THEME: Mars Exploration

This picture shows gullies on the walls of an impact crater in Newton Basin in Sirenum Terra, Mars. Similar gullies have been observed in numerous locations across Mars. Gullies in craters originate at a specific layer and may have formed by the release of groundwater to the Martian surface in geologically recent times. The potential presence of water means life might currently be present on Mars. Water on Mars could also be a valuable resource for future exploration. More information can be found at http://mars.jpl.nasa.gov/

MARS EXPLORATION

MAJOR EVENTS IN FY 2004

- Mars Exploration Rovers arrive at Mars in January 2004 and will begin science operations. The Rovers are designed to last for 90 days of surface operations and should travel about 600 meters during that time.
- Mars Reconnaissance Orbiter will begin integration and test in preparation for launch in 2005.

THEME: Mars Exploration Program (MEP)

OVERVIEW

The Mars Exploration Program (MEP) is a science-driven effort to understand and characterize Mars as a dynamic system, including its past and present geology, interior, climate, environment, and its biological potential. The MEP program seeks to characterize the habitability of Mars and determine whether it was ever or still is inhabited by forms of life. The compelling discoveries expected from the MEP may warrant scientific exploration by humans in the future. The MEP missions will contribute knowledge and capabilities necessary to enable such possibility. The FY04 budget request will enable NASA to operate existing assets at Mars (Mars Global Surveyor and Odyssey), support the operations and landing of the Mars 2003 Rovers, provide science and operational support for Mars Express and ASPERA-3, continue development of the 2005 Mars Reconnaissance Orbiter mission, and continue to invest in Education and Public Outreach (E&PO), technology, R&A, and advanced studies for future missions.

Missions	Goals supported by this theme	Objectives supporting those goals
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.	5.4 Understand the current state and evolution of the atmosphere, surface, and interior of Mars. 5.5 Determine if life exists or has ever existed on Mars. 5.6 Develop an understanding of Mars in support of possible future human exploration.
Inspire the Next Generation of Explorers	6. Inspire and motivate students to pursue careers in science, technology, engineering, and mathematics.	6.1 Improve student proficiency in science, technology, engineering and mathematics using educational programs, products and services based on NASA's unique missions, discoveries and innovations. (Supporting Role) 6.2 Motivate K-16+ students from diverse communities to pursue science and math courses and ultimately college degrees in science, technology, engineering, and mathematics. (Supporting Role) 6.3 Improve science, technology, and mathematics instruction with unique teaching tools and experiences that only NASA can provide, that are compelling to teachers and students. (Supporting Role) 6.4 Improve higher education capacity to provide for NASA's and the Nation's future science and technology workforce requirements. (Supporting Role)
	7. Engage the public in shaping and sharing the experience of exploration and discovery.	7.1 Improve the capacity of science centers, museums, and other institutions, through the development of partnerships, to translate and deliver engaging NASA content. (Supporting Role) 7.2 Improve science literacy by engaging the public in NASA missions and discoveries, and their benefits, through such avenues as public programs, community outreach, mass media, and the Internet. (Supporting Role)
Space Flight Capabilities	9. Extend the duration and boundaries of human space flight to create new opportunities for exploration and discovery.	9.5 Create innovative approaches and concepts to inform future decisions concerning systems, infrastructures and missions for human and robotic exploration of space. (Supporting Role)

RELEVANCE

The MEP will characterize another silicate planet which, like Earth, bears an atmosphere, and investigate the variability of its climate. This work will provide a quantitative basis for interplanetary comparative climatology.

The MEP seeks to understand the "habitability of a silicate planet" and to develop predictive models that pertain to sustainability and habitability. Current scientific knowledge suggests that the conditions for the onset of terrestrial life existed in the early history of Mars (as on Earth) and subsequently planetary evolution caused a divergence. Preserved climatologically and geological records on Mars may be relevant to the earliest history and sustainability of life on Earth. MEP will integrate investigations of climate, geology, and global thermal evolution to focus the search for evidence of life in accessible places on Mars. The investigation by the MEP as to whether Mars ever harbored any kind of life contributes to NASA's overall efforts to explore the Universe and search for life. By careful study of the planet, we may generate a level of understanding that will enable us to better understand and predict the environmental evolution and habitability of planet Earth.

THEME: Mars Exploration Program (MEP)

RELEVANCE (continued)

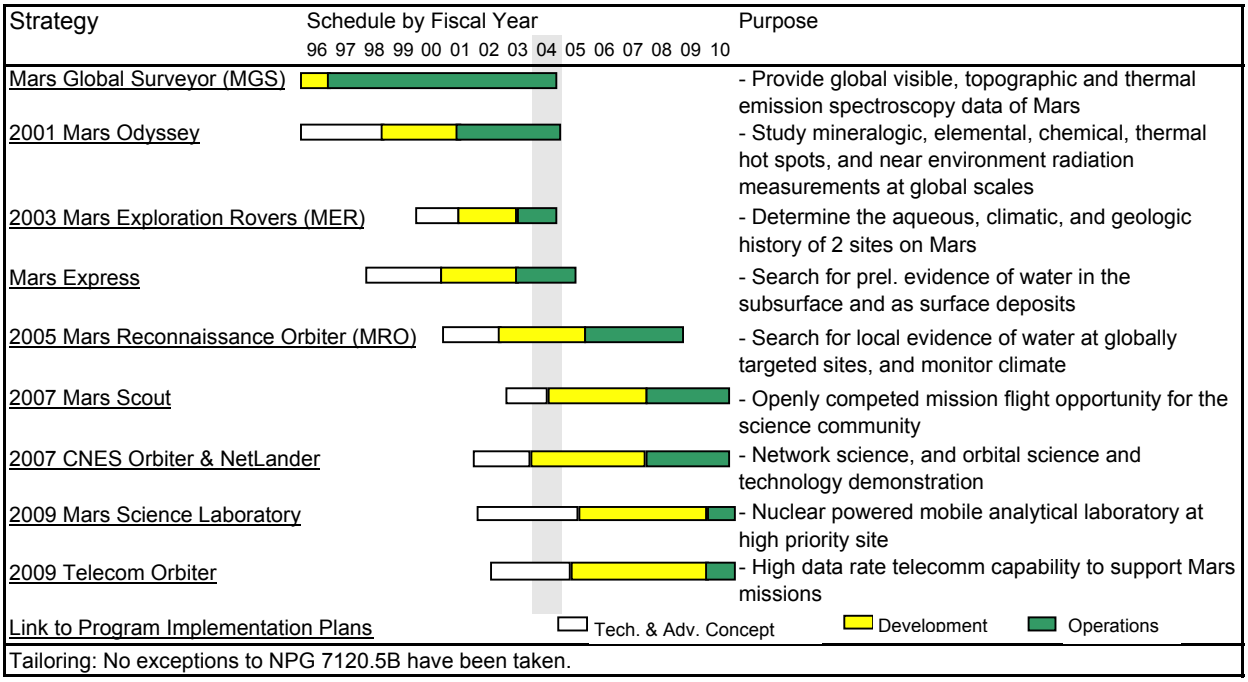
The MEP is the world's only comprehensive program designed to collect and interpret such a broad panoply of scientific knowledge concerning another planet, while setting the context to answer whether life exists elsewhere other than Earth. Mars, by its visible presence, appeals to the imagination, and its regular close proximity to the Earth (every 26 months) makes it a unique frontier than can be explored by robots, and perhaps eventually by humans. The MEP represents one of the U.S. government's strongest efforts to inspire the next generations of scientists, engineers, and explorers.

