



NASA's future exploration missions into the solar system and beyond will coordinate the unique capabilities of humans and robots to maximize safety, affordability, and effectiveness.

# Human and Robotic Technology

## MAJOR EVENTS IN FY 2005

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Human and Robotic Technology has been established as a new Theme in FY 2004 in response to the President's Vision for U.S. Space Exploration. Major activities for FY 2005 will be developed prior to the start of FY 2005.

## Theme: Human and Robotic Technology

### OVERVIEW

The Human and Robotic Technology (HRT) Theme represents NASA's commitment to investing in the technologies and capabilities that will make an ambitious and sustainable 21st century space exploration program possible. Through applied technology research, focused technology maturation, and timely technology transition, the HRT Theme will develop technologies that can be integrated into missions in the Lunar Exploration Theme and throughout NASA's Enterprises. The goals of exploration and of enabling human presence and activity beyond low Earth orbit will be a primary focus of HRT Theme activities and will demand a robust, ongoing commitment to focused innovation. Working with NASA and non-NASA researchers and technologists, through directed investments and innovative partnerships, the HRT Theme will advance a range of high-leverage technologies and space operations concepts, mature and validate key technologies, and transition them into applications to enable safe, affordable, effective and sustainable human-robotic exploration and discovery beyond low Earth orbit (LEO). The HRT theme will work closely with other government agencies, industry and academia to leverage common requirements and identify innovative ideas.

The Human and Robotic Technology Theme will accomplish its objectives through the execution of five programs:

- The Centennial Challenge Program is an experimental approach to stimulating innovation and competition in technical areas of interest to NASA. In commemoration of the Wright Brothers' seminal flight at Kitty Hawk, the Centennial Challenge program will establish purse awards for a portfolio of technical accomplishments that could advance the state of civil space exploration and aeronautics.
- Project Prometheus, the nuclear systems program, will develop spacecraft power and propulsion technologies to enable new space exploration capabilities and unprecedented science missions.
- The Technology Maturation Program will develop and validate novel concepts and technologies to enable safe, affordable, effective and sustainable human-robotic exploration, and will assure their timely transition into validation in the Lunar Exploration Theme and other NASA Enterprises.
- The Advanced Space Technology Program will advance and mature a range of high-leverage technologies and transition them to application in the Exploration Systems Enterprise and other NASA Enterprises.
- The Innovative Technology Transfer Partnerships Program will enable the creative use of intellectual assets both inside and outside of NASA to meet Agency technology needs and to benefit the Nation.

Missions	Goals supported by this Theme	Objectives supporting those Goals
To Understand and Protect our Home Planet	3. Create a more secure world and improve the quality of life by investing in technologies and collaborating with other agencies, industry, and academia.	3.2 Improve the Nation's economic strength and quality of life by facilitating innovative use of NASA technology.
Exploration Capabilities	9. Extend the duration and boundaries of human space flight to create new opportunities for exploration and discovery.	9.4 Develop technologies to enable safe, affordable, effective and sustainable human-robotic exploration and discovery beyond low Earth orbit (LEO).
	10. Enable revolutionary capabilities through new technology.	10.1 Improve the capability to assess and manage risk in the synthesis of complex engineering systems.
		10.3 Leverage partnerships between NASA Enterprises, U.S. industrial firms, and the venture capital community for innovative technology development.

### RELEVANCE

By identifying, developing, and transitioning new technologies that have broad potential to enable novel systems concepts and capabilities, the Human and Robotic Exploration Technology Theme makes a unique contribution to NASA's goal of expanding human presence into the solar system for exploration and discovery, while assuring a robust foundation of cross-cutting technology for the broad spectrum of future NASA space missions.

#### Education and Public Benefits

NASA plans to partner extensively in the implementation of the program, including significant reliance on the expertise of academia in research and development efforts. This will provide educational opportunities to undergraduate and graduate students in U.S. colleges and universities. In addition, by advancing diverse, novel technologies through projects with non-traditional NASA research partners, small business and others, public benefits from HRT will include new technologies for use in industry and by the general public.

