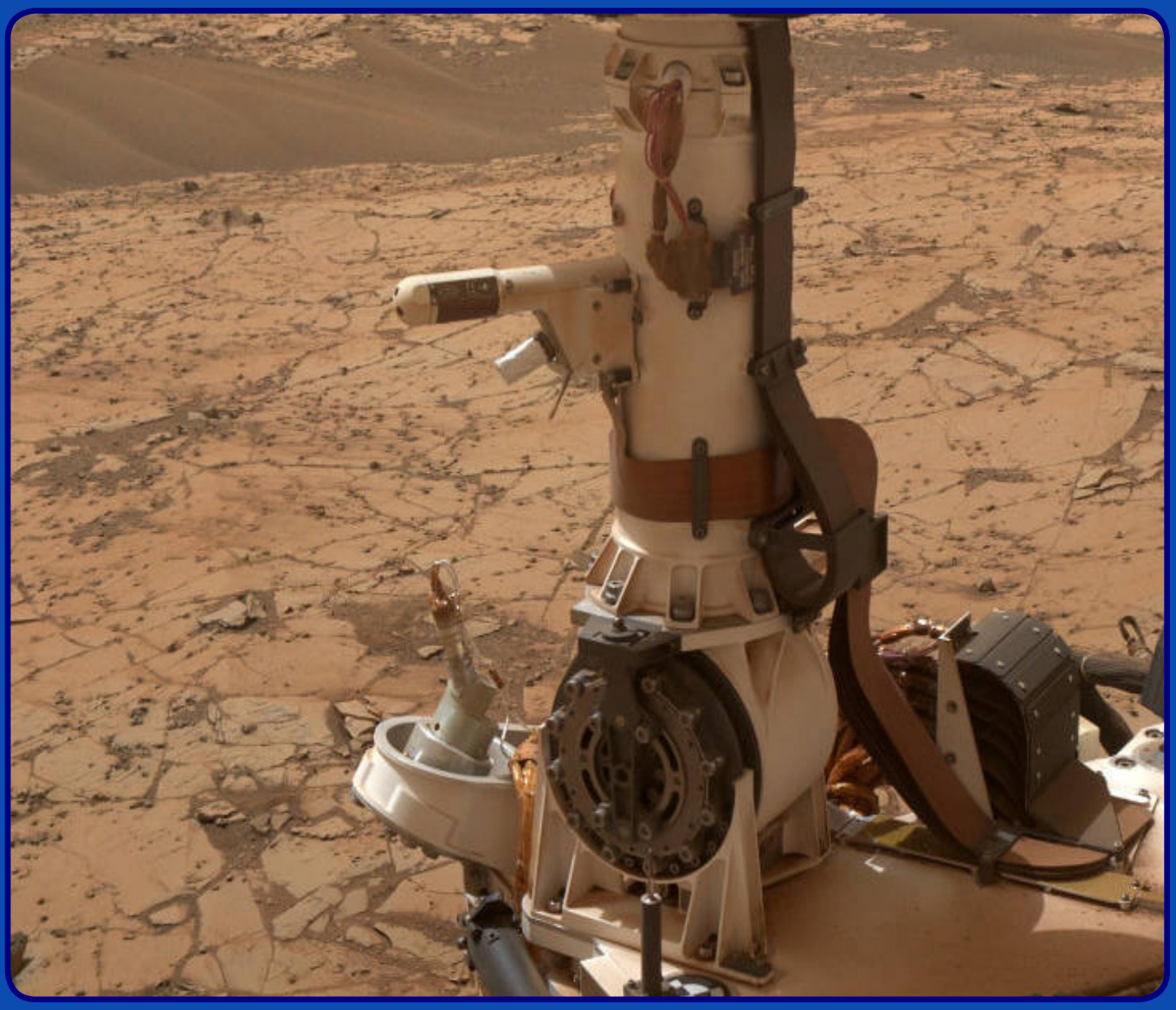
National Aeronautics and Space Administration

FY 2015 Agency Financial Report

www.nasa.gov



Cover Image Captions and Credits

Front Cover:

Outside Front Main Image: Artist's concept, Reach New Heights, Benefit All Humankind, Reveal The Unknown. (Credit: NASA)

Outside Front Bottom Images (left to right): The Ikhana UAS soars over the Mojave Desert during a flight from NASA Armstrong Flight Research Center, Edwards, California. (Credit: NASA Photo/Carla Thomas) ; Engineers Clean Mirror with Carbon Dioxide Snow. (Credit: NASA); Rocket Sled Tests May Lead to Mars. (Credit: NASA)

Inside Front: Mars Weather-Station Tools on Rover's Mast. (Credit: NASA)

Rear Cover:

Outside Rear**:** Solar Arrays on the International Space Station. (Credit: NASA)

Message from the Administrator

November 13, 2015

I am proud to present NASA's Fiscal Year (FY) 2015 Agency Financial Report, which provides information on our financial performance and insight into our stewardship of taxpayer dollars and the resources entrusted to NASA. This report also summarizes our progress toward achieving NASA's Mission to *drive advances in science, technology, aeronautics, and space exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of Earth.*

Efficient and effective financial management makes our mission possible. We received an unmodified "clean" audit opinion on our FY 2015 financial statements, with no material weaknesses. The report of the independent auditors is included in this Agency Financial Report. I am able to provide reasonable assurance that the performance and financial information in this report is reliable and complete.

Our long-term goal is to send humans to Mars, and to enable that goal we are undertaking a sustainable campaign and developing new systems for the human exploration of deep space. In FY 2015, NASA accomplished the successful Orion Exploration Flight Test (EFT)-1 in December 2014. This was the first test flight of the Orion spacecraft, which is designed to take humans on deep space missions in the future. Orion did not carry any people into space on this flight, but it became the first human-rated spacecraft to leave low Earth orbit since the Apollo 17 mission. This year we also accomplished major milestones in the development of the new Space Launch System (SLS), including the first qualification booster test. With support from the Exploration Ground Systems program, these new capabilities will carry astronauts into deep space.

Even in the face of cargo resupply setbacks in FY 2015, we continued vital research and technology development activities on the International Space Station (ISS). In FY 2015, NASA initiated the U.S.-Russian joint one-year human health and performance research project and the Identical Twins Study. The one-year crew mission is the latest step in the ISS' role as a platform for preparing humanity for exploration into deeper space. In addition, Boeing and SpaceX, NASA's Commercial Crew Program partners, have made great strides to re-establish America's capability to launch astronauts to the ISS, including constructing the infrastructure needed to safely launch and operate crew space transportation systems, refining designs, and starting to build test vehicles.

Our robotic explorers also continued to astound in FY 2015, including the New Horizons mission's accomplishment of the historic first-ever flyby of Pluto, and the Dawn mission's exploration of the dwarf planet Ceres. We added to our scientific and exploration capabilities by launching several missions, including the Magnetospheric Multiscale (MMS) mission and the significant achievement of launching five Earth-observing missions in one calendar year.

Transformative capabilities and cutting-edge technologies are being developed, tested, and flown by NASA today. Our space technology programs advanced several technologies, including the second near-space test flight of the Low Density Supersonic Decelerator (LDSD), a technology that could enable larger payloads to Mars and set the stage for future human explorers, and printing the first 3D-printed object in space on the ISS. Our technologies, partnerships, and education for the next generation contribute to the Nation's innovation economy. NASA accomplished a number of Federal government "firsts" this year, including the public release of NASA's technology portfolio (TechPort) system and the release of NASA's software catalog with an extensive collection of codes available for use at no charge.

NASA's mission success is thanks to our multi-disciplinary team of diverse, talented people across our Centers. We are committed to nurturing an innovative environment that fosters teamwork and excellence. For the third year in a row, employees named NASA the Best Place to Work in the Federal Government among large agencies.

As shown in this report, we strive to put your tax dollars to efficient and innovative use. In the year ahead, NASA will continue to push the boundaries of exploration. Along the way, we will make new scientific discoveries, develop new technologies and capabilities, and deliver tangible benefits to the public. Additional details on these achievements are provided in this report, and if you would like more information on our progress toward achieving our strategic goals, I invite you to read our Annual Performance Report, which will be released concurrently with NASA's Budget Estimates in early calendar year 2016.

Charles F. Bolden, Jr.
Administrator

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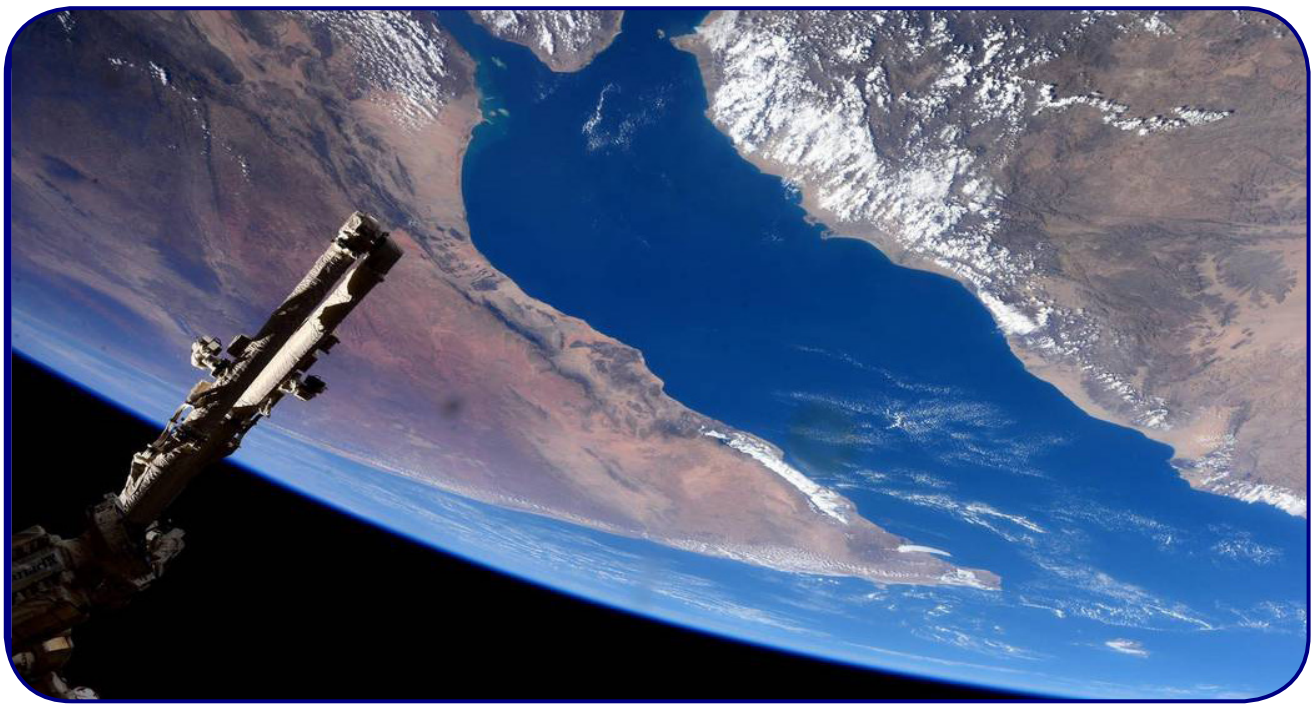

Image Caption: European Space Agency (ESA) astronaut, Samantha Cristoforetti, photographed the Gulf of Aden and Horn of Africa from the International Space Station. (Credit: NASA)

Management Discussion and Analysis

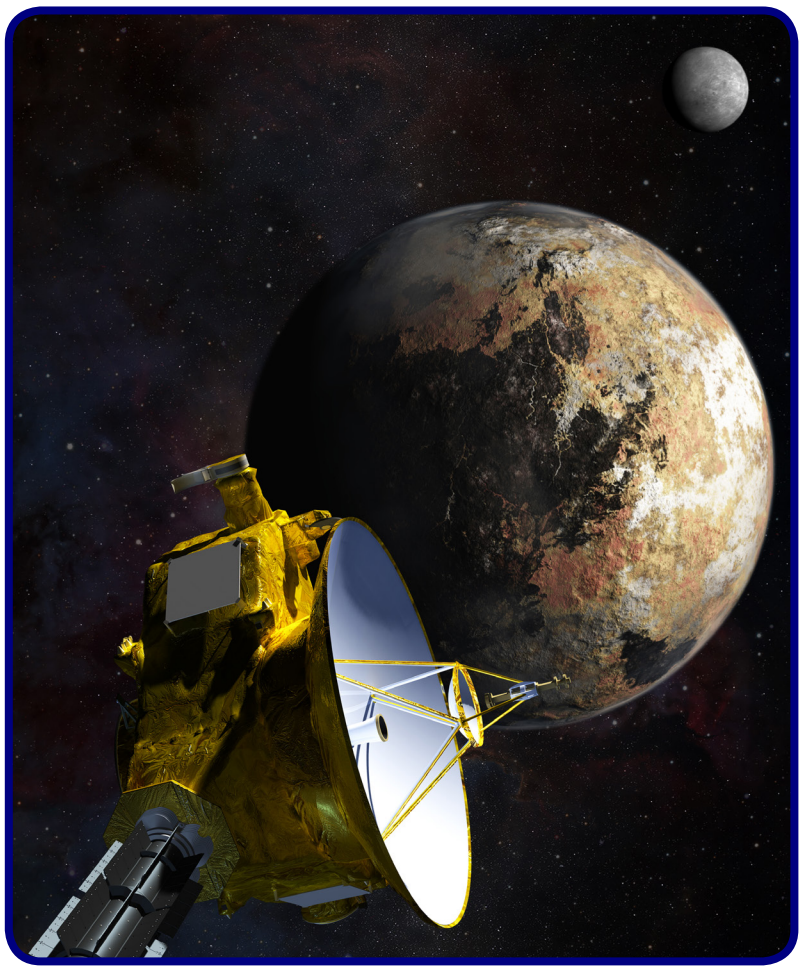

Image Caption: Artist's concept of the New Horizons spacecraft as it approaches Pluto and its largest moon, Charon, in July 2015. The craft's miniature cameras, radio science experiment, ultraviolet and infrared spectrometers, and space plasma experiments will characterize the global geology and geomorphology of Pluto and Charon, map their surface compositions and temperatures, and examine Pluto's atmosphere in detail. (Credit: NASA)

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Flying over an Aurora. (Credit: NASA)

Welcome to NASA

NASA has chosen to produce an Agency Financial Report (AFR) and Annual Performance Report (APR). NASA will publish its Fiscal Year (FY) 2015 APR concurrently with its Congressional Budget Justification and will post it on NASA's Web site at http://www.nasa.gov by February 2016.

This FY 2015 AFR provides an overview of NASA's major programmatic and financial results for FY 2015. It integrates financial and program performance to demonstrate stewardship and accountability and highlights FY 2015 achievements.

NASA demonstrates stewardship of its resources and accountability for results through compliance with the Chief Financial Officers Act (CFO Act) and the Government Performance and Results Act Modernization Act of 2010 (GPRAMA). Financial aspects of the Agency's business operations are accounted for according to U.S. generally accepted accounting principles and Federal Accounting Standards Advisory Board standards.

NASA presents both performance and financial results of operations by strategic goal.

Highlights of key program activities contributing to each strategic goal are provided in the Mission Performance discussion (page 15). A high-level summary of the linkage between program results and the cost of operations is provided in the Statement of Net Cost (SNC), which can be found in the Financials section (page 73). The SNC presents comparative net cost of operations during FY 2015 and FY 2014 by strategic goal and for the Agency as a whole. In addition, the Financials section explains any significant changes in NASA's financial condition from FY 2014 to FY 2015.

Financial systems that meet requirements of the Federal Financial Management Improvement Act (FFMIA) are vital to NASA's financial management program. The AFR describes NASA's compliance with the FFMIA, as well as the built-in checks and balances required by the Office of Management and Budget's (OMB) Circular A-123. OMB Circular A-123 places responsibility for internal controls over financial reporting on Agency management for the purpose of safeguarding assets and improving efficiency and effectiveness of operations.

Finally, the AFR presents the Agency's audited FY 2015 and FY 2014 financial statements and the related independent auditor's financial statements audit opinion. The FY 2015 AFR can be found on NASA's Web site at: http://www.nasa.gov/news/budget/.

Image Caption: This NASA/ESA Hubble Space Telescope image presents the Arches Cluster, the densest known star cluster in the Milky Way. (Credit: NASA/ESA)

Vision and Mission Statement

The National Aeronautics and Space Act of 1958 created NASA to provide for research into problems of flight within and outside the Earth's atmosphere and to ensure that the United States conducts activities in space devoted to peaceful purposes for the benefit of humankind.

In 2010, the President and the Congress unveiled an ambitious new direction for NASA, laying the groundwork for a sustainable program of exploration and innovation. This new direction extends the life of the International Space Station (ISS), supports the growing commercial space industry, and addresses important scientific challenges while continuing our commitment to robust human space exploration, science, and aeronautics programs. The strong bipartisan support for the NASA Authorization Act of 2010 confirms our essential role in addressing the Nation's priorities.

In 2014, NASA released a new Strategic Plan that builds upon the groundwork established in 2010 by outlining the Agency's vision for the future and providing a clear, unified, and long-term direction for all of NASA's activities. The Strategic Plan is the foundation on which NASA will build and measure the success of its programs and projects. The Strategic Plan can be found on NASA's Web site at:
http://www.nasa.gov/sites/default/files/files/2014_NASA_Strategic_Plan.pdf.

As established in the strategic plan, NASA's Vision and Mission are:

The NASA Vision

We reach for new heights and reveal the unknown for the benefit of humankind.

The NASA Mission

Drive advances in science, technology, aeronautics, and space exploration to enhance knowledge, education, innovation, economic vitality, and stewardship of Earth.

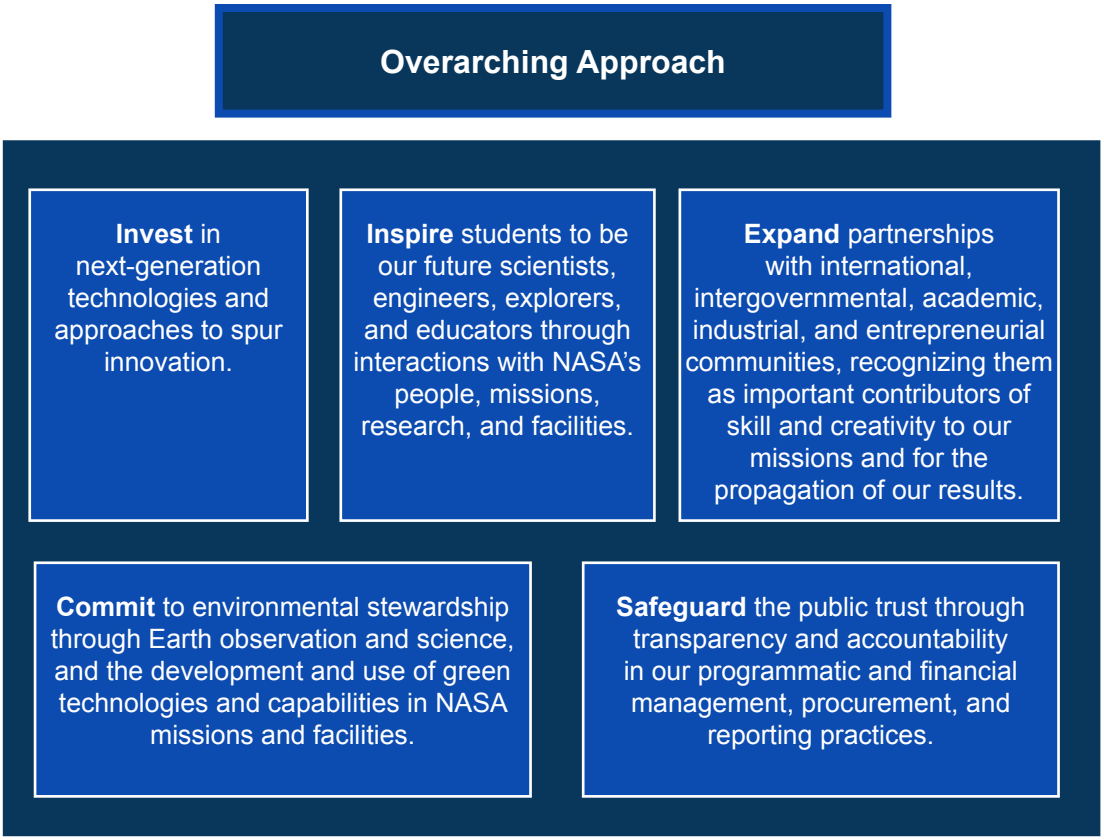
NASA's three strategic goals are:

1. Expand the frontiers of knowledge, capability, and opportunity in space.

2. Advance understanding of Earth and develop technologies to improve the quality of life on our home planet.

3. Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure.

NASA's overarching approach for achieving the Mission contains five key strategies for governing the management and conduct of the Agency's aeronautics and space programs. These strategies are the standard practices that each organization within NASA employs in developing and executing their plans to achieve the Mission. They also provide a framework that guides NASA's support for other areas of national and Administration policy: government transparency; science, technology, engineering, and mathematics (STEM) education; energy and climate change; innovation; and increased citizen and partnership participation to help address the multitude of challenges faced by the Nation. The strategies listed below help strengthen the Agency and support U.S. competitiveness on a global scale.



NASA developed four agency priority goals for FY 2014 - FY 2015, consistent with the requirements of GPRAMA. The statements for each FY 2014 - FY 2015 agency priority goal are in the following graphic. NASA will continue the four themes from the FY 2014 - FY 2015 goals with new agency priority goals for FY 2016 - FY 2017. More information is available at: http://www.performance.gov/agency/national-aeronautics-and-space-administration?view=public#overview.

FY 2014 - FY 2015 Agency Priority Goals

Human Exploration and Operations, Commercial Crew Program: By September 30, 2015, the Commercial Crew Program will complete the first phase of certification efforts with Commercial Crew Transportation partners and will make measurable progress toward the second certification phase with industry partners while maintaining competition.

Human Exploration and Operations, International Space Station Program: By September 30, 2015, NASA will increase the utilization of the International Space Station internal and external research facility sites with science and technology payload hardware to 70 percent.

Science, James Webb Space Telescope Program: By October 2018, NASA will launch the James Webb Space Telescope, the premier space-based observatory. To enable this launch date, NASA will complete the James Webb Space Telescope primary mirror backplane and backplane support structures and deliver them to the Goddard Space Flight Center for integration with the mirror segments by September 30, 2015.

Human Exploration and Operations, Exploration Systems Development: By September 30, 2015, NASA will complete the Space Launch System, Orion, and Exploration Ground Systems Critical Design Reviews (CDRs), allowing the programs to continue to progress toward Exploration Mission (EM)-1 and EM-2 missions.

Organization

NASA's organizational structure is designed to accomplish its Mission and provide a framework for sound business operations, management controls, and safety oversight. The Office of the Administrator provides the overarching vision and strategic direction for the Agency. The Agency's science, research, and technology development work is implemented through four mission directorates supported by the Mission Support Directorate:

Science Mission Directorate (SMD) manages the Agency's science portfolio budget account and focuses on programmatic work on Earth, planetary, astrophysics, and heliophysics research. SMD engages the U.S. science community, sponsors scientific research, and develops and deploys satellites and probes in collaboration with NASA's international partners and other agencies (through the Joint Agency Satellite Division) to answer fundamental scientific questions and expand understanding of space. Additional information on SMD is available at: http://science.nasa.gov/.

Aeronautics Research Mission Directorate (ARMD) manages the budget account for the Agency's aeronautics research portfolio, which enables technology innovation and development allowing the U.S. aviation industry to continue to grow and maintain global competitiveness. Research programs conduct cutting-edge research at both the fundamental and integrated systems levels to address national and global challenges. ARMD guides its research efforts using a strategic vision that embraces the multiple roles of aviation and expands the understanding of those roles to the global stage, while working to address tomorrow's challenges. Additional information on the ARMD is available at: http://www.nasa.gov/topics/aeronautics/index.html.

Space Technology Mission Directorate (STMD) manages the Space Technology budget account, which also funds the crosscutting activities of the Office of the Chief Technologist. STMD pioneers new technologies and capabilities needed by the Agency and commercial sector. It develops technologies that support the broader space economy and other Government missions in space and complements technology development in NASA's other mission directorates, delivering solutions to NASA's technology needs for future science and exploration missions. Additional information on the Office of the Chief Technologist is available at: http://www.nasa.gov/offices/oct/home/index.html.

Human Exploration and Operations Mission Directorate (HEOMD) manages the budget account for the Exploration and Space Operations portfolio. HEOMD manages development of the Space Launch System (SLS), the Orion spacecraft, and future exploration technologies. It works with U.S. commercial space industry partners to develop commercial systems for providing crew and cargo transportation services to and from low Earth orbit. HEOMD also manages operations and research for the ISS, and communications systems and networks that enable deep space and near-Earth exploration. Additional information on the HEOMD is available at: http://www.nasa.gov/directorates/heo/home/index.html.

The **Mission Support Directorate (MSD)** supports all NASA missions in a crosscutting manner. For example, MSD manages the Safety, Security and Mission Services (SSMS) and Construction and Environmental Compliance and Restoration (CECR) accounts, in addition to functions such as procurement and financial management, which cut across all mission directorates. SSMS and CECR accounts fund operations at Headquarters and the Centers as well as institutional and programmatic construction of facilities. MSD reports progress on major national initiatives to the Administrator and other senior Agency officials, provides independent reviews and investigations, and liaises with the public and other Federal agencies. MSD is based at Headquarters, but has representatives at the Centers to provide coordination and control. Additional information on the MSD is available at: http://msd.hq.nasa.gov/.

