast-enhanced color composite pictured above. Many features of Saturn's rings and cloud-tops now show considerable detail. When arriving at Saturn in July 2004, the Cassini orbiter will begin to circle and study the Saturnian system. Several months later, a probe named Huygens will separate and attempt to land on the surface of Titan.

Solar System Exploration

MAJOR EVENTS IN FY 2005

- Deep Impact will launch in December 2004. The spacecraft will release a small (820 lbs.) Impactor directly into the path of comet Tempel 1 in July 2005. The resulting collision is expected to produce a small impact crater on the surface of the comet's nucleus, enabling scientists to investigate the composition of the comet's interior.
- Onboard the Cassini orbiter is a 703-pound scientific probe called Huygens that will be released in December 2004, beginning a 22-day coast phase toward Titan, Saturn's largest moon; Huygens will reach Titan's surface in January 2005.

Theme: Solar System Exploration

OVERVIEW

The exploration of the solar system is a major component of the President's vision of NASA's future. Our cosmic "neighborhood" will first be scouted by robotic trailblazers pursuing answers to key questions about the diverse environments of the planets, comets, asteroids, and other bodies in our solar system. Eventually, they will be followed by human explorers who will create a sustained presence throughout the solar system.

The Solar System Exploration (SSE) Theme is a three-pronged quest to explore the formation and evolution of our solar system and the Earth within it, seek the origins of life and its existence beyond Earth, and chart our destiny within the solar system. The SSE program will examine potentially habitable environments, search for life, and attempt to understand how solar system processes affect the future of Earth and humanity.

Missions	Goals supported by this Theme	Objectives supporting those Goals
To Understand and Protect Our Home Planet	1. Understand the Earth system and apply Earth system science to improve prediction of climate, weather, and natural hazards.	1.4 Catalog and understand potential impact hazards to Earth from space.
To Explore the Universe and Search for Life	5. Explore the solar system and the universe beyond, understand the origin and evolution of life, and search for evidence of life elsewhere.	5.1 Learn how the solar system originated and evolved to its current diverse state.
		5.2 Understand how life begins and evolves and determine the characteristics of the solar system that led to the origin of life.

RELEVANCE

Our solar system is a place of incredible diversity, extreme environments, and continuous change. Today it is also a natural laboratory, on a grand scale, within which we seek answers to the mysteries of the universe and our place within it. In the forty years since the launch of the first interplanetary probe, our knowledge of the solar system and our ability to explore it have increased at an astonishing pace. Our robotic explorers have traveled throughout the solar system, revealing levels of complexity and diversity that were unimaginable prior to the advent of space exploration. They have also revealed to us the building blocks and chemical origins of life itself. The exploration of our solar system is founded upon the pursuit of three simple yet profound questions: Where do we come from? What is our destiny? Are we alone?

Education and Public Benefits
The SSE program strives to use our missions, research programs, and the human resources of the space science community to enhance the quality of American science, mathematics, and technology education, particularly at the pre-college level. SSE is dedicated to sharing the excitement of discoveries and knowledge generated by space science missions and research with the public, as well as contributing to the creation of the talented scientific and technical workforce needed for the 21st century. Public benefits from SSE include a growing understanding of the solar system and Earth's significance within it. SSE's Discovery program was among the first at NASA to require a plan for education and public outreach, as NASA recognized the importance of communicating the excitement of space exploration to the public.

IMPLEMENTATION

The Solar System Exploration theme is composed of many elements that work together to achieve the program's goals and objectives. Repeated management and scientific peer reviews ensure that each mission provides data in a cost-effective manner. In many cases, the data obtained from different missions are complementary, and are combined in cross-disciplinary studies by members of the scientific community. Theme responsibility resides in the Office of Space Science at NASA HQ.

Enterprise official is Ed Weiler, Associate Administrator for Space Science. Theme director and point of contact is Orlando Figueroa, Director of the Solar System Exploration Division at Headquarters. This theme is in full compliance with NPG 7120.5B.

Theme: Solar System Exploration

IMPLEMENTATION SCHEDULE

Theme Element	Schedule by Fiscal Year 02 03 04 05 06 07 08 09	Purpose
New Horizons		Scientific investigation of the planet Pluto and its moon Charon.
Cassini/Huygens		Scientific investigation of the planet Saturn; probe deployment to Saturn's moon, Titan.
Stardust		Study of, and return of material from, Comet Wild 2.
Genesis		Study the origin of the solar system by collecting and returning samples of charged particles in the solar wind.
Rosetta		Study the nucleus of Comet Churyumov-Gerasimenko.
Deep Impact		Excavate the interior of Comet P/Tempel 1.
MESSENGER		Scientific investigation of the planet Mercury.
Dawn		Scientific investigation of Ceres and Vesta -- two small planets in the main asteroid belt.

No exceptions to NPG 7120.5B have been taken.

STATUS

SSE accomplished the following this past year: - Stardust completed a close flyby of the main belt asteroid Annefrank on November 2, 2002. - Launch of joint NASA-ISAS (Japan's Institute of Space and Astronautical Science) mission MUSES-C on May 9, 2003. - Galileo reached the end of its mission on September 21, 2003 after nearly fourteen years in operation studying Jupiter and two of its moons, Europa and Io. The program received an EFFECTIVE rating using the 2003 Performance Assessment Rating Tool (PART).

PERFORMANCE MEASURES

Outcomes/Annual Performance Goals (APGs)	
Outcome 1.4.1	*By 2008, inventory at least 90 percent of asteroids and comets larger than 1 km 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 1.4.2	*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.
Outcome 5.1.1	*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 5.1.2	*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 5.1.3	*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 5.1.4	*Learn what our solar system can tell us about extra-solar planetary systems.*

Theme: Solar System Exploration

Outcomes/Annual Performance Goals (APGs)	
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 5.2.1	*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 5.2.2	*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 5.2.3	*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 5.2.4	*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.
Uniform Measures	
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.