Education and Public Benefits
Public benefits from MEP include understanding another world whose evolution is likely to have been similar to Earth's (where all records of the first 1 billion years have been eradicated). Developing technologies and know-how to enable a comprehensive physics- and chemistry-based search for evidence of life, including non-Earth-centric varieties, is of intrinsic value. Discovering that life exists any place other than Earth would be a profound revelation of historic importance, altering humanity's perception of its place in the universe. A scientific understanding of the potential evolution (and potential demise) of life on Mars is directly relevant to the habitability of Earth. Mars exploration technology is also applicable to other solar system missions, to Earth observation, and potentially to biological research on Earth, including mechanisms for detection and mitigation of bioterrorism.

IMPLEMENTATION

The Mars Exploration Program 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 is in the NASA HQ Office of Space Science. The Enterprise official is Dr. Edward Weiler, Associate Administrator for Space Science. The Theme Director and Point of Contract is Mr. Orlando Figueroa, Director of the Mars Exploration Program at HQ. This theme is in full compliance with NPG7120.5B.



Tailoring: No exceptions to NPG 7120.5B have been taken.

THEME: Mars Exploration Program (MEP)

STATUS

The Mars Exploration Program accomplished the following this past year:

- Mars Global Surveyor started second science mission extension;
- Odyssey was inserted into Mars science orbit successfully with all the instruments fully operational;
- 2003 Mars Exploration Rovers completed critical design phase and started Assembly, Test, Launch Operations (ATLO) in preparation for launches in May and June of 2003;
- Delivered to ESA the Mars Express instruments (Radar Sounder [MARSIS] Antenna and Transmitter and RF subsystems);
- Mars Reconnaissance Orbiter completed its formulation phase successfully;
- Released an Announcement of Opportunity (AO) for the 2007 Mars Scout mission; 25 proposals received, with 4 selected for concept studies in December 2002;
- Released Mars Instrument Develoment Program (MIDP) NRA; 15 proposals selected in late August 2002 for award; and
- Released Mars Fund. Research Program NRA; 93 proposals received in May 2002, with 31 selected for award.

By February of 2003, the Mars Exploration Program will have:

- Completed Mars Reconnaissance Orbiter instruments Critical Design Reviews (CDR); and
- Started preship review for Mars Exploration Rovers.

PERFORMANCE MEASURES

Annual Performance Goals	
	OUTCOME: A well managed program in accordance with Agency implementing strategies.
4MEP1	Each Development project will complete its current phase within 10% of total life-cycle cost shown on the table below.
4MEP2	Each Research project will allocate 75% of its funding competitively during FY04.
4MEP3	MEP will complete all of its missions within 10% of their baseline schedules.
5.4.1	OUTCOME: Understand the current state and evolution of the atmosphere, surface, and interior of Mars.
4MEP4	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.
4MEP5	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.
4MEP6	Successfully demonstrate progress in studying the chemistry, mineralogy, and chronology of martian materials. Progress towards achieving outcomes will be validated by external review.
4MEP7	Successfully demonstrate progress in determining the characteristics and dynamics of the interior of Mars. Progress towards achieving outcomes will be validated by external review.
5.5.1	OUTCOME: Determine whether life exists or has ever existed on Mars.
4MEP8	Successfully demonstrate progress in investigating the character and extent of prebiotic chemistry on Mars. Progress towards achieving outcomes will be validated by external review.
4MEP9	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.
5.6.1	OUTCOME: Develop an understanding of Mars in support of possible future human exploration.
4MEP10	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.
4MEP11	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.
6.1.1	OUTCOME: Kindergarten through graduate students will be more proficient in science, technology, engineering, and mathematics (STEM).
4MEP12	Provide opportunities for students to work directly with NASA space science missions, facilities, and data.
6.2.1	OUTCOME: More students from diverse communities motivated to pursue careers in STEM.
4MEP13	Provide new opportunities for participation in the space science program by an increasingly diverse population, including for minorities and minority universities to compete for and participate in space science missions, research, and education programs.

THEME: Mars Exploration Program (MEP)

PERFORMANCE MEASURES (continued)

Annual Performance Goals

6.3.1 OUTCOME: Improve quality of STEM instruction.

4MEP14 Provide high quality educational materials and teacher training based on Theme content and focused on national curriculum standards.

4MEP15 Provide exhibits, materials, workshops, and personnel at national and/or regional education and outreach conferences.

6.4.1 OUTCOME: More students prepared to enter the STEM workforce.

4MEP16 Provide higher education opportunities offered through OSS research awards and other NASA research and education programs.

7.1.1 OUTCOME: Improve the capacity of science centers, museums, and other institutions, through the development of partnerships, to translate and deliver engaging NASA content.

4MEP17 Through partnerships with major science museums or planetariums, put on display or on tour major exhibitions or planetarium shows based on Theme content.

4MEP18 Provide materials and technical expertise to support the development of exhibits and programs at science museums and planetariums.

7.2.1 OUTCOME: Engage the public in NASA missions and discoveries through such avenues as public programs, community outreach, mass media, and the Internet.

4MEP19 Seek out and capitalize on special events and particularly promising opportunities in the Theme science program to bring space science to and involve the public in the process of scientific discovery.

9.5.2 OUTCOME: Develop innovative approaches and concepts to inform future decisions concerning systems, infrastructures and missions for human and robotic exploration of space.

4MEP20 Develop advanced concepts for Mars missions where human intervention can significantly increase the scientific return, and develop a technology roadmap for critical technologies that can be demonstrated effectively in the robotic program.

INDEPENDENT REVIEWS

Types of Review	Performer	Last Review	Next Review	Purpose
COMPLEX	NRC	1999	N/A	MEP architecture, scientific strat./implem.
MEP Independent Assessment Team	Tom Young Committee	1999	N/A	MEP architecture, scientific strat./implem.
Nat'l Academy	Space Study Board	7/02	N/A	MEP architecture, scientific strat./implem. Effectiveness and quality of the program.
Advisory Council	NAC	9/02	Annually	Report progress towards science goals, and assess implementation strategies.
	SsAC	8/02	3 times/year	Report progress towards science goals, and assess implementation strategies.
	Solar System Sub-Committee	9/02	3 times/year	Report progress towards science goals, and assess implementation strategies.
Mars Exploration Program Analysis Group (MEPAG)	Peer/Mars Scientist	9/02	2 times / year	Refine and evaluate the scientific objectives and research focus areas.

BUDGET

Budget Authority ($millions)	FY02	FY03	Chng	FY04	Comments
Mars Exploration Program	**456.9**	**495.5**	**74.8**	**570.3**	
Development	342.8	266.5	-72.7	193.8	
2003 Mars Exploration Rovers	277.6	113.9	-113.9	0.0	Launch in May/June 2003.
2005 Mars Reconnaissance Orbiter	58.0	143.5	+40.0	183.5	Start full scale development in FY04.
Mars Small Missions - under $100M	7.2	9.1	+1.2	10.3	
- Mars Express	4.4	3.4	-3.4	0.0	Launch June 2003.
- ASPERA-3	0.6	0.5	-0.5	0.0	Launch June 2003.
- NetLander	2.2	5.2	+5.1	10.3	Start full scale development.
Operations	24.8	26.0	+18.8	44.8	MER launches in May & June 2003, and will
Technology and Advanced Concepts	65.9	177.5	+97.9	275.4	start mission Ops.
Research	23.4	25.5	+30.7	56.2	

Note: For all formats, the FY 02 column reflects the FY 2002 Congressional Operating Plan dated 9/30/02. The FY 03 column reflects the FY 2003 Presidents Budget Submit (PBS) as Amended. The Change column includes both programmatic and full cost adjustments. FY 2004 column is in full cost.

THEME: Mars Exploration Program (MEP)

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THEME: Mars Exploration Program (MEP)

DEVELOPMENT: 2003 Mars Exploration Rovers

PURPOSE

Objectives (Reference 2003 Strategic Plan)	Performance Measures
5.4; 5.6; 6.1 thru 6.4; 7.1; 7.2	4MEP1,3,5,6,12-19

The goal of both Mars Exploration Rovers (MERs) will be to learn about the history of ancient water and its role in the geology and climate of Mars. The rovers (MER-A and B) will be robotic field geologists, equipped to read the geologic record at their landing sites and to learn what the conditions were like when the rocks and soils there were formed. They will also have the mobility to travel up to 600 meters across the Martian landscapes measuring the chemical character of the soils, rocks, and even the previously inaccessible interiors of rocks where unaltered materials may lie.