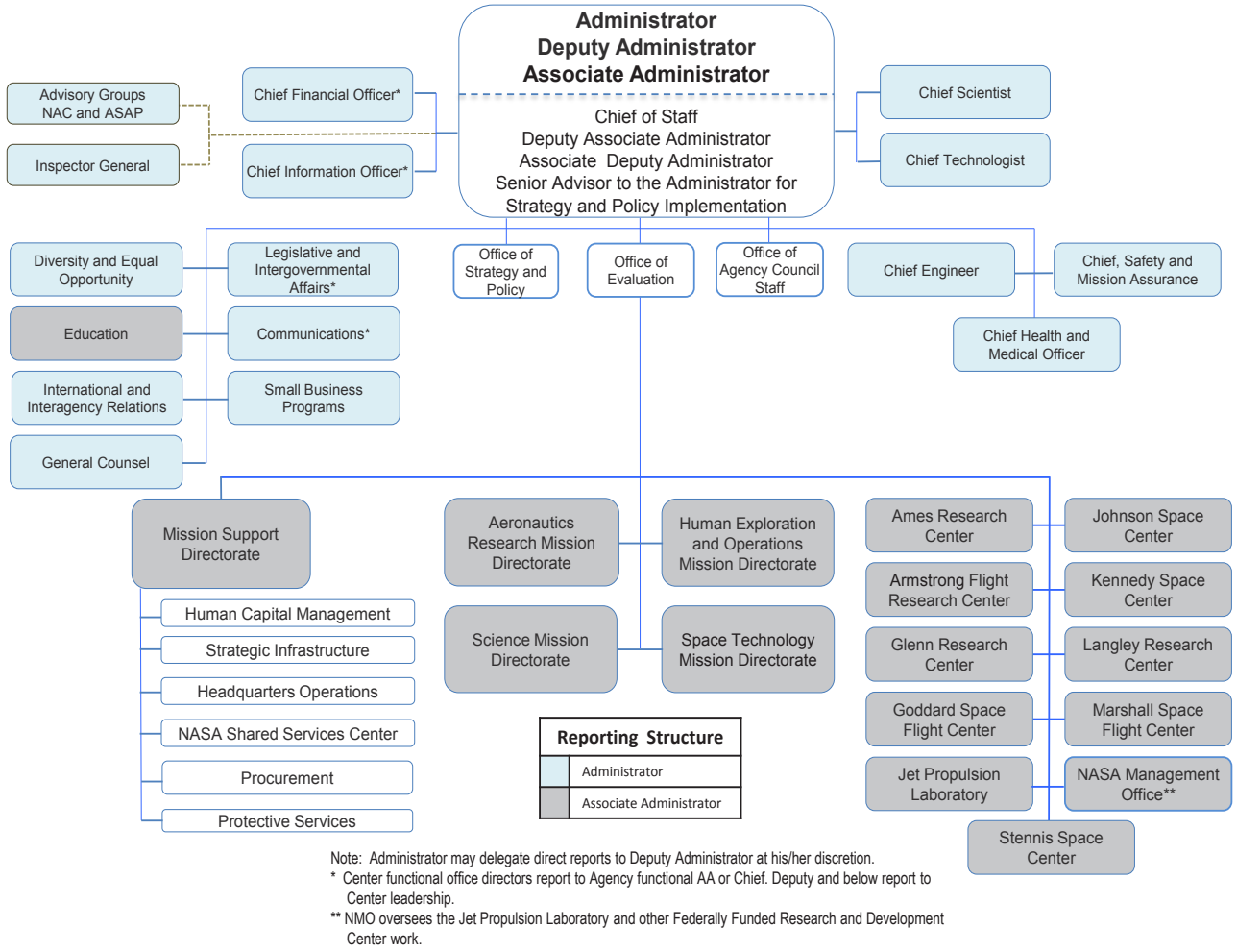
Office of Education (Education) develops and manages a portfolio of educational programs for students and teachers at all levels. Education seeks to develop a vibrant pool of future workforce for sustainable support of national and NASA missions by attracting and retaining students in STEM disciplines and raising public awareness of NASA's activities. To achieve these goals, Education works in partnership with other Government agencies, non-profit organizations, museums and the education community at large. Additional information on the Office of Education is available at:

http://www.nasa.gov/offices/education/about/.

The **Administrator's Staff Offices** support the Administrator's administrative responsibilities by providing a range of high-level guidance and support in critical areas like safety and mission assurance, technology planning, equal opportunity, information technology, financial administration, small business administration, international relations, and legislative and intergovernmental affairs. Additional information on the Administrator's staff offices is available at: http://www.nasa.gov/about/org_index.html.

NASA comprises Headquarters in Washington, DC, nine operating Centers located across the country, and the Jet Propulsion Laboratory, a Federally Funded Research and Development Center operated under a contract with the California Institute of Technology. NASA works in partnership with academia, the private sector, state and local governments, other Federal agencies, and a number of international organizations to support and achieve its Mission.

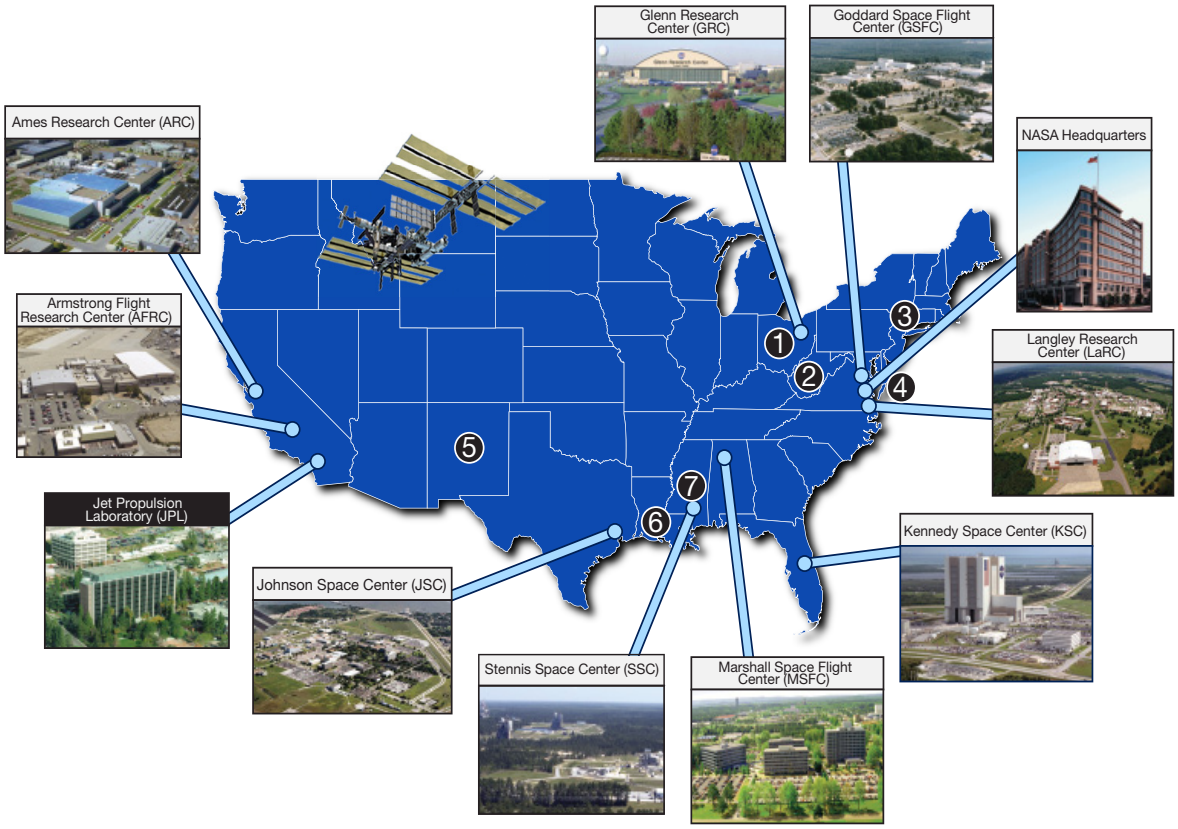
Organizational Structure



Note: Administrator may delegate direct reports to Deputy Administrator at his/her discretion.
* Center functional office directors report to Agency functional AA or Chief. Deputy and below report to Center leadership.
** NMO oversees the Jet Propulsion Laboratory and other Federally Funded Research and Development Center work.

Centers and Facilities Nationwide

Under the leadership of the Administrator, NASA's mission directorates, MSD, and staff offices at Headquarters provide overall guidance and direction to the Agency. NASA's Centers and installations conduct the Agency's day-to-day work in laboratories, on airfields, in wind tunnels, in control rooms, and in NASA's other one-of-a-kind facilities.



Select NASA Facilities
(noted by numbers on map)

1) Plum Brook Station, Sandusky, OH, managed by GRC
2) Software Independent Verification and Validation Facility, Fairmont, WV, managed by GSFC
3) Goddard Institute for Space Studies, New York, NY, managed by GSFC
4) Wallops Flight Facility, Wallops, VA, managed by GSFC
5) White Sands Test Facility and Space Network, White Sands, NM, managed by JSC
6) Michoud Assembly Facility, New Orleans, LA, managed by MSFC
7) NASA Shared Services Center, Stennis Space Center, MS, managed by SSC

Note: JPL is a Federally Funded Research and Development Center in Pasadena, California. The California Institute of Technology manages JPL.

The NASA Shared Services Center (NSSC) was established in March 2006 to provide all NASA Centers timely, accurate, and cost-effective support services in the areas of financial management, human resources, information technology, procurement, and business support services.

Workforce

As of the end of FY 2015, NASA employed more than 17,500 civil servants, including full-time, part-time, term appointee, student, and other non-permanent workers at its nine Centers, Headquarters, and NSSC. In addition, approximately 4,800 full-time equivalent employees perform NASA-funded work as employees of the Jet Propulsion Laboratory, operated by the California Institute of Technology. More information about NASA's workforce is available at: https://wicn.nssc.nasa.gov/. The NASA Office of Human Capital Management (OHCM) is responsible for planning and managing the Agency's workforce to ensure that the right skills are available to support NASA's Mission.

Talented and engaged people are NASA's greatest resource. NASA's Mission requires great responsibility and the continued need for a highly skilled, agile, inclusive, and innovative workforce. While many drivers of a positive workplace culture contribute to employee engagement and mission accomplishment, analysis has shown that three areas have the greatest potential to increase innovation given the current environment. The NASA Strategic Management Council will focus on the following three principal areas that will help to embed innovation in the NASA culture:

- Recognizing and rewarding innovative performance: Reward and appreciate employees for their innovative performance and contributions to their workplace.
- Engaging and connecting the workforce: Engage employees in the NASA Mission and enable them to cooperate, collaborate, and network with one another.
- Building model supervisors and leaders: Develop supervisors and leaders who view developing employees as an important and productive use of time.

NASA cares about the environment in which employees work. Direct attention to the NASA work environment, workforce, and culture through both inclusion and innovative strategies are critical to achieving NASA's Mission.

Image Caption: Members of the New Horizons science team react to seeing the spacecraft's last and sharpest image of Pluto before closest approach later in the day, Tuesday, July 14, 2015 at the Johns Hopkins University Applied Physics Laboratory (APL) in Laurel, Maryland. (Credit: NASA/Bill Ingalls)

Core Values

NASA's tradition of excellence is rooted in the four uncompromising shared core values of safety, integrity, teamwork, and excellence, as well as the firm belief that failure is not an option.

Safety: NASA's constant attention to safety is the cornerstone upon which we build mission success. We are committed, individually and as a team, to protecting the safety and health of the public, our team members, and those assets that the Nation entrusts to us.

Integrity: NASA is committed to maintaining an environment of trust, built upon honesty, ethical behavior, respect, and candor. Our leaders encourage this virtue in the NASA workforce by fostering an open flow of communication on issues among all employees without fear of reprisal. At NASA, we regard and reward employees for demonstrating integrity. Building trust through ethical conduct as individuals and as an organization is a necessary component of mission success.

Teamwork: NASA's most powerful asset for achieving mission success is a multidisciplinary team of diverse, competent people across NASA Centers. Our approach to teamwork is based on a philosophy that each team member brings unique experience and important expertise to project issues. Recognition of and openness to that insight improves the likelihood of identifying and resolving challenges to safety and mission success. We are committed to creating an environment that fosters teamwork and processes that support equal opportunity, collaboration, continuous learning, and openness to innovation and new ideas.

Excellence: To achieve the highest standards in engineering, research, operations, and management in support of mission success, NASA is committed to nurturing an organizational culture in which individuals make full use of their time, talent, and opportunities to pursue excellence in both the ordinary and the extraordinary.

FY 2015 In Review

NASA astronaut Scott Kelly captured this image of Aurora trailing a colorful veil over Earth, taken from the International Space Station on August 15, 2015. (Credit: NASA)

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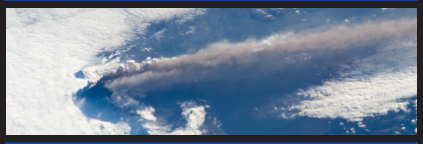
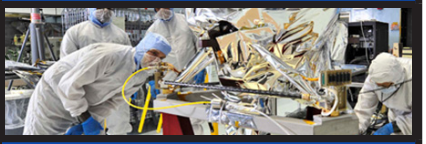
Mission Performance

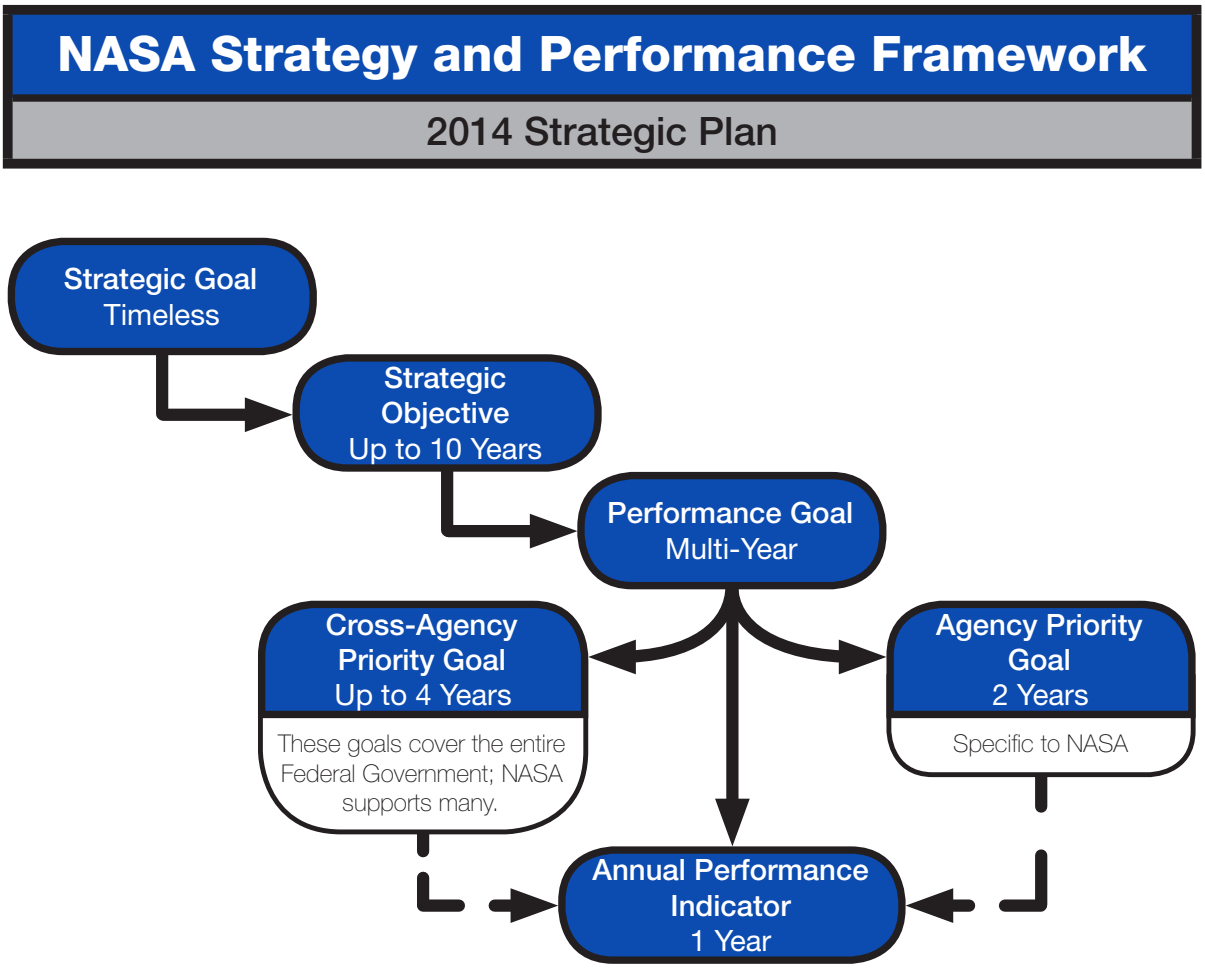
Performance Overview

NASA's strategic goals and strategic objectives, as established in NASA's 2014 Strategic Plan, are as follows:

Strategic Goal 1	Strategic Goal 2	Strategic Goal 3
		
Expand the frontiers of knowledge, capability, and opportunity in space.	**Advance understanding of Earth and develop technologies to improve the quality of life on our home planet.**	**Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure.**
By empowering the NASA community to…	By engaging our workforce and partners to…	By working together to…
Objective 1.1: Expand human presence into the solar system and to the surface of Mars to advance exploration, science, innovation, benefits to humanity, and international collaboration.	**Objective 2.1:** Enable a revolutionary transformation for safe and sustainable U.S. and global aviation by advancing aeronautics research.	**Objective 3.1:** Attract and advance a highly skilled, competent, and diverse workforce, cultivate an innovative work environment, and provide the facilities, tools, and services needed to conduct NASA's missions.
Objective 1.2: Conduct research on the International Space Station (ISS) to enable future space exploration, facilitate a commercial space economy, and advance the fundamental biological and physical sciences for the benefit of humanity.	**Objective 2.2:** Advance knowledge of Earth as a system to meet the challenges of environmental change, and to improve life on our planet.	**Objective 3.2:** Ensure the availability and continued advancement of strategic, technical, and programmatic capabilities to sustain NASA's Mission.
Objective 1.3: Facilitate and utilize U.S. commercial capabilities to deliver cargo and crew to space.		
Objective 1.4: Understand the Sun and its interactions with Earth and the solar system, including space weather.	**Objective 2.3:** Optimize Agency technology investments, foster open innovation, and facilitate technology infusion, ensuring the greatest national benefit.	**Objective 3.3:** Provide secure, effective, and affordable information technologies and services that enable NASA's Mission.
Objective 1.5: Ascertain the content, origin, and evolution of the solar system and the potential for life elsewhere.		
Objective 1.6: Discover how the universe works, explore how it began and evolved, and search for life on planets around other stars.	**Objective 2.4:** Advance the Nation's STEM education and workforce pipeline by working collaboratively with other agencies to engage students, teachers, and faculty in NASA's missions and unique assets.	**Objective 3.4:** Ensure effective management of NASA programs and operations to complete the mission safely and successfully.
Objective 1.7: Transform NASA missions and advance the Nation's capabilities by maturing crosscutting and innovative space technologies.		

At the heart of NASA's strategic goals and strategic objectives are the core missions of human space exploration, Earth and space science, aeronautics, and technology development. NASA is building capabilities for human space exploration, commercial space transportation, and the use of the International Space Station (ISS) for research, while also developing the James Webb Space Telescope (Webb).

NASA sets near-term performance goals (PGs), which are targets for the next several years, as well as annual performance indicators (APIs) to measure and communicate progress towards achieving the Agency's Vision and Mission. These PGs and APIs are aligned to the strategic goals and objectives. Together, the strategic goals, strategic objectives, PGs, and APIs, along with cross-agency priority (CAP) goals and Agency priority goals (APGs), form NASA's strategy-performance framework. More information can be found in our 2014 Strategic Plan, at nasa.gov/budget, and at performance.gov.



In this FY 2015 Agency Financial Report, NASA presents a high-level summary of performance, reflecting preliminary year-end assessments of progress towards the PGs and APIs. Final ratings and more detailed information will be provided in the Annual Performance Report (APR) in February 2016 at nasa.gov/budget.

NASA determines these ratings based on a series of internal assessments that are part of ongoing monitoring of NASA's program and project performance. External entities, such as scientific peer review committees and aeronautics technical evaluation bodies, validate select ratings prior to publication in the APR.

For reporting purposes, NASA uses a color-coded system to represent the assessment and rating of performance. Every performance metric has specific, individualized rating criteria. The generic rating criteria in the table below are illustrative of the types of individualized criteria assigned to each performance measure, and broadly apply to the performance metrics.

Generic
Performance Goal and Annual Performance Indicator Rating Criteria

Green	On Track or Complete	NASA completed or expects to complete this performance measure within the estimated timeframe.
Yellow	Slightly Below Target and/or Behind Schedule	NASA completed or expects to complete this performance measure, but is slightly below the target and/or moderately behind schedule.
Red	Significantly Below Target and/or Behind Schedule	NASA did not or does not expect to complete this performance measure within the estimated timeframe. The program is substantially below the target and/or significantly behind schedule.
White	Cancelled or Postponed	NASA senior management cancelled or postponed this performance measure. The Agency no longer is pursuing activities related to this performance measure, or the program did not have activities during the fiscal year.

Note: These are generic criteria provided for informational purposes only. NASA develops measure-specific criteria to rate all of the Agency's performance goals and annual performance indicators.

Performance Summary

In FY 2015, NASA reviewed progress toward 73 multi-year performance goals and 110 annual performance indicators – in total, progress against 183 performance metrics. NASA provided the FY 2015 Performance Plan online at nasa.gov in March 2014.

The summary of NASA's preliminary assessment of progress is provided below. The Agency will release final ratings with the APR in February 2016.

FY 2015 Preliminary Ratings Overview

All Performance Metrics

Number of Performance Metrics		183
Green	*Yellow*	*Red*
163	16	4
89%	9%	2%

Performance Metrics by Strategic Goal

Strategic Goal 1	Strategic Goal 2	Strategic Goal 3
		
Expand the frontiers of knowledge, capability, and opportunity in space.	Advance understanding of Earth and develop technologies to improve the quality of life on our home planet.	Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure.

Number of Performance Metrics								
76			47			60		
Green	Yellow	Red	Green	Yellow		Green	Yellow	Red
64	11	1	46	1		53	4	3
84%	15%	1%	98%	2%		88%	7%	5%

Green — On Track or Complete

Yellow — Slightly Below Target and/or Behind Schedule

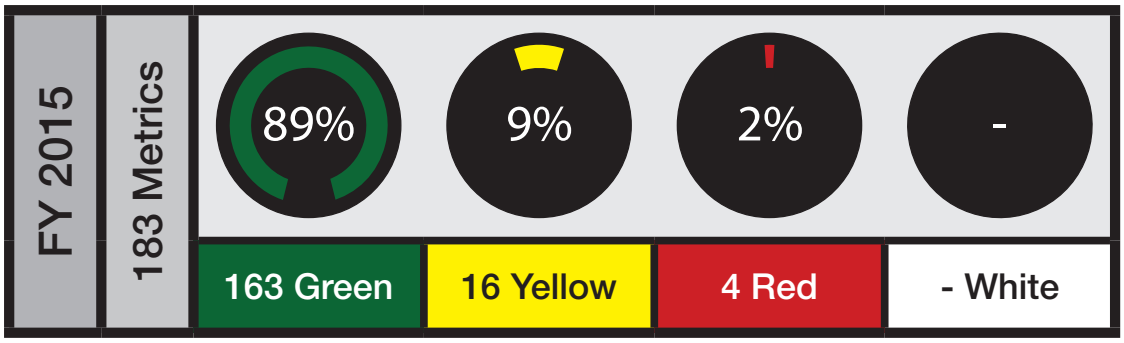
Red — Significantly Below Target and/or Behind Schedule

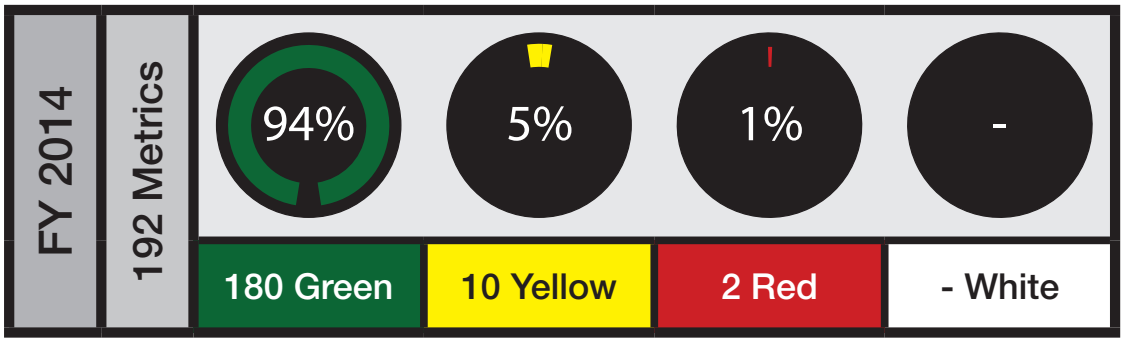
White — Cancelled or Postponed

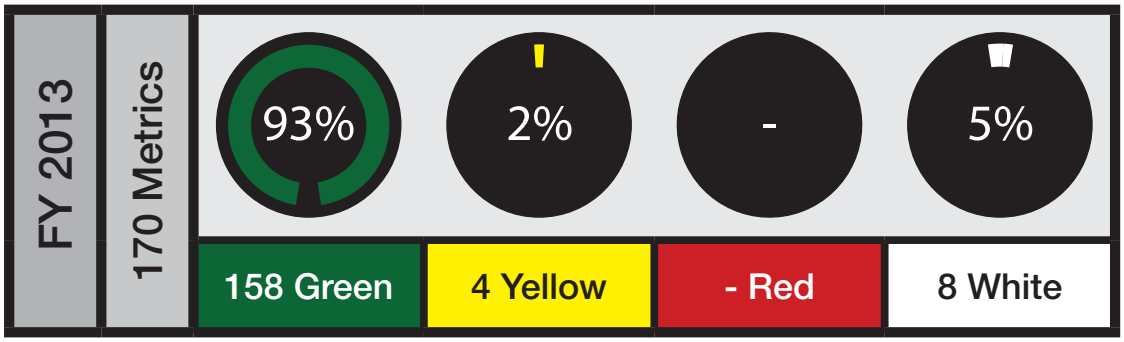
Note that these tables use preliminary ratings data for FY 2015. Final ratings will become available in February 2016 in the Annual Performance Report.

Performance Metric Trending

Rating Trending Over Last Three Fiscal Years







Year	Total Metrics	Green	Yellow	Red	White
FY 2015	183	163	16	4	-
FY 2014	192	180	10	2	-
FY 2013	170	158	4	-	8

Green	On Track or Complete
Yellow	Slightly Below Target and/or Behind Schedule
Red	Significantly Below Target and/or Behind Schedule
White	Cancelled or Postponed

Note that these tables use preliminary ratings data for FY 2015. Final ratings will become available in February 2016 in the Annual Performance Report.

Ratings by Strategic Goal and Objective

FY 2015 PG and API Ratings

Strategic Goal 1

Expand the frontiers of knowledge, capability, and opportunity in space.

Green	Yellow	Red
24 PGs	5 PGs	-
83%	17%	-
40 APIs	6 APIs	1 API
84%	13%	3%

Strategic Objective 1.1

Expand human presence into the solar system and to the surface of Mars to advance exploration, science, innovation, benefits to humanity, and international collaboration.

