

PERFORMANCE REPORTING AND PLANNING

Strategic Goal 3: Create the innovative new space technologies for our exploration, science, and economic future.

OUTCOME 3.1: SPONSOR EARLY STAGE INNOVATION IN SPACE TECHNOLOGIES IN ORDER TO IMPROVE THE FUTURE CAPABILITIES OF NASA, OTHER GOVERNMENT AGENCIES, AND THE AEROSPACE INDUSTRY.

The [Space Technology Mission Directorate](#) (STMD) includes nine programs (formerly included in the Space Technology Program within the Office of the Chief Technologist), representing all levels of technology readiness from early stage innovations to mission-ready projects. By investing in high payoff, disruptive technology that industry cannot tackle today, STMD matures the technology required for NASA’s future missions in science and exploration while proving the capabilities and lowering the cost for other government agencies and commercial space activities. STMD considers early-stage innovation, low technology readiness level (TRL) technology, to be the foundation of the development process. Investment in low-TRL technology increases knowledge and capabilities in response to new questions and requirements, and it stimulates creative new solutions to the challenges faced by NASA and the larger aerospace community.

Investments in low-TRL projects, through partnerships with the public and private sectors, have historically benefited the Nation on a broad basis, generating new industries and spin-off applications and providing a cadre of new technology-savvy innovators to fuel the Nation’s high-tech economy.

Reported Multi-Year Performance

Multi-Year Performance Goal 3.1.1.1: Develop and advance space technologies that support NASA's science, exploration and discovery missions.

FY11	<p>NASA is on track to meet this performance goal as the Agency continues to develop and advance technologies that support its science, exploration, and discovery missions. During FY 2012, the Agency researched, studied, and developed concepts of space technologies—as documented in 110 reports and plans—through the following programs: the Space Technology Research Grants (STRG) Program, the NASA Innovative Advanced Concepts (NIAC) Program, and the Center Innovation Fund (CIF) Program.</p> <p>In August 2011, the STRG Program awarded 80 NASA Space Technology Research Fellowships. During FY 2012, the selected graduate students performed space technology research at their respective campuses and at NASA centers and nonprofit U.S. Research and Development laboratories. In August 2012, the STRG Program additionally selected 10 Early Career Faculty Researchers to conduct research in priority areas including extending and sustaining human activities beyond low Earth orbit, exploring the evolution of the solar system and potential for life elsewhere, and expanding understanding of Earth and the universe.</p>
Green	
FY12	
Green	

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	<p>The NIAC Program invests in concepts with the potential to transform future aerospace missions, enable new capabilities, or significantly alter and improve current approaches. During FY 2012, the NIAC Program made excellent progress with its 30 initial Phase I studies selected in FY 2011. In August 2012, NIAC selected 18 new NIAC Phase I awards, and 10 new Phase II awards, based on earlier Phase I studies, to conduct research in FY 2013.</p> <p>The CIF Program stimulates and encourages creativity and innovation within the NASA Centers. Through the CIF Program, Centers support low TRL initiatives that leverage Center talent and capability. During FY 2012, the CIF Program supported technology development at each of the 10 NASA Centers.</p>
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Update to Multi-Year Performance Goal	
FY13 Update	Develop and advance early stage space technologies that support NASA's science, exploration and discovery missions.
FY14	This performance goal remains the same in FY14.

Reported Annual Performance					
ST-12-1: Research, study or develop concepts of 100 technologies as documented in technology reports or plans.					
Contributing Theme:		Space Technology			
Contributing Program(s):		Crosscutting Space Technology Development			
FY07	FY08	FY09	FY10	FY11	FY12
None	None	None	None	ST-11-1 Green	ST-12-1 Green
Planned Annual Performance					
FY13 Update	ST-13-1: Research, study, or develop concepts for 120 technologies as documented in technology reports or plans.				
FY14	ST-14-1: Research, study, or develop concepts for 150 technologies as documented in technology reports or plans.				
Comments	Based on the FY 2012 actual of 110 technologies documented in technology reports and plans, exceeding the target of 100 technologies, NASA has increased the FY 2013 target from the original 100 technologies to 120 technologies. NASA anticipates an increase in the number of relevant plans and reports again in FY 2013.				

Reported Multi-Year Performance

Multi-Year Performance Goal 3.1.1.2: Provide cash prize incentives to non-traditional sources for innovations of interest and value to NASA and the Nation.

FY11 Green	<p>NASA is on track to meet this performance goal. Through the Centennial Challenges Program, the Agency provides cash prize incentives to non-traditional sources for innovations of interest and value to NASA and the Nation. For example, in FY 2012, NASA conducted the Sample Return Robot Challenge competition (June 15-18, 2012). Six teams competed to design, develop, and demonstrate the next generation of robots capable of autonomous exploration of the landscapes of other worlds. As no participating teams successfully met the rigorous performance requirements of the challenge, NASA will repeat the competition in 2013. The Centennial Challenges Program also has other challenge</p>
FY12 Green	

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	competitions in various stages of development and formulation.
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Update to Multi-Year Performance Goal	
FY13 Update	No performance goal in FY13.
FY14	No performance goal in FY14.
Comments	As of FY 2013, NASA has retired this performance goal.