OVERVIEW

The Mars Exploration Rover-2003 mission consists of two identical flight systems, a launch vehicle for each flight system, and the terrestrial ground data processing stations. Each flight system consists of an Earth-Mars cruise spacecraft, entry-descent-landing system, and a mobile science rover with an integrated instrument package. The two flight systems, known as MER-A and MER-B, will be launched in May/June 2003 and June/July 2003 from the Eastern Test Range at Cape Canaveral, Florida.

http://mars.jpl.nasa.gov/missions/future/2003.html

PROGRAM MANAGEMENT

The Mars Exploration Rover-2003 Project is organized and managed as a project within the Mars Exploration Program (MEP) at the Jet Propulsion Lab (JPL). JPL has the end-to-end responsibility for program implementation. The Agency Program Management Council (PMC) has MER governing responsibility. The Enterprise official is Dr. Edward Weiler, Associate Administrator for Space Science at HQ. The Theme Director and the Point of Contact is Mr. Orlando Figueroa, Director of the Mars Exploration Program at HQ. This project is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

Baseline Commitment as of 02/2001. Mars Exploration Program Plan: Program Level Requirements for the Mars Exploration Rover-2003 Project.

Technical Specifications	FY04 President's Budget	Change from Baseline
Mission Life	90 days per rover	--
Launch	Delta 7925-9.5/7925H-9.5	--
Rover mass	330lb each	--
Rover Traverse Capability	600 meters	--
Imaging	Image at least one 360-degree panorama of landing sites, at .3mrad/pixel	--

Schedule	FY04 President's Budget	Change from Baseline
Mission Selection	4Q/FY00	--
Mission PDR	1Q/FY01	--
Mission CDR	4Q/FY01	--
Start S/C level I&T	2Q/FY02	--
Launch - 1st Lander	May/June 2003	--
Launch - 2nd Lander	June/July 2003	--

THEME: Mars Exploration Program (MEP)

DEVELOPMENT: 2003 Mars Exploration Rovers

ACQUISITION STRATEGY & PERFORMING ORGANIZATIONS

The MER Project is being implemented in an "in-house" mode at JPL. Approximately 49% of the budget allocated for the Project goes out of house. The rover science instruments, which have been selected and procured following an open Announcement of Opportunity (AO), will be integrated onto the rovers at JPL. In FY 2002, direct procurement represented 100% of budget authority. **Changes since FY 2003 Pres. Budget: None.**

Current Acquisitions	Actual *	Selection Method	Actual *	Performer	Actual *
Cooperative Agreements	0%	Full & Open Competition	55%	Industry	24%
Cost Reimbursable	44%	Sole Source	45%	Government	2%
Fixed Price	56%		100%	NASA Intra	0%
Grants	0%			University	74%
Other	0%	Sci Peer Review	100%	Non Profit	0%
* as % of FY02 direct procurement	100.0%	* as % of FY02 direct procurement			100%

Future Acquisitions - Major	Selection	Goals
None - all major acquistions are in place		

AGREEMENTS

Internal: None. *External:* DOE is responsible for the provision of safety analysis, and safety and emergency response at the launch site related to the Radioactive Heater Units (RHU). Gutenberg University in Germany will be providing the Mossbauer Spectrometer. **Changes since FY 2003 Pres. Budget: None.**

INDEPENDENT REVIEWS

Types of Review	Performer	Last Review	Next Review	Purpose
Preliminary Mission & System Design Review	NASA IRT; JPL Review	Jun 27-28, 2000	N/A	Phase A review of Mission Design and project implementation.
PDR	NASA IRT; JPL Review	Jan 31-Feb 2 2001	N/A	Evaluate the technical, cost, and schedule commitments of the project.
CDR	NASA IRT; JPL Rev Bd	Aug 21-23, 2001	N/A	Asses risk posture for technical margins, ATLO obj, and completion w/in budget commitments.
Project ATLO Readiness Review	NASA IRT; JPL Rev Bd	Jan 23-24, 2002	N/A	Assess readiness of major project systems (Science, Flt, Miss. Ops) to enter ATLO phase.
Mission Readiness Review	JPL Rev Bd	N/A	May 2003	Assess the readiness of the project for launch.

BUDGET/LIFE CYCLE COST

Budget Authority ($ in millions)	Prior	FY02	FY03	FY04	FY05	BTC	Total	Comments
FY 2004 President's Budget (LCC)	337.9	277.6	122.1	51.8	11.5		800.9	
Phase A	[5.4]						[5.4]	
Development	337.9	277.6	113.9				729.4	
Operations			5.9	26.6	4.5		37.0	
Data Analysis			2.3	25.2	7.0		34.5	
Changes since FY 03 Pres. Budget		+32.4		+10.7	-5.5		+37.6	***Reason for Change:***
- Development		32.4					32.4	Resolving mass & sched prob.
- Operations				0.9	0.1		1.0	
- Data Analysis				9.8	-5.6		4.2	Added sci seq contingency.
FY 2003 President's Budget (LCC)	337.9	245.2	122.1	41.1	17.0		763.3	
Development	337.9	245.2	113.9				697.0	
Operations			5.9	25.7	4.4		36.0	
Data Analysis			2.3	15.4	12.6		30.3	
Initial Baseline (LCC)	343.9	207.0	118.5	48.6	4.7		722.7	
Development	343.9	207.0	106.3				657.2	Includes ELV.
Operations			3.6	27.3	4.7		35.6	
Data Analysis			8.6	21.3			29.9	

Indicates budget numbers in full cost.
Indicates changes since the FY 2003 Presidents Budget Submit.
FY 2002, FY 2003, Prior and BTC are not in full cost.

THEME: Mars Exploration Program (MEP)

DEVELOPMENT: 2005 Mars Reconnaissance Orbiter (MRO)

PURPOSE

Objectives	Reference 2003 Strategic Plan	Performance Measures
5.4; 5.5; 5.6; 6.1 thru 6.4; 7.1; 7.2		4MEP1,3-7,9-19

The goal of the Mars Reconnaissance orbiter (MRO) is to understand the history of water on Mars by observing the planet's atmosphere, surface, and subsurface in unprecedented detail. This mission will identify the best sites for a new generation of landed vehicles to explore, by virtue of its ability to find local evidence of the chemical and geological "fingerprints" of water and other critical processes. MRO will explore from orbit hundreds of locations on the surface of Mars, observing details that were previously only visible to landers. MRO will focus on locations identified as most promising by Mars Global Surveyor and Odyssey, searching for the presence of surface materials conducive to biological activity or having the potential for preserving biogenic materials.

OVERVIEW

The MRO will be launched in August 2005 by an intermediate-class expendable launch vehicle from Cape Canaveral Air Station, and will enter Mars Orbit in 2006. The MRO mission will use its science payload and engineering systems to acquire global mapping, regional survey, and globally distributed targeted observations from a low-altitude, near-polar, mid-afternoon (dayside) Mars Primary Science Orbit (PSO). Currently, the goal is to achieve a near-polar 255x320 km PSO with closest approach to Mars over the planet's south pole. The MRO willl observe the planet's surface and atmosphere and explore its upper crust from the PSO during a Primary Science Phase, lasting one Martian year (687 Earth days).

http://mars.jpl.nasa.gov/missions/future/2005-plus.html

PROGRAM MANAGEMENT

The Mars Reconnaissance Orbiter (MRO) Project is organized and managed as a project within the Mars Exploration Program (MEP) at the Jet Propulsion Lab (JPL). The Agency Program Management Council (PMC) has MRO governing responsibility. The Enterprise official is Dr. Edward Weiler, Associate Administrator for Space Science at HQ. The Theme Director and the Point of Contact is Mr. Orlando Figueroa, Director of the Mars Exploration Program at HQ. This project is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

Baseline Commitment as of 7/02, as established in the Program-Level Requirements for the Mars Reconnaissance Orbiter-2005 (MRO) Project.