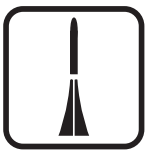
Green	Yellow
2 PGs	1 PG
67%	33%
5 APIs	1 API
83%	17%

Strategic Objective 1.2

Conduct research on the International Space Station (ISS) to enable future space exploration, facilitate a commercial space economy, and advance the fundamental biological and physical sciences for the benefit of humanity.

Green	Yellow	Red
2 PGs	4 PGs	-
33%	67%	-
6 APIs	3 APIs	1 API
60%	30%	10%

Strategic Objective 1.3



Facilitate and utilize U.S. commercial capabilities to deliver cargo and crew to space.

Green
2 PGs
100%
3 APIs
100%

Green — On Track or Complete

Yellow — Slightly Below Target and/or Behind Schedule

Red — Significantly Below Target and/or Behind Schedule

White — Cancelled or Postponed

Note that these tables use preliminary ratings data for FY 2015. Final ratings will become available in February 2016 in the Annual Performance Report.

Strategic Objective 1.4

Understand the Sun and its interactions with Earth and the solar system, including space weather.

Green
4 PGs
100%
7 APIs
100%

Strategic Objective 1.5

Ascertain the content, origin, and evolution of the solar system and the potential for life elsewhere.

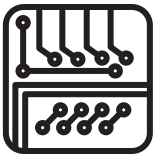
Green	Yellow
6 PGs	-
100%	-
8 APIs	1 API
89%	11%

Strategic Objective 1.6

Discover how the universe works, explore how it began and evolved, and search for life on planets around other stars.

Green
5 PGs
100%
6 APIs
100%

Strategic Objective 1.7



Transform NASA missions and advance the Nation's capabilities by maturing crosscutting and innovative space technologies.

Green	Yellow
3 PGs	-
100%	-
5 APIs	1 API
83%	17%

Green	On Track or Complete
Yellow	Slightly Below Target and/or Behind Schedule
Red	Significantly Below Target and/or Behind Schedule
White	Cancelled or Postponed

Note that these tables use preliminary ratings data for FY 2015. Final ratings will become available in February 2016 in the Annual Performance Report.

Strategic Goal 2

Advance understanding of Earth and develop technologies to improve the quality of life on our home planet.

Green	Yellow
20 PGs	-
100%	-
26 APIs	1 API
96%	4%

Strategic Objective 2.1

Enable a revolutionary transformation for safe and sustainable U.S. and global aviation by advancing aeronautics research.

Green	Yellow
6 PGs	-
100%	-
6 APIs	1 API
86%	14%

Strategic Objective 2.2

Advance knowledge of Earth as a system to meet the challenges of environmental change, and to improve life on our planet.

Green
8 PGs
100%
14 APIs
100%

Strategic Objective 2.3

Optimize Agency technology investments, foster open innovation, and facilitate technology infusion, ensuring the greatest national benefit.

Green
2 PGs
100%
2 APIs
100%

Strategic Objective 2.4

Advance the Nation's STEM education and workforce pipeline by working collaboratively with other agencies to engage students, teachers, and faculty in NASA's missions and unique assets.

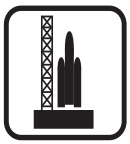
Green
4 PGs
100%
4 APIs
100%

Green	On Track or Complete
Yellow	Slightly Below Target and/or Behind Schedule
Red	Significantly Below Target and/or Behind Schedule
White	Cancelled or Postponed

Note that these tables use preliminary ratings data for FY 2015. Final ratings will become available in February 2016 in the Annual Performance Report.

Strategic Goal 3	Green	Yellow	Red
Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure.	21 PGs	2 PGs	1 PG
	88%	8%	4%
	32 APIs	2 APIs	2 APIs
	88%	6%	6%

Strategic Objective 3.1		Green	Yellow
	Attract and advance a highly skilled, competent, and diverse workforce, cultivate an innovative work environment, and provide the facilities, tools, and services needed to conduct NASA's missions.	7 PGs	2 PGs
		78%	22%
		14 APIs	2 APIs
		88%	12%

Strategic Objective 3.2		Green
	Ensure the availability and continued advancement of strategic, technical, and programmatic capabilities to sustain NASA's Mission.	7 PGs
		100%
		8 APIs
		100%

Strategic Objective 3.3		Green	Red
	Provide secure, effective, and affordable information technologies and services that enable NASA's Mission.	5 PGs	1 PG
		83%	17%
		5 APIs	2 APIs
		71%	29%

Strategic Objective 3.4		Green
	Ensure effective management of NASA programs and operations to complete the mission safely and successfully.	2 PGs
		100%
		5 APIs
		100%

Green	On Track or Complete
Yellow	Slightly Below Target and/or Behind Schedule
Red	Significantly Below Target and/or Behind Schedule
White	Cancelled or Postponed

Note that these tables use preliminary ratings data for FY 2015. Final ratings will become available in February 2016 in the Annual Performance Report.

Strategic Goals and Highlights

Strategic Goal 1:
Expand the frontiers of knowledge, capability, and opportunity in space.

NASA's enduring and core goal, for over 50 years, is to expand the frontiers of knowledge, capability, and opportunity in space and continually challenge the boundaries of science, technology, and imagination. This goal includes NASA's strategic objectives for human exploration, the International Space Station (ISS), partnerships with U.S. industry, heliophysics, planetary science, astrophysics, and space technology development.

Strategic Objective 1.1: Expand human presence into the solar system and to the surface of Mars to advance exploration, science, innovation, benefits to humanity, and international collaboration.

NASA is entering a new era in human spaceflight: exploration beyond low Earth orbit, implementing a multiple destination exploration strategy with a capability-driven approach. The Human Exploration and Operations Mission Directorate's (HEOMD's) Exploration Systems Development programs are creating the first components of the architecture needed for human exploration beyond low Earth orbit. The first, foundational elements include the Orion spacecraft, the Space Launch System (SLS), and Exploration Ground Systems (EGS). Programs within this strategic objective also develop the technologies and capabilities for in-space propulsion, in-space operations, long-duration habitation, and other systems to support humans in hostile environments.

Key Achievement in FY 2015: Orion's Successful Exploration Flight Test-1

In December 2014, NASA launched the

Image Caption: NASA's Orion spacecraft awaits the U.S. Navy's USS Anchorage for a ride home. Orion splashed down in the Pacific Ocean after its successful first flight test, where a combined team from NASA, the Navy, and Orion prime contractor Lockheed Martin retrieved the capsule. (Credit: U.S. Navy)

Image Caption: The first test fire of the booster for NASA's SLS rocket. (Credit: NASA)

Orion spacecraft on Exploration Flight Test (EFT)-1, aboard a Delta IV Heavy rocket. This was Orion's first flight test, which sent the vehicle 3,600 miles into space during a two-orbit, 4.5-hour test. One of the objectives was to test how the spacecraft would fare returning to Earth at high speeds and temperatures. The test also provided important insight into key separation events, including whether the Launch Abort System and protective fairings came off at the right times, how the parachutes assisting Orion during its descent fared, and how the operations to recover Orion from the Pacific Ocean progressed.

Orion's flight test yielded millions of elements of data, every piece of which is providing unique insight into how to improve the spacecraft's design so that it can safely send astronauts on their way to Mars and return them home.

Key Achievement in FY 2015: SLS Booster Test

At Orbital ATK's Promontory, Utah, test facility, engineers fired the booster for NASA's SLS rocket for a two-minute test on March 11, 2015. The test is one of two that will qualify the booster for flight before SLS begins carrying NASA's Orion spacecraft and other potential payloads to deep space destinations.

The Exploration Systems Development Web site provides further information about the development of Orion, SLS, and the ground systems to support operations.

Strategic Objective 1.2: Conduct research on the International Space Station (ISS) to enable future space exploration, facilitate a commercial space economy, and advance the fundamental biological and physical sciences for the benefit of humanity.

The ISS is the world's only orbiting, microgravity research and development laboratory, where researchers can perform multidisciplinary research and technology development to prepare for our exploration of the solar system. The Administration recently announced the decision to extend operations of the ISS through at least 2024.

Image Caption: On January 19, 2015, Expedition 45/46 Commander, Astronaut Scott Kelly (right) and his twin brother, former Astronaut Mark Kelly (left), spoke to news media outlets at the Johnson Space Center about Scott Kelly's upcoming One-Year mission aboard the International Space Station. (Credit: Robert Markowitz)

Continuing ISS operations are critical to achieving NASA's and the Nation's goals in science, technology, and human spaceflight.

Key Achievement in FY 2015: Start of the One-Year Mission

In March 2015, U.S. Astronaut Scott Kelly and Russian Cosmonaut Mikhail Kornienko started a one-year mission on the ISS, which is twice as long as typical U.S. missions. The one-year crew mission is the latest step in the ISS' role as a platform for preparing humanity for exploration into deeper space. These investigations are expected to yield beneficial knowledge about the medical, psychological, and biomedical challenges faced by astronauts during long-duration spaceflight.

While astronaut Scott Kelly is in space, NASA will also undertake unprecedented twin studies with Scott's identical twin brother, retired astronaut Mark Kelly. These studies will be unique investigations into the genetic aspects of spaceflight.

Updates on current ISS operations, crew information, photos and video, positional information, and live-streamed high-definition views of Earth are available on the ISS Web site.

Strategic Objective 1.3: Facilitate and utilize U.S. commercial capabilities to deliver cargo and crew to space.

U.S. commercial space transportation capabilities will provide safe, reliable, and cost

Image Caption: SpaceX conducts the pad abort test for the Crew Dragon spacecraft on May 6, 2015. (Credit: NASA)

effective access to and from low Earth orbit and the ISS for crew and cargo. NASA's partnerships with American industry also will stimulate commercial industry, promote job growth, and expand knowledge. Through HEOMD's Commercial Crew program, NASA is providing technical and financial support to industry providers during the development phase of their crew transportation systems, while certifying providers' transportation systems to carry NASA astronauts to and from the ISS.

Key Achievement in FY 2015: SpaceX Demonstrates Astronaut Escape System for Crew Dragon Spacecraft

In May 2015, SpaceX completed a successful pad abort test of its Crew Dragon spacecraft. The spacecraft traveled 3,561 feet up before jettisoning its trunk and safely splashing down under three main parachutes in the Atlantic Ocean. The Crew Dragon launch escape capabilities demonstrated the spacecraft's ability to save astronauts in the unlikely event of a life-threatening situation on the launch pad.

Key Achievement in FY 2015: Construction of CST-100 Crew Access Tower

In FY 2015, Boeing and United Launch Alliance started assembly of a crew access tower a few miles from Space Launch Complex 41 at Cape Canaveral Air Force Station in Florida. The work is critical in readying the launch site for a crew flight test to certify their systems for operational missions to the ISS for NASA's Commercial Crew program. Once assembled, the crew access tower

Image Caption: The first crew access tower tiers begin to take shape at Space Launch Complex-41 for flights aboard the Boeing CST-100. (Credit: NASA/Jim Grossman)

will stand about 200 feet and will provide safe access to Boeing's Crew Space Transportation (CST)-100 spacecraft as it stands on the pad atop a United Launch Alliance Atlas V rocket.

Strategic Objective 1.4: Understand the Sun and its interactions with Earth and the solar system, including space weather.

The domain of heliophysics ranges from the interior of the Sun, to the upper atmosphere and near-space environment of Earth (above 31.1 miles, or 50 kilometers), and outward to a region far beyond Pluto, where the Sun's influence wanes against the forces of interstellar space. Earth and the other planets of the solar system reside in this vast extended atmosphere of the Sun, called the heliosphere, which is made of electrified and magnetized matter entwined with penetrating radiation and energetic particles. The emerging science of interplanetary space weather is also crucial to NASA's human and robotic exploration objectives beyond Earth's orbit.

Key Achievement in FY 2015: NASA Launches the Magnetospheric Multiscale Mission

In March 2015, NASA launched four identical spacecrafts that make up the Magnetospheric Multiscale (MMS) mission. MMS is the first mission dedicated to studying the mystery of how magnetic fields around Earth connect and disconnect, explosively releasing energy via a process known as magnetic reconnection. The four spacecrafts will fly in a pyramid formation through space to take unprecedented measurements of magnetic reconnection phenomenon as it occurs in different areas of Earth's magnetosphere. Magnetic reconnection is a common process throughout the universe: occurring in space near Earth, in the atmosphere of the Sun and other stars, in the vicinity of black holes and neutron stars, and at virtually any boundary between space plasmas, includ-

Image Caption: The four MMS observatories were processed for launch in a clean room at the Astrotech Space Operations facility in Titusville, Florida. (Credit: NASA/Ben Smegelsky)

ing the boundary between the solar system's heliosphere and interstellar space. It is one of the most important drivers of space weather events. Eruptive solar flares, coronal mass ejections, and geomagnetic storms all involve the release, through reconnection, of energy stored in magnetic fields. Space weather events can affect technology systems such as communications networks, GPS navigation, and electrical power grids.

Key Achievement in FY 2015: NASA's Solar Probe Plus Mission Successfully Completed Its Critical Design Review

NASA's Solar Probe Plus mission, a spacecraft that will fly closer to the Sun than any before, reached a major milestone in March 2015 when it successfully completed its Critical Design Review, or CDR. An independent NASA review board met at the Johns Hopkins University Applied Physics Laboratory (APL) to review all aspects of the mission plan. APL has designed and will build and operate the spacecraft for NASA. The CDR certifies that the Solar Probe Plus mission design is at an advanced stage and that fabrication, assembly, integration, and testing of the many elements of the mission may proceed. Solar Probe Plus is scheduled to launch in the later half of calendar year 2018.

Scientists have long wanted to send a probe through the Sun's outer atmosphere, or corona, to better understand the solar wind and the material it carries into the solar system. The primary science goals for the Solar Probe Plus mission are to trace the flow of energy and understand the heating of the solar corona and to explore the physical mechanisms that accelerate the solar wind and energetic particles. To meet these goals, Solar Probe Plus will carry four instrument suites into the corona and study the solar wind and energetic particles as they blast off the surface of the star. The instruments will study magnetic fields, plasma, and energetic particles, and will image the solar wind. The spacecraft and instruments will be protected from the Sun's heat by a 4.5-inch-thick carbon-composite shield.

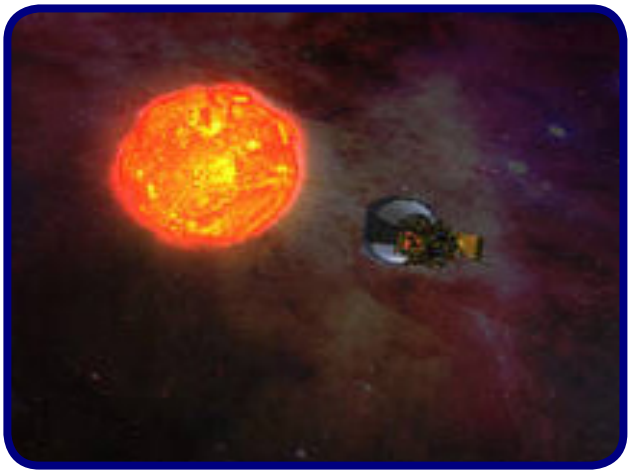


Image Caption: An artist's rendering of Solar Probe Plus shows the solar panels folded into the shadows of its protective shield, as it gathers data on its approach to the Sun. (Credit: NASA/ JHU-APL)

During the closest passes around the Sun, temperatures outside the spacecraft will reach nearly 2,500 degrees Fahrenheit.

Strategic Objective 1.5: Ascertain the content, origin, and evolution of the solar system and the potential for life elsewhere.

Planetary science is a grand human enterprise that seeks to understand the history of the solar system and the distribution of life within it. NASA is at the frontier of a journey of scientific discoveries that are yielding a profound new understanding of the solar system. Robotic exploration is the current approach to planetary science and is the necessary precursor to the expansion of humanity beyond Earth. Ground-based research and observations supplement NASA's space-based assets. NASA's Planetary Science Division continues to expand knowledge of the solar system, with active missions and Earth-based research programs exploring all the way from Mercury to Pluto and beyond.

Key Achievement in FY 2015: New Horizons Arrives at Pluto

In FY 2015, the New Horizons mission accomplished the historic first-ever flyby of Pluto. The New Horizons mission will increase understanding of worlds at the edge of the solar system by making the first reconnaissance of the dwarf planet Pluto and by venturing deeper into the distant, mysterious Kuiper Belt, a relic of solar system formation. New Horizons traveled more than nine years and three billion miles to reach Pluto.

Image Caption: Pluto nearly fills the frame in this image by NASA's New Horizons spacecraft, taken on July 13, 2015, when the spacecraft was 476,000 miles (768,000 kilometers) from the surface. This is the last and most detailed image sent to Earth before the spacecraft's closest approach to Pluto on July 14. The image is dominated by the large, bright feature, informally named the "heart," which measures approximately 1,000 miles (1,600 kilometers) across. (Credit: NASA/APL/SwRI)

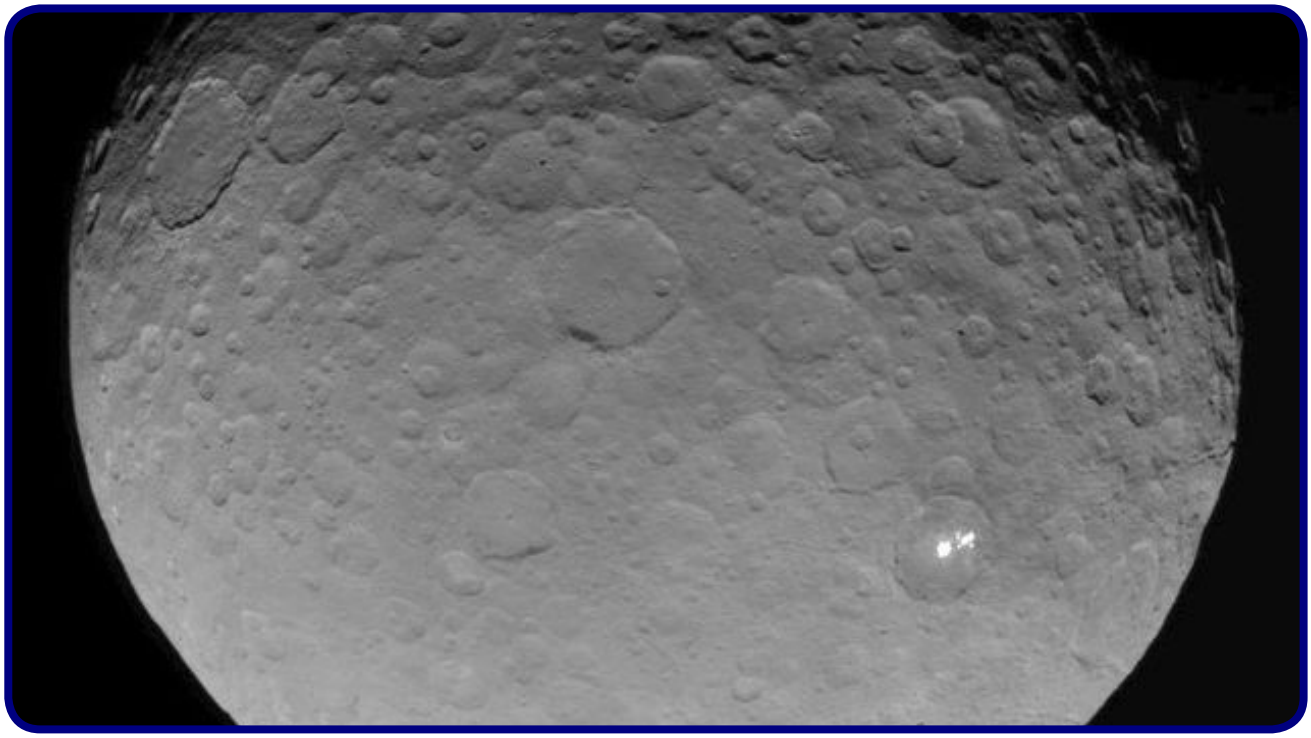


Image Caption: A cluster of mysterious bright spots on dwarf planet Ceres can be seen in this image, taken by NASA's Dawn spacecraft on May 4, 2015. (Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA)

Key Achievement in FY 2015: Dawn Arrives at Ceres

NASA's Dawn spacecraft arrived at Ceres, the largest object in the main asteroid belt between Mars and Jupiter, on March 6, 2015. Dawn is the first mission to visit a dwarf planet, and the first to orbit two distinct targets in the solar system. Dawn launched in 2007 and previously explored the protoplanet Vesta for 14 months, from 2011 to 2012.

Dawn has provided images of mysterious and unique features on Ceres, including bright spots and a mountain with steep slopes protruding from a relatively smooth area of the dwarf planet's surface.

Strategic Objective 1.6: Discover how the universe works, explore how it began and evolved, and search for life on planets around other stars.

NASA leads the Nation and the world on a continuing journey to answer some of the most profound questions that touch the hearts of all humanity: How does the universe work? How did we get here? Are we alone? The scope of astrophysics is truly breathtaking, ranging from the birth of the universe and the development of stars and galaxies over cosmic time, to the search for life on planets around other stars. Often in cooperation with ground-based observatories, NASA astrophysics missions exploit the full range of the electromagnetic spectrum

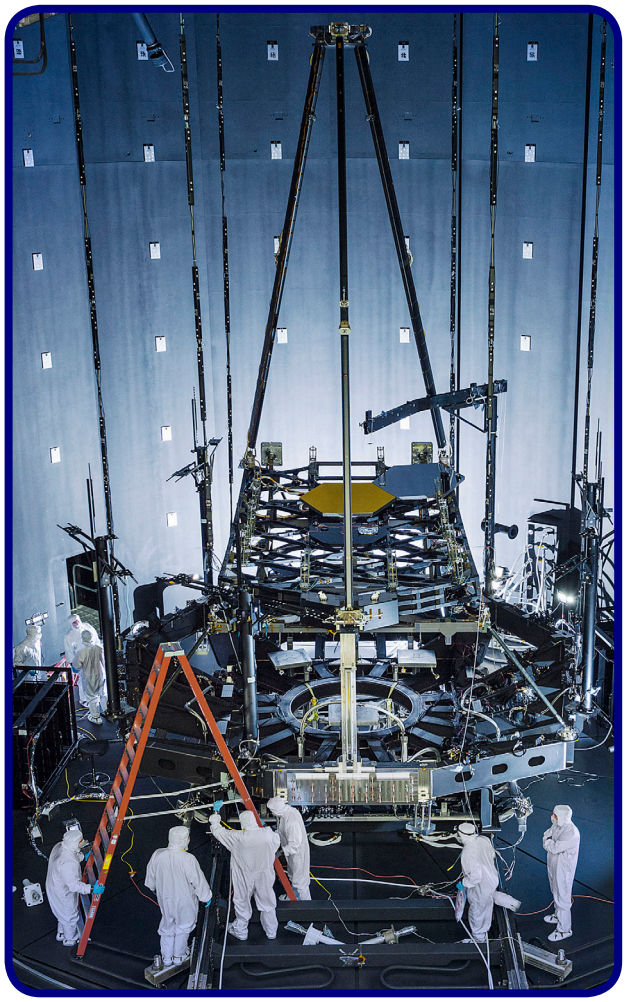


Image Caption: The pathfinder (or test model) of the Webb backplane is prepared for test inside Chamber A at NASA's Johnson Space Center. (Credit: NASA)

and the physics of high-energy subatomic particles to understand the broad diversity of objects in the universe.

Key Achievement in FY 2015: Webb Pathfinder Telescope Tested in Cryovacuum Chamber

The James Webb Space Telescope (Webb) will be a large infrared telescope with a 6.5-meter primary mirror. NASA continues to make progress toward the planned October 2018 launch date. A key step in FY 2015 was the test of the pathfinder (or test model) of the Webb backplane inside NASA's giant thermal vacuum chamber (Chamber A), located at NASA's Johnson Space Center in Houston, Texas. Previously used for manned spaceflight missions, this historic chamber is now being readied for a cryogenic test, which will simulate the frigid temperatures the Webb telescope will encounter in space.

Webb will be the premier observatory of the next decade, serving thousands of astronomers worldwide. It will study every phase in the history of the universe, ranging from the first luminous glows after the Big Bang, to the formation of solar systems capable of supporting life on planets like Earth, to the evolution of Earth's solar system.

Key Achievement in FY 2015: TESS Mission Confirmed to Proceed into Development

NASA has officially confirmed the Transiting Exoplanet Survey Satellite (TESS) mission, clearing it to move forward into the development phase. This marks a significant step for the TESS mission, which will search the entire sky for planets outside the solar system, known as exoplanets. TESS is expected to find more than 5,000 exoplanet candidates, including 50 Earth-sized planets. It will also find a wide array of exoplanet types, ranging from small, rocky planets to gas giants. Some of these planets could be the right sizes, and orbit at the correct distances from their stars, to support life. TESS is an ideal follow-up to the Kepler mission, which searches for exoplanets in a fixed area of the sky, and will complement several other critical space-based missions and ground-based observations.

Strategic Objective 1.7: Transform NASA missions and advance the Nation's capabilities by maturing crosscutting and innovative space technologies.

For decades, NASA's investment in space technology has helped make the United States the global leader in space exploration and scientific discovery, while significantly contributing to the technology-based U.S. economy. NASA's Space Technology Mission Directorate (STMD) continues that legacy today with a portfolio that spans a broad range of technical areas and various stages of technical maturity, from early stage concepts through flight demonstration. Through STMD, NASA advances technologies to improve capabilities for future human exploration and science missions (e.g., SLS, Orion, outer planetary exploration). In addition, STMD collaborates with other Government agencies to transform the Nation's capabilities in key technology areas; academia and other organizations to advance early stage concepts and technology development; and industry to advance technologies with potential to benefit the U.S. commercial space sector. The following are just a few examples of recent accomplishments:

- Advanced Orion compression pads, a game changing woven thermal protection system technology tailored to the needs of the Orion spacecraft. This technology has completed mission infusion review for Exploration Mission 1.

- The second near-space test flight of the Low Density Supersonic Decelerator (LDSD), a technology that could enable larger payloads to Mars and set the stage for future human explorers.

- The first in-space, 3D-printed object (aboard the ISS), paving the way to future long-term space expeditions.