Reported Annual Performance					
ST-12-2: Conduct at least one Centennial Challenges competition.					
Contributing Theme:		Space Technology			
Contributing Program(s):		Crosscutting Space Technology Development			
FY07	FY08	FY09	FY10	FY11	FY12
7ESRT3 Green	8IPP06 Green	None	None	ST-11-2 Green	ST-12-2 Green
Planned Annual Performance					
FY13 Update	No annual performance goal in FY13.				
FY14	No annual performance goal in FY14.				

Reported Multi-Year Performance

Multi-Year Performance Goal 3.1.1.4: Increase the proportion of Small Business Innovation Research and Small Business Technology Transfer (SBIR/STTR) technologies successfully infused into NASA programs/projects.

FY11	NASA is on track to meet this performance goal. During FY 2012, the SBIR/STTR Programs continued to infuse technologies into NASA programs and projects. Specifically, the Agency has infused 29.1 percent (i.e., 232 of 797) of the SBIR/STTR Phase II technology projects awarded from 2005 through 2009.
Green	
FY12	
Green	

Update to Multi-Year Performance Goal	
FY13 Update	No performance goal in FY13.
FY14	No performance goal in FY14.
Comments	NASA has tracked the performance of the SBIR/STTR Programs technology infusion efforts through different measures for almost a decade. The SBIR/STTR Programs have always performed well, meeting or exceeding expectations. Based on this continual high performance, NASA is retiring this performance goal and its related APG. However, the Agency will continue to monitor the programs closely and report on metrics specified in the SBIR/STTR Reauthorization Act of 2011.

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Reported Annual Performance					
ST-12-4: At least 25 percent of the Small Business Innovation Research and Small Business Technology Transfer (SBIR/STTR) Phase II technology projects awarded between 2005-2009 will be infused into NASA programs and projects.					
Contributing Theme:		Space Technology			
Contributing Program(s):		SBIR and STTR			
FY07	FY08	FY09	FY10	FY11	FY12
None	None	None	10IPP07 Green	ST-11-4 Green	ST-12-4 Green
Planned Annual Performance					
FY13 Update	No annual performance goal in FY13.				
FY14	No annual performance goal in FY14.				

Reported Multi-Year Performance

Multi-Year Performance Goal 3.1.1.5: Increase the Small Business Innovation Research and Small Business Technology Transfer (SBIR/STTR) Phase III contracts initiated or expanded.

FY11	NASA is on track to meet this performance goal. During FY 2012, the Agency advanced 78 SBIR/STTR technologies to Phase III. It is understood that products may need further development at the conclusion of the Phase II work. Phase III projects receive funding from sources other than the SBIR/STTR Program to continue product development.
Green	
FY12	
Green	

Update to Multi-Year Performance Goal	
FY13 Update	No performance goal in FY13.
FY14	No performance goal in FY14.
Comments	NASA has tracked the performance of the SBIR/STTR Programs technology infusion efforts through different measures for almost a decade. The SBIR/STTR Programs have always performed well, meeting or exceeding expectations. Based on this continual high performance, NASA is retiring this performance goal and its related APG. However, the Agency will continue to monitor the programs closely and report on metrics specified in the SBIR/STTR Reauthorization Act of 2011.

Reported Annual Performance					
ST-12-5: At least 20 of the Small Business Innovation Research and Small Business Technology Transfer (SBIR/STTR) technologies will be advanced to Phase III (received non-SBIR/STTR funding).					
Contributing Theme:		Space Technology			
Contributing Program(s):		SBIR and STTR			
FY07	FY08	FY09	FY10	FY11	FY12
None	None	None	10IPP04 Green	ST-11-5 Green	ST-12-5 Green

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Planned Annual Performance	
FY13 Update	No annual performance goal in FY13.
FY14	No annual performance goal in FY14.

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OUTCOME 3.2: INFUSE GAME CHANGING AND CROSSCUTTING TECHNOLOGIES THROUGHOUT THE NATION'S SPACE ENTERPRISE, TO TRANSFORM THE NATION'S SPACE MISSION CAPABILITIES.

For a sustainable set of affordable programs that achieve longer-term goals, NASA requires a faster, more aggressive strategy for creating and applying new technologies. Without a robust effort that matures technologies and establishes their feasibility, the ideas and transformational concepts developed at a low TRL may not materialize into benefits for future NASA missions or the Nation's economy.