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
NASA Advisory Council	NAC	12/03	3/04	Review science strategy, program implementation strategy
Nat'l Academy Advisory Council	SScAC	8/03	3/04	Review science strategy, program implementation strategy
Nat'l Academy Advisory Council	SSE Sub-Committee	10/03	2/04	Review science strategy, program implementation strategy
Nat'l Academy of Sciences	COMPLEX	11/03	3/04	Advises on long-term scientific strategies for solar system exploration
Nat'l Academy of Sciences	Space Studies Board	11/03	3/04	Effectiveness and quality of the program

BUDGET

Budget Authority ($ millions)	FY 2003	FY 2004	Change	FY 2005	Comments
Solar System Exploration	**1,039.1**	**1,315.9**	**-128.9**	**1,187.0**	--
Development	308.3	292.4	-82.7	209.7	--
MESSENGER	86.7	37.8	-37.8		--
Deep Impact	57.7	12.9	-3.4	9.5	--
Dawn	36.3	124.9	-40.5	84.4	--
Small Development Projects	3.9				--
New Horizons (Pluto)	123.6	116.8	-1.0	115.8	--
Operations	298.9	308.2	-31.2	277.0	--
Research	258.5	323.7	+42.9	366.6	--
Technology and Advanced Concepts	173.5	391.6	-57.9	333.7	--

Indicates changes since the previous year's President's Budget Submit

Indicates budget numbers in full cost.

Theme: Solar System Exploration
Development: MESSENGER

PURPOSE

Objectives	Performance Measures
5.1	5SSE9,15

The MErcury Surface, Space ENvironment, GEochemistry and Ranging (MESSENGER) project will determine: (1) the chemical composition of Mercury's surface; (2) Mercury's geological history; (3) the nature of Mercury's magnetic field; (4) the size and state of Mercury's core; (5) the volatile inventory of Mercury's poles; and (6) the nature of Mercury's exosphere and magnetosphere.

OVERVIEW

MESSENGER will orbit Mercury following two flybys of that planet. The orbital phase will use the flyby data as an initial guide to perform a focused scientific investigation of Mercury. MESSENGER's propulsion system is integrated into the spacecraft structure to make economical use of mass. The miniaturized instruments are located on a science deck facing Mercury, while the spacecraft is shielded from the blistering sunlight by a lightweight thermal shade. Most of the instruments are fixed-mounted, so coverage of Mercury is obtained by spacecraft motion over the planet. The imaging system uses a miniature scan mirror so it can quickly collect image mosaics.

MESSENGER Homepage: http://messenger.jhuapl.edu/index.html

PROGRAM MANAGEMENT

MESSENGER is a project in the Discovery program with project responsibility delegated to the Principal Investigator at the Carnegie Institution of Washington. The Johns Hopkins University's Applied Physics Laboratory (APL) Space Department Management Committee (SDMAC) is the governing Program Management Council (PMC). Enterprise Official is Ed Weiler, Associate Administrator for Space Science at Headquarters. Theme director and point of contact is Orlando Figueroa, director of the Solar System Exploration Division at Headquarters. This program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

The baseline for this technical commitment was made in 6/2001 and is detailed in Appendix 7 of the Discovery program plan.

Technical Specifications	FY 2005 President's Budget	Change from Baseline
Launch Vehicle:	Delta II	--
Operational capability:	MESSENGER's 12 months in orbit cover 2 Mercurial solar days. (The Mercurial solar day, from sunrise to sunrise, is equal to 176 Earth days.)	--
Science Instruments:	7 science instruments: Mercury Dual Imaging System (MDIS), Gamma-Ray and Neutron Spectrometer (GRNS), X-Ray Spectrometer (XRS), Magnetometer (MAG), Mercury Laser Altimeter (MLA), Mercury Atmospheric and Surface Composition Spectrometer (MASCS), Energetic Particle and Plasma Spectrometer (EPPS)	--

Schedule	FY 2005 President's Budget	Change from Baseline
Start of formulation	Dec-99	--
Start of implementation	Jul-01	--
Critical Design Review	Mar-02	--
Launch	Mar-04 (launch delayed – TBD)	--
Venus flybys	June 2004 and March 2006	--
Mercury flybys	July 2007 and April 2008	--
End of Data Analysis/archive	Apr-11	--
End of orbital data collection	Apr-10	--
Enter Mercury orbit	Apr-09	--

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

Carnegie Institute of Washington, under contract to NASA, provides the Principal Investigator (PI), Science Team Co-Investigators (Co-Is), and Education and Public Outreach (EPO) Team members. Johns Hopkins University/Applied Physics Laboratory, under contract to NASA, provides Science Team Co-Is, project management, mission design, systems engineering, and the spacecraft. Composite Optics, Inc. provides the structure and Gencorp Aerojet provides the propulsion system. The payload is provided by JHU/APL, NASA/Goddard Space Flight Center, the University of Colorado

Theme: Solar System Exploration
Development: MESSENGER

Laboratory for Atmospheric and Space Physics (LASP), and the University of Michigan Space Physics Research Laboratory (SPRL). The Mission Operations Center and Science Operations Center will be developed by JHU/APL. Changes since FY 2004 Pres. Budget: None.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	0%	Full & Open Competition	100%	Industry	25%
Cost Reimbursable	80%	Sole Source	0%	Government	0%
Fixed Price	11%		100%	NASA Intramural	9%
Grants	0%			University	66%
Other	9%			Non Profit	0%
* as of FY03 direct procurement	100%	* as of FY03 direct procurement		* as of FY03 direct procurement	100%

Future Acquisition - Major	Selection	Goals
None - all major contracts are in place	N/A	N/A

AGREEMENTS

Internal: The program is not dependent on other NASA activities outside of the control of the Associate Administrator for Space Science. External: None.

Changes since FY 2004 President's Budget: None.