Key Achievement in FY 2015: NASA Advances the State of the Art in High Power Solar Arrays

High power solar arrays represent a key STMD technology investment that can significantly benefit future NASA missions, other U.S. Government agencies, and commercial space. In 2012, NASA selected two companies – Alliant Techsystems, Inc. (now Orbital ATK) and Deployable Space Systems (DSS) – to develop solar arrays to enable future electric propulsion systems. Each company has a distinct design for its array. The Orbital ATK MegaFlex design is a circular array that opens axially like a fan. The DSS Mega-ROSA (i.e., Roll-Out Solar Array) design features a rectangular shape with flexible, modular "winglets" attached to a composite boom that can be rolled in or out like a window shade. These novel arrays are sized to provide approimately 20 kilowatts of power per wing, offering significant benefits over current systems. Compared to those on current commercial satellites, for example, these solar arrays can produce electricity with half the mass, a quarter of the stowed volume, and four times the radiation tolerance. Additionally, automated manufacturing of the new arrays could reduce cost by 35 percent.

There are many potential applications. Together with advanced thrusters and other novel technologies, these arrays will enable high-power solar electric propulsion for future NASA missions. These missions could include planetary or cis-lunar science missions, deep space human exploration, satellite servicing, orbital debris removal, and

Image Caption: ATK's MegaFlex and DSS's Mega-ROSA high power solar arrays. (Credit: NASA)

payload delivery. Additionally, another infusion application includes a functional space demonstration of large, advanced solar arrays on the ISS as an upgrade for increased power.

These systems are of interest for commercial satellite applications, as well. Current commercial satellites use large composite fold-out panels. The reduced mass and stowage volume afforded by these new solar arrays can lower satellite launch costs and eliminate the need for large, expensive launch shrouds. Similarly, these arrays offer potential costs savings and operational benefits for military satellite missions, and therefore are of interest to the U.S. Department of Defense.

Both teams have made great progress on their array designs, and possible applications for these systems continue to unfold. These high power solar arrays are only two examples of STMD's investment in a broad range of technologies with crosscutting, transformative payoffs.

Strategic Goal 2:
Advance understanding of Earth and develop technologies to improve the quality of life on our home planet.

NASA's accomplishments advance the understanding of Earth and help to improve life for its inhabitants, whether developing new aircraft technologies for safer, more efficient air travel, uncovering the complexities of Earth's natural systems, or transferring technologies to the commercial marketplace. This goal includes NASA's objectives for aeronautics research, Earth science, technology portfolio optimization, and science,

technology, engineering, and mathematics (STEM) education.

Strategic Objective 2.1: Enable a revolutionary transformation for safe and sustainable U.S. and global aviation by advancing aeronautics research.

The Aeronautics Research Mission Directorate (ARMD) contributes unique innovations to aviation through research activities that help sustain and advance the U.S. civil aviation industry. The results of these activities will enable a revolutionary transformation of the aviation system to improve quality of life and productivity on Earth.

ARMD established a new strategic vision in the 2014 NASA Strategic Plan, identifying six new strategic research thrusts: safe, efficient growth in global operations; innovation in commercial supersonic aircraft; ultra-efficient commercial vehicles; transition to low-carbon propulsion; real-time, system-wide safety assurance; and assured autonomy for aviation transformation.

Key Achievement in FY 2015: NASA completes the Environmentally Responsible Aviation Project

The Environmentally Responsible Aviation project concluded its final year having successfully completed eight Integrated Technology Demonstrations that support a NASA goal to enable industry to build advanced, ultra-efficient commercial vehicles. For airplanes that will be flying in the 2020-2025 timeframe, NASA research is aimed at cutting fuel use in half, reducing emissions up to 75 percent during takeoff and landing, and quieting aircraft noise 42 decibels below current standards. Two of these demonstrations took place this year aboard Boeing's ecoDemonstrator 757, a flying laboratory that allows researchers to try out aeronautical innovations in real-world conditions. The first of the two demonstrations studied how small jets embedded in an aircraft's vertical tail and blowing air over its surfaces could provide enough force to safely allow smaller tails on future aircraft designs. That would save weight, reduce drag and drop fuel usage up to 0.5 percent – a small number that quickly adds up to big savings for an airline operating hundreds of flights each day.

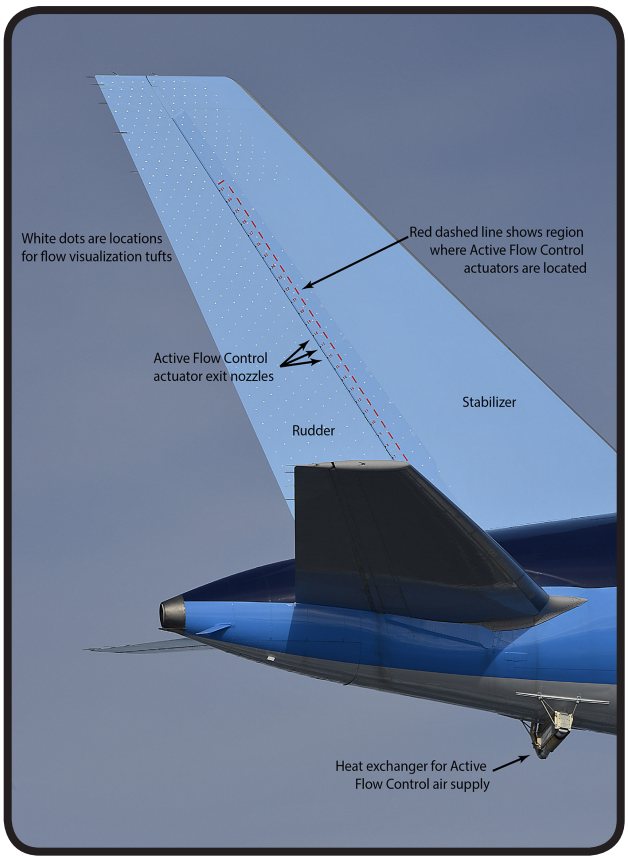


Image Caption: NASA's recent green aviation tests included the Active Flow Control Enhanced Vertical Tail Flight Experiment, for which 31 small devices called sweeping jet actuators were installed on the tail of a Boeing 757 ecoDemonstrator aircraft to determine what, if any, impact the devices had on the aerodynamics of the tail. (Credit: NASA/Boeing)

Image Caption: Materials scientist Mia Sioch (left) and systems engineer Mike Alexander (center), both from NASA's Langley Research Center, join Boeing technician Felix Boyett on a scissor lift so they can count insect residue on the right wing of Boeing's ecoDemonstrator 757 aircraft as part of NASA non-stick bug coating research in Shreveport, Louisiana. (Credit: NASA/Paul Bagby)

Find out more about ARMD's first demonstration with Boeing's ecoDemonstrator in their press release, "NASA Wraps Up First Green Aviation Tests on Boeing ecoDemonstrator."

The other demonstration studied how well special coatings worked to prevent sticky bug residue from building up on the leading edge of an airplane wing and increasing drag. Less bug residue would smooth airflow and help reduce fuel consumption. NASA knowledge gained through the ecoDemonstrator research will be publicly available to benefit industry.

Find out more about ARMD's second demonstration with special coatings in their press release, "NASA Tests Aircraft Wing Coatings that Slough Bug Guts."

Strategic Objective 2.2: Advance knowledge of Earth as a system to meet the challenges of environmental change, and to improve life on our planet.

NASA's Earth Science programs shape an interdisciplinary view of Earth, exploring the interaction among the atmosphere, oceans, ice sheets, land surface interior, and life itself, which enables scientists to measure global and climate changes and to inform decisions by government, organizations, and people. NASA's global observations provide a unique vantage point from which to study and gain understanding of changes in the planet. Since the Agency's inception in 1958, NASA has established itself as a world leader in Earth science and climate studies.

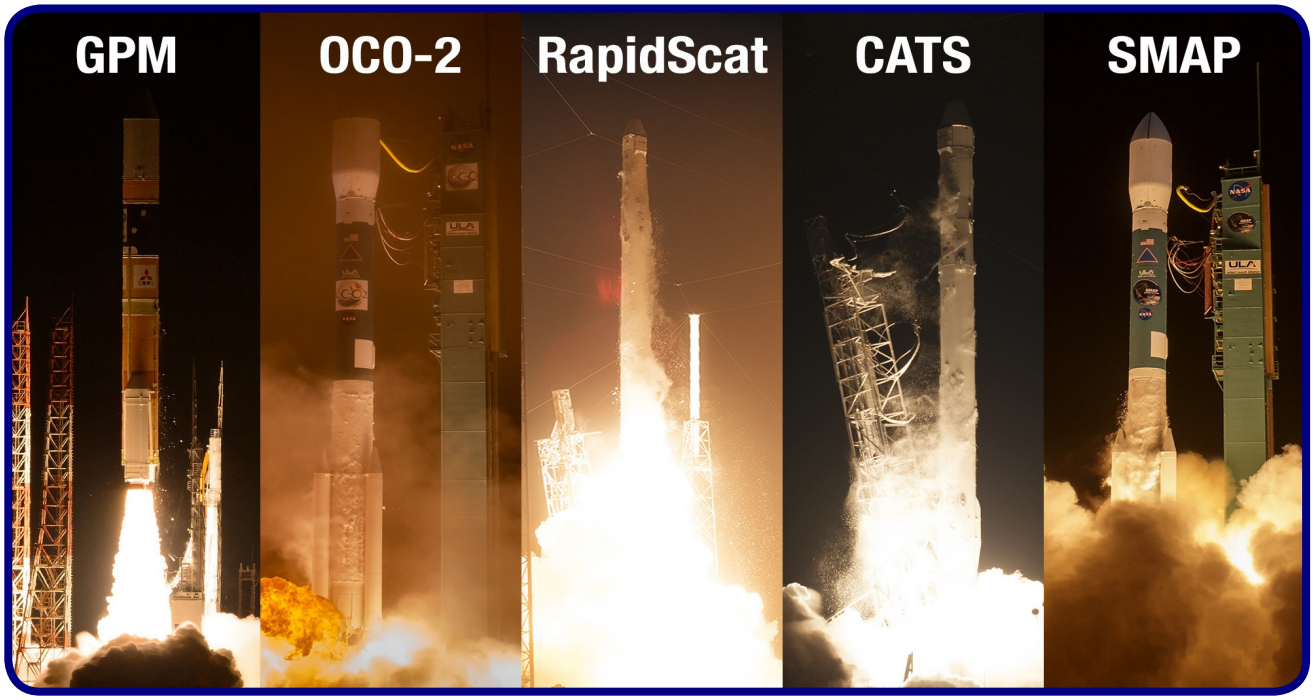


Image Caption: NASA successfully completed the launch of five new Earth-observing missions in less than a year. (Credit: NASA)

NASA does more than develop and build Earth-observing spacecraft and sensors. The Agency's multidisciplinary team of scientists, engineers, and computer modelers also analyze vast archives of data for insights into Earth's interconnected systems—atmosphere, ocean, ice, land, biosphere—and openly provide that data to the global community. NASA designs and deploys airborne, ground-based, and ocean-going field campaigns that complement, enhance, and improve space-based observational capabilities. NASA also works with other government agencies and partner organizations to apply Earth science data and computer models to improve decision making and solve problems.

Key Achievement in FY 2015: SMAP Launch Completes Five Launches in 11 Months

With the launch of Soil Moisture Active Passive (SMAP) on January 31, 2015, NASA successfully completed the launch of five new Earth-observing missions in less than a year. In addition to SMAP's measurements of soil moisture to improve climate and weather forecasts, the new missions are making ground-breaking observations of carbon dioxide (Orbiting Carbon Observatory-2, or OCO-2), ocean winds (ISS-RapidScat), clouds and aerosols (Cloud Aerosol Transport System, or CATS) and precipitation (Global Precipitation Measurement, or

GPM). Three of these missions, RapidScat, CATS, and SMAP launched in FY 2015.

These new missions will use the vantage point of space to give scientists the data they need to better understand Earth as a whole system. With these missions, including two instruments mounted on the exterior of the ISS, NASA now has 18 Earth-observing space missions in operation, providing the world with an improved global view of this changing planet. Observations from these missions, like all NASA data, will be freely available to the international scientific community and decision makers in the United States and abroad.

Key Achievement in FY 2015: NASA Satellites Provide Critical Information on Extent of California Drought

Working with the California Department of Water Resources (CDWR) and other state and Federal agencies, a NASA Applied Sciences project team applied Landsat, Terra, and Aqua satellite observations to create monthly fallowed-area maps of the Central Valley of California. The maps depict crop development on more than 200,000 fields in the valley, and a key innovation was the monthly production during the growing season. In 2014 and 2015, CDWR used the maps and other data to gauge idle agricultural land and inform state authorities about the extent of a drought. The information helped inform the allocation of drought emergency funds to food banks and social services agencies in affected counties, to provide support for farmworkers and their families.

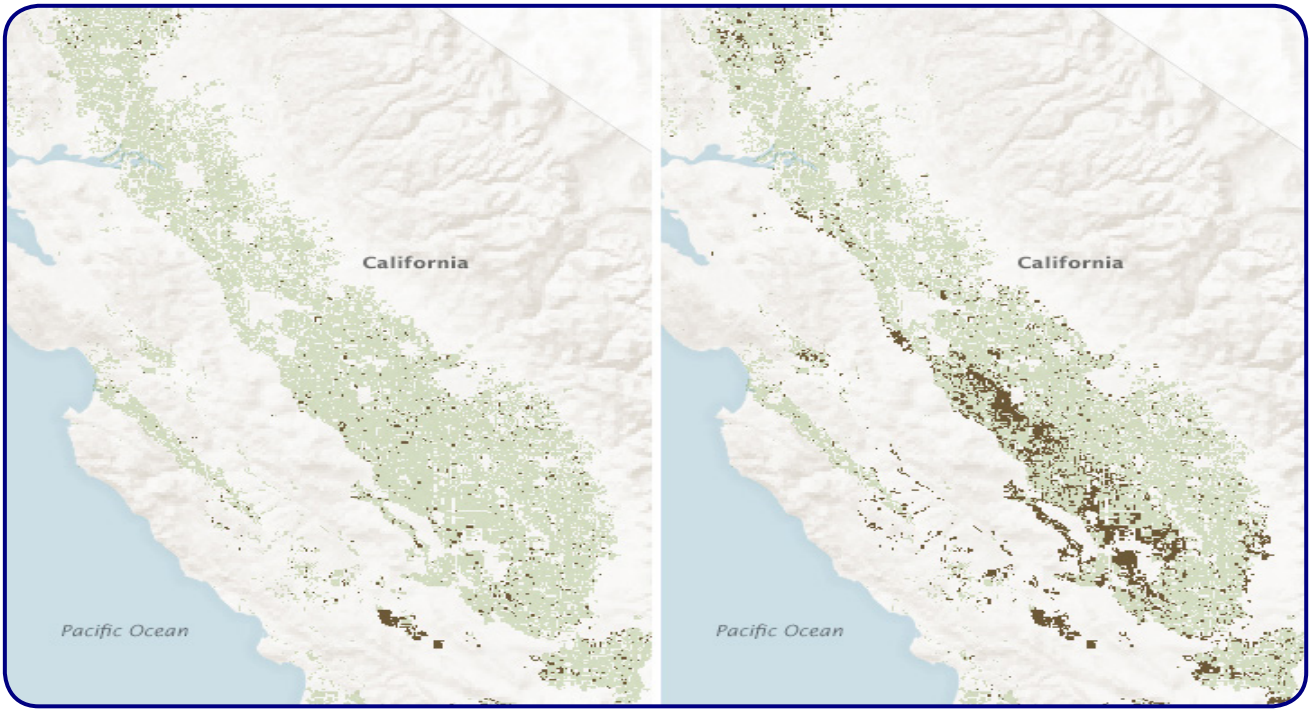


Image Caption: The statewide map of California is based on data from the Landsat series of satellites and from NASA's Terra and Aqua satellites. They show changes in crop cultivation and idle agricultural lands in California in August 2011 (on the left) and August 2014 (on the right). Brown pixels depict farms and orchards that have been left fallow, or "idled," since January 1 in each year. Green pixels show plots where at least one crop was grown during the calendar year. (Credit: NASA Earth Observatory image by Joshua Stevens, based on data from Forrest Melton, California State University, Monterey Bay)

Image Caption: NASA's TechPort is an integrated, Agency-wide software system designed to capture, track, and manage NASA's portfolio of technology investments. (Credit: NASA)

Image Caption: The NASA Software Catalog offers an extensive portfolio of software products for a wide variety of technical applications. (Credit: NASA)

Strategic Objective 2.3: Optimize Agency technology investments, foster open innovation, and facilitate technology infusion, ensuring the greatest national benefit.

NASA's Office of the Chief Technologist (OCT) enables critical technology development and open innovation, optimizes NASA's technology portfolio, and maximizes the transfer of NASA technology to U.S. partners. This work is performed under the Partnership Development and Strategic Integration program.

Key Achievement in FY 2015: NASA Releases TechPort

In FY 2015, NASA publicly released the Technology Portfolio System (TechPort), which is NASA's first comprehensive resource for locating information about NASA-funded technology development activities. NASA's technology development activities cover a broad range of areas, such as propulsion, nanotechnology, robotics, and human health. TechPort contains a variety of useful information on these activities, including technology descriptions, images, and locations where work is being performed.

This beta system enables the public to explore NASA's technology portfolio and learn about technology programs and projects as NASA works to mature technologies for aeronautics, space exploration, and scientific discovery missions. NASA is offering the public the opportunity to give this beta system a trial run and then provide feedback. Users' input will enhance the system design and the type of information provided in future versions.

Key Achievement in FY 2015: NASA Releases Second Edition of the NASA Software Catalog

In 2015, OCT released the second edition of the NASA Software Catalog, a downloadable collection of software programs providing cutting-edge solutions for a wide array of industrial, academic, government, and public applications.

The catalog includes more than 1,000 software codes organized into 15 categories, available for use at no charge. It enables NASA projects, government agencies, and other users to save money and time by using ready-made coding tools rather than buying or building their own. Since the catalog de-

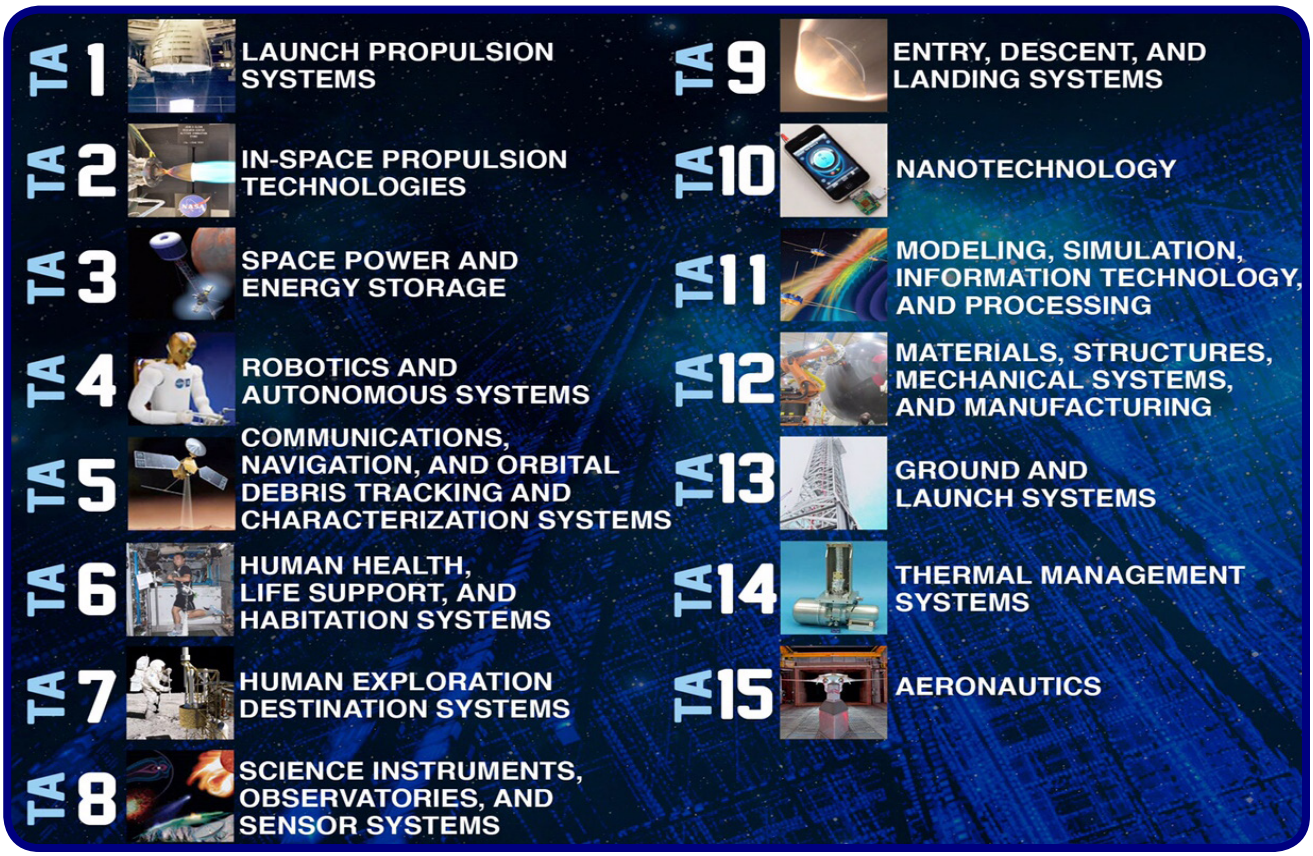


Image Caption: The 2015 NASA Technology Roadmaps are comprised of 15 distinct Technology Area roadmaps. (Credit: NASA)

buted in 2014, NASA has seen a dramatic increase in code sharing across government projects, and more than 100,000 downloads of the catalog and millions of visitors to the Web site to date.

Visit the Technology Transfer Program web site to find out more about NASA technologies, read success stories, explore additional resources, and to view the Patent Portfolio.

Key Achievement in FY 2015: NASA Unveiled the Latest Technology Roadmaps for Future Agency Needs

NASA has released the Agency's 2015 technology roadmaps, laying out the promising new technologies that will help NASA achieve its aeronautics, science, and human exploration missions for the next 20 years, including the NASA's journey to Mars.

NASA released a Request for Information, seeking public comment on the draft roadmaps to increase awareness, generate innovative solutions for space exploration and scientific discovery, and inspire public involvement in the U.S. space program. Public input was received and incorporated into the roadmaps. The final roadmaps were posted on OCT's Web site in July 2015.

The roadmaps are a key part of NASA's Strategic Technology Investment Plan. They lay out the strategy, guiding principles, and priorities for developing technologies that are essential to NASA's Mission and

help achieve national goals. Many of the technologies developed will also help meet the needs of other government agencies, as well as support the growth of the U.S. commercial space industry.

Strategic Objective 2.4: Advance the Nation's Science, Technology, Engineering, and Math (STEM) education and workforce pipeline by working collaboratively with other agencies to engage students, teachers, and faculty in NASA's missions and unique assets.

NASA's education programs work in collaboration with other Federal agencies to improve the quality of STEM education in the United States, which supports both NASA's Strategic Plan and the Administration's STEM policy. To maintain a globally competitive Nation, the Office of Education's programs develop and deliver activities that support the growth of NASA's and the Nation's STEM workforce, help develop STEM educators, engage and establish partnerships with institutions, and inspire and educate the public.

Key Achievement in FY 2015: NASA Hosts Rocket Week at Wallops Flight Facility

Rocket Week, held in June 2015 at NASA's Wallops Flight Facility in Virginia, provided student and educator participants with the

Image Caption: On June 25, 2015, NASA successfully launched a Terrier-Improved Orion suborbital sounding rocket from NASA's Wallops Flight Facility. It carried student experiments developed through the RockOn/RockSat-C programs. More than 200 middle school and university students and instructors participating in Rocket Week at Wallops were on hand to witness the launch. (Credit: NASA)

opportunity to learn about rocketry, developing experiments for space flight, team work, and how to apply these lessons in the classroom and to careers.

About 150 university and community college students and instructors built and flew experiments on a NASA suborbital rocket through the RockOn and RockSat-C programs. Conducted in collaboration with the Colorado and Virginia Space Grant Consortia, RockOn is in its eighth year, while RockSat-C is in its seventh year. In addition, 20 high school educators examined how to apply rocketry basics into their curriculum through the Wallops Rocket Academy for Teachers (WRATS), which is in its fifth year.

Strategic Goal 3:

Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure.

NASA maintains a dedicated, knowledgeable workforce and cutting-edge facilities and capabilities to carry out the ambitious tasks for its Mission. The programs under Strategic Goal 3 support all of NASA's space-, air-, and Earth-based research and innovation activities, producing the best return on the Nation's investment. Strategic Goal 3 includes NASA's strategic objectives for the Mission Support Directorate (MSD), technical capabilities, information technology (IT) services, and Safety and Mission Success programs.

Strategic Objective 3.1: Attract and advance a highly skilled, competent, and diverse workforce, cultivate an innovative work environment, and provide the facilities, tools, and services needed to conduct NASA's missions.

NASA is dedicated to innovation, bold ideas, and excellence, which enable the Agency to provide the day-to-day operations required to support and achieve its missions. Programs aligned with Strategic Objective 3.1 ensure effective management of human capital, finance, information technology, infrastructure, acquisitions, security, real and personal property, occupational health and safety, equal employment opportunity and diversity, small business programs, external relations, internal and external communications, stakeholder engagement, and other essential corporate functions.

Key Achievement in FY 2015: NASA named the Best Place to Work in the Federal Government for the Third Consecutive Year

NASA's most powerful asset for achieving mission success is a multidisciplinary team of diverse, talented people across NASA Centers. For the third consecutive year, NASA was voted the Best Place to Work in the Federal Government, according to the Partnership for Public Service. Based on 2014 Employee Viewpoint Survey results, this survey also named NASA the top-ranked large agency on innovation. These results are a testament to the excellence of NASA's workforce and their determination to maintain America's leadership in space exploration.

Information on careers at NASA, benefits, retirement information, and the Human Capital Program are available on the NASA People Web site.

Image Caption: Buildings are demolished at NASA's Santa Susana Field Laboratory in California. (Credit: NASA)

Key Achievement in FY 2015: NASA achieves success in freezing the footprint from FY 2012 to FY 2015

NASA identifies underutilized assets and demolishes facilities as part of its facilities strategy to renew and modernize the Agency's facilities and to sustain capabilities. Since 2004, NASA has demolished or disposed of 1,380 facilities, and since FY 2012, when the Office of Management and Budget issued the Freeze the Footprint policy for the Federal Government, NASA has achieved a 2.2 percent total reduction in square footage for office and warehouse space. In concert with demolition activities, NASA also consolidates facilities, uses public-private partnerships to offset operating costs, and requires offsets for new construction. These policies, activities, and investments reduce long-term facilities sustainment, utilities, and other support requirements, allowing NASA to focus on renewing and modernizing facilities and capabilities.