Technical Specifications	FY04 President's Budget	Change from Baseline
End of Nominal Life	5.4 years after launch; December 31, 2010	--
Primary Science Phase	Dec. 2006 thru Dec. 2008	--
Mass	2,000 kg	--
Power	5 kW (Beginning of Mission [BOM] at Earth)	--
Raw Data Volume	26 Tbits	--
Mapping Targeted Imaging	30cm/pixel ground sampling monochromatic imaging; < 40m/pixel ground sampling for mineralogical mapping	--
Imaging Capability	<7.5 m/pixel ground sampling context imaging from 300 km alt.	--
Primary science orbit (PSO)	255 X 320 km	--

Schedule	FY04 President's Budget	Change from Baseline
Instruments selection	Nov-01	--
Mission PDR	Jul-02	--
NAR	Jul-02	--
Mission CDR	3Q/FY03	--
Start S/C level I&T	3Q/FY04	--
Ship to launch site	3Q/FY05	--
Launch	4Q/FY05	--

THEME: Mars Exploration Program (MEP)

DEVELOPMENT: 2005 Mars Reconnaissance Orbiter (MRO)

ACQUISITION STRATEGY & PERFORMING ORGANIZATIONS

Lockheed Martin Astronautics (LMA) has been selected to build the spacecraft. The orbiter system contract with LMA for Phase C/D is implemented in the cost plus fixed/incentive fee contract. Launch vehicle procured via a competitive Launch Services Task Order (LSTO) on the NASA Launch Services (NLS) contract. All science investigations and instruments for the MRO mission were competitively selected under a NASA Announcement of Opportunity (AO). In FY 2002, direct procurement represented 100% of budget authority. **Changes since FY 2003 Pres. Budget: None.**

Current Acquisitions	Actual *	Selection Method	Actual *	Performer	Actual *
Cooperative Agreements	0%	Full & Open Competition	73%	Industry	54.0%
Cost Reimbursable	99%	Sole Source	27%	Government	0.3%
Fixed Price	1%		100%	NASA Intramural	0.2%
Grants	0%			University	45.5%
Other	0%	Sci Peer Review - sci budget	34%	Non Profit	
* as % of FY02 direct procurement	100%	* as % of FY02 direct procurement		* as % of FY02 direct procurement	100.0%

Future Acquisitions - Major	Selection	Goals
No major acquistions planned for FY04.		

AGREEMENTS

Internal: Program is not dependent on other NASA activities outside of the control of the Associate Administrator of Space Science. *External:* The Agenzia Spaziale Italiana (ASI) will provide the Shallow Radar (SHARAD) radar for this mission. **Changes since FY 2003 Pres. Budget: None.**

INDEPENDENT REVIEWS

Types of Review	Performer	Last Review	Next Review	Purpose
Preliminary Mission System	-IPAO	Jan-02	N/A	Transition from Phase A to Phase B.
PDR	-IPAO	Jul-02	N/A	Transition from Phase B to C/D.
Independent Annual Review	-IPAO	Jul-02	N/A	Evaluates project readiness for implementation.
Non-Advocate Review	-SAIC	Jul-02	N/A	Evaluate formulation planning, tech., & cost b/l
CDR	-IPAO Sys.	N/A	Jul-03	Transition from design to build.

BUDGET/LIFE CYCLE COST

Total budget authority represents the Life Cycle Cost (LCC), these figures include concept studies through the end of the prime science mission.

Budget Authority ($ in millions)	Prior	FY02	FY03	FY04	FY05	FY06	FY07	FY08	BTC*	Total	Comments
FY 2004 President's Budget (LCC)	12.0	58.0	143.5	183.5	109.1	33.7	37.8	31.1	38.2	646.9	
Pre-Dev	12.0	58.0								70.0	
Development			143.5	183.5	103.5					430.5	
Operations					4.1	22.6	20.4	16.1	30.6	93.8	
Data Analysis					1.4	11.1	17.4	15.0	7.6	52.6	
Changes since FY 03 Pres. Budget		+0.1		+10.1	+5.9	+1.7	+1.1	+31.1	-28.0	+22.1	***Change Reason:***
- Pre-Dev		+10.0								+10.0	
- Dev		-9.9		+10.1	+5.7					+5.9	JPL burden rate
- MO					+0.2	+1.4	+0.6	+16.1	-15.8	+2.5	and full cost
- DA						+0.3	+0.5	+15.0	-12.2	+3.7	changes.
FY 2003 President's Budget (LCC)	12.0	57.9	143.5	173.4	103.1	32.0	36.7		66.2	624.8	
Pre-Dev	12.0	48.0								60.0	
Development		9.9	143.5	173.4	97.8					424.6	
Operations					3.9	21.2	19.8		46.4	91.3	
Data Analysis					1.4	10.8	16.9		19.8	48.9	
Initial Baseline (LCC)	12.0	58.0	147.8	175.4	103.4	32.8	36.7	30.3	36.1	632.5	
Pre-Dev	12.0	58.0								70.0	
Development			147.8	175.4	98.0					421.2	
Operations					4.0	22.0	19.8	15.7	28.5	90.0	
Data Analysis					1.4	10.8	16.9	14.6	7.6	51.3	

Indicates budget numbers in full cost.
Indicates changes since the FY 2003 President's Budget Submit.
FY 2002, FY 2003, Prior and BTC are not in full cost.

THEME: Mars Exploration Program (MEP)

DEVELOPMENT: Mars Exploration Program Small Development Projects

PURPOSE

Objectives		Performance Measures
5.4; 5.6; 6.1 thru 6.4; 7.1; 7.2	Reference 2003 Strategic Plan	4MEP1,3-5,7,10,12-19

The Red Planet is a source of intrigue and fascination, currently the only other planet where a strong possibility of finding life exists--past or present. NASA is part of two major international missions; ESA Mars Express and CNES Premier 2007 (NetLander). The overall science objective is to understand the fate of the Martian water supply. This is crucial in resolving the mystery of whether life ever existed on Mars.

OVERVIEW

NASA is part of the Mars Express, an European Space Agency(ESA) and Agenzia Spaziale Italiana (ASI) planned mission to explore the Mars atmosphere and surface from polar orbit. The spacecraft will carry a science payload with European instruments from the ill-fated Russian Mars 96 mission, a communications relay to support lander missions, and a small lander (called Beagle II). NASA's involvement includes a joint radar instrument with ASI; U.S. science co-investigators support; radio relay systems ensuring various spacecrafts operate together; hardware for energetic neutral atoms analyzer instrument; and backup tracking support during critical mission phases by Deep Space Network. Also, there is the development and data analysis of the Swedish ASPERA-3 experiment (a funded Discovery Program Mission of Opportunity), to study the solar wind and Martian atmosphere interaction.

NetLander is as a Discovery Program Mission of Opportunity. It is the first planetary mission focusing on Mars investigations and its large-scale atmosphere circulation. This project consists of four landers, each carrying instruments to study Mars' interior, atmosphere and subsurface, as well as ionosphere structure and geodesy. NetLander will launch on the Centre National d'Etudes Spatiales (CNES) Mars 2007 Premier spacecraft. The U.S. contribution is the ATMospheric Instrumentation System (ATMIS), NetLander Ionosphere and Geodesy Experiment (NEIGE), and SEISmology Experiment (SEIS).

http://mars.jpl.nasa.gov/missions/future/express.html http://www.geo.fmi.fi/PLANETS/NetLander.html

PROGRAM MANAGEMENT

The Mars Express, ASPERA-3, and Netlander projects are delegated to the Jet Propulsion Laboratory (JPL). The Agency Program Management Council (PMC) has Mars Express, ASPERA-3 and NetLander governing responsibility. The Enterprise official is Dr. Edward Weiler, Associate Administrator for Space Science at HQ. The Theme Director and the Point of Contact is Mr. Orlando Figueroa, Director of the Mars Exploration Program at HQ. These projects are in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

Mars Express baselined per the MEP Program Commitment Agreement (PCA);
NetLander and ASPERA-3 per Discovery PCA.