RISK MITIGATION

Risk Date: 8/11/2003

Top Risks	R	Overall	R	Cost	R	Schedule	Y	Technical	Probability	Impact	Mitigation Plan
R	Launch postponement to May 2004								High	High	Reserves identified

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Independent Assessment	Discovery Program Office	9/03	1/04	Critical Design Review; Pre-Environmental Review

Theme: Solar System Exploration
Development: MESSENGER

BUDGET/LIFE CYCLE COST

Budget Authority ($ millions)	Prior	FY03	FY04	FY05	FY06	FY07	FY08	FY09	BTC	Total	Comments
FY2005 PRESBUD	160.4	86.7	42.3	7.7	8.2	9.4	11.5	16.3	15.8	358.3	--
Development	160.4	86.7	37.8							284.9	--
Operations			3.0							3.0	--
Mission Operations & Data Analysis			1.5	7.7	8.2	9.4	11.5	16.3	15.8	70.4	--
Changes since 2004 PRESBUD	-0.1	+18.7	-0.2	+0.3	+0.5	+0.4	+0.4	+16.3	-15.6	+20.6	--
Development	-0.1	+18.7	-0.2							+18.4	--
Operations				-4.3	-4.4	-4.4	-5.5		-14.2	-32.9	--
Mission Operations & Data Analysis			+1.5	+7.7	+8.2	+9.4	+11.5	+16.3	+15.8	+70.4	MO&DA combined
Data Analysis			-1.5	-3.1	-3.4	-4.6	-5.6		-17.2	-35.3	--
FY2004 PRESBUD	160.5	68.0	42.5	7.4	7.7	9.0	11.1		31.4	337.7	--
Development	160.5	68.0	38.0							266.5	--
Operations			3.0	4.3	4.4	4.4	5.5		14.2	35.9	--
Data Analysis			1.5	3.1	3.4	4.6	5.6		17.2	35.3	--
Initial Baseline	157.4	68.0	39.1	7.1	7.5	8.7			42.2	330.0	--
Development	157.4	68.0	34.7							260.1	--
Operations			2.9	4.1	4.2	4.2			19.5	34.9	--
Data Analysis			1.5	3.0	3.3	4.5			22.7	35.0	--

Indicates changes since the previous year's President's Budget Submit
Indicates budget numbers in full cost.

Theme: Solar System Exploration
Development: Deep Impact

PURPOSE

Objectives	Performance Measures
1.4, 5.1	5SSE1,6-7,15

Deep Impact will reveal the composition of the interior of a comet, increasing our understanding of the formation of the solar system. Data from the mission may also provide some insight into avoiding Near-Earth Object (NEO) collisions with the Earth.

OVERVIEW

The Deep Impact mission will send a large copper projectile crashing into the surface of a comet at more than 20,000 miles per hour, creating a huge crater and revealing never before seen materials and the internal composition and structure of a comet. The impact will excavate a crater of approximately 100 meters in diameter and 25 meters in depth. Deep Impact will observe how the crater forms, measure the crater's depth and diameter, measure the composition of the interior of the crater and its ejecta and determine the changes in natural outgassing produced by the impact. Dramatic images from both the flyby spacecraft and the impactor will be sent back to distant Earth in near-real time. Amateur astronomers, some already tracking the comet, will offer the public a first-hand look at this incredible July 2005 encounter.

DEEP IMPACT Homepage: http://deepimpact.umd.edu/

PROGRAM MANAGEMENT

Deep Impact is a project in the Discovery program with project responsibility delegated to the Principal Investigator (PI) at University of Maryland. The Jet Propulsion Laboratory Program Management Council (PMC) has Deep Impact governing responsibility. Enterprise Official is Ed Weiler, Associate Administrator for Space Science at Headquarters. Theme director and point of contact is Orlando Figueroa, director of the Solar System Exploration Division at Headquarters. This program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

The baseline for this technical commitment was made in 5/01 and is detailed in Appendix 8 of the Discovery program plan.

Technical Specifications	FY 2005 President's Budget	Change from Baseline
Mission requirement	Fly to comet Tempel 1	--
Payload	High Resolution Imager (HRI), Medium Resolution Imager (MRI) and Impactor Target Sensor (ITS)	--
Launch Vehicle	Delta II	--
Launch Mass	1,020 kg	--
Prime antenna diameter	1 meter (parabolic)	--
Communications bandwidths	x-band for flyby spacecraft (uplink command and downlink telemetry) and s-band for impactor communication to/from the flyby spacecraft	--
Max Data Rate	175 kbps	--
Max solar array power	620 W at encounter	--

Schedule	FY 2005 President's Budget	Change from Baseline
Start of Formulation	Nov-99	--
Start of Implementation	Jun-01	--
Critical Design Review	Jan-02	--
Launch	Jan-04 (launch delayed to Dec-04)	--
Encounter	Jul-05	--
End of DA/Archive	Apr-06	--
End of Mission	Aug-05	--

Theme: Solar System Exploration
Development: Deep Impact

Acquisition Strategy and Performing Organizations

University of Maryland provides the PI and the science team for the overall science inputs to the mission design. The Jet Propulsion Laboratory provides the project management, mission design, systems engineering and mission operations. Ball Aerospace and Technology Corporation provides the flyby and impactor spacecraft and the HRI, MRI and ITS instruments. Changes since FY 2004 President's Budget: None.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	0%	Full & Open Competition	100%	Industry	64%
Cost Reimbursable	10%	Sole Source	0%	Government	0%
Fixed Price	90%		100%	NASA Intramural	21%
Grants	0%			University	15%
Other	0%	Sci Peer Review	100%	Non Profit	0%
* as of FY03 direct procurement	100%	* as of FY03 direct procurement		* as of FY03 direct procurement	100%

Future Acquisition - Major	Selection	Goals
None - all major contracts are in place		

Agreements

Internal: The project is not dependent on other NASA activities outside of the control of the Associate Administrator for Space Science. External: There are no other non-NASA organizations (other than Deep Impact team members) on which the project depends for mission success.

Changes since FY 2004 President's Budget: None.

Risk Mitigation

Risk Date: 1/21/04

Top Risks		Overall		Cost		Schedule		Technical	Probability	Impact	Mitigation Plan
	Y		R		G		Y				

Independent Reviews

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Independent Assessment	Discovery PO	8/03	3/04	CDR Review; Baseline Confirmation/Risk Review; Envir. Test Readiness Review

Theme: Solar System Exploration
Development: Deep Impact

BUDGET/LIFE CYCLE COST

Budget Authority ($ millions)	Prior	FY03	FY04	FY05	FY06	FY07	FY08	FY09	BTC	Total	Comments
FY2005 PRESBUD	187.7	57.7	21.6	17.0	2.6					286.6	
Development	187.7	57.7	12.9	9.5						267.8	
Operations			6.9							6.9	
Mission Operations & Data Analysis			1.8	7.5	2.6					11.9	
Changes since 2004 PRESBUD		-1.4	-0.1	+5.7	+0.6					+4.7	
Development		-1.4	-0.1	+9.5						+8.0	
Operations				-8.3	-0.4					-8.8	
Mission Operations & Data Analysis			+1.8	+7.5	+2.6					+11.9	MO&DA combined
Data Analysis			-1.8	-3.0	-1.6					-6.4	
FY2004 PRESBUD	187.8	59.1	21.7	11.3	2.0					281.9	
Development	187.8	59.1	13.0							259.8	
Operations			6.9	8.3	0.4					15.7	
Data Analysis			1.8	3.0	1.6					6.4	
Initial Baseline	182.1	59.1	21.0	11.1	2.0					275.3	
Development	182.1	59.1	12.6							253.8	
Operations			6.8	8.2	0.3					15.3	
Data Analysis			1.6	2.9	1.7					6.2	

Indicates changes since the previous year's President's Budget Submit
Indicates budget numbers in full cost.