## Theme: Human and Robotic Technology

### IMPLEMENTATION

The NASA Enterprise official is Craig Steidle, Associate Administrator for Exploration Systems. The Program Executive Officer is Jim Nehman, Program Executive Officer for Exploration Systems. The Theme Director is not yet determined. The HRT Theme will operate through a family of technology programs that address advanced space technology, technology maturation, and technology transfer, all coordinated by an integrated team at NASA Headquarters in the Office of Exploration Systems. Several programs of the HRT Theme will be implemented in close collaboration with other NASA Enterprises and various external organizations.

### IMPLEMENTATION SCHEDULE

The programs within the Human and Robotic Technology Theme are managed to be compliant with NPG 7120.5B

### STATUS

The Human and Robotic Technology Theme is new in FY 2005 and incorporates a range of program elements, both new and existing. An in-depth review of current programs will be conducted early during calendar 2004 in light of the National Space Exploration Policy and the President's Vision for U.S. Space Exploration.

### PERFORMANCE MEASURES

Outcomes/Annual Performance Goals (APGs)	
<i>Outcome 3.2.1</i>	<i>On an annual basis, develop 50 new technology transfer agreements with the Nation's industrial and entrepreneurial sectors.</i>
5HRT18	Complete 50 technology transfer agreements with the U.S. private sector for the transfer of NASA technologies, through hardware licenses, software usage agreements, facility usage agreements or Space Act Agreements.
<i>Outcome 9.4.1</i>	<i>Identify, develop and validate human-robotic capabilities by 2015 required to support human-robotic lunar missions.</i>
5HRT1	Establish an integrated, top-down strategy-to-task technology R&D planning process to facilitate the development of human-robotic exploration systems requirements
5HRT2	Execute two systems-focused Quality Function Deployment exercises through an Operational Advisory Group (including both technologists and operators) to better define systems attributes necessary to accomplish human-robotic exploration operational objectives.
5HRT3	Execute selected R&D-focused Quality Function Deployment exercises through an external/internal Technology Transition Team to review candidate human-robotic exploration systems technologies, and provide detailed updates to human-robotic technology road maps.
5HRT4	Test and validate preferred engineering modeling and simulation computational approaches through which viable candidate architectures, systems designs and technologies may be identified and characterized. Select one or more approaches for ongoing use in systems/technology road mapping and planning.
<i>Outcome 9.4.2</i>	<i>Identify and execute a research and development program to develop technologies by 2015 critical to support human-robotic lunar missions.</i>
5HRT5	Identify and analyze viable candidates and identify the preferred approach to sustained, integrated human-robotic solar system exploration involving lunar/planetary surfaces and small bodies, and supporting operations. Validate a focused technology R&D portfolio that addresses the needs of these approaches and identifies existing gaps in technological capabilities.
5HRT6	Establish and obtain approval for detailed R&D requirements, roadmaps and program planning in key focused technology development areas, including self-sufficient space systems; space utilities and power; habitation and bioastronautics; space assembly, maintenance and servicing; space transportation; robotic networks; and information technology and communications.
<i>Outcome 9.4.3</i>	<i>By 2016, develop and demonstrate in space nuclear fission-based power and propulsion systems that can be integrated into future human and robotic exploration missions.</i>
5HRT7	Develop Level 1/ Level 2 requirements for nuclear power and propulsion systems in support of selected human and robotic exploration architectures and mission concepts.
5HRT8	Complete a validated road map for nuclear power and propulsion R&D, and related vehicle systems technology maturation.
5HRT9	Formulate a demonstration mission plan for Jupiter Icy Moons Orbiter that will test and validate nuclear power and propulsion systems for future human-robotic exploration missions.
<i>Outcome 9.4.4</i>	<i>Develop and deliver 1 new critical technology every 2 years in at least each of the following disciplines: in-space computing, space communications and networking, sensor technology, modular systems, and engineering risk analysis.</i>
5HRT15	Complete an Advanced Space Technology Program technology roadmap that interfaces appropriately with the technology planning of NASA's enterprises.
5HRT16	Deliver at least one new critical technology in each key area (including: in-space computing, space communications and networking,