[The Space Technology Mission Directorate](#) (STMD) bridges the gap between idea formulation and mission infusion to deliver improvements to future missions. STMD includes programs (formerly included in the Space Technology Program within the Office of the Chief Technologist) that focus on maturing mid-TRL technologies and proving the feasibility of advanced space concepts and technologies that may lead to entirely new approaches to space system design and operations, exploration, and scientific research. Through significant modeling, analysis, ground-based testing, and laboratory experimentation, STMD will mature technologies in preparation for potential system-level flight demonstrations within NASA itself or by other government agencies. Executing these challenging laboratory and spaceflight demonstrations requires creating technology projects with well-defined milestones and schedules, developing facilities, laboratories, and flight test opportunities, fabricating materials, hardware, and software, developing and integrating technologies, and conducting demonstrations.

Reported Multi-Year Performance

Multi-Year Performance Goal 3.2.1.1: Transition developed game changing technologies to the technology demonstration programs or directly to Mission Directorates for mission insertion, and/or for use by other U.S. space activities.

FY11	<p>NASA is on track to meet this performance goal. During FY 2012, The Game Changing Development (GCD) Program continued to develop game changing technologies to transition to other Mission Directorates. Examples of GCD technologies delivered to the Human Exploration and Operations Mission Directorate during FY 2012 (unless otherwise noted) include:</p> <ul style="list-style-type: none"> • A 125 Watt fuel cell for use on a rover test bed; • Autonomous systems software, including an advanced caution and warning software update, a vehicle system manager, and cryogenic loading operations software; • Human-robotic system components, including an anchoring end effector, grapple and dexterous arms, and hands-free extravehicular activity (EVA) jet pack concepts; • A Rapid Cycle Amine (RCA) swing bed (version 2.0) for advanced carbon dioxide removal for extravehicular mobility unit (EMU); and • A Variable Oxygen Regulator (VOR) for EMU to reduce crew fatigue and consumable usage (delivered during the first quarter of FY 2013). <p>NASA also continues to initiate game changing technology projects. Examples of projects initiated during FY 2012 include Clean Space, Barrier Infrared Detector (BIRD), and Woven Thermal Protection System (W-TPS).</p>
Green	
FY12	
Green	

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Update to Multi-Year Performance Goal	
FY13 Update	Develop and advance game-changing and cross-cutting space technologies that support NASA's science, exploration, and discovery missions.
FY14	This performance goal remains the same in FY14.
Comments	As of FY 2013, NASA is consolidating all of the APGs contributing to Outcome 3.2 under this performance goal. NASA has broadened the performance goal to reflect this wider scope of work.

Reported Annual Performance					
ST-12-7: Initiate three game changing technology projects.					
Contributing Theme:		Space Technology			
Contributing Program(s):		Crosscutting Space Technology Development			
FY07	FY08	FY09	FY10	FY11	FY12
None	None	None	None	ST-11-7 Green	ST-12-7 Green
Planned Annual Performance					
FY13 Update	ST-13-2: Complete three feasibility studies, ground demonstrations, or laboratory experiments proving the technical feasibility of new space technologies.				
FY14	ST-14-2: Complete at least ten feasibility studies, ground demonstrations, or laboratory experiments proving the technical feasibility of new space technologies.				

Reported Annual Performance					
ST-12-9: Initiate at least one new small satellite mission that will demonstrate game changing or crosscutting technologies in space.					
Contributing Theme:		Space Technology			
Contributing Program(s):		Crosscutting Space Technology Development			
FY07	FY08	FY09	FY10	FY11	FY12
None	None	None	None	None	ST-12-9 Green
Planned Annual Performance					
FY13 Update	ST-13-3: Implement at least one new small spacecraft mission that was selected in the previous fiscal year to demonstrate game-changing or cross-cutting technologies in space.				
FY14	ST-14-3: Launch at least one small spacecraft demonstration mission and begin implementing at least one new small spacecraft project to demonstrate game changing or crosscutting technologies in space.				
Comments	In the FY 2013 Performance Plan released with the FY 2013 Budget Estimates, NASA's goal for ST-13-3 was to "[i]mplement at least one new small satellite mission that was initiated in FY 2012 and demonstrate game changing or cross-cutting technologies in space." This language did not accurately reflect the intent of goal, so NASA has revised the text. NASA has clarified the measurement to be made.				

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Reported Annual Performance					
ST-12-10: Complete preliminary design of at least one system-level technology for flight or relevant environment demonstration.					
Contributing Theme:		Space Technology			
Contributing Program(s):		Crosscutting Space Technology Development			
FY07	FY08	FY09	FY10	FY11	FY12
None	None	None	None	ST-11-10 Green	ST-12-10 Green
Planned Annual Performance					
FY13 Update	ST-13-4: Implement at least two Technology Demonstration Missions (TDM) technology development projects that were initiated in the previous two years.				
FY14	ST-14-4: Conduct testing and/or relevant environment demonstration of three Technology Demonstration Mission (TDM) technology development projects.				
Comments	In the FY 2013 Performance Plan released with the FY 2013 Budget Estimates, the target was to implement at least three Technology Demonstration Mission technology development projects. At the time this measure was written, NASA had not completed the solicitation for these missions. NASA has adjusted the measure to reflect the actual number of proposals selected.				