Theme: Solar System Exploration
Development: Dawn

PURPOSE

Objectives	Performance Measures
5.1	5SSE8,15

The Dawn mission's primary objective is to significantly increase our understanding of the conditions and processes acting during the solar system's earliest history, by examining the geophysical and geochemical properties of the main belt asteroids 1 Ceres and 4 Vesta. This will be accomplished by sending a spacecraft to orbit these asteroids and perform science investigations using imaging, spectroscopy, magnetometry, altimetry, and radio science.

OVERVIEW

Dawn has a focused set of science and measurement objectives to be obtained through radio science and five instruments. The mission launches in May 2006 and uses solar-electric propulsion to reach and orbit each asteroid for approximately 11 months, performing science investigations at various altitudes and lighting conditions. The use of solar-electric propulsion readily mitigates launch injection errors and is used during the interplanetary cruise to match trajectories with the asteroid. The simple interplanetary trajectory requires no gravity assists, no critical sequences, and a maximum of 1 ion thruster operating at a time (there are 3 thrusters on the spacecraft). Stay times at Vesta and Ceres can easily be extended. The five instruments have functional overlaps allowing graceful degradation of science objectives if any instrument fails. Two of the instruments are fully redundant and three are partially redundant. The spacecraft electronics are fully redundant. The total mission duration is nine years.

DAWN Homepage: http://www-ssc.igpp.ucla.edu/dawn/

PROGRAM MANAGEMENT

Dawn is a project in the Discovery program with project responsibility delegated to the Principal Investigator (PI) at University of California, Los Angeles (UCLA). The Jet Propulsion Laboratory (JPL) Program Management Council (PMC) has Dawn governing responsibility. Enterprise Official is Ed Weiler, Associate Administrator for Space Science at Headquarters. Theme director and point of contact is Orlando Figueroa, director of the Solar System Exploration Division at Headquarters. This program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

The baseline for this technical commitment will be set at the delta Confirmation Review, to be held 2/6/04.

Technical Specifications	FY 2005 President's Budget	Change from Baseline
Payload:	The five instruments are a framing camera, mapping spectrometer, gamma ray/neutron spectrometer, laser altimeter, and magnetometer	--
Launch Vehicle:	Delta 2925H	--
Cruise:	3 NSTAR Xenon (Xe) thrusters, one at a time; Maximum fuel mass: 288 kg to Vesta and 89 kg to Ceres	--
Vesta:	Orbit at 700 and 120 km altitude, 11 months	--
Ceres:	Orbit at 890 and 140 km altitude, 11 months	--

Schedule	FY 2005 President's Budget	Baseline	Change from Baseline
Start of Formulation	Sep 02	--	--
Preliminary Design Review	Oct 03	Aug 03	+ 2 months
Critical Design Review	May 04	Apr 04	+ 1 month
Launch	May 06	--	--
Vesta Encounter	Jul 10	--	--
Ceres Encounter	Aug 14	--	--
End of Mission & Data Archiving	Jul 16	--	--

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

UCLA provides the Principal Investigator and the science team, Education and Public Outreach, and the magnetometer instrument. The Jet Propulsion Laboratory is responsible for project management, mission and system engineering, mission assurance, the ion propulsion subsystem, navigation and mission operations. Orbital Sciences Corporation, under subcontract to JPL, is responsible for the spacecraft and flight software. Goddard Space Flight Center is responsible for the Laser Altimeter. Los Alamos National Laboratory is responsible for the gamma ray/neutron spectrometer. The German

Theme: Solar System Exploration
Development: Dawn

Aerospace Center is responsible for the framing camera, and the Italian Space Agency is responsible for the mapping spectrometer. Changes since FY 2004 President's Budget: None.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	0%	Full & Open Competition	100%	Industry	31%
Cost Reimbursable	100%	Sole Source	0%	Government	0%
Fixed Price	0%		100%	NASA Intramural	0%
Grants	0%			University	69%
Other	0%	Sci Peer Review	100%	Non Profit	0%
* as of FY03 direct procurement	100%	* as of FY03 direct procurement		* as of FY03 direct procurement	100%

Future Acquisition - Major	Selection	Goals
None - all major acquisitions are in place.		

AGREEMENTS

Internal: The program is not dependent on other NASA activities outside of the control of the Associate Administrator for space science. External: Provision of the framing camera instrument from the German Aerospace Center (DLR) and the mapping spectrometer instrument from the Italian Space Agency (ASI). Letters of Agreement have not been signed. Changes since FY 2004 President's Budget: Letters of Agreement have been developed.

RISK MITIGATION

Risk Date: 7/18/2003

Top Risks	Y	Overall	R	Cost	Y	Schedule	Y	Technical	Probability	Impact	Mitigation Plan

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Independent Asses.	Discovery Program Office		5/04	CDR Review; Pre-Environmental Review

BUDGET/ LIFE CYCLE COST

Budget Authority ($ millions)	Prior	FY03	FY04	FY05	FY06	FY07	FY08	FY09	BTC	Total	Comments
FY2005 PRESBUD	1.4	36.3	124.9	84.4	43.8	6.1	6.4	6.7	56.3	366.4	
Development	1.4	36.3	124.9	84.4	42.8					289.8	
Mission Operations & Data Analysis					1.0	6.1	6.4	6.7	56.3	76.5	
Changes since 2004 PRESBUD			-0.8	+0.9	+2.9	-0.1	-0.1	+6.7	-33.3	-23.9	
Development			-0.8	+0.9	+2.9					+3.0	
Operations					-1.0	-5.1	-5.2		-44.9	-56.3	
Mission Operations & Data Analysis					+1.0	+6.1	+6.4	+6.7	+56.3	+76.5	MO&DA combined
Data Analysis						-1.1	-1.3		-44.7	-47.1	
FY2004 PRESBUD	1.4	36.3	125.7	83.5	40.9	6.2	6.5		89.6	390.2	
Development	1.4	36.3	125.7	83.5	39.9					286.8	
Operations					1.0	5.1	5.2		44.9	56.3	
Data Analysis						1.1	1.3		44.7	47.1	

Indicates changes since the previous year's President's Budget Submit

Indicates budget numbers in full cost.