Technical Specifications	FY04 President's Budget	Change from Baseline
Mars Express & ASPERA-3		--
Launch	June 2003	
Launch Vehicle	Soyuz Fregat Launcher, from Baikonur in Kazakhstan	
Mission Life	One Martian Year (687 Earth days)	
NetLander		--
Launch	September 2007	
Launch Vehicle	Ariane V, from Kouros launch complex in French Guiana	
Mission Life	One Martian Year (687 Earth days)	

Schedule	FY04 President's Budget	Change from Baseline
Mars Express (Mars) & ASPERA-3 (Discovery MoO)		--
Launch	Jun-03	
Mars Orbit Insertion	Dec-03	
NetLander (Discovery)	CNES schedule/budget under review; decision to be made by end of CY 2002	--
PDR	4QTR/FY02	
CDR	2QTR/FY03	
Delivery to CNES for I&T	2QTR/FY06	
Launch	Sep-07	
Land	4QTR/FY08	

THEME: Mars Exploration Program (MEP)

DEVELOPMENT: Mars Exploration Program Small Development Projects

ACQUISITION STRATEGY & PERFORMING ORGANIZATIONS

Mars Express is European Space Agency (ESA) mission; ESA has overall responsibility. ASPERA-3 is a joint NASA-Agenzia Spaziale Italiana (ASI) instrument development. University of Iowa is responsible for the Mars Express Radio Frequency System (the Integrated Receiver, Transmitter, and Antenna Subsystems). ASI is responsible for Digital Electronic Subsystem, subsystem integration, and delivery. The PI for the ASPERA-3 is at Southwest Research Institute, and is responsible for its development and operation. The Centre National d'Etudes Spatiales (CNES) is the leading organization for the overall NetLander mission. The U.S.-provided experiments were openly competed as a Mission of Opportunity under the Discovery Program. The U.S.-provided experiments are integrated into NetLander experiment packages, and have a cost cap as stated in the Phase B Selection Letter. In FY 2002, direct procurement represented 100% of budget authority. **Changes since FY 2003 Pres. Budget: None.**

Current Acquisitions	Actual *	Selection Method	Actual *	Performer	Actual *
Cooperative Agreements	0%	Full & Open Competition	92%	Industry	11%
Cost Reimbursable	48%	Sole Source	8%	Government	
Fixed Price	52%		100%	NASA Intramural	1%
Grants	0%			University	86%
Other	0%	Sci Peer Review	39%	Non Profit	2%
* as % of FY02 direct procurement	100%	* as % of FY02 direct procurement		* as % of FY02 direct procurement	100%

Future Acquisitions - Major	Selection	Goals
No major acquisitions planned for FY04.		

AGREEMENTS

Internal: Program is not dependent on activities outside the control of the Space Science Associate Administrator. *External:* ESA has overall Mars Express mission program management. CNES has overall program management for the entire 2007 Mars Premier mission. DOE and NASA are in negotiations for provision of Radioactive Heater Units (RHU's) required for the NetLander mission. **Changes since FY 2003 Pres. Budget: None.**

INDEPENDENT REVIEWS

Types of Review	Performer	Last Review	Next Review	Purpose
Mars Express				Delivered to ESA 7/02
- Project Confirmation	JPL	Sep-00	N/A	Phase C/D Development
- Critical Design Review	ESA	Apr-02	N/A	Transition from design to build
- MARSIS Peer Review/	JPL	Feb-02	N/A	Flight Hardware delivery
- ESA Flight Readiness Review	ESA	N/A	Jan-03	June 2003 launch
ASPERA-3	LaRC/TMCO	5/99	N/A	Mission selection
Netlander	IRT	Oct-01	Sep-02	Preliminary Design Review (PDR)

BUDGET/LIFE CYCLE COST

Budget authority represents the Development Cost, including launch services for NASA missions. Mission Operations and Data Analysis costs are budgeted elsewhere.

Budget Authority ($ in millions)	Prior	FY02	FY03	FY04	FY05	FY06	FY07	FY08	BTC*	Total	Comments
FY 2004 President's Budget (Dev.on	16.2	7.2	9.1	10.3	8.1	4.4	2.3	2.5		60.1	
Mars Express	12.9	4.4	3.4							20.7	
ASPERA-3	3.0	0.6	0.5							4.1	
Netlander	0.3	2.2	5.2	10.3	8.1	4.4	2.3	2.5		35.3	
Changes since FY 03 Pres. Budget	+0.4	+0.6		+1.7	+1.8	+0.4	-0.1	+2.5	-8.0	-0.7	***Reason:***
- Mars Express	+0.1	+0.6		-0.1						+0.6	Instrum. delay.
- NetLander	+0.3			+1.8	+1.8	+0.4	-0.1	+2.5	-8.0	-1.3	Rephased.
FY 2003 President's Budget (Dev. or	15.8	6.6	9.1	8.6	6.3	4.0	2.4		8.0	60.8	
Mars Express	12.8	3.8	3.4	0.1						20.1	
ASPERA-3	3.0	0.6	0.5							4.1	
Netlander		2.2	5.2	8.5	6.3	4.0	2.4		8.0	36.6	
Initial Baseline (LCC)	8.8	7.5	5.2	8.3	5.3	4.6	0.3			40.0	
Mars Express	6.0	6.8	4.6	7.6	4.5	3.9				33.4	Lifecycle; 9/00
ASPERA-3	2.8	0.7	0.6	0.7	0.8	0.7	0.3			6.6	Lifecycle; 11/99
Netlander											N/A-not confirm

Indicates budget numbers in full cost.

Indicates changes since the FY 2003 Presidents Budget Submit.

FY 2002, FY 2003, Prior and BTC are not in full cost.

THEME: Mars Exploration Program (MEP)

OPERATIONS

PURPOSE

Objectives	Reference 2003 Strategic Plan	Performance Measures
5.4 thru 5.6		4MEP4-11

Maximize the scientific return from NASA's investment in spacecraft and other data collection sources by efficiently and reliably operating the data-collecting hardware that enables scientific discoveries.

OVERVIEW

- The Mars Surveyor Program, approved by Congress in FY 1994, was initiated with the **Mars Global Surveyor (MGS)** mission. MGS was launched in November 1996 and began mapping operations in March 1999. MGS carries five instruments and is orbiting Mars mapping the atmosphere, surface, and magnetic field. MGS will provide measurement of potential Mars Exploration Rovers (MER) landing sites, and support UHF relay of engineering data during MER descent and landing.
- The **2001 Mars Odyssey** mission, launched in April 2001, consists of an orbiter to map surface mineralogy,elemental composition, and the radiation environment. Its objective is to determine the elemental and chemical composition and map the mineralogy and morphology of the surface, and measure the radiation environment around Mars.
- The science goal of the **2003 Mars Exploration Rovers**, scheduled for launches in May and June 2003, is to learn the history of ancient water and its role in the geology and climate of Mars. Each of the rovers (MER-A and B) will "act" as a robotic field geologist, equipped to read the geologic record at its landing site and learn what conditions were when the rocks and soils were formed. They each can travel up to 1,000 meters across the Martian landscapes measuring the chemical character of the soils, rocks, and previously inaccessible interiors of rocks where unaltered materials may lie.
- **Mars Multi-Mission Operations** supports the development and operations of systems for Mars projects. The goal is to provide an effective and efficient mission operations system for each project with commonality across projects where feasible, while recognizing that each project is an independent entity and has unique requirements.