Reported Annual Performance					
ST-12-11: Select and fly technology payloads from NASA, other government agencies, industry, and academia using flight services procured from at least three commercial reusable suborbital or parabolic platform providers.					
Contributing Theme:		Space Technology			
Contributing Program(s):		Crosscutting Space Technology Development			
FY07	FY08	FY09	FY10	FY11	FY12
None	None	None	None	ST-11-11 Green	ST-12-11 Green
Planned Annual Performance					
FY13 Update	ST-13-5: Select and fly technology payloads from NASA, other government agencies, industry, and academia using flight services procured from at least three different commercial reusable suborbital or parabolic platform providers.				
FY14	ST-14-5: Select and fly technology payloads from NASA, other government agencies, industry, and academia using flight services procured from at least four different commercial reusable suborbital or parabolic platform providers.				

Reported Multi-Year Performance

Multi-Year Performance Goal 3.2.3.1: Demonstrate small satellite capabilities with game changing and crosscutting potential for the government and commercial space sectors.

FY11	NASA, through the Small Spacecraft Technology (SST) Program , remains on track to demonstrate small satellite capabilities with game changing and crosscutting potential for the government and commercial space sectors in FY 2013. The PhoneSat project, initiated before FY 2012, is awaiting launch as a rideshare on the inaugural flight of the Orbital Science Corporation's Antares rocket currently scheduled for early 2013. This project will demonstrate operation of an extremely low-cost satellite using a commercially procured
Green	
FY12	
Green	

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	<p>mobile telephone as its control system. A total of three individual PhoneSats will be launched, one of them being a second-generation PhoneSat developed during FY 2012.</p> <p>During FY 2012, NASA also initiated a new satellite mission, the Edison Demonstration of Smallsat Networks (EDSN). The EDSN project will demonstrate the use of a distributed set of small satellites for coordinated scientific observations. It has completed its System Requirements Review.</p>
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Update to Multi-Year Performance Goal	
FY13 Update	No performance goal in FY13.
FY14	No performance goal in FY14.
Comments	As of FY 2013, NASA has retired the focused performance goals under Outcome 3.2 and consolidated the APGs, including new refocused APGs, under performance goal 3.2.1.1. This will streamline STMD's multi-year performance measurement.

Reported Multi-Year Performance

Multi-Year Performance Goal 3.2.4.1: Infuse game changing and crosscutting technologies into future NASA missions or into national space activities through flight or relevant environment demonstrations.

FY11	<p>NASA remains on track to meet this performance goal. In August 2012 for example, the MSL Entry, Descent, and Landing Instrument (MEDLI) Suite, a first-of-its-kind instrumentation system on the Mars Science Laboratory, measured the temperature and pressure on the spacecraft as it flew through the Martian atmosphere. MEDLI delivered unprecedented environmental data that will help NASA build more efficient robotic and crewed Mars landers in the future.</p> <p>Also during FY 2012, NASA's Technology Demonstration Missions (TDM) Program completed the Preliminary Design Review for the Solar Sail technology demonstration and the Formulation Review for the Low-Density Supersonic Decelerator. Additionally, the TDM Program has multiple projects successfully progressing through their life cycles toward demonstration and infusion.</p>
Green	
FY12	
Green	

Update to Multi-Year Performance Goal	
FY13 Update	No performance goal in FY13.
FY14	No performance goal in FY14.
Comments	As of FY 2013, NASA has retired the focused performance goals under Outcome 3.2 and consolidated the APGs, including new refocused APGs, under performance goal 3.2.1.1. This will streamline STMD's multi-year performance measurement.

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Reported Multi-Year Performance

Multi-Year Performance Goal 3.2.5.1: Perform sub-orbital, simulated zero-gravity and other space analog flight opportunities to develop and demonstrate emerging ideas and technologies.

FY11	NASA is on track to successfully meet this performance goal. During FY 2012, the Flight Opportunities (FO) Program flew payloads on flights procured from three commercial reusable platform providers: Masten (suborbital), UP Aerospace (suborbital), and ZeroG (parabolic). These payloads to develop and demonstrate emerging ideas and technologies included: the Guidance Embedded Navigator Integrator Environment (GENIE) payload (on Masten Xombie), the Suborbital Flight Environment Monitor (SFEM) payload (on Up Aerospace SL-6), and 19 technology payloads on ZeroG aircraft.
Green	
FY12	
Green	

Update to Multi-Year Performance Goal	
FY13 Update	No performance goal in FY13.
FY14	No performance goal in FY14.
Comments	As of FY 2013, NASA has retired the focused performance goals under Outcome 3.2 and consolidated the APGs, including new refocused APGs, under performance goal 3.2.1.1. This will streamline STMD's multi-year performance measurement.