Strategic Objective 3.2: Ensure the availability and continued advancement of strategic, technical, and programmatic capabilities to sustain NASA's Mission.

NASA's technical capabilities and assets support NASA missions, as well as the work of others outside of the Agency. The programs under Strategic Objective 3.2 ensure that the Agency's key capabilities and critical assets will be available in the future to support the missions that require them, such as launch services to NASA and civil sector

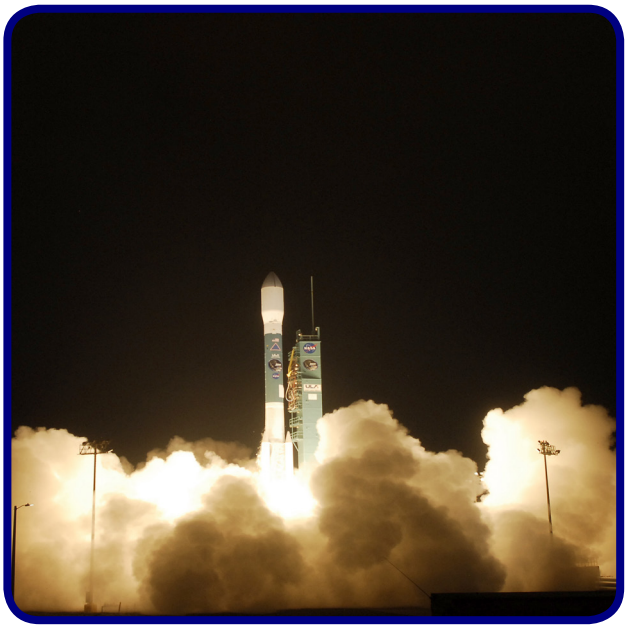


Image Caption: NASA's SMAP observatory launches aboard a United Launch Alliance Delta II rocket on January 31, 2015, at Space Launch Complex-2, Vandenberg Air Force Base, California. (Credit: NASA/Kim Shiflett)

missions, as well as an uninterrupted, reliable space communications network to allow data transmissions to Earth from space.

Key Achievement in FY 2015: Successful launches of Expendable Launch Vehicles for NASA Missions

The Launch Services program achieved a 100 percent success rate in FY 2015 with the successful launch of two NASA missions. This included the launch of the SMAP observatory on a United Launch Alliance Delta II rocket on January 31, 2015.

Key Achievement in FY 2015: Successful Series of Tests for the Space Launch System (SLS) RS-25 Rocket Engine

As of August 2015, the Rocket Propulsion Test (RPT) program performed 399 tests in FY 2015 for a total of 115,814 seconds, while maintaining a 98.5 percent test facility availability. RPT's customers included the SLS program's series of tests of the RS-25 developmental engine as part of the engine's preparation for a return to deep-space missions aboard the new SLS rocket. NASA is designing the SLS to carry humans deeper into space than ever before, to such destinations as an asteroid and Mars. Four RS-25 engines will power the core stage of the new vehicle. RS-25 engines formerly served as the Space Shuttle's main engines. They will be operated at slightly higher power levels to provide the additional thrust needed to power the SLS. The main goal of the series was to test the engine under simulated temperature, pressure, and other changes required by the SLS design. The first test in the series was in January, and the series concluded successfully at the end of the fiscal year.

Image Caption: Engineers conducted an SLS RS-25 rocket engine test fire at NASA's Stennis Space Center, Mississippi, in June 2015. (Credit: NASA)

Image Caption: An artist's concept of TDRS-L shows the satellite in orbit. (Credit: NASA)

Key Achievement in FY 2015: Initial Operational Capability achieved for TDRS-L

In FY 2015, NASA completed Initial Operational Capability for the Tracking and Data Relay Satellite (TDRS)-L, which was launched in January 2014. TDRS-L is the latest element in the communications network that links NASA's ground controllers to orbiting spacecraft, including the Hubble Space Telescope, the ISS, and NASA's Earth-observing missions.

Strategic Objective 3.3: Provide secure, effective, and affordable information technologies and services that enable NASA's Mission.

Information technology is a critical component of NASA's infrastructure to enable mission success. The Agency IT Services (AITS) program provides the policy and management for NASA's enterprise IT services, including end user services, business applications, network management, computing platforms and data centers, and Web services for the Agency's Web sites. IT security is a crucial element within the delivery of these services to ensure the confidentiality, integrity, and availability of NASA's information assets. The AITS program provides innovative IT solutions to assist NASA's scientists, engineers, and analysts with cost-effectively achieving their mission. The program also improves public access to NASA's scientific and technical information and increases public participation in NASA's diverse activities.

Key Achievement in FY 2015: Leveraging NASA's Data

NASA released over 30,000 datasets and 40 application programming interfaces during FY 2015 through its public online portal at https://data.nasa.gov/, supporting the Federal cross-agency priority goal on open government data. Datasets available on NASA's data portal are automatically listed on the Government-wide Web site, data.gov. NASA's data portal includes developer resources to help users build applications that utilize NASA's data, as well as robust data visualization tools to increase the public understanding of the datasets. Additionally, participants in the 2015 International Space Apps Challenge used NASA datasets for their challenge submissions across four areas: Earth, Outer Space, Humans, and Robotics. To obtain a clearer understanding of the demand for NASA's data, the Agency introduced a new capability at data.nasa.gov that allows the public to request specific datasets. Furthermore, in order to improve the accessibility of certain key data, NASA's Open Innovation team provided fully machine-readable datasets on NASA's intellectual property and user facilities on data.gov. Previously, these data were stored in

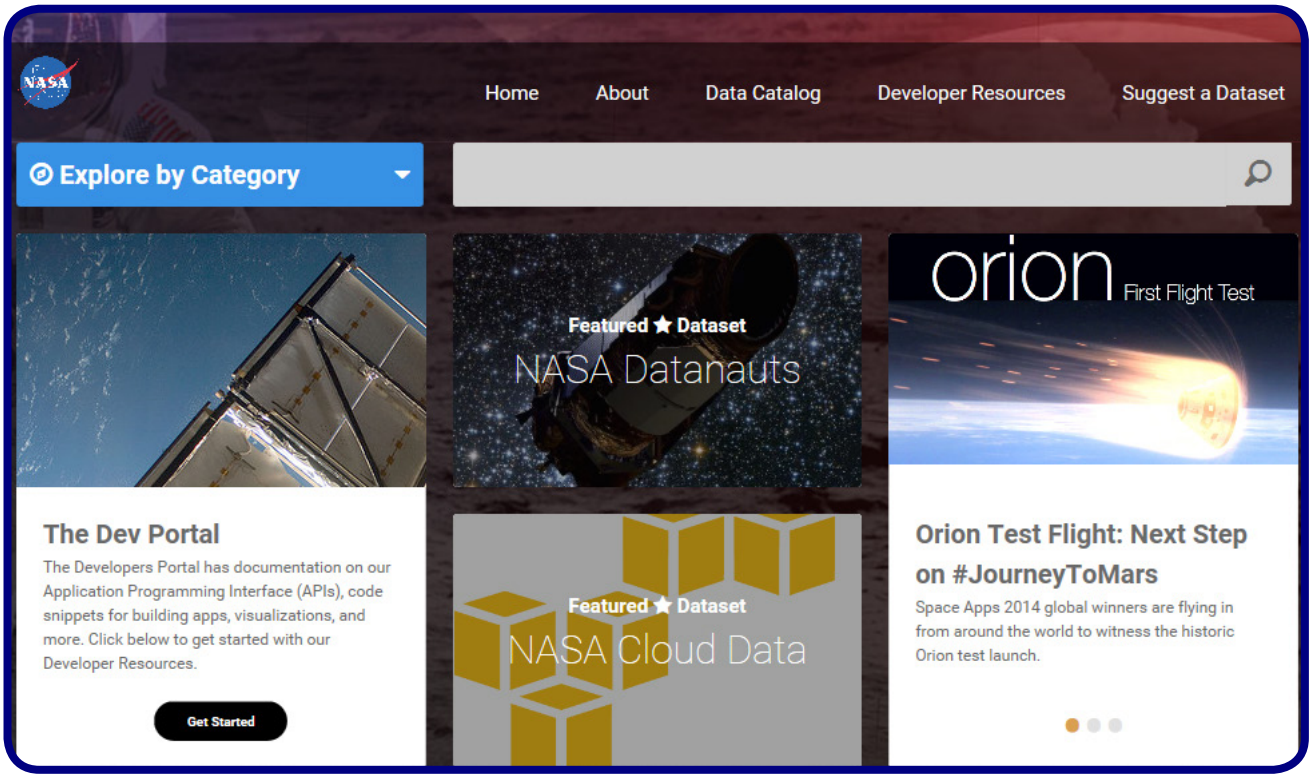


Image Caption: NASA's data portal, located at http://data.nasa.gov, is a continually growing catalog of publically available NASA datasets, Application Programming Interfaces (APIs), visualizations, and more. (Credit: NASA)

separate databases and in non-machine readable formats. The user facilities dataset alone has been viewed over 2,000 times on data.gov.

NASA also took strides to use its data more effectively to improve mission performance. On July 16, 2013, there was a near catastrophic incident during NASA's 224th spacewalk, or extravehicular activity (EVA). A Mishap Investigation Board (MIB) later identified the EVA data and data systems as one of the root-causes that required correction since inability to quickly access a previous failure mode resulted in the team relying on data from memory. The MIB recommended the integration of EVA data systems to provide EVA users with easy access to complete, accurate, and up-to-date data, which led to the initiation of the EVA Data Integration (EDI) project. The EVA Management Office turned to the Office of the Chief Information Officer (OCIO) for help in solving this data integration challenge. Through this collaboration, the EDI project developed a vision and integration plan that leverages OCIO's cloud computing and data architecture initiatives to solve the problems of the traditional stove-piped data systems. Ultimately, the EDI project reduces data complexity, increases value of data through unified systems, improves timely availability of data, makes data collaboration easier, and allows for smarter mission decisions.

Key Achievement in FY 2015: Upgrades to the Security Operations Center

NASA completed a set of upgrades in FY 2015 for the Security Operations Center

(SOC) at Ames Research Center. The upgrades spanned across 27 Intrusion Detection Systems, increasing the Agency's readiness to combat cyber threats. These technology upgrades improve the SOC's capability to detect and prevent security incidents, increasing the ability to analyze system and network vulnerabilities across the enterprise as compared to known and evolving cyber threats.

Strategic Objective 3.4: Ensure effective management of NASA programs and operations to complete the mission safely and successfully.

Safety and Mission Success (SMS) programs protect the health and safety of the NASA workforce and improve the likelihood that NASA's programs, projects, and operations will be completed safely and successfully. NASA's commitment to safety and mission success encompasses its employees, contractors, commercial partners, and the American public. SMS activities are conducted by the Office of the Chief Engineer (OCE), Office of Safety and Mission Assurance (OSMA), and Office of the Chief Health and Medical Officer (OCHMO).

SMS successfully implemented its strategic objective of enhancing mission success of NASA's programs, projects, and operations, while ensuring the safety and health of the public and the NASA workforce in FY 2015. SMS demonstrated this through the following:

- Zero fatalities or permanent disabling injuries to the public resulting from NASA activities.
- Maintaining a Total Case Rate and Lost Time Case Rate that exceeded the goals of the President's Protecting Our Workers and Ensuring Reemployment initiative.
- Reducing the non-mission failure damage to NASA assets.
- Ensuring 100 percent of Category 1 and 2 projects used Agency SMS policy, procedures, and independent assessments focused on both technical and programmatic mission success.
- Ensuring that 100 percent of the engineering and programmatic workforce had access to the standards and knowledge base needed to maintain and build their skills.

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Financial Performance

CFO Letter

November 13, 2015

On behalf of the National Aeronautics and Space Administration (NASA), I am pleased to present the Fiscal Year (FY) 2015 financial highlights and financial statements. As demonstrated throughout this Agency Financial Report (AFR), NASA is committed to the highest standards of financial accountability in support of the Nation's aeronautics and space missions executed around the world. The AFR is the cornerstone of NASA's efforts to provide transparent, meaningful financial information to the American public and to demonstrate the Agency's effective stewardship of the finite resources entrusted to it.

More importantly, the AFR culminates the work and dedication displayed every day by the Agency's workforce, the Office of Inspector General, and our independent external auditor. The AFR represents the intersection between NASA's programs and financial management. As the complexity and diversity of our mission portfolio grows, the Agency's financial systems and processes are also evolving to meet expanding program, management, and other stakeholder information needs.

NASA operates world-wide, with nine operating Centers and associated component facilities and one Federally Funded Research and Development Center. The AFR represents the complexity of financing our operations, through a combination of public-private partnerships and relationships/agreements with a multitude of other Federal agencies to achieve our respective missions. Similar to the progress in our mission portfolios, NASA continues to make progress in the effectiveness of our financial management practices and systems. For example, this year NASA:

- Initiated a business process documentation and streamlining effort with the goal of defining consistent, effective core business processes across our diversified Centers and facilities. NASA focused on the travel and reimbursable agreement processes in FY 2015 and additional areas will be added in the future.

- Expanded the use of the Department of Defense's Wide Area Workflow (WAWF) eInvoicing system. WAWF is an electronic invoicing, receipt and acceptance system that will improve NASA's cash flow management, eliminate lost documents and, ultimately, reduce operating costs.

- Improved the budget formulation and execution systems to better align with mission needs and to increase the usage of those systems across the Agency. These systems provide a consistent means for developing, maintaining and tracking NASA's budget and budget decisions.

- Continued to meet Improper Payments Information Act (IPIA) and Improper Payments Elimination and Recovery Act (IPERA) compliance requirements over the last nine years. NASA has reviewed all of its programs annually and has not identified significant improper payments for any of its programs.

As evidence that our efforts continue to have tangible results, I am pleased to report that NASA remains in substantial compliance with the Federal Financial Management Improvement Act (FFMIA). I also take great pride in reporting that for the fifth year in a row NASA received an unmodified "clean" audit opinion on our FY 2015 financial statements, with no material weaknesses. This year's opinion identifies two significant deficiencies, one related to information technology and the other to NASA's asbestos liability estimate, and non-compliance with the Single Audit Act. We take these issues seriously and have developed plans toward addressing the reported issues as soon as possible.

The financial highlights that follow explain how we used the funds entrusted to us to perform our mission and achieve the results described in this AFR's Performance section. In the Financial section, we provide our audited financial statements, accompanying notes, and the independent auditor's opinion on our financial statements.

I am pleased with our achievements and remain committed to ensuring sound financial management that delivers reliable and actionable information for both internal and external decision makers and stakeholders. I appreciate the immense dedication of the entire Agency, with special thanks to the Office of Inspector General.

David P. Radzanowski
Chief Financial Officer

Financial Highlights

This section provides highlights of NASA's financial performance for fiscal year (FY) 2015. The highlights explain the financial results of program and operational decisions. Key components of this section include:

Overview of Financial Position — Balance Sheet
Sources of Funding — Statement of Budgetary Resources
Net Cost of Operations — Statement of Net Cost

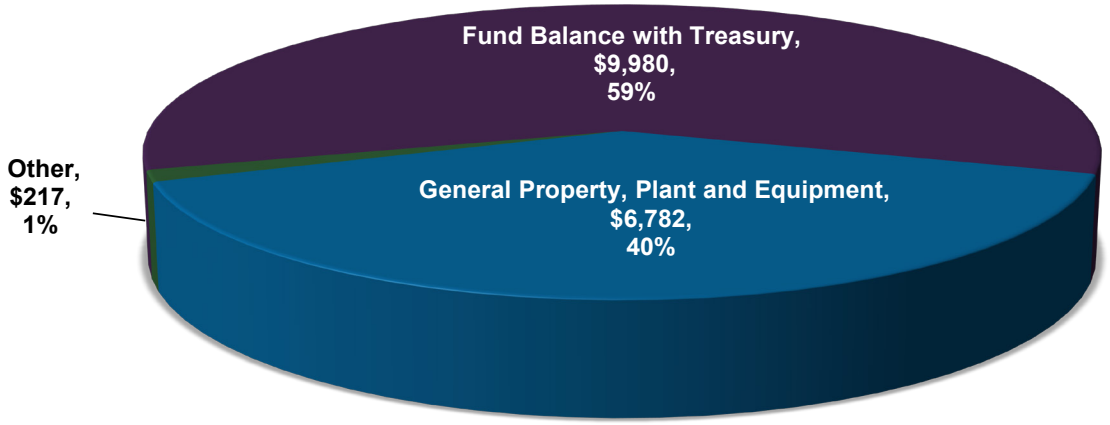
Overview of Financial Position

NASA's Balance Sheet provides a comparable snapshot of the Agency's financial position as of September 30, 2015 and September 30, 2014. It displays amounts in three primary categories:

- Assets, which are the future economic benefits owned or available for use by NASA;
- Liabilities, which are amounts owed by NASA but not yet paid; and
- Net Position, which reflects the sources and uses of Agency funding.

Balance Sheet Categories *(In Millions of Dollars)*	2015	2014	Percent (%) Change
Total Assets	**$ 16,979**	**$ 18,155**	**(6)**
Fund Balance with Treasury	9,980	10,293	(3)
General Property, Plant and Equipment	6,782	7,679	(12)
Other	217	183	19
Total Liabilities	**$ 4,811**	**$ 4,560**	**6**
Accounts Payable	1,455	1,565	(7)
Environmental and Disposal Liabilities	1,412	1,274	11
Other Accrued Liabilities	1,372	1,185	16
Other Liabilities	529	488	8
Federal Employee and Veteran's Benefits	43	48	(10)
Total Net Position	**$ 12,168**	**$ 13,595**	**(10)**
Unexpended Appropriations	6,988	7,413	(6)
Cumulative Results of Operations	5,180	6,182	(16)

Asset by Type for FY 2015
(in Millions of Dollars)



Assets were the largest of the three categories (Total Liabilities plus Total Net Position will always equal Total Assets). NASA's asset balance at the end of FY 2015, was $17 billion, 6 percent lower than in FY 2014.

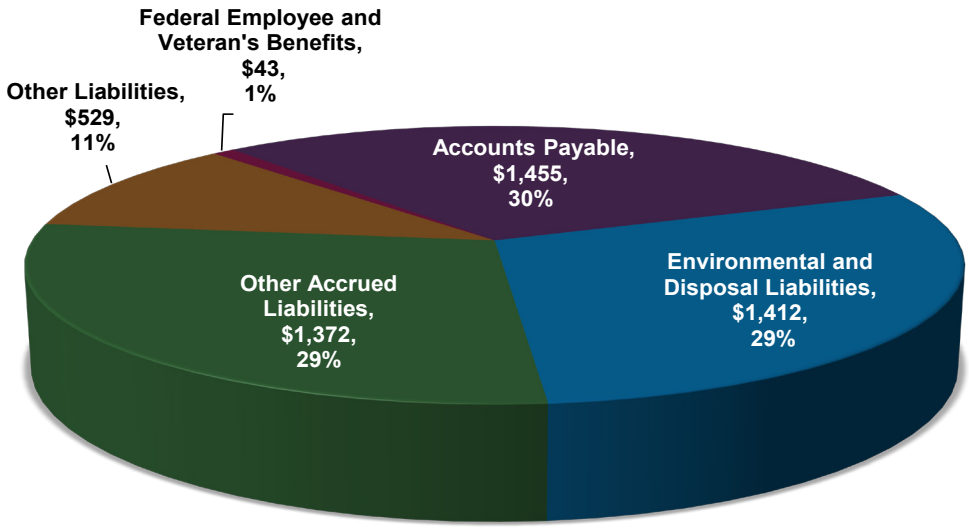
The Agency's Fund Balance with Treasury (FBWT) and its General Property, Plant and Equipment (G-PP&E) were the two primary components of the total asset balance.

FBWT, which represents NASA's cash balance with the U.S. Department of the Treasury, was the largest asset at $10 billion, 59 percent of total assets. This cash balance included Congressional appropriations funds available for NASA's mission work (for example, employee labor or purchased goods and services from contractors) that have not yet been paid.

NASA's G-PP&E had a net book value of $6.8 billion as of September 30, 2015, which was a decrease of $897 million, 12 percent lower than in FY 2014. The decrease was driven by depreciation of the International Space Station (ISS).

The Other category represents the amount of Investments, Accounts Receivable, and Other Assets at the end of FY 2015. The increase of $34 million, 19 percent higher than in FY 2014, is primarily due to launch services supporting National Oceanic and Atmospheric Administration (NOAA) Geostationary Operational Environmental Satellite-R (GOES-R). As the launch date is approached, milestone requirements increase in value. This increase is most apparent in the launch year and the two years before launch. GOES-R is slated to launch in early 2016.

Liabilities by Type for FY 2015
(in Millions of Dollars)



Liabilities as of September 30, 2015, were $4.8 billion. Accounts Payable, Environmental and Disposal Liabilities, and Other Accrued Liabilities represent the majority of NASA's liabilities.

Accounts Payable, which represents amounts owed to other entities, was $1.5 billion, a decrease of $110 million, or 7 percent, compared to FY 2014. The decrease is primarily due to contract closeout activities in FY 2015 which resulted in payment of invoices, thereby reducing the accounts payable balance compared to FY 2014.

Environmental and Disposal Liabilities of $1.4 billion, represents the estimated cost to cleanup both known and projected environmental hazards. These liabilities increased by $138 million, or 11 percent, from FY 2014. The increase was primarily due to higher estimated cleanup costs for existing environmental restoration projects.

Other Accrued Liabilities with public entities were $1.4 billion, an increase of $187 million, or 16 percent, compared to FY 2014. This increase was related to the straight-line cost accrual process used for specific types of contracts and purchase orders that are accrued monthly and which will disburse over the period of performance.

Other Liabilities represents various amounts, including Advances to Others, Unfunded Annual Leave and Accrued Funded Payroll. The increase of $41 million, 8 percent higher than in FY 2014, is primarily due to more advance payments being received for the Planetary Ventures lease in FY 2015. This agreement did not exist in FY 2014. Additionally, more advances were received in FY 2015 from the Department of Homeland Security for NASA to provide application development and computing infrastructure support for the Automated Behavior Analysis (AuBA) system.

Federal Employee and Veteran's Benefits are amounts the Department of Labor estimates on behalf of NASA for future workers' compensation liabilities for current employees. The estimate for future

workers' compensation benefits includes the expected liability for death, disability, medical and miscellaneous costs for approved compensation cases, plus a component of claims incurred but not reported.

Net Position, comprised of Unexpended Appropriations and Cumulative Results of Operations ("net worth"), decreased by $1.4 billion, 10 percent from FY 2014. Unexpended Appropriations, at $7 billion, was down by 6 percent from FY 2014 balances. This was primarily due to a decrease in unobligated balances available in FY 2015 compared to FY 2014. Cumulative Results of Operations, at $5.2 billion, was down by 16 percent from FY 2014 balances, primarily due to the increase in depreciation expense associated with the ISS and higher costs to execute NASA missions.

Sources of Funding

The Statement of Budgetary Resources provides information on the budgetary/funding available to NASA. NASA's resources consist primarily of funds received from two sources:

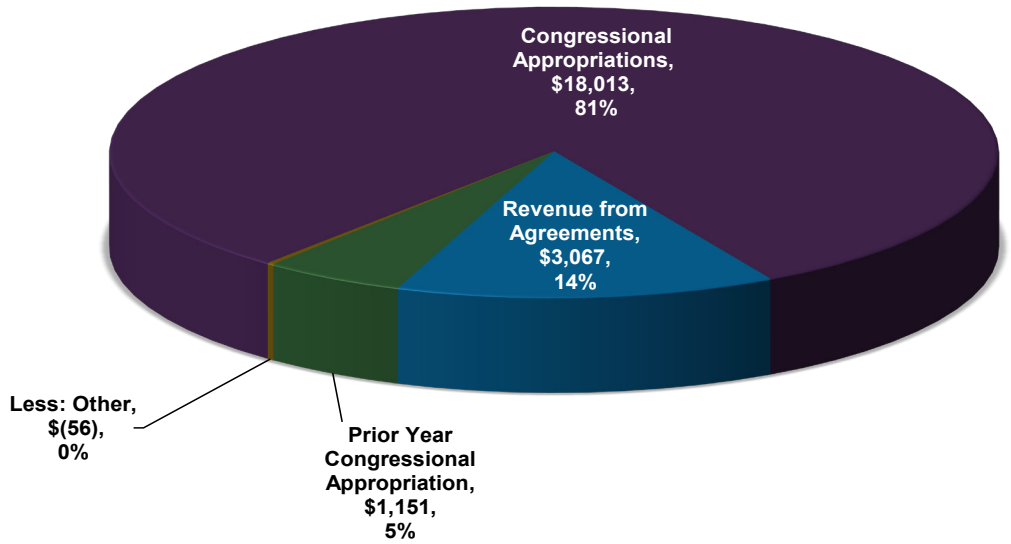
- Appropriations from Congress for the current fiscal year and unobligated balances from prior fiscal years; and
- Revenue from agreements with other governmental organizations or private entities

In FY 2015, the total funds available for use by the Agency were $22.2 billion.

Appropriations from Congress for FY 2015, at $18 billion, comprised 81 percent of the funds available for use by the Agency. Congress designates the funding available to the Agency for a specific NASA mission or purpose. Appropriations that remained available from prior years comprised $1.2 billion, 5 percent of NASA's available resources in FY 2015.

NASA's funding also included $3.1 billion in FY 2015 from revenue earned from agreements of $2.8 billion and recoveries of prior year obligations of $256 million. Earned

Sources of Funding by Type for FY 2015
(in Millions of Dollars)



revenues with other governmental organizations or private entities were received under NASA's authority to provide goods, services, or use of facilities to other entities on a reimbursable basis.

Of the $22.2 billion funding available to NASA in FY 2015, NASA obligated $21.1 billion for programmatic and institutional use. An obligation results from an agreement that binds the Government to make an expenditure (or outlay) of funds, and reflects a reservation of budget authority that will be used to pay for a contract, labor, or other items. The remaining $1.1 billion remains available for obligation until the funds expire.

Net Cost of Operations

The Statement of Net Cost presents Net Cost of Operations by strategic goal and for NASA overall. NASA's strategic goals are described in the Mission Performance section of the Agency Financial Report. The Net Cost of Operations represents gross cost incurred less revenue earned for work performed for other government organizations or private entities. As of September 30, 2015, NASA's gross cost was $21.9 billion, an increase of $1.5 billion from FY 2014. Earned Revenue from other government organizations or private entities was $2.3 billion, 10 percent of gross costs, leaving NASA with a FY 2015 net cost of $19.6 billion, an increase of $1.4 billion from FY 2014.

Gross Cost of Operations

NASA's day-to-day operations are performed at NASA and contractor offices and facilities around the globe and in space.