Theme: Solar System Exploration
Development: New Horizons (Pluto)

PURPOSE

Objectives	Performance Measures
5.1	5SSE2,7,15

The New Horizons Pluto mission will conduct a reconnaissance of Pluto and its moon Charon. The mission objectives are to: a) Characterize the global geology and morphology of Pluto and Charon; b) Map the surface composition of Pluto and Charon; and c) Characterize the neutral atmosphere of Pluto and its escape rate.

OVERVIEW

New Horizons will complete the reconnaissance of the planets by making the first-ever flyby of the Pluto-Charon system. Understanding these worlds is fundamental to understanding the origin and evolution of the outer solar system. New Horizons will seek to answer key scientific questions regarding the surfaces, atmospheres, interiors, and space environments of Pluto and Charon using imaging, visible and infrared spectral mapping, ultraviolet spectroscopy, radio science, and in situ plasma sensors. The mission also features an active Jupiter-system flyby to exercise the spacecraft and instruments, a bonus that will enable us to review new findings about Jupiter and its major satellites. NEW HORIZONS Homepage: http://pluto.jhuapl.edu/mission.htm

PROGRAM MANAGEMENT

Project responsibility for New Horizons, the first mission under the New Frontiers program, is delegated to the Principal Investigator (PI) at Southwest Research Institute (SwRI). The Johns Hopkins University/Applied Physics Laboratory (JHU/APL) has project management responsibility. Enterprise Official is Ed Weiler, Associate Administrator for Space Science at Headquarters. Theme director and point of contact is Orlando Figueroa, director of the Solar System Exploration Division at Headquarters. This program is in full compliance with NPG 7120.5B.

TECHNICAL COMMITMENT

The baseline for New Horizons is detailed in the Program Level I requirements

Technical Specifications	FY 2005 President's Budget	Change from Baseline
Launch Mass	465 kg	--
Power at Pluto	228 watts	--
Launch Vehicle	Atlas V 551	--
Communications	X-band, 2.1-meter high gain antenna	--
Payload	LongRange Reconnaissance Imager, Exploration RemoteSensing Instrument, SolarWind Analyzer for PAM, Energetic Particle Spectrometer Science Investigation, Radio Science Experiment, Student Dust Counter	--
Data Rate	768 bps to 70-meter antenna	--

Schedule	FY 2005 President's Budget	Change from Baseline
Critical Design Review	Oct-03	--
Flight Readiness Review	Dec-05	--
Launch	Jan-06	--
Jupiter Flyby/Gravity Assist	Mar-07	--
Pluto-Charon Encounter	Jul-15	--
End of Mission	Jan-20	--

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	0%	Full & Open Competition	100%	Industry	44%
Cost Reimbursable	100%	Sole Source	0%	Government	7%
Fixed Price	0%		100%	NASA Intramural	2%
Grants	0%			University	47%
Other	0%			Non Profit	0%
*As of FY 2003 direct procurement	100%	*As of FY 2003 direct procurement		*As of FY 2003 direct procurement	100%

Theme: Solar System Exploration
Development: New Horizons (Pluto)

Future Acquisition - Major	Selection	Goals
None -- all major contracts are in place.		

AGREEMENTS

Internal: The project is not dependent on other NASA activities outside of the control of the Associate Administrator for Space Science. External: There are no other non-NASA organizations (other than New Horizon's team members) on which the project depends for mission success. Changes since FY 2004 President's Budget: None.

RISK MITIGATION

Risk Date:8/8/2003

Top Risks	R	Overall	Y	Cost	R	Schedule	Y	Technical	Probability	Impact	Mitigation Plan

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Independent Assessment	New Frontiers PO	10/03	12/05	Critical Design Review; Flight Readiness Review

BUDGET/ LIFE CYCLE COST

Budget Authority ($ millions)	Prior	FY03	FY04	FY05	FY06	FY07	FY08	FY09	BTC	Total	Comments
FY2005 PRESBUD	30.7	123.6	116.8	115.8	84.4	19.0	8.4	5.9	114.6	619.2	
Development	30.7	123.6	116.8	115.8	84.4	19.0	8.4	5.9	114.6	619.2	
Changes since 2004 PRESBUD	+30.7	+123.6	+116.8	+115.8	+84.4	+19.0	+8.4	+5.9	+114.6	+619.2	Moved from formulation into development
Development	+30.7	+123.6	+116.8	+115.8	+84.4	+19.0	+8.4	+5.9	+114.6	+619.2	
FY2004 PRESBUD.											

Indicates changes since the previous year's President's Budget Submit
Indicates budget numbers in full cost.

Theme: Solar System Exploration
Development: Small Development Projects

PURPOSE

Objectives	Performance Measures
5.2	5SSE11,15

The SSE Small Projects program provides frequent flight opportunities for highly focused, relatively inexpensive missions. Missions are selected through the Announcement of Opportunity (AO) process. Also included in this group are Missions of Opportunity (MO) -- space science investigations that are flown as part of a non-NASA space mission.

OVERVIEW

The mission that is currently included in Solar System Exploration Small Projects is Rosetta, which is an international collaboration to study the origin of comets and the solar system itself. The U.S. responsibility is to provide four instruments, science participation, Deep Space Network access and navigational support.

Rosetta program home page: http://sci.esa.int/home/rosetta

PROGRAM MANAGEMENT

Rosetta is a single project with development responsibility delegated to the Jet Propulsion Laboratory.

TECHNICAL COMMITMENT

The baseline for Rosetta is detailed in the Program Level I Requirements.