OUTCOME 3.3: DEVELOP AND DEMONSTRATE THE CRITICAL TECHNOLOGIES THAT WILL MAKE NASA'S EXPLORATION, SCIENCE, AND DISCOVERY MISSIONS MORE AFFORDABLE AND MORE CAPABLE.

The purpose of mission-driven technology development is to meet unique near-term mission needs within technical, cost, and schedule goals. NASA is prioritizing the desired set of future technologies that will offer the most synergies and advancement of mission capabilities. The Agency is enabling advances and improved performance by furthering existing evolutionary technologies, as well as developing revolutionary new technologies. It also is balancing potential technology benefits with specific mission risks to establish the appropriate time frame to infuse each emerging technology.

Reported Multi-Year Performance

Multi-Year Performance Goal 3.3.1.1: Demonstrate robotic technologies that support in-space operations, scientific discovery, and work as assistants with the crew.

FY11	NASA is on track to meet this performance goal. During FY 2012, Robonaut 2 (R2) , a dexterous humanoid robot, successfully worked with three task panels onboard ISS (i.e., powered task panel, intravehicular activity task panel, and EVA task panel). These activities demonstrate the robot's ability to manipulate human interfaces used in space operations and scientific discovery. On the EVA task panel, for example, R2 performed handrail grasping and cleaning. Additionally, R2 demonstrated its ability to work with a handheld airflow measurement system onboard ISS and provided data to ground controllers during its first tool use demonstration.
None	
FY12	
Green	

During FY 2012, NASA also completed and tested telerobotic software used to control and operate R2. The new software was formally validated in October 2012 in preparation for upload to ISS.

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Update to Multi-Year Performance Goal	
FY13 Update	Develop technologies to enable autonomous mission operations in space to increase affordability.
FY14	This performance goal remains the same in FY14.
Comments	NASA changed the description of this performance goal to reflect the broadened scope of work beginning in FY 2013.

Reported Annual Performance					
ERD-12-5: Develop telerobotic software for remote manipulation of Robonaut 2.					
Contributing Theme:		Exploration Research and Development			
Contributing Program(s):		Advanced Exploration Systems			
FY07	FY08	FY09	FY10	FY11	FY12
None	None	None	None	ERD-11-7 Green	ERD-12-5 Green

Planned Annual Performance	
FY13 Update	No annual performance goal in FY13.
FY14	No annual performance goal in FY14.

Reported Annual Performance	
No annual performance goal in FY12 or trended performance.	
Contributing Theme:	Exploration Research and Development
Contributing Program(s):	Advanced Exploration Systems

Planned Annual Performance	
FY13 Update	ERD-13-3: Test docking and anchoring techniques for asteroid missions using a prototype crew excursion vehicle, the Multi-Mission Space Exploration Vehicle (MMSEV), moving on an air bearing floor.
FY14	No annual performance goal in FY14.

Reported Annual Performance	
No annual performance goal in FY12 or trended performance.	
Contributing Theme:	Exploration Research and Development
Contributing Program(s):	Advanced Exploration Systems

Planned Annual Performance	
FY13 Update	ERD-13-4: Assess the feasibility of a Multi-Purpose Logistics Module (MPLM) based habitation module to support human deep-space missions.
FY14	No annual performance goal in FY14.

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Reported Annual Performance	
No annual performance goal in FY12 or trended performance.	
Contributing Theme:	Exploration Research and Development
Contributing Program(s):	Advanced Exploration Systems
Planned Annual Performance	
FY13 Update	No annual performance goal in FY13.
FY14	ERD-14-4: Test Autonomous Mission Operations software for ISS to reduce crew's dependence on ground-based mission control.

Reported Multi-Year Performance

Multi-Year Performance Goal 3.3.2.1: Develop advanced spacesuits to improve the ability of astronauts to conduct extravehicular activity (EVA) operations in space including assembly and service of in-space systems and exploration of surfaces of the Moon, Mars, near-Earth objects (NEOs), and other small bodies.

FY11	Over the three-year timeframe for this performance goal and by the end of FY 2013, NASA will achieve the goal of assembly and test of the Portable Life Support System (PLSS). This is the system attached to the spacesuit that regulates pressure that provides breathable oxygen, removes excess moisture and odors, and provides other life support. NASA completed the PLSS design review and plans to test it in a vacuum chamber in FY 2013.
Green	
FY12	
Green	

Update to Multi-Year Performance Goal	
FY13 Update	Develop advanced spacesuits to improve the ability of astronauts to conduct Extra Vehicular Activities (EVA) for in-space operations and surface exploration.
FY14	No performance goal in FY14.
Comments	NASA's work on EVA systems is part of a wider effort to develop capabilities for crew mobility for the human exploration of near-Earth asteroids and planetary surfaces. In FY 2014, after current work on EVA systems is concluded, NASA will align any planned future technology development activities to the broadened performance goal 3.3.1.1.