## Theme: Human and Robotic Technology

Outcomes/Annual Performance Goals (APGs)	
	sensor technology, modular systems, and engineering risk analysis) to NASA's enterprises, for possible test and demonstration.
5HRT17	Prepare and announce the Centennial Challenge Cycle 2 major award purses, including competition rules, regulations, and judgement criteria.
<i>Outcome 10.1.1</i>	<i>By 2005 demonstrate 2 prototype systems that prove the feasibility of resilient systems to mitigate risks in key NASA mission domains. Feasibility will be demonstrated by reconfigurability of avionics, sensors, and system performance parameters.</i>
5HRT10	Develop prototype design and organizational risk analysis tools to do risk identifications, assessments, mitigation strategies, and key trade-off capabilities not only between risks, but between risks and other mission design criteria.
APG 5HRT11	Develop a robust software tool for accident investigation that can help identify the causes of spacecraft, airplane, and/or other mission hardware accidents.
<i>Outcome 10.3.1</i>	<i>Promote and develop innovative technology partnerships between NASA, venture capital firms and U.S. industry for the benefit of all Enterprise mission needs, initiating three partnerships per year.</i>
APG 5HRT12	Establish three partnerships with U.S. industry and the investment community using the Enterprise Engine concept.
APG 5HRT13	Develop 12 industry partnerships, including the three established using the Enterprise Engine, that will add value to NASA Enterprises.
<i>Outcome 10.3.2</i>	<i>Facilitate on an annual basis the award of venture capital funds or Phase III contracts to no less than two SBIR firms to further develop or produce their technology through industry or government agencies.</i>
APG 5HRT14	Achieve through NASBO, the award of Phase III contracts or venture capital funds to no less than two SBIR firms to further develop or produce their technology through industry or government agencies.
<b>Uniform Measures</b>	
5HRT15	Distribute at least 80% of allocated procurement funding to competitively awarded contracts, including continuing and new contract activities.

### INDEPENDENT REVIEWS

Review Types	Performer	Last Review Date	Next Review Date	Purpose
TBD				

### BUDGET

Budget Authority (\$ millions)	FY 2003	FY 2004	Change	FY 2005	Comments
<b>Human and Robotic Technology</b>		<b>679.3</b>	<b>+414.4</b>	<b>1,093.7</b>	--
<u>Technology and Advanced Concepts</u>		<u>679.3</u>	<u>+414.4</u>	<u>1,093.7</u>	--
Technology Maturation			+114.9	114.9	New Program
Project Prometheus			+437.9	437.9	Transfer from Space Science
Advanced Space Technology		467.0	-107.5	359.5	Transfer from Aeronautics (MSM)
Innovative Technology Transfer Partnerships		212.3	-50.9	161.4	Transfer from Aeronautics (ITTP)
Centennial Challenges			+20.0	20.0	New Program

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

**Theme: Human and Robotic Technology**  
**Technology and Advanced Concepts: Centennial Challenges**

**PURPOSE**

Objectives	Performance Measures
9.4	5HRT17

The Centennial Challenges program will establish a series of annual prizes for revolutionary, breakthrough accomplishments that advance solar system exploration and other NASA priorities. Some of the most difficult technical challenges in solar system exploration will require very novel solutions from non-traditional sources of innovation. By making awards based on actual achievements, instead of proposals, NASA will tap innovators in academia, industry and the public that do not normally work on NASA issues. Centennial Challenges will be modeled on past successes, including 19th century navigation prizes, early 20th century aviation prizes, and more recent prizes offered by the US government and private sector. Examples of potential Challenges include very low-cost robotic space missions; contests to demonstrate rover systems that are highly mobile, capable, and survivable; and fundamental advances in technical areas like lander navigation, spacecraft power systems, life detection sensors, and nano-materials.

**OVERVIEW**

The Centennial Challenges program will issue challenges on annual cycles in key solar system exploration and other NASA technical areas. Prize purses for each challenge will remain available until awarded or for the duration of that challenge. Challenges will be open to U.S. citizens who are not government employees or as otherwise detailed in the rules of the individual challenge.

The Centennial Challenges program plans to conduct annual workshops to solicit and examine ideas for specific challenge ideas. Initial challenges are expected to be issued in the areas of low-cost robotic space missions; highly mobile, capable, and survivable rover systems; and fundamental advances in key spacecraft technologies. The Centennial Challenges program will work closely with other Exploration Systems programs and with other NASA Enterprises to ensure that individual challenges align with NASA goals and possess an appropriate level of difficulty.