Gross Costs of Operations is presented in the following table, detailing select NASA programs that supported each strategic goal. Gross Cost of Operations includes expenses incurred for NASA's R&D investments that are expected to maintain or increase national economic productive capacity or yield other future benefits. See the Required Supplementary Stewardship Information section (page 99) of this report for further discussion. Highlights of NASA program activities as of September 30, 2015, that contributed to gross costs are provided for each strategic goal. A discussion of activities and costs that were reimbursed primarily by other government organizations or private entities (for example, earned revenue) is also provided.

Net Cost of Operations by Strategic Goal
(In Millions of Dollars)

Gross Cost by Strategic Goal *(In Millions of Dollars)*	2015	2014	Percent (%) Change
Strategic Goal 1	**$ 12,962**	**$ 11,788**	**10**
International Space Station	3,941	2,921	35
Space Launch System	1,753	1,825	(4)
Orion Multi-Purpose Crew Vehicle	1,319	1,041	27
Other NASA Programs	5,949	6,001	(1)
Strategic Goal 2	**$ 3,741**	**$ 3,646**	**3**
Science Mission Directorate Reimbursable	1,493	1,474	1
Earth Systematic Mission	633	590	7
Earth Science Research	424	420	1
Other NASA Programs	1,191	1,162	2
Strategic Goal 3	**$ 5,158**	**$ 4,895**	**5**
Center Management and Operations	1,877	1,993	(6)
Space Communications and Navigation	514	566	(9)
Science & Engineering	496	363	37
Other NASA Programs	2,271	1,973	15
Total Gross Costs by Strategic Goal	**$ 21,861**	**$ 20,329**	**8**

Strategic Goal 1: Expand the frontiers of knowledge, capability, and opportunity in space.

Gross Costs for Strategic Goal 1 were $13 billion, an increase of $1.2 billion, 10 percent over FY 2014 costs. The costs for this strategic goal represent 59 percent of total Agency gross cost. The three primary programs that support this goal International Space Station (ISS), Space Launch System (SLS), and Orion contributed over 50 percent of the cost for Strategic Goal 1:

- The ISS Program had costs of $3.9 billion, $1 billion higher costs in FY 2015 compared to FY 2014, and were largely driven by the launches of two domestic commercial cargo transportation systems.
- The SLS program had costs of $1.8 billion, $72 million lower cost in FY 2015 compared to FY 2014. SLS completed a key milestone ground test in preparation for future missions to help propel NASA's SLS rocket and Orion Spacecraft while continuing the development of the SLS heavy-lift rocket.
- The Orion program incurred costs of $1.3 billion, $278 million higher costs in FY 2015 compared to FY 2014. The primary increase in Orion program costs resulted from a successful first orbital uncrewed test flight, and continued work to launch another uncrewed test flight in FY 2018.

Strategic Goal 2: Advance understanding of Earth and develop technologies to improve the quality of life on our home planet.

Gross Costs for Strategic Goal 2 were $3.7 billion, an increase of $95 million, 3 percent over FY 2014 costs. The costs for this strategic goal represent 17 percent of total Agency gross cost. Almost half of the costs incurred for Strategic Goal 2 were in support of activities performed for other government organizations or private entities who reimburse NASA for these costs (earned revenue). The primary reimbursable activities are described in the earned revenue discussion below.

The largest NASA organization and programs supporting Strategic Goal 2 were

the Science Mission Directorate, Earth Systematic Mission, and Earth Science Research.

- The Science Mission Directorate Reimbursable organization incurred costs of $1.5 billion, $19 million higher costs compared to 2014. NASA conducted the "fit check" between the Joint Polar Satellite System (JPSS)-1 spacecraft and the Payload Attach Fitting to assure both components are mechanically compatible in preparation of mating the components at launch.

- The Earth Systematic Mission program incurred costs of $633 million, $43 million higher costs in FY 2015 compared to 2014. The Gravity Recovery and Climate Experiment Follow-On (GRACE-FO) project completed development and design phase of the GRACE-FO satellites, which are scheduled to launch in 2017.

- The Earth Science Research program incurred costs of $424 million, $4 million higher costs in FY 2015 compared to 2014. The Scientific Computing project embarked on various experiments to test and improve onboard computing and reliability for the next generation of NASA's Earth, Space and Planetary Science missions.

Strategic Goal 3: Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure.

Gross Costs for Strategic Goal 3 were $5.2 billion, an increase of $263 million, 5 percent over FY 2014 costs. The costs for this strategic goal represent 24 percent of total Agency gross cost. Three of the largest NASA programs supporting Strategic Goal 3 were Center Management and Operations (CMO), Space Communications and Navigation (SCaN), and Science and Engineering (S&E).

- CMO had costs of $1.9 billion, $116 million lower costs in FY 2015 compared to 2014. This is related to costs provided to the CMO for Agency programs and projects that reside at and are executed, along with the care of institutional assets, establishing and maintaining the staff and their competencies, and the maintenance and operation of facilities required by current and future programs and projects at the Centers.

- SCaN had costs of $514 million, $52 million lower costs in FY 2015 compared to 2014.

- S&E program had costs of $496 million, $133 million higher costs in FY 2015 compared to 2014. The increase was due to an engineering services contract award at NASA's Goddard Space Flight Center.

Earned Revenue

Total earned revenue, which represents work performed by NASA for other government organizations or private entities, was $2.3 billion in FY 2015, an increase of $156 million from FY 2014. Two programs accounted for over half of NASA's earned revenue in FY 2015: JPSS and GOES-R.

- NASA supports JPSS in partnership with NOAA. JPSS had earned revenue of $805 million, an increase of $46 million from 2014, primarily due to the completion of "fit check" for the JPSS-1 spacecraft. In addition, a delivery order was awarded for

the Rapid Spacecraft Acquisition III (Rapid III) contract for the JPSS-2 spacecraft.

- Earned Revenue from GOES-R was $603 million, an increase of $39 million from 2014, primarily due to completion of the development of the GOES-R series satellite. The first satellite in the GOES-R series is scheduled for launch in early 2016.

Image Caption: Engineers prepare to remove the CERES instrument from the Radiometric Calibration Chamber following the completion of thermal vacuum testing at Northrop Grumman's manufacturing facility in Redondo Beach, Calif. This sensor will be integrated onto NOAA's JPSS (Joint Polar Satellite System) spacecraft, scheduled for launch in 2017. (Credit: Northrop Grumman Corporation)

Limitations of the Financial Statements

The principal financial statements have been prepared to report the financial position and results of operations of NASA, pursuant to the requirements of 31 U.S.C. 3515(b). While the statements have been prepared from the books and records of NASA in accordance with generally accepted accounting principles for Federal entities and the formats prescribed by the Office of Management and Budget (OMB) Circular A-136, the statements are in addition to the financial reports used to monitor and control budgetary resources, which are prepared from the same books and records. The statements should be read with the realization that they are for a component of the U.S. Government, a sovereign entity.

Image Caption: Lights of an Aurora From the International Space Station. NASA Astronaut Scott Kelly captured this photo of an aurora from the International Space Station on June 23, 2015. The dancing lights of the aurora provide spectacular views on the ground, but also capture the imagination of scientists who study incoming energy and particles from the Sun. Aurora are one effect of such energetic particles, which can speed out from the Sun both in a steady stream called the solar wind and due to giant eruptions known as coronal mass ejections or CMEs. (Credit: NASA)

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Systems, Controls, and Legal Compliance

Image Caption: Soyuz Rocket Boosts Expedition 44 Crew to the International Space Station. Soyuz TMA-17M launched from the Baikonur Cosmodrome in Kazakhstan to the International Space Station on July 23, carrying Expedition 44 Soyuz Commander Oleg Kononenko of the Russian Federal Space Agency (Roscosmos), Flight Engineer Kjell Lindgren of NASA, and Flight Engineer Kimiya Yui of the Japan Aerospace Exploration Agency into orbit to begin their five-month mission on the Station. (Credit: NASA)

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Systems, Controls and Legal Compliance

NASA's Internal Control Framework

The Federal Managers' Financial Integrity Act (FMFIA) requires agency heads to evaluate and report on the internal control and financial systems to ensure the integrity of Federal programs and operations. This evaluation aims to provide reasonable assurance that internal controls are operating effectively to ensure efficient operations, reliable financial reporting, and compliance with applicable laws and regulations.

Internal control is at the core of NASA fulfilling its mission and achieving its goals while safeguarding governmental resources. NASA management is responsible for implementing internal control activities that are appropriate to their department's processes. NASA's policy is to comply with Office of Management and Budget (OMB) Circular A-123, *Management's Responsibility for Internal Control*, which provides government-wide requirements for internal control and accountability, based on the FMFIA. OMB Circular A-123 also requires agencies to establish internal controls over their programs, financial reporting, and financial management systems.

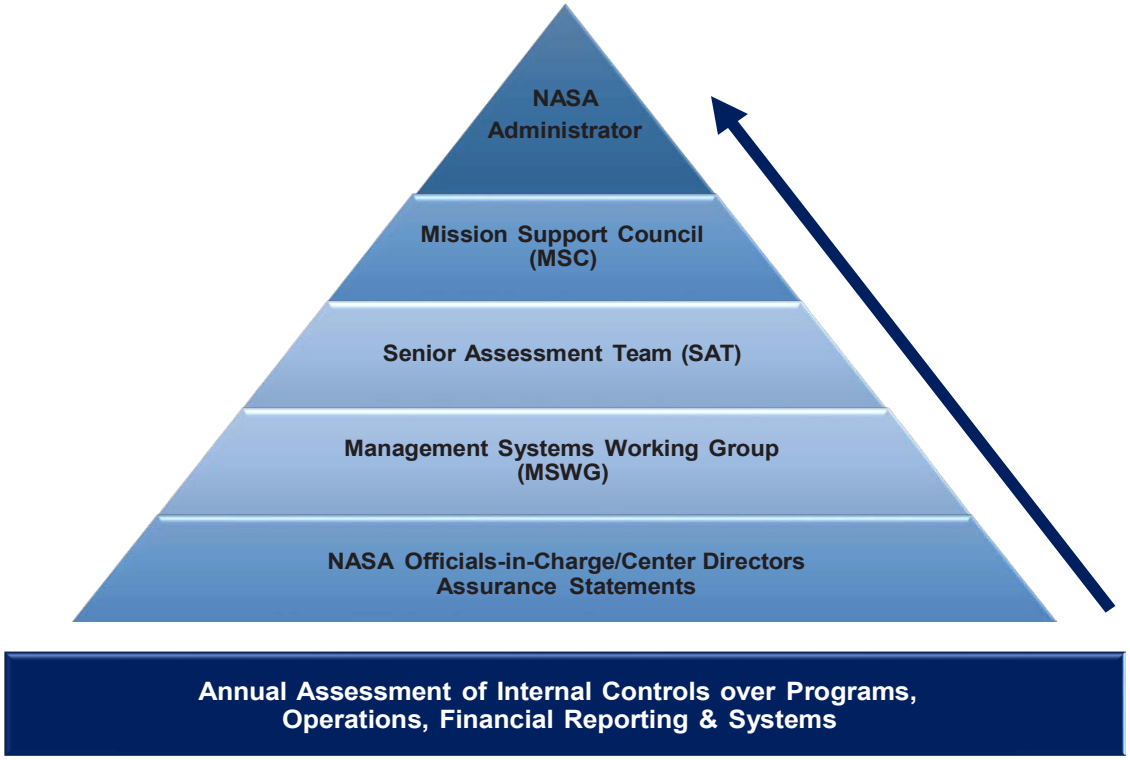
NASA evaluates internal control across the Agency at various levels of the organization to ensure significant risks are identified, and related internal controls are tested and evaluated. NASA evaluates the effectiveness of the internal controls over operations, management systems, and financial reporting with consideration of reviews and other relevant sources of information.

NASA management is responsible for establishing and maintaining effective internal controls in its respective areas of responsibility. As part of this responsibility, management regularly evaluates internal control, and NASA executive leadership provides annual assurance statements reporting on the effectiveness of internal controls at meeting objectives. In addition, the NASA Office of the Chief Financial Officer (OCFO) deploys an extensive annual testing and assessment methodology that evaluates internal controls over financial reporting.

The FMFIA assurance statement is primarily based on individual assurance statements submitted by NASA Officials-in-Charge (OIC). These statements are based upon organizational self-assessments that are

informed by various sources of information such as internal reviews of controls, as well as recommendations for improvements from external audits, investigations, and reviews conducted by the Office of Inspector General (OIG) and the Government Accountability Office (GAO). The Mission Support Council (MSC), the organization responsible for oversight of NASA's Internal Control Program, advises the Administrator on the Statement of Assurance. The Senior Assessment Team (SAT), which is an arm of the MSC, helps to guide the internal control evaluation and reporting process. The Management System Working Group (MSWG) performs the first-level evaluation of annual results and serves as the primary advisory body for NASA internal control activities. The MSWG analyzes the annual assessment results and reports issues that may significantly impact the effective design and operation of internal controls to the SAT. An illustration of the Annual Statement of Assurance process is included below.

The NASA FMFIA Annual Statement of Assurance (SoA) Process



Management Assurances

Administrator's Statement of Assurance

November 13, 2015

NASA management is responsible for establishing and maintaining effective internal controls and financial management systems that meet the objectives of the Federal Managers' Financial Integrity Act (FMFIA), the Federal Financial Management Improvement Act (FFMIA), as well as all other related laws and guidance. NASA is committed to a robust and comprehensive internal control program. We recognize that ensuring the effective, efficient, economical, and responsible use of the resources that have been provided to the Agency is not only good stewardship, but also the proper approach to maximize our progress toward the realization of our mission goals. Integrity and ethical values are emphasized throughout the Agency and communicated both formally and informally through training, codification in policy, and through organizational norms and culture. As a result, managers and employees throughout the Agency are actively engaged in identifying or updating key control objectives, assessing risks, implementing controls or other mitigating strategies, conducting reviews, and taking corrective actions as necessary.

NASA conducted its Fiscal Year 2015 annual assessment of the effectiveness of internal controls over operations and compliance with applicable laws and regulations in accordance with FMFIA and the Office of Management and Budget (OMB) Circular A-123, *Management's Responsibility for Internal Control*. Based on the results of this evaluation, NASA provides reasonable assurance that its internal controls over the effectiveness and efficiency of operations and compliance with applicable laws and regulations as of September 30, 2015, were operating effectively and no material weaknesses were found in the design or operation of the internal controls.

In addition, NASA's Office of the Chief Financial Officer performed an assessment of the effectiveness of internal controls over financial reporting in compliance with OMB Circular A-123, *Appendix A-Internal Control over Financial Reporting*. Based on the results of the evaluation, there were no material weaknesses identified in the design or operation of these controls. NASA provides reasonable assurance that internal controls over financial reporting were operating effectively, as of June 30, 2015. Finally, in accordance with the requirements of the FFMIA, we assessed the implementation and maintenance of NASA financial management systems. We found that these substantially comply with Federal financial management systems requirements, applicable Federal accounting standards, and the U.S. Government Standard General Ledger at the transaction level.

In conclusion, NASA makes an unqualified statement of assurance that its internal controls for FY 2015 were operating effectively.

NASA will continue its commitment to ensuring a sound system of internal control exists over operations, reporting, and financial systems and will continue to monitor and enhance its quality assurance activities.

Charles F. Bolden, Jr.
Administrator

Financial Systems Strategies

NASA's Core Financial (CF) and budget management systems include the Systems Applications & Products (SAP) Enterprise Resources Planning (ERP) and the e-budget suite of tools. The CF system has served as NASA's financial accounting system of record since 2003, and the e-budget tools have supported budget formulation and congressional presentation/justification since 2007. Both suites of tools provide the foundation for NASA's ability to achieve its financial management objectives and management of the budget.

To date, NASA has implemented the following CF modules: funds management, financial accounting, sales and distribution, investment management, materials management, controlling (cost), project systems, and real estate, as well as a Contractor Cost Reporting (CCR) extension. Collectively, these integrated components make up NASA's financial system of record for financial statements, external reports, project analysis, and management control. Transactions within the integrated modules and interfaces are recorded on a real-time basis. The CF system is supported by other commercial off-the-shelf (COTS) software, NASA developed applications, and interfaces with systems managed by other Federal agencies.

NASA is developing and evaluating options to receive and process all applicable invoices electronically by the end of 2018 in accordance with OMB's directive M-15-19, *Improving Government Efficiency and Saving Taxpayer Dollars Through Electronic Invoicing*. We are working closely with the Procurement community and plan to make a decision regarding a system solution by the spring of 2016. Additionally, we will investigate end-to-end payment process changes to improve payment cycle time, reduce interest penalties, and reduce operating costs.

The Agency has implemented and developed several required Performance Measures Manager (PMM) system enhancements mandated by OMB for Strategic Objective Annual Review (SOAR) related activities, other Agency glossy reports and an updated annual performance plan. In addition, as part of this enhancement cycle, NASA has performed system maintenance to synchronize NASA's system with Treasury's system, Budget Formulation and Execution Manager (BFEM). NASA is continuously levied with evolving OMB requirements for Federal strategic planning, performance management, and reporting. To remain a leader in innovation and in anticipation of OMB requirements, NASA is investigating future initiatives to enhance performance reporting.

Since initial implementations, all of these tools have been continuously enhanced and expanded for changing policies, standards, OMB requirements, and internal assessments to ensure tight controls. As a result of NASA's efforts to continually enhance our Financial and Budgetary tools/systems, we have achieved an unmodified opinion for the last 4 years and have improved budgetary deliverables in accordance with congressional direction.

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Looking Forward

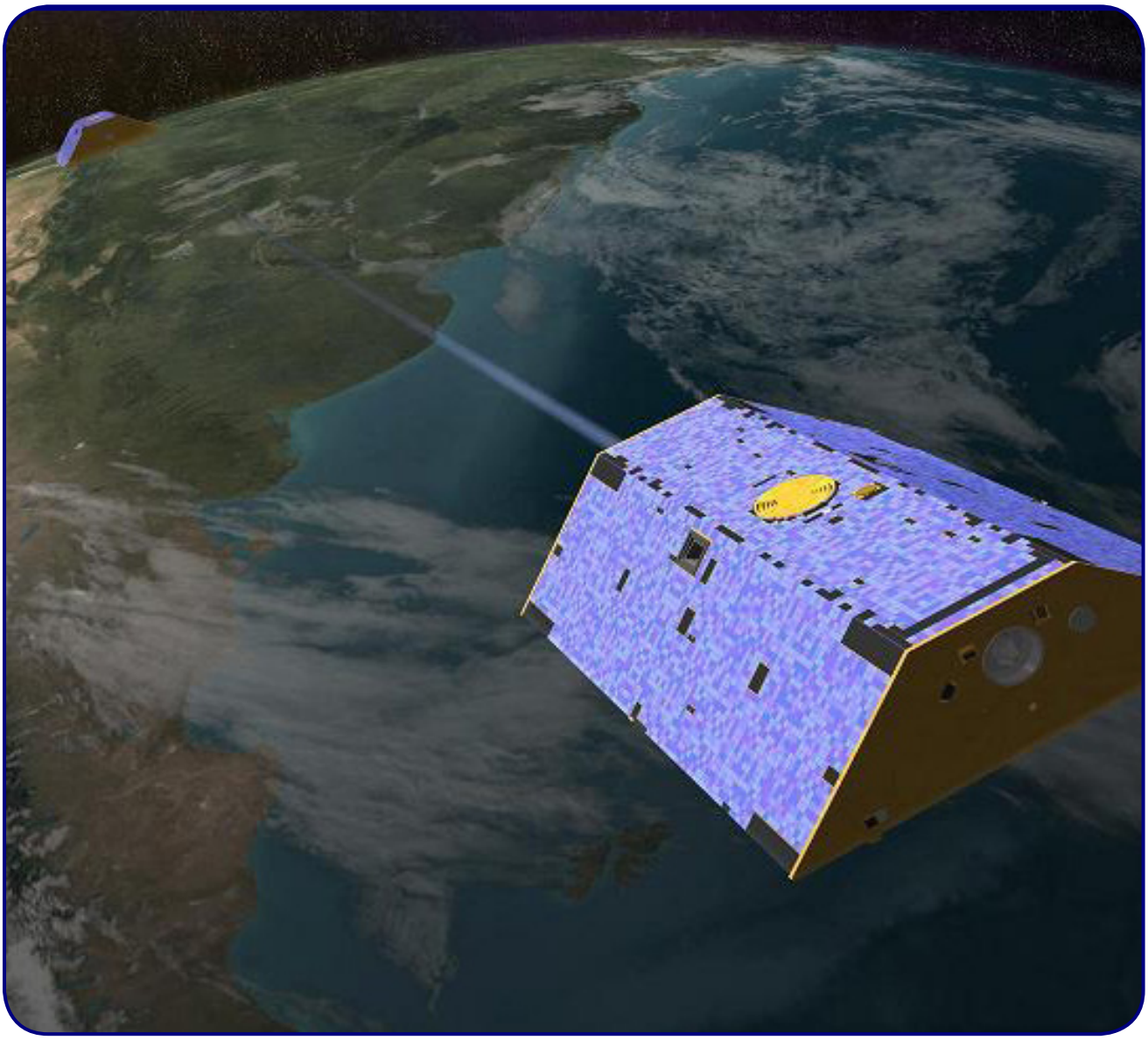

Image Caption: This image shows the Gravity Recovery and Climate Experiment 1 & 2 (GRACE 1 & 2). GRACE provides highly accurate measurements of the gravitational field of the Earth, and determines how this field varies with time. (Credit: NASA)

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Looking Forward

In FY 2016, NASA will build on the successes achieved across FY 2015, as it expands the frontiers of knowledge, capability, and opportunity. NASA, its partners, and the Nation are embarking upon an ambitious exploration program that will incorporate new technologies and leverage proven capabilities as humankind expands its reach out into the solar system. NASA is entering a new era in human spaceflight of exploration beyond low Earth orbit. Next year, the Space Launch System (SLS), Orion, and Exploration Ground Systems (EGS) programs will make progress towards Exploration Mission (EM)-1, an uncrewed test flight to distant retrograde lunar orbit (and the first pairing of Orion with SLS).

In addition, to further knowledge about how humans live and work in space, the joint U.S.-Russian one-year mission will be completed in FY 2016. U.S. astronaut Scott Kelly and Russian cosmonaut Mikhail Kornienko will live on the International Space Station (ISS) for one year, which is twice as long as crew members typically stay on the ISS. The mission's investigation of genetics and the effects of long-duration spaceflight on humans is being assisted through comparisons with astronaut Scott Kelly's identical twin, retired astronaut Mark Kelly, who remains on Earth.

NASA will complete concept refinement studies for the Low Boom Flight Demonstration (LBFD). These studies are elements of a research program over the next decade to focus on overcoming the adverse impact of sonic boom in order to alleviate public concern and environmental impacts. NASA is making progress towards innovation in commercial supersonic transportation, which could be a game changer for transcontinental and intercontinental travel.

NASA's science programs will continue to seek answers to profound questions, address the need to understand humanity's place in the universe, and provide information to policy makers who address issues affecting all life on Earth. NASA is also working to improve its operations and is increasingly launching its science missions on schedule and on budget.

NASA will launch several missions in FY 2016, including the Interior Exploration using Seismic Investigations, Geodesy and Heat Transport (InSight) mission to Mars. This robotic lander will study the deep interior of the planet Mars, and is similar in design to the Mars lander that the Phoenix mission used successfully in 2007 to study ground ice near the north pole of Mars. The reuse of this technology will provide a low-risk path to Mars without the added cost of designing and testing a new system from scratch.

NASA will also continue to make strides in the development of other key science missions for future launches, including the following:

- Solar Probe Plus (SPP)
- Solar Orbiter Collaboration (SOC)
- Ionospheric Connection (ICON)
- Global-scale Observations of the Limb and Disk (GOLD)
- Transiting Exoplanet Survey Satellite (TESS)

- Neutron star Interior Composition Explorer (NICER)
- Origins-Spectral Interpretation-Resource Identification-Security-Regolith Explorer (OSIRIS-REx)
- Mars 2020
- Ice, Cloud, and land Elevation Satellite (ICESat-2)
- Surface Water and Ocean Topography (SWOT)
- Gravity Recovery and Climate Experiment (GRACE) Follow-On mission
- James Webb Space Telescope (Webb)

NASA expects its innovative research activities and technology development to lead to future spacecraft advancements, support life in space, and enable the next generation air transportation system. U.S. technological leadership is vital to national security, economic prosperity, and global standing. NASA will remain committed to contributing to science, technology, engineering, and mathematics (STEM) education, the Nation's economic vitality, and stewardship of Earth.

Humanity's future in space is bright and NASA is leading the way. NASA reaches for new heights, toward the next giant leap. As a foundational component of this journey, NASA will continue to focus on fiscal responsibility, performance management, and long-term affordability, while addressing management challenges or risks that may pose roadblocks to future success.