PROGRAM MANAGEMENT

The MEP mission operations responsibility is delegated to JPL. The Program Management Council (PMC) has MEP governing responsibility. The Enterprise official is Dr. Edward Weiler, Associate Administrator for Space Science at HQ. The Theme Director and the Point of Contact is Mr. Orlando Figueroa, Director of the Mars Exploration Program at HQ. This program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

The baseline is based on the MEP Program Commitment Agreement (PCA).

Technical Specifications	FY04 President's Budget	Change from Baseline
Mars Global Surveyor (MGS)		
Extended Science (E2)	continue through 9/04	additive to the original baseline
2001 Mars Odyssey		
Primary Science	917 Days	--
Prime Mission - Relay Support	2/02 through 8/04	--
2003 Mars Exploration Rovers (MER)		
MER - Mission Life	90 sols for each rover	--
MER - Rover Traverse Capability	Up to 1 Km from landing site	--
Mars Multi-Mission Operations		
Continue to provide tools and training to the Mars mission for efficient operations support		--

Schedule	FY04 President's Budget	Change from Baseline
Mars Global Surveyor (MGS)		
Primary Mapping Phase	3/99 through 1/01	--
Extended Phase	2/01 through 9/04	--
2001 Mars Odyssey		
Primary Science Mission - Phase E	4/01 through 9/04	--
2005 Mars Reconnaissance Orbiter (MRO)		
Launch	Aug-05	--
End of Primary Science Mission	Dec-10	--
2003 Mars Exploration Rovers (MER)		
Launch	May 2003 & June 2003	--
End of Prime Science Mission	2004	--
Mars Multi-Mission Operations	On-going	--

THEME: Mars Exploration Program (MEP)

OPERATIONS

ACQUISITION STRATEGY & PERFORMING ORGANIZATIONS

The MER Project is being implemented in an "in-house" mode at JPL. Approximately 49% of the budget allocated for the Project goes out of house. The rover science instruments, which have been selected and procured following an open Announcement of Opportunity (AO), will be integrated onto the rovers at JPL. Both the Mars Global Surveyor and the 2001 Mars Odyssey are JPL In-house missions, where JPL is responsible for project management, mission design and operation for both missions. Lockheed-Martin provides operations support for the orbiter/spacecraft under a cost plus fixed and incentive award fee contract. In FY 2002, direct procurement represented 100% of budget authority. **Changes since FY 2003 Pres. Budget: None.**

Current Acquisitions	Actual *	Selection Method	Actual *	Performer	Actual *
Cooperative Agreements	0%	Full & Open Competition	68%	Industry	3%
Cost Reimbursable	100%	Sole Source	32%	Government	0%
Fixed Price	0%		100%	NASA Intramural	0%
Grants	0%			University	97%
Other	0%	Sci Peer Review	0%	Non Profit	0%
* as % of FY02 direct procurement	100%	* as % of FY02 direct procurement		* as % of FY02 direct procurement	100%

Future Acquisitions - Major	Selection	Goals
None planned for FY04		

AGREEMENTS

Internal: Program is not dependent on activities outside of the control of the Space Science Associate Administrator. *External:* Two missions in Data Analysis (Mars Express [Mars Express & ASPERA-3] and NetLander) involve agreements with the European Space Agency (ESA), the Centre National d'Etudes Spatials (CNES), and the Italian Space Agency (ASI). **Changes since FY 2003 Pres. Budget: None.**

INDEPENDENT REVIEWS

Types of Review	Performer	Last Review	Next Review	Purpose
Senior Review (MGS)	HQ	1999	2004	Determine the feasibility of MGS science.
Mars Odyssey				
- Red Team Review (Odyssey)	JPL	2000	N/A	Mission design and launch readiness.
- Odyssey High Gain Antenna Deployment Review	JPL	Jan. 8, 2002	N/A	Assess readiness for antenna deployment.
- Odyssey Mapping Critical Events Readiness Review	JPL	Jan. 8, 2002	N/A	Assess readiness for mapping phase.
- Odyssey GRS Boom Independent Review	SAID, LaRC, Aerospace	Feb. 2002	N/A	Assess the Gamma Ray Spectrometer (GRS) boom deployment mechanism and
- Odyssey Gamma Ray Spectrometer (GRS) Boom Deployment Critical Events Readiness Review	JPL	Apr. 2002	N/A	Assess readiness to perform Gamma Ray Spectrometer (GRS) boom deployment.

BUDGET

Budget Authority ($ in millions)	FY02	FY03	FY04	Comments
These figures include funding for approved mission operations (MGS thru 9/04; Odyssey thru 9/04; MRO thru 12/10; MER thru 2004) and allow for continuous multi-mission operations support.				
FY 2004 President's Budget (Operations)	24.8	26.0	44.8	
Mars Global Surveyor (MGS)	7.4	6.0	4.4	
2001 Mars Odyssey	14.0	10.6	10.0	
2003 Mars Exploration Rovers (MER)		5.9	26.6	
2005 Mars Reconnaissance Orbiter (MRO)				
Mars Multi-Mission Operations	3.4	3.5	3.8	
Changes since FY 03 Pres. Budget			+1.7	***Reason for Change:***
Programmatic Changes			+0.1	
2001 Mars Odyssey			+0.1	
2005 Mars Reconnaissance Orbiter (MRO)				
Full Cost Changes			+1.6	Full cost.

Indicates budget numbers in full cost.
Indicates changes since the FY 2003 Presidents Budget Submit.
FY 2002 and FY 2003 are not in full cost.

THEME: Mars Exploration Program (MEP)

RESEARCH

PURPOSE

Objectives (Reference 2003 Strategic Plan)	Performance Measures
5.4 thru 5.6; 6.1 thru 6.4; 7.1 and 7.2	4MEP2,4-19

The objective of the integrated Mars Research Program is to utilize flight mission data to develop a predictive understanding of Mars as a "system." In addition, "Mars Fundamental Research Program" has been developed to foster new investigations that treat the fundamental physics and chemistry of Mars.

OVERVIEW

Research & Analysis: Mars Data Analysis (MDAP) and Mars Characterization support a large group of scientific investigators (largely at universities) whose research is based upon flight mission data. Mars Fundamental Research program supports competitively-selected researchers investigating the basic physics and chemistry of Mars as a system. Funding for this portion of the research efforts are currently being carried under the Solar System Theme; under the Research Program section, Research & Analysis.

Data Analysis: The **Mars Global Surveyor (MGS**) has been conducting science mapping operations around Mars since March 1999. The spacecraft, now in its second extended mission, will serve as a communications relay satellite during the entry, descent, and landing phase of the Mars landers planned for 2003. MGS has discovered evidence of a modern water cycle on Mars in the form of mid-latitude gully systems, as well as the former presence of an Earth-magnitude magnetic field whose record is frozen into the crustal rocks.

- The **2001 Odyssey Mars Orbiter** has already discovered high (40% by volume) concentrations of water ice in the first few feet of the Martian surface in the high latitudes, possibly indicating a massive ground ice "reservoir" on Mars. In addition, its THEMIS instrument has observed mineralogic diversity at sub-km scales, suggesting greater compositional heterogeneity than previously thought.
- The science goal of the **2003 Mars Exploration Rovers**, scheduled for launches in May and June 2003, is to learn the history of ancient water and its role in the geology and climate of Mars.
- Included in the Mars Data Analysis are **ASPERA-3 and Mars Express**, part of a European Space Agency (ESA)/Italian space agency mission to be launched in June 2003.

PROGRAM MANAGEMENT

NASA HQ has responsibility for the Mars Research Program. The Program Management Council (PMC) has governing responsibility. The Enterprise official is Dr. Edward Weiler, Associate Administrator for Space Science at HQ. The Theme Director and the Point of Contact is Mr. Orlando Figueroa, Director of the Mars Exploration Program at HQ. This program is in full compliance with NPG7120.5B.