NASA expects the Centennial Challenges program to generate innovative solutions to solar system exploration and other NASA technical issues that would not be invented or demonstrated through standard NASA procurement processes. By issuing challenges without judging or proscribing their solution, NASA will attract diverse teams applying multiple, unconventional, low-cost approaches from non-traditional sources to NASA's engineering problems.

**PROGRAM MANAGEMENT**

The NASA Enterprise official is Craig Steidle, Associate Administrator for Exploration Systems. The Centennial Challenges Program Manager is not yet determined, but will report directly to the Associate Administrator for Exploration.

**TECHNICAL COMMITMENT**

This Program will establish a baseline during FY 2004.

Schedule	FY 2005 President's Budget	Change from Baseline
Organizational workshop	Oct. 2004	--
Issue 1st set of Challenges	Dec. 2004	--
Rules and judges for specific Challenges finalized	Dec. 2004	--
Selection of 2nd set of Challenges	Sept. 2005	--
Issue 2nd set of Challenges	Oct. 2005	--
Selection of 3rd set of Challenges	Sept. 2006	--

**ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS**

The Program is a new start in FY 2005. NASA will seek additional authority to conduct large prizes in the NASA FY 2005 authorization bill. U.S. citizens who are not employees of NASA or other federal agencies, including FFRDCs, can compete unless otherwise stated in the rules of a specific challenge.

**Theme: Human and Robotic Technology**  
**Technology and Advanced Concepts: Centennial Challenges**

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	0%	Full & Open Competition	100%	Industry	50%
Cost Reimbursable	0%	Sole Source	0%	Government	0%
Fixed Price	0%		100%	NASA Intramural	0%
Grants	0%			University	50%
Other	100%	Sci Peer Review	%	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
Cooperative Agreement	0%	Full & Open Competition

**AGREEMENTS**

Internal: The program is not dependent on other NASA activities outside of the control of the Associate Administrator of Exploration. External: The Program does not currently have agreements with any external organization.

**RISK MITIGATION**

Risk Date: 1/31/2004

Top Risks	G	Overall	G	Cost	G	Schedule	G	Technical	Probability	Impact	Mitigation Plan
G		TBD: Risks will be assessed when this Program enters the Formulation phase.						TBD	TBD	TBD	

**INDEPENDENT REVIEWS**

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Relevance	TBD		9/05	Assess Challenge selection process

**BUDGET**

Budget Authority (\$ millions)	FY 2003	FY 2004	FY 2005	Comments
FY2005 PRESBUD			20.0	
Centennial Challenges			20.0	New Program
Changes since 2004 PRESBUD				
FY2004 PRESBUD				

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

**Theme: Human and Robotic Technology**  
**Technology and Advanced Concepts: Project Prometheus**

**PURPOSE**

Objectives	Performance Measures
9.4	5HRT7-9

Project Prometheus, the nuclear systems program, will develop and demonstrate nuclear fission-based spacecraft power and propulsion systems. The Prometheus power and propulsion systems will enable human and robotic exploration, will enhance scientific capabilities, and will facilitate unprecedented levels of scientific return.

**OVERVIEW**

Project Prometheus activities fall into two categories: 1) the development of nuclear fission-based power and propulsion systems that can be employed on multiple types of missions; and 2) the demonstration of those systems on the Jupiter Icy Moons Orbiter (JIMO) mission.

Requirements for nuclear fission reactors and dependent propulsion technologies will be defined as elements of a developing architecture that will be employed in science-driven human and robotic exploration of the solar system. Those activities in the existing Project Prometheus that are geared specifically towards space science mission objectives will remain in the Space Science Enterprise. Those include development of radioisotope power systems (RPS) for science spacecraft including the New Horizons mission and the scientific research and instrument development that will prepare for the JIMO mission to Jupiter's moons. The Exploration Systems Enterprise will manage requirements definition, formulation, and development of the JIMO mission under the guidance of Space Science Enterprise scientific mission objectives.

JIMO will use nuclear electric power and propulsion technologies to enable an extended search for evidence of water on the icy Jovian moons, Ganymede, Callisto and Europa. With unprecedented power from a nuclear fission reactor and a highly efficient electric propulsion system, the JIMO spacecraft will take advantage of its ability to orbit multiple destinations at close range and use its vast array of high-capability science instruments (both active and passive) to return a volume of data orders of magnitude greater than that which could be returned by existing technologies. The technologies demonstrated on JIMO will be used to provide power and propulsion for human missions across the solar system and for a new generation of space science missions.