Technical Specifications	FY 2005 President's Budget	Change from Baseline
Microwave Instrument for Rosetta Orbiter (MIRO)	Center-band frequencies of 190 & 564 Ghz	
ALICE UV Spectrometer	Obtain spectra in the 700-2050Å bandpass	
Ion Electron Spectrometer (IES)	Operate in three science modes	
ROSINA	Two spectrometers, a velocity and temperature sensor, and a common data processing unit	

Schedule	FY 2005 President's Budget	Baseline	Change from Baseline
Rosetta Launch	Not earlier than 02/26/04	01/2003	Thirteen months

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

The Rosetta instrument developers were selected by ESA and endorsed by NASA in February 1996. Selections made were JPL for MIRO, Southwest Research Institute for ALICE and IES, and Lockheed Martin Palo Alto Research Laboratory for ROSINA hardware. Changes since FY 2004 President's Budget: none.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	25%	Full & Open Competition	100%	Industry	25%
Cost Reimbursable	25%	Sole Source	0%	Government	0%
Fixed Price	0%		100%	NASA Intramural	25%
Grants	50%			University	50%
Other	0%	Sci Peer Review	100%	Non Profit	0%
*As of FY 2003 direct procurement	100%	*As of FY 2003 direct procurement		*As of FY 2003 direct procurement	100%

Future Acquisition - Major	Selection	Goals
None - all major acquisitions are in place		

AGREEMENTS

Internal: SSE Small projects are not dependent on other NASA activities outside of the control of the Associate Administrator of Space Science. External: MOU between NASA and ESA, 1999. Changes since FY 2004 Pres. Budget: None.

Theme: Solar System Exploration
Development: Small Development Projects

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
N/A (European Space Agency-led project)	N/A			N/A

BUDGET/ LIFE CYCLE COST

Budget Authority ($ millions)	Prior	FY03	FY04	FY05	FY06	FY07	FY08	FY09	BTC	Total	Comments
FY2005 PRESBUD	35.3	3.9								39.2	
Rosetta	35.3	3.9								39.2	
Changes since 2004 PRESBUD	-5.8	+3.0								-2.8	
Rosetta	-5.8	+3.0								-2.8	
FY2004 PRESBUD	41.1	0.9								42.0	
Rosetta	41.1	0.9								42.0	

Indicates changes since the previous year's President's Budget Submit
Indicates budget numbers in full cost.

Theme: Solar System Exploration
Operations

PURPOSE

Objectives	Performance Measures
1.4, 5.1, 5.2	5SSE5-14,16

Maximize the scientific return from NASA's investment in spacecraft and other data collection sources by conducting efficient and reliable operations of the data-collecting hardware which produces scientific discoveries.

OVERVIEW

SSE Operations funds operational missions that support SSE goals and objectives, and the Deep Space Mission System (DSMS) that provides communications with SSE missions. Starting in FY 2005, the operations funding for Stardust, Genesis, MESSENGER, Deep Impact, and Dawn will be combined with the Data Analysis funding for those missions (see Enterprise summary section for more information).

Discovery Program Homepage: http://discovery.nasa.gov/ Cassini Homepage: http://www.jpl.nasa.gov/cassini/ DSN Homepage: http://deepspace.jpl.nasa.gov/dsn/

PROGRAM MANAGEMENT

Enterprise Official is Ed Weiler, Associate Administrator for Space Science at Headquarters. Theme director and point of contact is Orlando Figueroa, director of the Solar System Exploration Division at Headquarters. SSE mission operations are managed by the Jet Propulsion Laboratory, with the exception of MESSENGER and New Horizons, which are managed by the Johns Hopkins University's Applied Physics Laboratory. This program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

The baseline for all SSE missions is defined in their respective PCAs.

Technical Specifications	FY 2005 President's Budget	Change from Baseline
All missions	will meet Level I specifications as identified in each mission's respective program plan.	None

Mission	Launch Date	Comment
Cassini	Oct. 1997	Arrives at Saturn in July 2004.
Stardust	Feb. 1999	Prime mission through Jan. 2006.
Genesis	Aug. 2001	Prime mission though Sept. 2004.
Deep Impact	Jan. 2004	Launch delayed to Dec. 2004; comet encounter July 2005.
MESSENGER	March 2004	Launch delayed (TBD).

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

The Cassini mission is an international endeavor with the Jet Propulsion Laboratory, European Space Agency and Italian Space Agency. Prime contractors for Discovery missions are selected by the Principal Investigator (PI) of each mission. In FY 2003, direct procurement represented 100% of budget authority. Changes since FY 2004 President's Budget: None.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	0%	Full & Open Competition	15%	Industry	5%
Cost Reimbursable	100%	Sole Source	85%	Government	0%
Fixed Price	0%			NASA Intramural	0%
Grants	0%		100%	University	95%
Other	0%	Sci Peer Review	%	Non Profit	0%
*As of FY 2003 direct procurement	100%	*As of FY 2003 direct procurement		*As of FY 2003 direct procurement	100%

Future Acquisition	Selection	Goals
CSOC recompetition	Late 2003	100% Full & Open Competition

Theme: Solar System Exploration

Operations

AGREEMENTS

Internal: NASA has a MOA in place among the Office of Space Science, Office of Space Flight, Office of Earth Science, and the Office of Aerospace Technology regarding space communication responsibilities. External: NASA has international agreements with the European Space Agency (ESA); the German, French, and Italian Space Agencies (DLR, CNES and ASI); and the countries of Spain and Australia. Changes since FY 2004 President's Budget: None.

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Independent Annual Review	Independent Review Team	9/03	5/04	Validate performance of Discovery program against PCAs
Independent Implementation 2	Independent Review Team	8/03	12/04	DSMS - progress and risk assessment

BUDGET

Budget Authority ($ millions)	FY 2003	FY 2004	FY 2005	Comments
FY2005 PRESBUD	298.9	308.2	277.0	
Stardust	4.7	5.3		
Genesis	8.1	8.2		
Messenger		3.0		
Deep Impact		6.9		
Cassini	31.3	30.1	16.3	
DSN expansion	15.2	0.7		
DSMS	239.6	254.0	260.7	
Changes since 2004 PRESBUD	-11.7	-1.7		MO&DA combined
Stardust	+0.1			
Genesis	+0.9			
Cassini	-0.2	-0.2		
DSN expansion	-0.1			
DSMS	-10.0	-1.5		
Contour	-2.4			
FY2004 PRESBUD	310.6	309.9		
Stardust	4.6	5.3		
Genesis	7.2	8.2		
Contour	2.4			
Messenger		3.0		
Deep Impact		6.9		
Cassini	31.5	30.3		
DSN expansion	15.3	0.7		
DSMS	249.6	255.5		

Indicates changes since the previous year's President's Budget Submit

Indicates budget numbers in full cost.