Financials

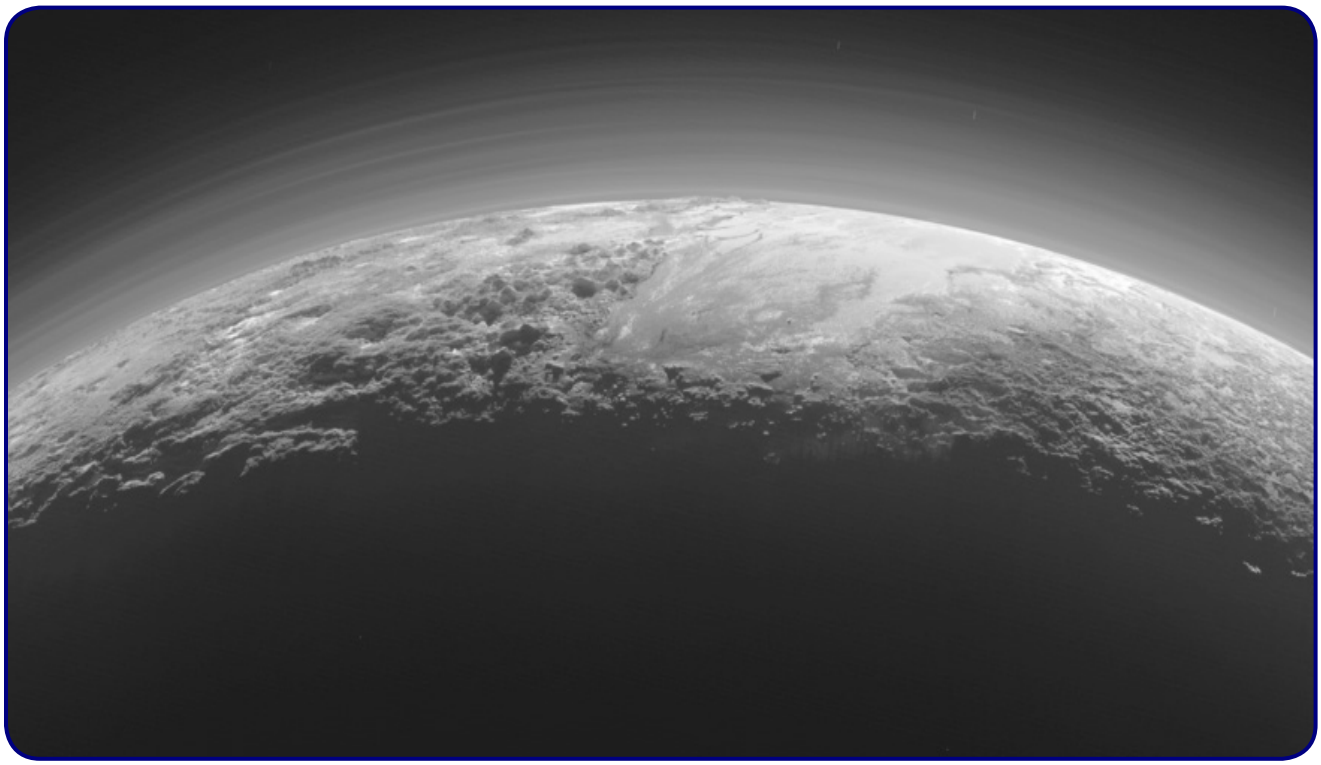

Image Caption: Just 15 minutes after its closest approach to Pluto on July 14, 2015, NASA's New Horizons spacecraft looked back toward the Sun and captured this near-sunset view of the rugged, icy mountains and flat ice plains extending to Pluto's horizon. The smooth expanse of the informally named icy plain Sputnik Planum (right) is flanked to the west (left) by rugged mountains up to 11,000 feet (3,500 meters) high, including the informally named Norgay Montes in the foreground and Hillary Montes on the skyline. To the right, east of Sputnik, rougher terrain is cut by apparent glaciers. The backlighting highlights over a dozen layers of haze in Pluto's tenuous but distended atmosphere. The image was taken from a distance of 11,000 miles (18,000 kilometers) to Pluto; the scene is 780 miles (1,250 kilometers) wide. (Credit: NASA/JHUAPL/SwRI)

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Introduction to the Principal Financial Statements

The principal financial statements are prepared to report the financial position and results of operations of the National Aeronautics and Space Administration (NASA), pursuant to the requirements of 31 U.S.C. 3515 (b). The statements are prepared from the records of NASA in accordance with generally accepted accounting principles (GAAP) and the formats prescribed by the Office of Management and Budget (OMB) Circular No. A-136, *Financial Reporting Requirements, Revised* (August 2015). The statements are in addition to financial reports prepared by NASA in accordance with OMB and U.S. Department of the Treasury (Treasury) directives to monitor and control the status and use of budgetary resources, which are prepared from the same records. The statements should be read with the understanding that they are for a component of the U.S. Government, a sovereign entity. One important implication of this is that NASA has no authority to pay liabilities not covered by budgetary resources. Liquidation of such liabilities requires enactment of an appropriation. Comparative data for FY 2014 is included where applicable. The principal financial statements, which include the following, are the responsibility of management:

- **Consolidated Balance Sheet** provides information on assets, liabilities, and net position as of the end of the reporting period. Net position is the difference between assets and liabilities. It is a summary measure of the Agency's financial condition at the end of the reporting period.

- **Consolidated Statement of Net Cost** reports net cost of operations during the reporting periods by strategic goal and at the entity level. It is a measure of Gross Cost of Operations less Earned Revenue, and represents cost to taxpayers for achieving each strategic goal and Agency mission at the entity level.

- **Consolidated Statement of Changes in Net Position** reports the beginning balance of net position, current financing sources and use of resources, unexpended resources (transactions that affect net position) for the reporting period, and ending net position for the current period.

- **Combined Statement of Budgetary Resources** reports information on sources and status of budgetary resources for the reporting period. Information in this statement is reported on the budgetary basis of accounting which supports compliance with budgetary controls and controlling legislation.

- **Required Supplementary Stewardship Information** provides information on NASA's Research and Development costs by strategic goal.

- **Required Supplementary Information** contains a Combining Statement of Budgetary Resources and information on Deferred Maintenance.

Financial Statements, Notes, and Supplemental Information

National Aeronautics and Space Administration
Consolidated Balance Sheet
As of September 30, 2015 and 2014
(In Millions of Dollars)

	2015	2014
Assets (Note 2):		
Intragovernmental:		
Fund Balance with Treasury (Note 3)	$ 9,980	$ 10,293
Investments (Note 4)	17	17
Accounts Receivable (Note 5)	191	161
Other Assets (Note 8)	6	-
Total Intragovernmental	10,194	10,471
Accounts Receivable, Net (Note 5)	2	5
General Property, Plant and Equipment, Net (Note 6)	6,782	7,679
Other Assets (Note 8)	1	-
Total Assets	**$ 16,979**	**$ 18,155**
Stewardship PP&E (Note 7)		
Liabilities (Note 9):		
Intragovernmental:		
Accounts Payable	$ 38	$ 113
Other Liabilities (Note 11)	120	82
Total Intragovernmental	158	195
Accounts Payable	1,417	1,452
Federal Employee and Veteran Benefits	43	48
Environmental and Disposal Liabilities (Note 10)	1,412	1,274
Other Accrued Liabilities (Note 11)	1,372	1,185
Other Liabilities (Note 11)	409	406
Total Liabilities	**4,811**	**4,560**
Commitments and Contingencies (Note 12)		
Net Position:		
Unexpended Appropriations	6,988	7,413
Cumulative Results of Operations	5,180	6,182
Total Net Position	**12,168**	**13,595**
Total Liabilities and Net Position	**$ 16,979**	**$ 18,155**

The accompanying notes are an integral part of these financial statements.

National Aeronautics and Space Administration
Consolidated Statement of Net Cost
For the Fiscal Years Ended September 30, 2015 and 2014
(In Millions of Dollars)

	2015	2014
Cost by Strategic Goal (Note 13)		
Strategic Goal 1 – Expand the frontiers of knowledge, capability, and opportunity in space:		
Gross Costs	$ 12,962	$ 11,788
Less: Earned Revenue	318	277
Net Costs	12,644	11,511
Strategic Goal 2 – Advance understanding of Earth and develop technologies to improve the quality of life on our home planet:		
Gross Costs	$ 3,741	$ 3,646
Less: Earned Revenue	1,839	1,731
Net Costs	1,902	1,915
Strategic Goal 3 – Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure:		
Gross Costs	$ 5,158	$ 4,895
Less: Earned Revenue	134	127
Net Costs	5,024	4,768
Net Cost of Operations		
Total Gross Costs	$ 21,861	$ 20,329
Less: Total Earned Revenue	2,291	2,135
Net Cost	**$ 19,570**	**$ 18,194**

The accompanying notes are an integral part of these financial statements.

National Aeronautics and Space Administration
Consolidated Statement of Changes in Net Position
For the Fiscal Years Ended September 30, 2015 and 2014
(In Millions of Dollars)

	2015	2014
Cumulative Results of Operations:		
Beginning Balances	$ 6,182	$ 6,819
Budgetary Financing Sources:		
Appropriations Used	18,381	17,320
Nonexchange Revenue	4	4
Other Financing Sources:		
Donations and Forfeitures of Property	-	7
Transfers In/Out Without Reimbursement	31	49
Imputed Financing	156	178
Other	(4)	(1)
Total Financing Sources	18,568	17,557
Net Cost of Operations	(19,570)	(18,194)
Net Change	(1,002)	(637)
Cumulative Results of Operations	**5,180**	**6,182**
Unexpended Appropriations:		
Beginning Balance	7,413	7,113
Budgetary Financing Sources:		
Appropriations Received	18,010	17,647
Appropriations Transfered In/Out	2	-
Other Adjustments	(56)	(27)
Appropriations Used	(18,381)	(17,320)
Total Budgetary Financing Sources	(425)	300
Unexpended Appropriations	**6,988**	**7,413**
Net Position	**$ 12,168**	**$ 13,595**

The accompanying notes are an integral part of these financial statements.

National Aeronautics and Space Administration
Combined Statement of Budgetary Resources
For the Fiscal Years Ended September 30, 2015 and 2014
(In Millions of Dollars)

	2015	2014
Budgetary Resources:		
Unobligated Balance, Brought Forward, October 1	$ 1,151	$ 1,044
Recoveries of Prior Year Unpaid Obligations	256	339
Other Changes in Unobligated Balance	(56)	(27)
Unobligated Balance from Prior Year Budget Authority, Net	1,351	1,356
Appropriations	18,013	17,647
Spending Authority from Offsetting Collections	2,811	2,501
Total Budgetary Resources	**$ 22,175**	**$ 21,504**
Status of Budgetary Resources:		
Obligations Incurred (Note 14)	$ 21,071	$ 20,353
Unobligated Balance, End of Year:		
Apportioned	1,016	1,018
Unapportioned	88	133
Total Unobligated Balance, End of Year	1,104	1,151
Total Status of Budgetary Resources	**$ 22,175**	**$ 21,504**
Change in Obligated Balance:		
Unpaid Obligations:		
Unpaid Obligations, Brought Forward, October 1	$ 10,124	$ 9,771
Obligations Incurred (Note 14)	21,071	20,353
Outlays (Gross) (-)	(20,970)	(19,661)
Recoveries of Prior Year Unpaid Obligations (-)	(256)	(339)
Unpaid Obligations, End of Year	9,969	10,124
Uncollected Payments:		
Uncollected Payments, Federal Sources, Brought Forward, October 1 (-)	(988)	(1,051)
Change in Uncollected Payments, Federal Sources	(117)	63
Uncollected Payments, Federal Sources, End of Year (-)	(1,105)	(988)
Memorandum (Non-Add) Entries:		
Obligated Balance, Start of Year	**9,136**	**8,720**
Obligated Balance, End of Year	**$ 8,864**	**$ 9,136**
Budget Authority and Outlays, Net:		
Budget Authority, Gross	$ 20,824	$ 20,148
Actual Offsetting Collections (-)	(2,694)	(2,564)
Change in Uncollected Payments, Federal Sources	(117)	63
Budget Authority, Net	**$ 18,013**	**$ 17,647**
Outlays, Gross	$ 20,970	$ 19,661
Actual Offsetting Collections (-)	(2,694)	(2,564)
Outlays, Net	18,276	17,097
Distributed Offsetting Receipts (-)	(4)	(5)
Agency Outlays, Net	**$ 18,272**	**$ 17,092**

The accompanying notes are an integral part of these financial statements.

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Note 1: Summary of Significant Accounting Policies

Reporting Entity

The National Aeronautics and Space Administration (NASA) is an independent agency established by Congress on October 1, 1958, by the National Aeronautics and Space Act of 1958. NASA was incorporated from its predecessor agency, the National Advisory Committee for Aeronautics, which provided technical advice to the United States (U.S.) aviation industry and performed aeronautics research. Today, NASA serves as the principal Agency of the U.S. Government for initiatives in civil space and aviation.

NASA is organized into four Mission Directorates supported by one Mission Support Directorate (see Organization at page 7):

- Aeronautics Research: conducts research which enhances aircraft performance, environmental compatibility, capacity, flexibility, and safety of the future air transportation system;
- Human Exploration and Operations: develops new capabilities, supporting technologies and foundational research for affordable, sustainable human and robotic exploration;
- Science: explores the Earth, Moon, Mars, and beyond; charts the best route of discovery, and obtains the benefits of Earth and space exploration for society; and
- Space Technology: develops new technologies needed to support current and future NASA missions, other agencies and the aerospace industry.

The Agency's administrative structure includes the Strategic Management Council, Mission Support Council, Program Management Council, and other Committees to integrate strategic, tactical, and operational decisions in support of strategic focus and direction.

Operationally, NASA is organized into nine Centers across the country, the Headquarters Office, the NASA Shared Services Center (NSSC), and the Jet Propulsion Laboratory (JPL). JPL is a Federally Funded Research and Development Center (FFRDC), operated for NASA by a contractor, California Institute of Technology (Caltech), staffed by Caltech employees in NASA-owned facilities.

The Agency's consolidated financial statements present the accounts of all funds that have been established and maintained to account for the resources under the control of NASA management.

Basis of Accounting and Presentation

These consolidated financial statements are prepared in accordance with the U.S. generally accepted accounting principles and Federal Accounting Standards Advisory Board (FASAB) standards in the format prescribed by the OMB Circular No. A-136, *Financial Reporting Requirements, Revised* (August 2015). FASAB authority to set Federal government accounting standards is recognized by the American Institute of Certified Public Accountants (AICPA). The financial statements present the financial position, net cost of operations, changes in net position, and budgetary resources of NASA, as required by the Chief Financial Officers Act of 1990, Public Law (P.L.) 101-576, and the Government Management Reform Act (P.L.) 103-356.

The financial statements should be read with the realization that they are for a component of the U.S. Government, a sovereign entity. One important implication of this is that liabilities cannot be liquidated without legislation providing resources and legal authority to do so. The accounting structure of Federal agencies is designed to reflect proprietary and budgetary accounting. Proprietary accounting uses the accrual method of accounting. Under the accrual method of accounting, revenues are recognized when earned and expenses are recognized when incurred, without regard to the timing of receipt or payment of cash. Budgetary accounting does not use the accrual method of accounting; it accounts for the sources and status of funds to facilitate compliance with legal controls over the use of Federal funds.

Material intra-agency transactions and balances have been eliminated from the principal statements for presentation on a consolidated basis, except for the Statement of Budgetary Resources, which is presented on a combined basis in accordance with OMB Circular No. A-136, *Financial Reporting Requirements, Revised* (August 2015). As such, intra-agency transactions have not been eliminated from the Statement of Budgetary Resources.

Budgets and Budgetary Accounting

NASA complies with Federal budgetary accounting guidelines of OMB Circular No. A-11, *Preparation, Submission and Execution of the Budget*, *Revised* (June 2015). Congress funds NASA's operations through nine main appropriations: Science; Aeronautics; Exploration; Space Operations; Education; Safety, Security and Mission Services; Space Technology; Office of Inspector General; and Construction and Environmental Compliance and Restoration. Reimbursements received under reimbursable service agreements cover the cost of goods and services NASA provides to other Federal entities or non-Federal entities. The reimbursable agreement shall be priced based on cost principles to reasonably reflect the actual cost for the goods and services provided to the customer.

Research and Development, Other Initiatives and Similar Costs

NASA makes substantial Research and Development (R&D) investments for the benefit of the United States. The R&D programs include activities to extend our knowledge of Earth, its space environment, and the Universe; and to invest in new aeronautics and advanced space transportation technologies supporting the development and application of technologies. Following guidance outlined in the FASAB Technical Release No. 7, *Clarification of Standards Relating to the National Aeronautics and Space Administration's Space Exploration Equipment*, NASA applies the Financial Accounting Standards Board's (FASB) Accounting Standards Codification (ASC) 730-10-25, *Research and Development - Recognition*, and FASB ASC 730-10-50 *Research and Development - Disclosure*, to its R&D projects.

Use of Estimates

The preparation of financial statements requires management to make assumptions and reasonable estimates affecting the reported amounts of assets and liabilities and disclosures of contingent liabilities as of the date of the financial statements and the reported amounts of revenues and expenses for the reporting period. Accordingly, actual results may differ from those estimates.

Fund Balance with Treasury

The U.S. Department of the Treasury (Treasury) collects and disburses cash on behalf of Federal agencies during the fiscal year. The collections include funds appropriated by Congress to fund the Agency's operations and revenues earned for services provided to other Federal agencies or the public. The disbursements are for goods and services received in support of its operations and other liabilities. Fund Balance with Treasury (FBWT) is the balance of cash NASA has in its account with the Treasury. NASA's FBWT is comprised of balances in general funds, trust funds, working capital funds, and other types of funds.

Investments in U.S. Government Securities

NASA investments include the following intragovernmental non-marketable securities:

(1) The Endeavor Teacher Fellowship Trust Fund (Endeavor Trust Fund) was established from public donations in tribute to the crew of the Space Shuttle Challenger. The Endeavor Trust Fund bi-annual interest earned is re-invested in short-term bills. P.L. 102-195 requires the interest earned from the Endeavor Trust Fund investments be used to create the Endeavor Teacher Fellowship Program.

(2) The Science, Space and Technology Education Trust Fund (Challenger Trust Fund) was established to advance science and technology education. The Challenger Trust Fund balance is invested in short-term bills and long-term bonds. P.L. 100-404 requires that a quarterly payment of $250,000 be sent to the Challenger Center from interest earned on the Challenger Trust Fund investments. In order to meet the requirement of providing funds to the Challenger Center, NASA invests the bi-annual interest earned in short-term bills with maturity that coincides with quarterly payments of $250,000 to beneficiaries. Interest received in excess of the amount needed for quarterly payment to beneficiaries is invested in long-term bonds.

Accounts Receivable

Most of NASA's accounts receivable is for intragovernmental reimbursements for cost of goods and services provided to other Federal agencies; the rest is for debts to NASA by non-Federal government entities. Allowances for delinquent non-Federal accounts receivable are based on factors such as: aging of accounts receivable, debtors' ability to pay, payment history, and other relevant factors. Delinquent non-Federal accounts receivable over 120 days are referred to Treasury for collection, wage garnishment or cross-servicing in accordance with the Debt Collection Improvement Act (DCIA). The Digital Accountability and Transparency Act of 2014 (DATA Act) amended the DCIA requirement of 180 days to 120 days.

Operating Materials and Supplies

NASA does not maintain inventory stock for resale. The Agency follows the purchases method of accounting for operating materials and supplies under which it expenses operating materials and supplies when purchased, not when used.

General Property, Plant and Equipment

NASA reports depreciation expense using the straight-line method over an asset's estimated useful life, beginning with the month the asset is placed in service. General Property, Plant and Equipment (G-PP&E) are assets with acquisition costs

of $500,000 or more, a useful life of 2 years or more, and R&D assets that are determined at the time of acquisition to have alternative future use. Assets that do not meet these capitalization criteria are expensed. NASA increased the capitalization threshold from $100,000 to $500,000 for personal and real property beginning October 1, 2014. Assets acquired prior to October 1, 2014, were capitalized at the prior threshold of $100,000 or more. Capitalized costs include costs incurred by NASA to bring the property to a form and location suitable for its intended use. Certain NASA assets are held by government contractors. Under provisions of the Federal Acquisition Regulation (FAR), the contractors are responsible for the control and accountability of the assets in their possession. These government-owned, contractor-held assets are included within the balances reported in NASA's financial statements.

NASA has barter agreements with international entities; the assets and services received under these barter agreements are unique, with limited easement to only a few countries, as these assets are on the International Space Station (ISS). The intergovernmental agreements state that the parties will seek to minimize the exchange of funds in the cooperative program, including the use of barters to provide goods and services. NASA has received some assets from these parties in exchange for future services. The fair value is indeterminable; therefore, no value was ascribed to these transactions in accordance with FASB ASC 845-10-25 Non-Monetary Transactions – Recognition and ASC 845-10-50 Non-Monetary Transactions – Disclosure. The amounts reflected in NASA's financial reports for the ISS exclude components of the ISS owned or provided by other participants in the ISS.

Statement of Federal Financial Accounting Standards (SFFAS) No. 10, *Accounting for Internal Use Software* requires the capitalization of internally developed, contractor developed, and commercial off the shelf software. Capitalized costs for internally developed software include the full costs (direct and indirect) incurred during the software development stage only. For purchased software, capitalized costs include amounts paid to vendors for the software and other material costs incurred by NASA to implement and make the software ready for use through acceptance testing. When NASA purchases software as part of a package of products and services (for example: training, maintenance, data conversion, reengineering, site licenses, and rights to future upgrades and enhancements), capitalized and non-capitalized costs of the package are allocated among individual elements on the basis of a reasonable estimate of their relative fair market values. Costs not susceptible to allocation between maintenance and relatively minor enhancements are expensed. Software in progress of being developed is not amortized until placed in service. NASA capitalizes costs for internal use software when the total projected cost is $1 million or more and the expected useful life of the software is 5 years or more.

Beginning FY 2015, NASA implemented SFFAS No. 44, *Accounting for Impairment of General Property, Plant, and Equipment Remaining in Use*, to recognize and report permanent impairment losses to G-PP&E remaining in use except internal use software as required. G-PP&E is considered impaired when there is a significant and permanent decline in the service utility of G-PP&E or expected service utility for construction work in process. There are existing processes and internal controls in place to reasonably

assure identification and communication of potential material impairments; therefore, NASA does not conduct a periodic survey solely for the purpose of implementing these standards. NASA recognizes an impairment loss as a result of applying these standards as applicable.

Beginning FY 2015, NASA implemented SFFAS No. 42, *Deferred Maintenance and Repairs*, and amended the relevant required supplementary information (RSI) accordingly (see page 110).

Liabilities Covered by Budgetary Resources

As a component of a sovereign entity, NASA cannot pay for liabilities unless authorized by law and covered by budgetary resources. Liabilities covered by budgetary resources are those for which appropriated funds are available as of the balance sheet date. Examples of covered liabilities include accounts payable and employees' salaries. Budgetary resources include unobligated balances of budgetary resources at the beginning of the year, new budget authority, and spending authority from offsetting collections.

Liabilities and Contingencies Not Covered by Budgetary Resources

Liabilities not covered by budgetary resources are those for which congressional appropriation is required. Liabilities not covered by budgetary resources include future environmental cleanup liability, legal claims, pensions and other retirement benefits, workers' compensation, annual leave, and cancelled appropriations.

Federal Employee and Veteran's Benefits

A liability is recorded for workers' compensation claims related to the Federal Employees' Compensation Act (FECA), administered by the U.S. Department of Labor. The FECA provides income and medical cost protection to covered Federal civilian employees injured on the job, employees who have incurred a work-related occupational disease, and beneficiaries of employees whose death is attributable to a job-related injury or occupational disease. The FECA program initially pays valid claims and subsequently seeks reimbursement from the Federal agencies employing the claimants. The FECA liability includes the actuarial liability for estimated future costs of death benefits, workers' compensation, and medical and miscellaneous costs for approved compensation cases.

Personnel Compensation and Benefits

Annual, Sick and Other Leave

Annual leave is accrued as it is earned; the accrual is reduced as leave is taken. Each year, the balance in the accrued annual leave account is adjusted to reflect current pay rates. To the extent current or prior year appropriations are not available to fund annual leave earned but not taken, funding will be obtained from future financing sources. Sick leave and other types of non-vested leave are expensed as taken.

Retirement Benefits

NASA employees participate in the Civil Service Retirement System (CSRS), a defined benefit plan, or the Federal Employees Retirement System (FERS), a defined benefit and contribution plan. For CSRS employees, NASA makes contributions of 7.0 percent of gross pay. For FERS employees,

NASA makes contributions of gross pay of 13.2 percent to the defined benefit plan, 1.0 percent to a retirement savings plan (contribution plan), and matches employee contributions up to an additional 4.0 percent of gross pay. For those employees participating in FERS, a thrift savings plan is automatically established, and NASA makes a mandatory contribution of 1.0 percent to this plan.

Insurance Benefits

SFFAS No. 5, *Accounting for Liabilities of the Federal Government* requires Government agencies to report the full cost of Federal Employee Health Benefits (FEHB) and the Federal Employees Group Life Insurance (FEGLI) Programs. NASA uses the applicable cost factors and data provided by the Office of Personnel and Management to value these liabilities.

Reclassifications of 2014 Information

Certain reclassifications have been made to the FY 2014 financial statements, footnotes and supplemental information to better align with the Agency's policies and procedures effective in FY 2015.

Note 2: Non-Entity Assets

Non-entity assets are assets held by NASA but not available for obligation. The total non-entity assets during FY 2015 and FY 2014 are less than one-half million dollars.

(In Millions of Dollars)	2015	2014
Total Non-Entity Assets	$ —	$ —
Total Entity Assets	16,979	18,155
Total Assets	**$ 16,979**	**$ 18,155**

Note 3: Fund Balance with Treasury

Treasury processes cash receipts and disbursements for NASA. Those transactions are reconciled against NASA's records. FBWT is NASA's cash balance with the Treasury. The FBWT is comprised of balances in general funds, trust funds, working capital fund, and other types of funds. General Funds primarily consist of appropriated funds for NASA. Trust Funds include balances in the Endeavor Trust Fund; Challenger Trust Fund; and Gifts and Donations. The Working Capital Fund (WCF) consists of balances related to NSSC, IT Infrastructure Integration Program (I3P) and Solutions for Enterprise-Wide Procurement (SEWP). Other types of funds include Deposit funds and Budget Clearing and Suspense funds.

(In Millions of Dollars)	2015	2014
Fund Balances:		
General Funds	$ 9,796	$ 10,135
Trust Funds	1	1
Working Capital Fund	171	152
Other Fund Types	12	5
Total	**$ 9,980**	**$ 10,293**

The Status of Fund Balance with Treasury represents the total fund balance recorded in the general ledger for unobligated and obligated balances. Unobligated Balances — Available is the amount remaining in appropriation funds available for obligation. Unobligated Balances — Unavailable is the amount remaining in appropriation funds used only for adjustments to previously re-

corded obligations. Obligated Balances Not Yet Disbursed is the cumulative amount of obligations incurred for which outlays have not been made. Non-budgetary FBWT is comprised of amounts in other types of funds.

(In Millions of Dollars)	2015	2014
Status of Fund Balances with Treasury:		
Unobligated Balances:		
Available	$ 1,016	$ 1,018
Unavailable	88	133
Obligated Balance Not Yet Disbursed	8,864	9,136
Non-Budgetary FBWT	12	6
Total	**$ 9,980**	**$ 10,293**

Note 4: Investments

Investments consist of non-marketable par value intragovernmental securities issued by Treasury's Bureau of the Fiscal Service. Trust Fund balances are invested in Treasury securities, which are purchased at either a premium or discount, and redeemed at par value exclusively through Treasury's Federal Investment Branch. The effective-interest method is used to amortize premiums on bonds, and the straight-line method is used to amortize discounts on bills.

Interest receivable on investments was less than one-half million dollars. In addition, NASA did not have any adjustments resulting from the sale of securities prior to maturity or any change in value that was more than temporary.