**PROGRAM MANAGEMENT**

The NASA Enterprise official is Craig Steidle, Associate Administrator for Exploration Systems. The Program Executive Officer is Jim Nehman, Program Executive Officer for Exploration Systems. The Project Prometheus Program Director is Alan Newhouse. 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		FY 2005 Budget Submit							Change from Baseline
		FY03	FY04	FY05	FY06	FY07	FY08	FY09	
Project Prometheus: Nuclear Propulsion (fission) - NRAs for Power Conversion	TRL	3	3	TBD					--
	\$M	3.20	8	TBD					--
Project Prometheus: Nuclear Propulsion (fission) - NRAs for High Power Nuclear Propulsion	TRL	3	4	TBD					--
	\$M	2	3.70	TBD					--

Schedule	FY 2005 President's Budget	Change from Baseline
TBD	--	--

**Theme: Human and Robotic Technology**  
**Technology and Advanced Concepts: Project Prometheus**

**ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS**

Current Acquisition	Actual*	Selection Method	Actual*	Performer	Actual*
Cooperative Agreement	0%	Full & Open Competition	100%	Industry	85%
Cost Reimbursable	100%	Sole Source	0%	Government	5%
Fixed Price	0%		100%	NASA Intramural	10%
Grants	0%			University	0%
Other	0%	Sci Peer Review	%	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
TBD		

**AGREEMENTS**

Project Prometheus is currently working on a Memorandum of Agreement with the Department of Energy. Changes since FY04 Presidents Budget: JIMO received FY03 funding from Congress.

**INDEPENDENT REVIEWS**

Review Types	Performer	Last Review Date	Next Review Date	Purpose
TBD				

**BUDGET**

Budget Authority (\$ millions)	FY 2003	FY 2004	FY 2005 Comments
<u>FY2005 PRESBUD</u>			437.9
Project Prometheus			437.9
<u>Changes since 2004 PRESBUD</u>			+437.9 Transfer from Space Science
<u>FY2004 PRESBUD.</u>			

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



**Theme: Human and Robotic Technology**  
**Technology and Advanced Concepts: Technology Maturation**

**PURPOSE**

Objectives	Performance Measures
9.4	5HRT1-6

The Technology Maturation Program will develop and validate novel concepts and technologies to enable safe, affordable, effective and sustainable human-robotic exploration, and will assure their timely transition into Lunar Exploration Theme demonstrations and operations.

**OVERVIEW**

In order to make possible an ambitious future space program, NASA is now committing itself to strategically focused innovation through applied technology research, focused technology maturation, and timely demonstrations. The goals of enabling human presence and activity beyond low Earth orbit are particularly challenging and will demand a robust, ongoing commitment to innovation and new technology development. The Exploration Systems Enterprise Technology Maturation Program will further develop and validate novel concepts and technologies emerging from NASA and non-NASA advanced technology programs and assure their timely transition into system development programs and projects to enable safe, affordable, effective, and sustainable human-robotic exploration and discovery in the solar system.

**PROGRAM MANAGEMENT**

The NASA Enterprise official is Craig Steidle, Associate Administrator for Exploration Systems. The Program Executive Officer is Jim Nehman, Program Executive Officer for Exploration Systems. The Theme and Program Management is not yet determined. The Technology Maturation Program will operate through a family of focused technology projects, lead by a team at NASA Headquarters in the Office of Exploration Systems. The Technology Maturation Program will be implemented in close collaboration with other NASA Enterprises and various external organizations.

**TECHNICAL COMMITMENT**

There is no baseline for this Program. This Program is a new start in FY2005.