TECHNICAL COMMITMENT

The baseline is based on the MEP Program Commitment Agreement (PCA).

Technical Specifications (FY04 President's Budget)	Change from Baseline
The integrated Mars Research and Analysis program (MRA) which includes Mars Data Analysis Program (MDAP)/Characterization and Mars Fundamental Research (MFR) solicits research investigations concerning Mars using peer-review (competitive), and is guided by investigation priorities developed by a variety of scientific groups, including the Space Studies Board COMPLEX (National Research Council), the Mars Exploration Program Analysis Group (MEPAG), and the Solar System Decadal Survey (NRC).	--
All program science data, including calibration and relevant spacecraft engineering information, will be archived in the Planetary Data System (PDS) following a short period (no greater than 6 months) for verification, calibration and validation. There shall be no proprietary data rights.	--

Schedule — FY04 President's Budget

An announcement for the Mars Research Program is released annually via the Research Opportunities in Space Science (ROSS) NRA. Below is the 2002 schedule for the Mars Research & Analysis Program. The schedule for 2003 and beyond will be similar.

	Release Date	Proposal Due Date	Panel Review	Award	Remark/Comment
ROSS NRA	Jan-02				Release annually.
- Mars Fundamental Sci.		Mar-2002	Jun-2002	Aug-2002	
- Mars Data Analysis		Aug-2002	Nov-2002	Dec-2002	

THEME: Mars Exploration Program (MEP)

RESEARCH

ACQUISITION STRATEGY & 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 2002, direct procurement represented 100% of budget authority. **Changes since FY 2003 Pres. Budget: None.**

Current Acquisitions	Actual *	Selection Method	Actual *	Performer	Actual *
Cooperative Agreements	3%	Full & Open Competition	99%	Industry	6%
Cost Reimbursable	63%	Sole Source	1%	Government	7%
Fixed Price	1%		100%	NASA Intramural	2%
Grants	24%			University	79%
Other	9%	Sci Peer Review	60%	Non Profit	6%
* as % of FY02 direct procurement	100%	* as % of FY02 direct procurement		* as % of FY02 direct procurement	100%

Future Acquisitions - Major	Selection	Goals
1. Annual R&A research announcement	late 2003	100% Science Peer Review

AGREEMENTS

Internal: The program is not dependent on activities outside of the control of the Space Science Associate Administrator. *External:* Two missions in Data Analysis (Mars Express [Mars Express & ASPERA-3] and NetLander) involve agreements with the European Space Agency (ESA), the Centre National d'Etudes Spatials (CNES), and the Italian Space Agency (ASI). **Changes since FY 2003 Pres. Budget: None.**

INDEPENDENT REVIEWS

Types of Review	Performer	Last Review	Next Review	Purpose
MO&DA Senior Review	Sr. Review committee	July 2000	summer 2003	To review extending mission beyond its primary science phase.
R&A peer review	peer review committee	summer 2002	summer 2003	Review Mars proposals in response to R&A announcement.

BUDGET

Budget Authority ($ in millions)	FY02	FY03	FY04	
FY 2004 President's Budget (Research)	23.4	25.5	56.2	
Mars Research & Analysis				
Mars Data Analysis	23.4	25.5	56.2	
Mars Global Surveyor (MGS)	6.7	4.9	2.4	
2001 Mars Odyssey	9.1	9.8	11.0	
2003 Mars Exploration Rovers (MER)		2.3	25.2	
Mars Express		0.8	4.6	
ASPERA-3			0.8	
2005 Mars Reconnaissance Orbiter (MRO)				
NetLander				
Characterization & MSN Extension	7.6	7.7	12.2	
Changes since FY 03 Pres. Budget			+16.5	***Reason for Change:***
Programmatic Changes			+14.5	
Characterization				Added for FY 08.
2005 Mars Reconnaissance Orbiter (MRO)				Added for FY 08.
2001 Mars Odyssey			+1.2	Added reserve for science sequencing.
2003 Mars Exploration Rovers (MER)			+9.0	Added reserve for science sequencing.
Mars Express			+0.3	Added reserve for science sequencing.
Future Mars DA			+4.0	Reduced funding for science extension.
Full Cost Changes			+2.0	Full cost.

Indicates budget numbers in full cost.
Indicates changes since the FY 2003 Presidents Budget Submit.
FY 2002 and FY 2003 are not in full cost.

THEME: Mars Exploration Program (MEP)

TECHNOLOGY AND ADVANCED CONCEPTS

PURPOSE

Objectives	Reference 2003 Strategic Plan	Performance Measures
5.4 thru 5.6; 6.1 thru 6.4; 7.1; 7.2; 9.5		4MEP11-12,14-15,17-20

The Mars Exploration Program (MEP) Technology and Advanced Concepts effort includes future missions still in the formulation phase, and the development of advanced technologies needed for specific science missions. This process begins with mission studies as 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, risk, and cost. In MEP, future missions will focus on targeted, in-situ, regional, and sample return investigations. Examples of types of technologies critical to the success of these missions include instrumentation, mobility, autonomy, communications, planetary protection, and sample returns.

OVERVIEW

The 2007 Opportunity will include: A competitively selected mission, called Mars Scout. Patterned after the Discovery Program, and similarly capped at $325M (FY03 dollars), these missions will complement and augment the core Program. The first launch is planned for 2007. In 2007, the French space agency (CNES) is planning to launch an orbiter that will deliver to the Martian surface four small landers (NetLanders) to conduct geophysical network science, will provide the platform for the demonstration of NASA-provided search and rendezvous technologies, and will provide an opportunity for additional selectively competed science. NASA's contribution toward the NetLander project includes three instruments which were selected as a Discovery Program Mission of Opportunity.

The 2009 Opportunity will include: A roving long-range, long-duration science laboratory that will represent a major leap in surface analytical capability. The roving science laboratory will demonstrate precision landing, and is expected to include a new suite of analytical instruments tuned to seek answers to questions of geochemistry and biological processes. It will measure aspects of the surface and subsurface materials potentially linked with ancient life and climate. The 2009 U.S Telesat will be multi-band (X, Ka, UHF) telecommunications relay satellite located at an optimal orbit to maximize coverage of orbital, sub-orbital, and surface assets on the planet. The U.S. telesat replaces the planned 2007 ASI/G. Marconi and the 2009 NASA/ASI orbiters, which were deleted due to lack of formal commitment from ASI.

The Technology Program consists of two principal elements: The Focused Technology Program (targeting near-term missions) and Base Technology Program (targeting mid- and far-term missions). Currently, the emphasis is on the technologies required to implement the Mars Science Laboratory (MSL) mission in 2009. The critical technologies for this mission are Entry, Descent, and Landing (EDL), Long-Life, Go-To capability for a rover, Sample Acquisition, Handling and Processing, and Mars Proximity Telecom. The Base Technology Program addresses those technologies that are applicable for mid- and far-term missions (i.e. missions starting more than five years from now) and that are applicable to multiple missions.

Next Decade Mars program is not included in this budget submit. The replanning effort, which includes investigation and programmatic options, is on-going and will be finalized by the end of calendar year 2003.

http://mars.jpl.nasa.gov/missions/future/2003.html

PROGRAM MANAGEMENT

The program responsibility has been delegated to JPL. The Program Management Council (PMC) has governing responsibility. Each MEP mission will execute the NASA formulation sub-process per NPG 7120.5B to provide high confidence that it will be ready to proceed into implementation. The Enterprise official is Dr. Edward Weiler, Associate Administrator for Space Science at HQ. The Theme Director and the Point of Contact is Mr. Orlando Figueroa, Director of the Mars Exploration Program at HQ.