Theme: Solar System Exploration
Research

PURPOSE

Objectives	Performance Measures
1.4, 5.1, 5.2	5SSE5-14,16-17

SSE research develops the theoretical tools and laboratory data needed to analyze flight data, makes possible new and better instruments to fly on future missions, and analyzes the data returned so that we can answer specific questions posed and fit this new knowledge into the overall picture of the solar system.

OVERVIEW

The SSE research element funds a variety of programs, including SSE Research and Analysis (R&A), the analysis of data (DA) from SSE operating missions, and the science data tools and archives needed to perform and catalog the research. DA programs are tied to specific missions, which are focused on the achievement of specific strategic objectives. The scope of R&A programs is generally wider because they must provide the new theories and instrumentation that enable the next generation of flight missions. The alignment of research programs with SSE strategic goals is ensured through two mechanisms. First, NASA Research Announcements soliciting R&A proposals contain explicit prioritization criteria with respect to Enterprise objectives. Second, the entire R&A program is reviewed triennially to assess the science quality and productivity of the major components and to adjust plans to best support Enterprise goals. Data Analysis (DA) programs have traditionally been performed by mission instrument teams and interdisciplinary scientists competitively selected for an individual mission for the lifetime of that mission. The DA program includes annual, open and competitive solicitations to all missions that can accommodate guest investigations. Starting in FY 2005, the operations funding for Stardust, Genesis, MESSENGER, Deep Impact, and Dawn will be combined with the Data Analysis funding for those missions (see Enterprise summary section for more information).

For more information, go to: http://spacescience.nasa.gov/missions/index.htm; http://research.hq.nasa.gov/code_s/code_s.cfm; and http://ssds.nasa.gov/

PROGRAM MANAGEMENT

NASA Headquarters is responsible for the SSE Research Program. Enterprise Official is Ed Weiler, Associate Administrator for Space Science at Headquarters. Theme director and point of contact is Orlando Figueroa, director of the Solar System Exploration Division at Headquarters. This program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

Content of SSE R&A and DA is defined in each individual mission PCA or NASA Research Announcement.

Technical Specifications
OSS strategic planning process specifies a series of goals, strategic objectives and research focus areas. The OSS Strategic Plan draws from the Solar System Exploration Decadal Survey (NRC), as well as the road mapping activities by the Solar System Exploration Subcommittee (SSES). All selections processes & reviews of the elements of the SSE research program use these strategic items as guide posts for selection and/or continuation. Research proposals must relate to these strategic items.

Schedule	FY 2005 President's Budget	Change from Baseline
Data Analysis Senior Reviews	Every Two Years	--
R & A Research Opportunities In Space Science (ROSS)	Yearly in Feb.	--

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

The Research and Analysis (R&A) and Data Analysis (DA) programs make awards following peer reviewed competitions under NASA Research Announcements (NRAs), Announcements of Opportunity (AOs) and Cooperative Agreement Notices (CANs). In FY 2003, direct procurement represented 100% of budget authority. Changes since FY 2004 President's Budget: None.

Current Acquisition	Actual*	Selection Method	Actual *	Performer	Actual*
Cooperative Agreement	12%	Full & Open Competition	98%	Industry	6%
Cost Reimbursable	48%	Sole Source	2%	Government	5%
Fixed Price	1%			NASA Intramural	5%
Grants	30%		100%	University	73%
Other	9%			Non Profit	11%
*As of FY 2003 direct procurement	100%	*As of FY 2003 direct procurement		*As of FY 2003 direct procurement	100%

Theme: Solar System Exploration
Research

Future Acquisition	Selection	Goals
Annual R&A research announcement	late 2004	100% Science Peer Review

AGREEMENTS

Internal: The program is not dependent on other NASA activities outside of the control of the Associate Administrator for Space Science. External: Cassini and Rosetta Data Analysis involve agreements with the European Space Agency. Changes since FY 2004 President's Budget: None.

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
MO&DA Senior Review	Sr. Review Committee	8/03	8/04	Recommend approval and funding level for extending science investigations.
R&A peer review	peer review committee	8/03	8/04	To review SSE proposals responding to the annual R&A announcement.

BUDGET

Budget Authority ($ millions)	FY 2003	FY 2004	FY 2005	Comments
FY2005 PRESBUD	258.5	323.7	366.6	
Cassini Data Analysis	38.4	44.8	64.7	
Miscellaneous MO&DA	25.7	32.1	54.4	
SSE R&A	194.4	246.8	247.5	
Changes since 2004 PRESBUD	+3.8	+2.1		Combined MO&DA
Cassini Data Analysis	+5.2	-0.3		
Miscellaneous MO&DA	+25.7	+32.1		
SSE R&A	+1.5	+2.5		
Miscellaneous DA	-28.6	-32.3		
FY2004 PRESBUD	254.7	321.6		
Cassini Data Analysis	33.2	45.1		
Miscellaneous DA	28.6	32.3		
SSE R&A	192.9	244.3		

Indicates changes since the previous year's President's Budget Submit
Indicates budget numbers in full cost.

Theme: Solar System Exploration
Technology and Advanced Concepts

PURPOSE

Objectives	Performance Measures
1.4, 5.1, 5.2	5SSE3-14

The SSE Technology and Advanced Concepts effort develops advanced technologies needed for specific science missions. This process begins with mission studies -- the first phase of the flight program development process. In this phase, scientists work collaboratively with technologists and mission designers to develop the most effective alignment of technology development programs with future mission requirements. This collaboration enables intelligent technology investment decisions through detailed analysis of the trade-offs between design considerations and cost. Technologies critical to the success of future SSE missions include, but are not limited to, new propulsion systems and techniques that enable greater mission flexibility, improved radioisotope power systems, advanced communications systems, and advanced avionics capabilities.

OVERVIEW

The Solar System Exploration Theme's Technology and Advanced Concepts program boasts a variety of efforts designed to push the state of the art in planetary exploration. The goal of the In-Space Power and Propulsion (ISPP) program is to develop alternative, more efficient power and propulsion systems. The ISPP will include the radioisotope power systems (RPS) work and some of the electric propulsion efforts that had previously been part of Project Prometheus, the nuclear systems program. While most of Project Prometheus will now be part of NASA's new Exploration Systems Enterprise, the Space Science Enterprise will retain not only the RPS and electric propulsion work, but also the fundamental science component of the Jupiter Icy Moons Orbiter (JIMO) and instrument technology development for that mission. The Solar System Exploration Technology and Advanced Concepts effort also supports the selection of future Discovery and New Frontiers missions, and the development of communications and avionics technologies.