Schedule	FY 2005 President's Budget	Change from Baseline
Validate a focused technology R&D portfolio	2005	--
Obtain approval for detailed R&D requirements, roadmaps and program planning	2005	--
Execute two systems-focused Quality Function Deployment exercises	2005	--
Establish an integrated top-down strategy-to-task R&D planning process	2005	--

**ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS**

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

Future Acquisition - Major	Selection	Goals
TBD		

**Theme: Human and Robotic Technology**  
**Technology and Advanced Concepts: Technology Maturation**

**RISK MITIGATION**

Risk Date: 1/31/2004

Top Risks	G	Overall	G	Cost	G	Schedule	G	Technical	Probability	Impact	Mitigation Plan
G		TBD: Risks will be assessed when this program enters the Formulation phase									

**INDEPENDENT REVIEWS**

Review Types	Performer	Last Review Date	Next Review Date	Purpose
Overall				Will be used where appropriate to evaluate quality of program implementation.

**BUDGET**

Budget Authority (\$ millions)	FY 2003	FY 2004	FY 2005	Comments
<u>FY2005 PRESBUD</u>			114.9	
Technology Maturation			114.9	
<u>Changes since 2004 PRESBUD</u>			+114.9	New Program
<u>FY2004 PRESBUD.</u>				

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

## Theme: Human and Robotic Technology

### Technology and Advanced Concepts: Advanced Space Technology

#### PURPOSE

Objectives	Performance Measures
10.1, 9.4	5HRT10-11,15-16

The Advanced Space Technology Program will advance and mature a range of high-leverage technologies and transition them to application in the Exploration Systems Enterprise and other NASA Enterprises. The Program research and development portfolio will specifically focus on the requirements of exploration and science missions in five critical areas: in-space computing, space communications and networking, sensor technology, modular systems, and engineering risk analysis.

#### OVERVIEW

The Advanced Space Technology (AST) Program enables revolutionary capabilities through new technology. Its investment portfolio will be focused on enabling exploration and science-driven architectures and capabilities. Technologies developed in AST will allow NASA Enterprises to conduct new human and robotic exploration missions, gather new types of scientific data, and execute revolutionary mission operations concepts to better assess and manage mission risk. The primary customers for AST technologies are the Exploration Systems Enterprise and other NASA Enterprises. The advanced system concepts, fundamental technologies, and engineering tools on which the AST Program is focused are unique to NASA needs, and are applicable across many classes of missions in multiple Enterprises. Accordingly, research activities in the AST Program will address at least five categories of technology that are fundamentally critical to missions in all NASA Enterprises: in-space computing, space communications and networking, sensor technology, modular systems, and engineering risk analysis. These products may require many years to progress from initial concept definition to mission infusion. Advanced Space Technology incorporates the previous Mission and Science Measurement Theme from the former Aerospace Technology Enterprise.

#### PROGRAM MANAGEMENT

During calendar 2004, Exploration Systems Enterprise management will conduct a full review of ongoing activities in the Computing, Information, and Communications Technologies Program, the Engineering for Complex Systems Program, and the Enabling Concepts Technology Program. That review will examine existing Technical Commitments in the former Mission and Science Measurement Technology Theme and approaches to program management within the Theme. The review's results will be used in coordination with architecture and requirements definition processes within the Office of Exploration Systems to determine whether any realignment of technical commitments may be necessary.

The NASA Enterprise official is Craig Steidle, Associate Administrator for Exploration Systems. The Program Executive Officer is Jim Nehman, Program Executive Officer for Exploration Systems. The Theme and Program Management is not yet determined.

#### TECHNICAL COMMITMENT

Technical Commitments in the former Mission and Science Measurement Technology Theme and approaches to program management will be under review during calendar 2004.

Schedule	FY 2005 President's Budget	Change from Baseline
TBD	TBD	--

#### ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

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

**Theme:** Human and Robotic Technology

**Technology and Advanced Concepts:** Advanced Space Technology



Future Acquisition - Major	Selection	Goals
TBD		

**INDEPENDENT REVIEWS**

Review Types	Performer	Last Review Date	Next Review Date	Purpose
TBD				

**BUDGET**

Budget Authority (\$ millions)	FY 2003	FY 2004	FY 2005	Comments
<u>FY2005 PRESBUD</u>		467.0	359.5	
Advanced Space Technology		467.0	359.5	
<u>Changes since 2004 PRESBUD</u>		+467.0		Transferred from Aerospace Technology (MSM)
Advanced Space Technology		+467.0		
<u>FY2004 PRESBUD</u>				