Reported Annual Performance					
ERD-12-6: Complete tests of Extra Vehicular Activity (EVA) Portable Life Support System (PLSS) subsystem in a vacuum chamber environment.					
Contributing Theme:		Exploration Research and Development			
Contributing Program(s):		Advanced Exploration Systems			
FY07	FY08	FY09	FY10	FY11	FY12
None	8CS06 Yellow	None	None	ERD-11-8 Green	ERD-12-6 Yellow
Why this APG was not achieved:					
NASA rescheduled the test of the PLSS in a vacuum chamber to FY 2013 based on a realignment of funding to other priorities. Assembly of the device also was delayed due to component technology development timelines that were greater than anticipated.					

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Planned Annual Performance	
FY13 Update	ERD-13-5: Test a packaged Portable Life Support System (PLSS) for an advanced spacesuit in a vacuum chamber.
FY14	No annual performance goal in FY14.

Reported Multi-Year Performance

Multi-Year Performance Goal 3.3.2.2: Develop technologies and mission concepts for demonstrating in-space cryogenic propellant storage and transfer making exploration and science missions more affordable and capable.

FY11	NASA is on track to meet this performance goal. During FY 2012, the TDM Program completed the Mission Concept Review for the Cryogenic Propellant Storage and Transfer (CPST) demonstration. CPST also passed Key Decision Point-A in June 2012. This milestone indicates NASA's decision to proceed with the Concept and Technology Development phase of project formulation, culminating in a System Requirements Review.
Green	
FY12	
Green	

Update to Multi-Year Performance Goal	
FY13 Update	This performance goal remains the same in FY13.
FY14	This performance goal remains the same in FY14.

Reported Annual Performance					
ST-12-12: Complete the Mission Concept Review for the Cryogenic Propellant Storage and Transfer demonstration.					
Contributing Theme:		Space Technology			
Contributing Program(s):		Exploration Technology Development			
FY07	FY08	FY09	FY10	FY11	FY12
None	None	None	None	ST-11-12 Green	ST-12-12 Green
Planned Annual Performance					
FY13 Update	No annual performance goal in FY13.				
FY14	ST-14-6: Complete the Mission Concept Review for the Cryogenic Propellant Storage and Transfer demonstration.				

Reported Multi-Year Performance

No Multi-Year Performance Goal in FY12 or trended performance.

Update to Multi-Year Performance Goal	
FY13	No performance goal in FY13.
FY14	3.3.2.3: Mature environmental control and life support system (ECLSS) technology that enables human exploration beyond low Earth orbit and improves affordability.

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Reported Annual Performance	
No annual performance goal in FY12 or trended performance.	
Contributing Theme:	Exploration Research and Development
Contributing Program(s):	Advanced Exploration Systems
Planned Annual Performance	
FY13 Update	No annual performance goal in FY13.
FY14	ERD-14-5: Conduct integrated sub-system tests for improved water recovery and more reliable atmosphere revitalization systems.

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OUTCOME 3.4: FACILITATE THE TRANSFER OF NASA TECHNOLOGY AND ENGAGE IN PARTNERSHIPS WITH OTHER GOVERNMENT AGENCIES, INDUSTRY, AND INTERNATIONAL ENTITIES TO GENERATE U.S. COMMERCIAL ACTIVITY AND OTHER PUBLIC BENEFITS.

While technology and innovation are critical to accomplishing NASA's missions, it also benefits the U.S. economy through transfer of new technologies for other applications. NASA makes a determined effort to transfer technologies outside of the Agency and to develop technology partnerships. NASA's technology investments support advancement in key research areas, fuel rapid improvements in mission capabilities, foster a robust industrial base, improve the Nation's competitive position in the international marketplace, enable new industries, improve quality of life, and contribute to economic growth.

NASA seeks partnerships and cooperative activities with the emerging commercial space sector. Three key themes underscore this effort: considering the private sector as an investment partner and sharing the cost of developing a capability; purchasing services rather than hardware when possible; and fostering the creation of broader opportunities for innovation. Pursuing these partnership themes brings direct value to NASA's current and future missions, advances the interests of the partners, and encourages additional commercial space development. In addition to partnership strategies, NASA seeks to transfer its technologies directly to other government agencies, the national aerospace industry, and the broader U.S. commercial sector. NASA-spurred advances in energy, communication, health, materials science, and other fields generate spinoff applications that benefit the Nation. The Agency has established a core team at each Center charged with technology transfer, licensing, and new partnership development, and these teams work closely with scientists and engineers to match NASA technologies with the needs of external organizations.