THEME: Mars Exploration Program

TECHNOLOGY AND ADVANCED CONCEPTS

TECHNICAL COMMITMENT

The baseline is outlined in the 2002 Mars Exploration Program Plan. If approved after the Preliminary Design Review, a Program Commitment Agreement (PCA) for will be developed and used as the baseline.

Technical Specifications	FY04 President's Budget	Change from Baseline
Mars Scout	TBD until mission selection (8/03).	N/A; no established b/l
2007 CNES Orbiter	4 years + 1 year possible extended mission.	N/A; no established b/l
- Operational Life	UHF telecom payload for CNES orbiter.	
- Payload element		
2009 Mars Science Laboratory	12 months flight time; 5-6 course	N/A; no established b/l
- Cruise/approach	correction; Lander performs direct entry with	
- Entry/Descent/Landing	altimetry performed in terminal descent; 450-600 kg	
- Surface Mission	rover; 500 sol lifetime; 10km mobility.	
2009 U.S. Telecom	1 yr. cruise; 6 years on-orbit; Electra UHF	N/A; no established b/l
- Mission Duration	plus Xband proximity link and gimbaled	
- Payload element	camera.	

MARS TECHNOLOGY		**FY02**	**FY03**	**FY04**	
Entry, Descent, and Landing ~10 km landing error	TRL	3	4	5	--
Long-life (surface power & survivability of hardware)	TRL	3	4	5	--
Go-to capability for a Rover; 10+ km	TRL	3	4	5	--
Sample Acquisition, Handling and Processing	TRL	3	4	5	--
Mars Proximity Telecom (radiation tolerant, wireless network node for telecom and nav.)	TRL	4	5	6	--
Subsurface access (up to five meters)		3	4	5	--
Science Instruments and Systems	TRL	3	4	5	--
Telecom and Navigation	TRL	2	3	4	--

Current TRL status relative to FY03 plan (R/Y/G/B) ⇧ ⇧ Planned TRL status relative to FY03 plan

Schedule	FY04 President's Budget	Change from Baseline
2007 Mars Scout		
Select Mission; Formulation start	Aug-03	N/A - no established baseline
PDR	Jul-04	until confirmation.
Implementation start	Aug-04	
CDR	Feb-05	
Launch	Sep-07	
2007 CNES Prime Mission		
Formulation start	TBD	N/A - no established baseline.
PDR	TBD	
Implementation start	TBD	
CDR	TBD	
Launch	TBD	
2009 MSL		
Formulation start	Jun-03	N/A - no established baseline.
PDR	Jun-05	until confirmation
Implementation start	Jun-05	
CDR	Aug-06	
Launch	Oct-09	
2009 U.S. Telecom		
Formulation start	Mar-04	N/A - no established baseline
PDR	Aug-05	until confirmation.
Implementation start	Oct-05	
CDR	Feb-06	
Launch	Oct-09	

THEME: Mars Exploration Program

TECHNOLOGY AND ADVANCED CONCEPTS

ACQUISITION STRATEGY & PERFORMING ORGANIZATIONS

NASA has set a goal of openly competing at least 75% of budgeted dollars in the Mars Exploration Program. Specific acquisition plans include:

- **2007 Mars Scout** - Full mission competed through Announcements of Opportunity following a process similar to that of the Discovery Program, with a life cycle cost cap at $325M, FY03 dollars.
- The **2007 CNES** mission will be implemented through international partnership when there is a clear mutual scientific benefit. NASA Headquarters will structure such partnerships.
- **2009 Mars Science Laboratory** - Hybrid JPL in-house and industry.
- **2009 U.S. Telecom** mission - fully competed. Will include Government Furnished Equipment (GFE) such as the proximity link (Electra payload) developed under other contracts/tasks managed by JPL. In FY 2002, direct procurement represented 100% of budget authority. **Changes since FY 2003 Pres. Budget: None.**

Current Acquisitions	Actual *	Selection Method	Actual *	Performer	Actual *
Cooperative Agreements	0%	Full & Open Competition	92%	Industry	11%
Cost Reimbursable	48%	Sole Source	8%	Government	
Fixed Price	52%		100%	NASA Intramural	1%
Grants	0%			University	86%
Other	0%			Non Profit	2%
* as % of FY02 direct procurement	100%	* as % of FY02 direct procurement		* as % of FY02 direct procurement	100%

Future Acquisitions - Major	Selection	Goals
1. Scout mission	Fall 03	100% Full & Open Competition, 100% Science Peer Review.
2. Technology NRA - released annually	Annually	100% Full and Open Competition, with 100% Peer Review.
3. PU 238 for Mars Science Laboratory	1QTR/FY03	Contract through DOE via sole source International Agreement.

AGREEMENTS

Internal: The program is not dependent on other NASA activities outside of the control of the Associate Administrator of Space Science.

External: DOE for Multi-Missions Radioisotope Thermoelectric Generators (MMRTG), Centre National d'Etudes Spatials (CNES) for the 2007 CNES Mission, and Canadian Space Agency (CSA) for the 2009 Mars Science Laboratory.

Changes since FY 2003 Pres. Budget: Descoped 2007 CNES Orbiter, deleted 2007 ASI Orbiter and 2009 ASI/SAR, added 2009 U.S. Telecom

THEME: Mars Exploration Program

TECHNOLOGY AND ADVANCED CONCEPTS

INDEPENDENT REVIEWS

Types of Review	Performer	Last Review	Next Review	Purpose
Scout Step 1 Proposal Review	LaRC/TMCO	N/A	9/02	Select 3-4 mission concepts.
Scout Step 2 Concept Study Rev.	LaRC/TMCO	N/A	3/03	Select Scout flight mission.
2007 Mars Scout NAR	IPAO	N/A	Jul-2004	Assess readiness for implementation.
2007 CNES Orbiter	CNES	N/A	TBD	NASA will support CNES review schedule.
2009 MSL NAR	IPAO	N/A	Jun-2005	Assess readiness for implementation.
2009 U.S. Telecom NAR	IPAO	N/A	Jan-2006	Assess readiness for implementation.
Technology 3 yr Review	Ext Rev Bd	Sep-2002	Oct-2002	Assess content, quality and relevance of technology investments.

BUDGET

Budget Authority ($ in millions)	FY02	FY03	FY04	Comments
FY 2004 President's Budget	65.9	177.5	275.4	
2007 Scout Mission	0.2	7.1	29.1	
2007 CNES Orbiter	4.0	19.4	14.1	
2007 ASI/GMO		3.2		
2009 ASI/SAR				
2009 MSL	5.7	21.6	118.0	
2009 US Telesat			9.3	
Mars Technology	26.5	50.0	36.3	
Program CoF (JPL Flight Project Bldg)		16.5		
JPL Discrete CoF			15.6	
Mars Program Plan & Architecture	29.5	59.7	53.0	
Next Decade Missions				To be addressed in FY 05 budget.
Changes since FY 03 PBS			+43.7	***Reason for Change:***
Programmatic Changes:			+32.4	
2007 Scout Mission			+7.5	Increased cost cap&added Mission of Oppt.
2007 CNES Orbiter			-7.6	Descoped Rendezvous and capture.
2007 ASI/GMO			-6.3	Received no formal commitment from ASI.
2009 ASI/SAR			-0.6	Received no formal commitment from ASI.
2009 MSL			+71.7	MSL Tech and MMRTG funding rephased.
2009 US Telesat			+9.0	Added to replace '07 GMO & '09 ASI/SAR.
Mars Technology			-37.2	Moved MSL tech to MSL mission.
Program CoF (JPL Flight Project Bldg)				Deferred start from FY 02 to FY 05.
JPL Institutional CofF			+15.6	Transfer from Agency CofF.
Mars Program Plan & Architecture			-19.7	Transfer funding to Optical Comm; program reserve reduced to fund cost increases.
Full Cost Changes			+11.3	Full cost.

Indicates budget numbers in full cost.
Indicates changes since the FY 2003 Presidents Budget Submit.
FY 2002 and FY 2003 are not in full cost