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

## Theme: Human and Robotic Technology

### Technology and Advanced Concepts: Innovative Technology Transfer Partnerships

#### PURPOSE

Objectives	Performance Measures
10.3	5HRT12-14

The Exploration Systems Enterprise's Innovative Technology Transfer Partnerships (ITTP) Program enables the creative use of intellectual assets both inside and outside of NASA to meet the technology needs of the Exploration Systems Enterprise and other NASA Enterprises. ITTP serves to capture, manage, and support the full lifecycle of NASA's intellectual property and technology assets in ways that foster innovative application to generate benefits for NASA missions, U.S. industry, and the Nation. Primarily through developing joint agreements, ITTP helps to introduce new technologies and reduce technology development costs for the NASA Enterprises. Under this objective, NASA seeks collaborative technology development with U.S. industry for the benefit of NASA Enterprises and to make NASA technologies available to industry, academia, and government for use in creating new innovative products and competitive business opportunities that help to strengthen the U.S. economy. ITTP also provides continuing management of NASA's Small Business Innovation Research and Small Business Technology Transfer programs to both develop technologies for NASA mission needs and provide industry with commercially viable technology. ITTP personnel foster an awareness of, and enable efficient and effective U.S. industry access to, NASA intellectual property for the purposes of transfer and collaborative technology development.

#### OVERVIEW

The Innovative Technology Transfer Partnerships Program will primarily focus on providing technological solutions to NASA for meeting Exploration Systems Enterprise and other Enterprise mission needs by seeking technologies not only from within NASA but also from other federal agency programs and by obtaining technology from U.S. industry and academia. Where technological solutions do not currently exist, the ITTP theme will seek dual-use technology collaborations among NASA, non- aerospace industrial firms, and the venture capital community. NASA will continue to support regulatory requirements associated with the transfer of NASA developed technology to U.S. industry/academia, and enhance NASA technology spin-in objectives through the Small Business Innovation Research and Small Business Technology Transfer (SBIR/STTR) programs. Efforts to document and license technologies, to transfer these technologies to the private sector as legislatively mandated, and to prudently manage NASA's intellectual property, will be very limited. The Enterprise Engine program will focus on establishing dual-use technology collaborations among NASA, non-aerospace industrial firms, and the investment community to address NASA's new technology needs. SBIR/STTR programs will continue to support innovative technology development by the Small Business community and the National Technology Transfer Center (NTTC) will continue to provide support to the Technology Transfer Partnerships activity. The Innovative Technology Transfer Partnerships program incorporates the previous Innovative Technology Transfer Partnerships Theme from the former Aerospace Technology Enterprise.

#### PROGRAM MANAGEMENT

The NASA Enterprise official is Craig Steidle, Associate Administrator for Exploration Systems. The Program Executive Officer is Jim Nehman, Program Executive Officer for Exploration Systems. The Theme Director is John Mankins, Director for Human and Robotic Technology. The Innovative Technology Transfer Program Director is Benjamin Neumann. The Technology Transfer Partnerships Program Manager is Benjamin Neumann. The SBIR/STTR Program Manager is Carl Ray.

#### TECHNICAL COMMITMENT

Schedule	FY 2005 President's Budget	Change from Baseline
TBD	--	--

#### ACQUISITION STRATEGY AND PERFORMING ORGANIZATIONS

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

**Theme:** Human and Robotic Technology

**Technology and Advanced Concepts:** Innovative Technology Transfer Partnerships

Future Acquisition - Major	Selection	Goals
TBD		

**INDEPENDENT REVIEWS**

Review Types	Performer	Last Review Date	Next Review Date	Purpose
TBD				

**BUDGET**

Budget Authority (\$ millions)	FY 2003	FY 2004	FY 2005	Comments
<u>FY2005 PRESBUD</u>		<u>212.3</u>	<u>161.4</u>	
Innovative Tech Transfer Partnerships			161.4	
SBIR		116.5		
STTR		14.0		
Technology Transfer Programs		35.8		
Commercial Programs		42.0		
SBIR/STTR Programs Management		4.0		
<u>Changes since 2004 PRESBUD</u>		+212.3		
SBIR		+116.5		
STTR		+14.0		
Technology Transfer Programs		+35.8		
Commercial Programs		+42.0		
SBIR/STTR Programs Management		+4.0		
<u>FY2004 PRESBUD</u>				

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