Guided by [OCT](#), the [Innovative Partnerships Office](#) has a dual role: to seek partnerships that can leverage technologies, expertise, and capabilities to advance NASA's missions and to provide access to NASA resources including intellectual property that will benefit the United States through economic growth and improved quality of life. To achieve these two complementary objectives, NASA technology transfer professionals work closely with NASA Center scientists, engineers, and software developers to foster commercial application of NASA's wide spectrum of research and technology development. As noted in the annual NASA [Spinoff](#) publications, partnerships forged between NASA and others with shared vision and objectives have saved hundreds of lives, created thousands of jobs, provided millions of dollars in cost avoidance, and generated millions of dollars in revenue. More about the Agency's technology transfer activities also is available on [NASA's Open Government Initiative site](#).

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Reported Multi-Year Performance

Multi-Year Performance Goal 3.4.1.1: Establish 12 technology-related significant partnerships that create value for programs and projects. Track both quantitative dollar value and qualitative benefits to NASA (e.g., reduced volume or mass, improved safety) per year.

FY11	<p>NASA is on track to successfully meet this performance goal. During FY 2012, OCT developed a wide range of significant partnerships with both the public and private sectors. Some of the factors OCT uses to frame the definition of significance include impact, scope/size/funding, uniqueness of collaboration, strategic outcome, and/or value-added to NASA’s capabilities. OCT completed the following 12 significant partnerships with:</p> <ul style="list-style-type: none"> • The City of New York to provide NASA independent verification and validation (IV&V) services to critical system software, provide analysis results and technical reports, participate in reviews and provide status reports, and produce a variety of deliverables concerning the Emergency Communications Transformation Program. In this partnership NASA will make services, data, and analysis available to New York City, in collaboration with NASA's IV&V Facility. • Cumberland and Western Company to develop a strategic technology and commercialization partnership anchored in state-of-the-art fly wheel technologies, which are useful in the design and production of revolutionary energy storage and energy transfer devices. • The University of Surry, United Kingdom, to establish cooperation between the Parties in the Deploytech Project, Work Package 1, for the advancement of the TRL of space deployable solar sail technology. • DTM Technologies, Modena, Italy, for access to reduced gravity testbeds under the NASA Flight Opportunities Program to advance the technology readiness level of a nano-particle migration and capture device to facilitate the commercial and government use of space-related technologies. • Nirvana Energy Systems to develop a Stirling Homepower Unit with a predicted efficiency of at least 32 percent. • The "E-Fermi" Advanced Technical Institute to study how reduced gravity conditions influence the sintering process. • National Institute of Standards and Technology (NIST) to collaborate with the Advanced Manufacturing National Program Office to advance manufacturing in the United States. • Honda R&D Americas to test an epoxy coating system using NASA's Smart Coating System technology to support mutual technology needs. • Sherwin Williams to determine the performance benefit of using a corrosion-induced microcapsule system to improve corrosion resistance of a coating over steel. • LifeLoc to investigate and characterize the technical feasibility and practicality of applying Glenn Research Center’s sensor technologies and related expertise to commercialization of the miniaturization and operating temperature stability of precision fuel cell sensors and breath sampling system for commercial application in portable breath alcohol testers. • The Space Frontiers Foundation to collaborate on public events and to support a business plan competition with a \$100 thousand first-prize purse. This business plan competition specifically aims at generating economic development and broadening entrepreneurial space opportunities for public benefit. • The Manufacturing Advocacy and Growth Network (MAGNET) to create an on-going collaboration to interject NASA knowledge and expertise to the local public sector for the purpose of aiding the region's economic development, This agreement will provide MAGNET clients opportunities to interact with NASA subject matter experts and utilize NASA facilities to overcome technical barriers that prohibit their products from going to market. The collaboration will enhance the national economy while maintaining the U.S.
Green	
FY12	
Green	

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	leadership in technology.
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Update to Multi-Year Performance Goal	
FY13 Update	Accelerate the development and adoption of NASA-funded technology through the establishment of cost-sharing partnerships.
FY14	This performance goal remains the same in FY14.
Comments	NASA has revised this performance goal description to reflect the broadened scope of work.

Reported Annual Performance					
ST-12-13: Establish at least 12 technology-related significant partnerships during FY 2012.					
Contributing Theme:		Space Technology			
Contributing Program(s):		Partnership Development and Strategic Integration			
FY07	FY08	FY09	FY10	FY11	FY12
7IPPI Green	8IPPO1 Green	9IPPI Green	None	ST-11-13 Green	ST-12-13 Green

Planned Annual Performance	
FY13 Update	ST-13-6: Establish a total of twelve partnerships with U.S. industry, other U.S. agencies, or other entities to develop technology that supports NASA's missions or national interests.
FY14	ST-14-7: To reduce the time it takes to process a NASA Space Act Agreement (SAA), initiate an NASA study and implement steps that result in a 10 percent reduction in time at least 5 NASA Centers in FY2014.
Comments	NASA establishes hundreds of partnerships each fiscal year. As a result, the Agency consistently achieves and exceeds its annual target to establish partnerships to develop technology. In FY 2014, NASA is changing the focus to improving performance Agency-wide for processing a specific type of partnership, for which there are performance challenges. The goal is to reduce the time it takes to process a Space Act Agreement and begin the associated study.