SSE Technology Homepage: http://solarsystem.nasa.gov/technology/tech.html New Frontiers Homepage: http://centauri.larc.nasa.gov/newfrontiers/ Discovery Acquisition Homepage: http://discovery.larc.nasa.gov/discovery/

PROGRAM MANAGEMENT

Enterprise Official is Ed Weiler, Associate Administrator for Space Science at Headquarters. Theme director and point of contact is Orlando Figueroa, director of the Solar System Exploration Division at Headquarters. The program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

Project technical baselines are defined by the individual Formulation Authorization Document (FAD), Program Commitment Agreement (PCA) or equivalent documentation.

Technical Specifications		FY05 Budget Submit							Change from Baseline
		FY03	FY04	FY05	FY06	FY07	FY08	FY09	
In-Space Power and Propulsion (excluding electric propulsion)	TRL	3	4	4	5	5	5	5	--
	$M	43.20	61.60	82.7	87.1	90.2	93.7	96.2	--
In-Space Power and Propulsion: Radioisotope Power Systems - Stirling Radioisotope Generator	TRL	7	7	7	7	7	8	8	--
	$M	20	27						--
In-Space Power and Propulsion: Radioisotope Power Systems - NRAs for Concepts	TRL	3	3	3	3	3	3	3	--
	$M	3	4						--
In-Space Power and Propulsion: Radioisotope Power Systems - NRAs for Breadboards	TRL	5	5	5	5	5	5	5	--
	$M	12	12						--

Schedule	FY 2005 President's Budget	Change from Baseline
New Frontiers 2 - AO Release	Oct. 2003	--
New Frontiers 2 - Proposals Due	Feb. 2004	--
Discovery 11 - AO Release	Feb. 2004	--
Discovery 11 - Proposals Due	May 2004	--
New Frontiers 2 - Concept Study Selection	July 2004	--

Schedule	FY 2005 President's Budget	Change from Baseline
Discovery 11 - Concept Study Selection	Oct. 2004	--
New Frontiers 2 - Downselect	May 2005	--
Discovery 11 - Downselect	June 2005	--
NRA Selections for RPS Concepts	1st Qtr. FY06	--
NRA Selections for RPS Breadboards	1st Qtr. FY06	--
Discovery 12 - AO Release	Aug. 2006	--
New Frontiers 3 - AO Release	Oct. 2006	--
Discovery 12 - Proposals Due	Nov. 2006	--
New Frontiers 3 - Proposals Due	March 2007	--
Discovery 12 - Concept Study Selection	April 2007	--
New Frontiers 3 - Concept Study Selection	Aug. 2007	--
Discovery 12 - Downselect	Dec. 2007	--
New Frontiers 3 - Downselect	June 2008	--
NRA Selections for RPS Concepts	1st Qtr. FY09	--
NRA Selections for RPS Breadboards	1st Qtr. FY09	--
Discovery 13 - AO Release	Feb. 2009	--
Discovery 13 - Proposals Due	July 2009	--

ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

Major acquisitions in FY 2003 included a selection for the Next Generation Ion Engine for the ISPP program. In FY 2003, direct procurement represented 100% of budget authority. Changes since FY 2004 President's Budget: none.

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	0%	Full & Open Competition	74%	Industry	12%
Cost Reimbursable	79%	Sole Source	26%	Government	15%
Fixed Price	2%		100%	NASA Intramural	0%
Grants	0%			University	62%
Other	19%			Non Profit	11%
*As of FY 2003 direct procurement	100%	*As of FY 2003 direct procurement		*As of FY 2003 direct procurement	100%

Future Acquisition	Selection	Goals
New Frontiers 2	May 2005	100% Full & Open Competition
Discovery 11	June 2005	100% Full & Open Competition

AGREEMENTS

Internal: The program is not dependent on other NASA activities outside of the control of the Associate Administrator for Space Science. NASA is currently working on a Memorandum of Agreement with the Department of Energy regarding nuclear systems work. Changes since FY 2004 President's Budget: None.

INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
ISPP: Independent Technology Assessment	SSE Subcomm. Tech. Assessment	7/03	7/04	Evaluate and prioritize ISPP technologies

Theme: Solar System Exploration
Technology and Advanced Concepts

BUDGET

Budget Authority ($ millions)	FY 2003	FY 2004	FY 2005	Comments
FY2005 PRESBUD	173.5	391.6	333.7	
In-Space Power and Propulsion Program (ISPP)	86.9	76.5	163.6	ISPP Includes Radioisotope Power Systems work (previously included with Project Prometheus)
X-2000	15.0			
Future Discovery Pre-Development	6.6	34.1	48.7	
Future New Frontiers		12.6	100.7	
Other	8.8	10.7	8.2	
Project Prometheus	56.1	257.7		Reflects transfer of Project Prometheus to Exploration Systems Enterprise
Jupiter Icy Moons Orbiter Payload			12.5	
Changes since 2004 PRESBUD	-72.6	-158.8		Pluto was moved in its entirety to Development
In-Space Power and Propulsion Program	+24.4	+1.5		
X-2000	-15.0	-10.9		
Future Discovery Pre-Development	-6.5	+10.1		
Future New Frontiers	-15.0	-117.6		
Other	+8.8	+10.7		
Project Prometheus	+56.1	+257.7		
Optical Communications		-31.2		Transferred to Mars Exploration Theme
Nuclear Power	-79.0	-55.7		
Nuclear Propulsion	-46.5	-130.9		
JIMO		-92.6		
FY2004 PRESBUD	246.1	550.4		
In-Space Power and Propulsion Program	62.5	75.0		
Optical Communications		31.2		
X-2000	30.0	10.9		
Future Discovery Pre-Development	13.1	24.0		
Future New Frontiers	15.0	130.2		
Nuclear Power	79.0	55.7		
Nuclear Propulsion	46.5	130.9		
JIMO		92.6		

Indicates changes since the previous year's President's Budget Submit
Indicates budget numbers in full cost.