Reported Multi-Year Performance

Multi-Year Performance Goal 3.4.1.2: Complete 30 technology transfer agreements with the commercial and academic community through such mechanisms as licenses, software use agreements, facility use agreements, and Space Act Agreements per year.

FY11 Green	NASA is on track to successfully meet this performance goal with the completion of 56 technology transfer agreements during FY 2012. Specifically, NASA has achieved 21 technology patent licenses (additional licenses are being negotiated) and released 35 new software programs into the public domain, increasing its emphasis on open source software.
FY12 Green	

Update to Multi-Year Performance Goal	
FY13 Update	No performance goal in FY13.
FY14	Implement 5-year Strategic Plan to improve ability to transfer NASA-developed technologies.

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Comments	NASA retired this performance goal because technology transfer is being covered by OCT's Priority Goal, "Enable bold new missions and make new technologies available to government agencies and U.S. industry." NASA plans to complete this Priority Goal by the end of FY 2013. In FY 2014, NASA will renew this performance goal with a more long-term and broadly stated scope that continues the important work accomplished under the Priority Goal.
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Reported Annual Performance					
ST-12-14: Complete at least 30 technology transfer agreements during FY 2012.					
Contributing Theme:		Space Technology			
Contributing Program(s):		SBIR and STTR			
FY07	FY08	FY09	FY10	FY11	FY12
7IPP2 Green	8IPP02 Green	9IPP2 Green	None	ST-11-14 Green	ST-12-14 Green
Planned Annual Performance					
FY13 Update	No annual performance goal in FY13.				
FY14	ST-14-8: The Agency will develop and implement 2 innovative methods for technology licensing.				

Reported Multi-Year Performance

Multi-Year Performance Goal 3.4.1.5: Document, coordinate, and prioritize Agency-level technology strategic investments to ensure NASA has a balanced portfolio of both near-term NASA mission (pull) technologies and longer-term transformational (push) technologies that benefit both Agency programs and national needs.

FY11	NASA is on track to meet this performance goal. NASA has documented the majority of its technology investments, and it has coordinated and drafted a prioritized Space Technology Strategic Investment Plan (SSTIP). The SSTIP is a comprehensive strategic plan that prioritizes space technologies essential to the pursuit of NASA's Mission. The SSTIP provides a focused approach to guide NASA's space technology investment over the next four years within the context of a 20-year horizon. It does so in strategic terms, not specifying funding. This plan began to take shape in 2010, when NASA developed the draft Space Technology Roadmaps, 14 plans for developing technologies in 14 essential space technology areas over the next 20 years. NASA then requested the National Research Council to review the Space Technology Roadmaps and provide recommendations for improvement.
Green	
FY12	During FY 2012, OCT issued an Agency-wide data call to capture space technology investments across NASA. Mission directorates and offices incorporated project descriptions, technology readiness levels, technology areas, responsible parties, and partnerships into the NASA-developed and -managed Technology Portfolio System (TechPort). This new Agency internal Web site is now available to NASA civil servant and contractor employees. It can capture, track, and manage NASA's portfolio of technology investments, including detailed information on individual technology programs and projects. It enables NASA to efficiently search, identify technology gaps, update assessments of NASA's Roadmap Technology Areas, and provide comprehensive technology reports. It will be made available to the public in fall 2013.
Green	

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Update to Multi-Year Performance Goal	
FY13 Update	No performance goal in FY13.
FY14	No performance goal in FY14.
Comments	In FY 2012, OCT completed this performance goal by releasing the Space Technology Strategic Investment Plan and getting TechPort online. OCT is now implementing the plan and using TechPort to capture space technology investments across NASA.

Reported Annual Performance					
ST-12-17: Ensure that 75 percent of all NASA Space Technology Program's projects are recorded in the portfolio database.					
Contributing Theme:		Space Technology			
Contributing Program(s):		Partnership Development and Strategic Integration			
FY07	FY08	FY09	FY10	FY11	FY12
None	None	None	None	None	ST-12-17 Green
Planned Annual Performance					
FY13 Update	No annual performance goal in FY13.				
FY14	No annual performance goal in FY14.				

Reported Multi-Year Performance

No Multi-Year Performance Goal in FY12 or trended performance.

Update to Multi-Year Performance Goal	
FY13	No performance goal in FY13.
FY14	3.4.1.6: Implement a process that enables the Agency to define and lead Agency Grand Challenges that impact life on Earth.

Reported Annual Performance	
No annual performance goal in FY12 or trended performance.	
Contributing Theme:	Space Technology
Contributing Program(s):	Partnership Development and Strategic Integration
Planned Annual Performance	
FY13 Update	No annual performance goal in FY13.
FY14	ST-14-9: Establish at least two new "open innovation" mechanisms that leverage external support for the Protect the Planet Grand Challenge.