2015							
(In Millions of Dollars)	Cost	Amortization Method	Amortized (Premium) Discount	Interest Receivable	Investments, Net	Other Adjustments	Market Value Disclosure
Intragovernmental Securities:							
Non-Marketable:		Straight-Line					
Par value	$ 20	Effective-interest 0.115 - 6.602%	$ (3)	$ —	$ 17	$ —	$ 17
Total	**$ 20**		**$ (3)**	**$ —**	**$ 17**	**$ —**	**$ 17**

2014							
(In Millions of Dollars)	Cost	Amortization Method	Amortized (Premium) Discount	Interest Receivable	Investments, Net	Other Adjustments	Market Value Disclosure
Intragovernmental Securities:							
Non-Marketable:		Straight-Line					
Par value	$ 20	Effective-interest 0.03 - 6.602%	$ (3)	$ —	$ 17	$ —	$ 17
Total	**$ 20**		**$ (3)**	**$ —**	**$ 17**	**$ —**	**$ 17**

Note 5: Accounts Receivable, Net

The Accounts Receivable balance represents net valid claims by NASA to cash or other assets of other entities. Intragovernmental Accounts Receivable represents reimbursements due from other Federal entities for goods and services provided by NASA on a reimbursable basis. Accounts Receivable Due from the Public is the total of miscellaneous debts owed to NASA from employees and/or smaller reimbursements from other non-Federal entities. A periodic evaluation of Accounts Receivable Due from the Public is performed to estimate any uncollectible amounts based on current status, financial and other relevant characteristics of debtors, and the overall relationship with the debtor. An allowance for doubtful accounts is recorded for Accounts Receivable Due from the Public in order to reduce Accounts Receivable to its Net Realizable Value in accordance with SFFAS No. 1, *Accounting for Selected Assets and Liabilities*. The total allowance for doubtful accounts during FY 2015 and FY 2014 is less than one–half million dollars.

	2015			2014		
(In Millions of Dollars)	Accounts Receivable	Allowance for Uncollectible Accounts	Net Amount Due	Accounts Receivable	Allowance for Uncollectible Accounts	Net Amount Due
Intragovernmental	$ 191	$ —	$ 191	$ 161	$ —	$ 161
Public	2	—	2	5	—	5
Total	**$ 193**	**$ —**	**$ 193**	**$ 166**	**$ —**	**$ 166**

Note 6: General Property, Plant and Equipment, Net

Beginning October 1, 2014, NASA increased the capitalization threshold from $100,000 to $500,000 for personal and real property. Assets acquired prior to October 1, 2014, were capitalized at the prior threshold of $100,000 or more. As recommended by the Government Accountability Office (GAO), NASA periodically evaluates the capitalization thresholds in order to ensure their continuing relevance to the materiality for the financial statements. NASA determined that the new capitalization threshold provides reasonable balance between costs and benefits, including operating efficiency, while assuring the fair presentation of the financial statements. In addition, NASA made reclassifications to the major classes of G-PP&E disclosed in the following table for FY 2014 in order to better align with the Agency's policies, procedures, and programs effective in FY 2015.

NASA has one capital lease and several operating leases for both real and personal property. Leased property is primarily comprised of office buildings, storage facilities, and office equipment from both Federal and non-Federal entities.

There is no known restriction to the use or convertibility of NASA G-PP&E.

2015

(In Millions of Dollars)	Depreciation Method	Useful Life	Cost	Accumulated Depreciation	Book Value
Space Exploration PP&E					
International Space Station	Straight-line	5–20 years	$ 12,802	$ (12,107)	$ 695
Assets Under Construction		N/A	892	—	892
Space Shuttle	Straight-line	5–20 years	87	(87)	—
Total			**13,781**	**(12,194)**	**1,587**
Other PP&E					
Structures, Facilities and Leasehold Improvements	Straight-line	15–40 years	9,983	(7,198)	2,785
Equipment	Straight-line	5–20 years	3,137	(1,969)	1,168
Construction in Process		N/A	787	—	787
Assets Under Construction		N/A	318	—	318
Internal Use Software and Development	Straight-line	5 years	280	(265)	15
Land		N/A	122	—	122
Total			**14,627**	**(9,432)**	**5,195**
Total General PP&E			**$ 28,408**	**(21,626)**	**6,782**

2014

(In Millions of Dollars)	Depreciation Method	Useful Life	Cost	Accumulated Depreciation	Book Value
Space Exploration PP&E					
International Space Station	Straight-line	5–20 years	$ 12,905	$ (11,050)	$ 1,855
Assets Under Construction		N/A	818	—	818
Space Shuttle	Straight-line	5–20 years	92	(92)	—
Total			**13,815**	**(11,142)**	**2,673**
Other PP&E					
Structures, Facilities and Leasehold Improvements	Straight-line	15–40 years	9,674	(6,891)	2,783
Equipment	Straight-line	5–20 years	2,965	(1,819)	1,146
Construction in Process		N/A	535	—	535
Assets Under Construction		N/A	402	—	402
Internal Use Software and Development	Straight-line	5 years	275	(257)	18
Land		N/A	122	—	122
Total			**13,973**	**(8,967)**	**5,006**
Total General PP&E			**$ 27,788**	**$ (20,109)**	**$ 7,679**

Note 7: Stewardship PP&E

Federal agencies are required to classify and report heritage assets, multi-use heritage assets, and stewardship land in accordance with SFFAS No. 29, *Heritage Assets and Stewardship Land*.

Stewardship PP&E have physical characteristics similar to those of G-PP&E but differ from G-PP&E because their value is more intrinsic and not easily determinable in dollars. The only type of stewardship PP&E owned by NASA are heritage assets.

Heritage assets are PP&E which possess one or more of the following characteristics:

- Historical or natural significance
- Cultural, educational, or aesthetic value
- Significant architectural characteristics

Dollar value and useful life of heritage assets are not easily determinable. There is no minimum dollar threshold for designating PP&E as a heritage asset, and depreciation expense is not taken on these assets. For these reasons, heritage assets (other than multi-use heritage assets) are reported in physical units, rather than with assigned dollar values. In accordance with SFFAS No. 29, the cost of acquisition, improvement, reconstruction, or renovation of heritage assets is expensed in the period incurred.

Assets that are used in day-to-day government operations and have a heritage function are considered multi-use heritage assets. Such assets are accounted for as G-PP&E and are capitalized and depreciated in the same manner as other G-PP&E. Multi-use heritage assets at the end of the period totaled 70 and 71 buildings and structures as of September 30, 2015 and September 30, 2014, respectively. The value associated with these multi-use heritage assets is reflected in the G-PP&E values reported in Note 6.

When a G-PP&E has no use in operations, but is designated as a heritage asset, its cost and accumulated depreciation are removed from the books. They remain on the record as heritage assets, except where there is legal authority for transfer or sale at which time they are removed from the heritage asset record. Heritage assets are withdrawn when they are disposed or reclassified as multi-use heritage assets. Heritage assets are generally in fair condition suitable for display.

NASA currently has three major classes of heritage assets: Buildings and Structures; Air and Space Displays and Artifacts; and Art and Miscellaneous Items. The first two categories of heritage assets support NASA's mission by providing the public with tangible examples of assets which were built and deployed to support NASA's mission. These real life assets enhance the public's understanding of NASA's numerous programs. Typically the Buildings and Structures have been designated as National Historic Landmarks.

The third category of heritage assets, Art and Miscellaneous Items, is mainly comprised of items created by artists who have contributed their time and talent to record their impressions of the U.S. Aerospace Program in paintings, drawings, and other media. These works of art not only provide a historic record of NASA projects, but they support NASA's mission by giving the public a new and fuller understanding of advancements in aerospace.

Heritage Assets *(In Physical Units)*	2014	Additions	Withdrawals	2015
Buildings and Structures	12	—	—	12
Air and Space Displays and Artifacts	614	17	15	616
Art and Miscellaneous Items	1,022	5	—	1,027
Total Heritage Assets	**1,648**	**22**	**15**	**1,655**

Note 8: Other Approved Liabilities/Assets

NASA's Other Assets consist of Intragovernmental Advances and G-PP&E that NASA determines are no longer needed and are awaiting disposal, retirement, or removal from services. The Intragovernmental Advances are reported at cost and primarily represent the payments made to the Army Corps of Engineers in support of the construction of the Computational Research Facility at Langley Research Center. The G-PP&E Other Assets are recorded at estimated net realizable value.

(In Millions of Dollars)	2015	2014
Intragovernmental Assets		
Other Advances	$ 6	$ —
Non-Intragovernmental Assets		
General PP&E - Removed from Service and Pending Disposal	1	—
Total Other Assets	**$ 7**	**$ —**

Note 9: Liabilities Not Covered by Budgetary Resources

Liabilities not covered by budgetary resources are liabilities for which congressional action is needed before budgetary resources can be provided. They include certain environmental matters (see Note 10, Environmental and Disposal Liabilities for more information), annual leave, workers' compensation under the Federal Employees' Compensation Act (FECA) administered by the Department of Labor, cancelled appropriations, legal claims, and pensions and other retirement benefits.

The present value of the FECA actuarial liability estimate at year-end was calculated by the Department of Labor using a discount rate of 3.13 percent in FY 2015 and 3.46 percent in FY 2014. This liability includes the estimated future costs for claims incurred but not reported or approved as of the end of each year. NASA has recorded Accounts Payable related to cancelled appropriations for which there are contractual commitments to pay. These payables will be funded from appropriations available for obligation at the time a bill is processed, in accordance with P.L. 101-510, National Defense Authorization Act.

(In Millions of Dollars)	2015	2014
Intragovernmental Liabilities:		
Other Liabilities		
Workers' Compensation	$ 10	$ 10
Total Intragovernmental	10	10
Public Liabilities:		
Accounts Payable		
Accounts Payable for Cancelled Appropriations	49	42
Federal Employee and Veterans Benefits		
Actuarial FECA Liability	43	48
Environmental and Disposal Liabilities	1,412	1,274
Less: Enviornmental and Dispoal Liabilities - Funded	82	68
Other Liabilities		
Unfunded Annual Leave	208	209
Contingent Liabilities	1	36
Total Liabilities Not Covered by Budgetary Resources	**1,641**	**1,551**
Total Liabilities Covered by Budgetary Resources	**3,170**	**3,009**
Total Liabilities	**$ 4,811**	**$ 4,560**

Note 10: Environmental and Disposal Liabilities

In accordance with guidance issued by the FASAB, if an agency is required by regulation to clean up hazardous waste resulting from Federal operations, if estimable, the amount of cleanup cost must be reported and/or disclosed in the financial statements.

NASA records an estimated liability for restoration projects, which are known contaminations of PP&E. NASA also records an estimated liability for the future disposal of PP&E which currently, or prior to their disposal, will become contaminated.

NASA assesses the likelihood of required cleanup as probable, reasonably possible or remote. If the likelihood of required cleanup is probable and the cost can be reasonably estimated, a liability is recorded in the financial statements. If the likelihood of required cleanup is reasonably possible, the estimated cost of cleanup is disclosed in the notes to the financial statements. If the likelihood of required cleanup is remote, no liability is recorded or estimate disclosed.

Environmental and Disposal Liabilities represent cleanup costs resulting from:

- Operations including facilities obtained from other governmental entities that have resulted in contamination from waste disposal methods, leaks and spills;
- Other past activity that created a public health or environmental risk, including identifiable costs associated with asbestos abatement; and
- Total cleanup costs associated with the removal, containment, and/or disposal

(In Millions of Dollars)	2015	2014
Environmental Liabilities		
Restoration Projects	$ 1,324	$ 1,188
Property, Plant & Equipment	66	64
Asbestos	22	22
Total Environmental and Disposal Liabilities	**$ 1,412**	**$ 1,274**

of hazardous wastes or material and/or property at permanent or temporary closure or shutdown of associated PP&E.

Federal, state, and local statutes and regulations require environmental cleanup. The statutes and regulations most applicable to NASA covering environmental response, cleanup, and monitoring include: the Comprehensive Environmental Response, Compensation and Liability Act; the Resource Conservation and Recovery Act; the Nuclear Waste Policy Act of 1982; as well as state and local laws.

Consistent with SFFAS No. 5, *Accounting for Liabilities of the Federal Government* and with SFFAS No. 6, *Accounting for Property, Plant, and Equipment*, NASA estimates the anticipated environmental disposal cleanup costs for PP&E. NASA recognizes and records in its financial statements an environmental cleanup liability for PP&E that is probable and measurable.

Restoration Projects

NASA recorded a total estimated liability for known restoration projects of $1.3 billion in FY 2015. This was an increase of $136 million over the $1.2 billion recorded in FY 2014. The increase in this liability is primarily due to the availability of new or updated information on the extent of contamination and refinements to the estimation methodology.

In addition to the probable cleanup costs for known hazardous conditions recognized in the financial statements, there are other remediation sites where the likelihood of required cleanup for known hazardous conditions is reasonably possible. Remediation costs at certain sites classified as reasonably possible were estimated to be $6 million for FY 2015 and $10 million for FY 2014.

With respect to environmental remediation that NASA considers reasonably possible but not estimable, NASA concluded that either the likelihood of a NASA liability is less than probable but more than remote or the regulatory drivers and/or technical data that exist are not reliable enough to calculate an estimate.

PP&E

NASA recorded a total estimated liability for the future closure of PP&E of $66 million in FY 2015. This was an increase of $2 million over the $64 million recorded in FY 2014.

The current proposed decommissioning approach for the ISS is to execute a controlled targeted deorbit to a remote ocean location. This is consistent with the approach used to deorbit other space vehicles such as Russia's Progress, Europe's Automated Transfer Vehicle (ATV) and Japan's H-II Transfer Vehicle (HTV). The documented target reliability for this decommissioning approach is 99 percent. Prior to decommissioning the ISS, any hazardous materials on board the ISS would be removed or jettisoned. As a result, only residual quantities of hazardous, toxic, and radioactive materials would remain prior to the decommissioning.

Based on past experience with the re-entry of satellites, larger portions or fragments of the ISS would be expected to survive the thermal and aerodynamic stresses of re-entry. However, the historical disposal of satellites and vehicles into broad ocean areas with a controlled deorbit has left little evidence of their re-entry. Any remaining contamination in the ISS debris field would not be expected to have a substantive impact on marine life. Therefore, the probability of NASA incurring

environmental cleanup costs related to the ISS is remote and no estimate for such costs has been developed or reported in these financial statements.

Asbestos

Effective in FY 2013, NASA and other Federal government agencies are required to accrue and/or disclose the costs and the associated liabilities for abatement of both friable and non-friable asbestos. NASA maintains numerous structures and facilities across each of the Centers which are known to contain asbestos. Based on work completed to date, NASA has determined that information regarding both the quantity of asbestos and the costs associated with the removal and disposal of asbestos is insufficient to reasonably estimate the liability associated with the removal and disposal of asbestos.

As prescribed in FASAB Technical Release 10, *Implementation Guidance on Asbestos Cleanup Costs Associated with Facilities and Installed Equipment*, NASA determined that completing site-specific inventories of asbestos, and gathering reliable cost estimates regarding the removal and disposal of asbestos, would cost an estimated $22 million for FY 2015 and FY 2014.

Note 11: Other Liabilities

Other Liabilities are comprised of intragovernmental liabilities and liabilities with public entities. Other Accrued Liabilities primarily consist of the accrual of contractor costs for goods and services. The period of performance for contractor contracts typically spans the duration of NASA programs, which could be for a number of years prior to final delivery of the product. In such cases, NASA records a cost accrual throughout the fiscal year as the work is performed. Advances from Others primarily consists of payments received from other Federal agencies in advance of the performance of services under reimbursable agreements. Other Liabilities also includes Federal employee payroll and benefit liabilities, including unfunded annual leave and funded sick leave that has been earned but not taken, and salaries and wages that have been earned but are unpaid.

(In Millions of Dollars)	2015			2014		
	Current	Non-Current	Total	Current	Non-Current	Total
Intragovernmental Liabilities:						
Advances From Others	$ 41	$ —	$ 41	$ 56	$ —	$ 56
Workers' Compensation	4	6	10	5	6	11
Employer Contributions and Payroll Taxes	12	—	12	10	—	10
Other Accrued Liability	57	—	57	5	—	5
Total Intragovernmental	**114**	**6**	**120**	**76**	**6**	**82**
Unfunded Annual Leave	—	208	208	—	209	209
Accrued Funded Payroll	64	—	64	61	—	61
Advances from Others	118	—	118	90	—	90
Employer Contributions and Payroll Taxes	6	—	6	5	—	5
Liability for Deposit and Clearing Funds	12	—	12	5	—	5
Contingent Liabilities	—	1	1	—	36	36
Other Accrued Liabilities	1,372	—	1,372	1,185	—	1,185
Total Public	**1,572**	**209**	**1,781**	**1,346**	**245**	**1,591**
Total Other Liabilities	**$ 1,686**	**$ 215**	**$ 1,901**	**$ 1,422**	**$ 251**	**$ 1,673**

Note 12: Commitments and Contingencies

NASA is a party in various administrative proceedings, court actions (including tort suits), and claims. For cases in which management and legal counsel believe it is probable that the outcomes will result in a loss to NASA, contingent liabilities are recorded.

There were cases reviewed by legal counsel where the probable future measurable loss is remote and as such no contingent liability has been recorded in connection with these cases.

There are several cases where the likelihood of loss is reasonably possible, with the loss estimated up to $190 million for September 30, 2015.

There are certain contracts which may contain provisions regarding contingent obligations to fund accumulated unfunded employee benefit plans upon contract termination. Currently, these potential liabilities are not measurable.

(In Millions of Dollars)	2015	2014
Contingent Liabilities	$ 1	$ 36
Total Contingent Liabilities	**$ 1**	**$ 36**

Note 13: Intragovernmental Cost and Exchange Revenue

Intragovernmental costs and revenue are exchange transactions made between NASA and other Federal government entities. Costs and revenue with the Public result from transactions between NASA and non-Federal entities. Reimbursable agreements shall be priced based on cost principles to reasonably reflect the actual cost for the goods and services provided to the customer.

(In Millions of Dollars)	2015	2014
Strategic Goal 1 – Expand the frontiers of knowledge, capability, and opportunity in space		
Intragovernmental Costs	$ 381	$ 403
Public Costs	12,581	11,385
Total Gross Costs	12,962	11,788
Less:		
Intragovernmental Earned Revenue	231	196
Public Earned Revenue	87	81
Total Earned Revenue	318	277
Net Cost	**$ 12,644**	**$ 11,511**
Strategic Goal 2 – Advance understanding of Earth and develop technologies to improve the quality of life on our home planet		
Intragovernmental Costs	$ 155	$ 131
Public Costs	3,586	3,515
Total Gross Costs	3,741	3,646
Less:		
Intragovernmental Earned Revenue	1,792	1,686
Public Earned Revenue	47	45
Total Earned Revenue	1,839	1,731
Net Cost	**$ 1,902**	**$ 1,915**
Strategic Goal 3 – Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure		
Intragovernmental Costs	$ 558	$ 596
Public Costs	4,600	4,299
Total Gross Costs	5,158	4,895
Less:		
Intragovernmental Earned Revenue	40	55
Public Earned Revenue	94	72
Total Earned Revenue	134	127
Net Cost	**$ 5,024**	**$ 4,768**
Net Cost of Operations	**$ 19,570**	**$ 18,194**

Note 14: Apportionment Categories of Obligations Incurred: Direct vs. Reimbursable Obligations

(In Millions of Dollars)	2015	2014
Direct Obligations:		
Category A	$ 1	$ 1
Category B	18,273	17,786
Reimbursable Obligations:		
Category B	2,797	2,566
Total Obligations Incurred	**$ 21,071**	**$ 20,353**

Category A consists of amounts requested to be apportioned annually and distributed for each calendar quarter in the fiscal year. Category B consists of amounts requested to be apportioned on a basis other than calendar quarters, such as time periods other than quarters, activities, projects, objects, or a combination thereof.

Note 15: Explanation of Differences Between the Statement of Budgetary Resources (SBR) and the Budget of the U.S. Government

The FY 2017 Budget of the United States Government (President's Budget), which presents the actual amounts for the year ended September 30, 2015, has not been published as of the issue date of these financial statements. On approval of the Administration, NASA will publish its FY 2017 President's Budget Request on the NASA web site at: http://www.nasa.gov/news/budget

NASA reconciled the amounts of the FY 2014 column on the Statement of Budgetary Resources (SBR) to the actual amounts for FY 2014 in the FY 2016 President's Budget for budgetary resources, obligations incurred, distributed offsetting receipts, and net outlays as presented below.

(In Millions of Dollars)	Budgetary Resources	Obligations	Distributed Offsetting Receipts	Net Outlays
Combined Statement of Budgetary Resources	$ 21,504	$ 20,353	$ (5)	$ 17,092
Included on SBR, not in President's Budget				
Expired Accounts	(218)	(83)	—	—
Distributed Offsetting Receipts	—	—	5	7
Budget of the United States Government	**$ 21,286**	**$ 20,270**	**$ —**	**$ 17,099**

The difference between the SBR and the President's Budget represents expired accounts and distributed offsetting receipts reported on the SBR but not in the President's Budget.

Note 16: Undelivered Orders at the End of the Period

Undelivered Orders represent the amount of goods and/or services ordered to perform NASA's mission objectives, which have not been received. The total Undelivered Orders at the end of the period totaled $7.2 billion and $7.4 billion as of September 30, 2015 and September 30, 2014, respectively.

Note 17: Reconciliation of Net Cost to Budget

SFFAS No. 7, *Accounting for Revenue and Other Financing Sources and Concepts for Reconciling Budgetary and Financial Accounting*, requires a reconciliation of proprietary and budgetary accounting information.

Accrual-based measures used in the Statement of Net Cost differ from the obligation-based measures used in the Statement of Budgetary Resources. This reconciliation shows the relationship between the net obligations derived from the Statement of Budgetary Resources and net costs of operations derived from the Statement of Net Cost by identifying and explaining key items that affect one statement but not the other.

(In Millions of Dollars)	2015	2014
Resources Used to Finance Activities		
Budgetary Resources Obligated		
Obligations Incurred	$ 21,071	$ 20,353
Less: Spending Authority from Offsetting Collections and Recoveries	3,067	2,840
Net Obligations	18,004	17,513
Other Resources		
Donations & Forfeitures of Property	—	7
Transfers In/Out Without Reimbursements	31	49
Imputed Financing from Costs Absorbed by Others	156	178
Net Other Resources Used to Finance Activities	187	234
Total Resources Used to Finance Activities	**18,191**	**17,747**
Resources Used to Finance Items Not Part of the Net Cost of Operations		
Change in Budgetary Resources Obligated for Goods, Services, and Benefits Ordered But Not Yet Provided	374	(205)
Resources that Fund Expenses Recognized in Prior Periods	(40)	(3)
Resources that Finance the Acquisition of Assets	(918)	(1,104)
Other Resources or Adjustments to Net Obligated Resources that Do Not Affect Net Cost of Operations	(31)	(56)
Total Resources Used to Finance Items Not Part of the Net Cost of Operations	**(615)**	**(1,368)**
Total Resources Used to Finance the Net Cost of Operations	**$ 17,576**	**$ 16,379**
Components of Net Cost that Will Not Require or Generate Resources in the Current Period		
Components Requiring or Generating Resources in Future Periods		
Increases in Annual Leave Liability	$ —	$ 4
Increases in Environmental and Disposal Liability	138	31
Other	8	41
Total Components of Net Cost that Will Require or Generate Resources in Future Periods	146	76
Components Not Requiring or Generating Resources		
Depreciation	1,652	1,624
Revaluation of Assets or Liabilities	(21)	—
Other	217	115
Total Components of Net Cost of Operations that Will Not Require or Generate Resources	1,848	1,739
Total Components of Net Cost of Operations that Will Not Require or Generate Resources in the Current Period	**1,994**	**1,815**
Net Cost of Operations	**$ 19,570**	**$ 18,194**

Required Supplementary Stewardship Information

Stewardship Investments: Research and Development

NASA's strategic goals and outcomes are the basis of the Agency's performance framework and are executed to support its strategic plan. To provide a complete analysis of NASA costs, both Research and Development (R&D) and non-R&D costs are presented. Descriptions for the strategic goals and outcomes associated with these costs are also presented.

Research and Development Costs by Strategic Goal

(In Millions of Dollars)	2015	2014	2013	2012	2011
Research and Development Costs					
Basic					
Strategic Goal 1	$ 2,005	$ 2,020	$ 1,728	$ 851	$ 827
Strategic Goal 2	1,088	970	1,147	329	304
Strategic Goal 3	(1)	-	-	-	-
Total Basic Expenses	**$ 3,092**	**$ 2,990**	**$ 2,875**	**$ 1,180**	**$ 1,131**
Applied					
Strategic Goal 1	$ 1,729	$ 1,828	$ 1,993	$ 1,561	$ 1,497
Strategic Goal 2	622	578	597	480	467
Strategic Goal 3	-	6	-	-	-
Total Applied Expenses	**$ 2,351**	**$ 2,412**	**$ 2,590**	**$ 2,041**	**$ 1,964**
Development					
Strategic Goal 1	$ 5,867	$ 4,980	$ 5,005	$ 3,023	$ 4,094
Strategic Goal 2	341	434	177	608	665
Strategic Goal 3	32	8	33	-	-
Total Development Expenses	**$ 6,240**	**$ 5,422**	**$ 5,215**	**$ 3,631**	**$ 4,759**
Total Research and Development	**$ 11,683**	**$ 10,824**	**$ 10,680**	**$ 6,852**	**$ 7,854**
Non-Research and Development Cost					
Strategic Goal 1	$ 3,361	$ 2,960	$ 2,770	$ 5,222	$ 5,907
Strategic Goal 2	1,690	1,664	1,742	2,137	1,784
Strategic Goal 3	5,127	4,881	5,027	5,818	4,337
Total Non-Research and Development Expenses	**$ 10,178**	**$ 9,505**	**$ 9,539**	**$ 13,177**	**$ 12,028**
Total Expenses	**$ 21,861**	**$ 20,329**	**$ 20,219**	**$ 20,029**	**$ 19,882**

NASA makes substantial R&D investments for the benefit of the Nation. These amounts are expensed as incurred in determining the gross cost of operations.

NASA's R&D programs include activities to extend our knowledge of Earth, its space environment, and the Universe, and to invest in new aeronautics and advanced space transportation technologies that support the development and application of technologies critical to the economic, scientific, and technical competitiveness of the United States.

Investment in R&D refers to those expenses incurred to support the search for new or refined knowledge and ideas and for the application or use of such knowledge and ideas

for the development of new or improved products and processes with the expectation of maintaining or increasing national economic productive capacity or yielding other future benefits.

Strategic Goals and Outcomes:

Strategic Goal 1: Expand the frontiers of knowledge, capability, and opportunity in space

Strategic Objective 1.1: Expand human presence into the solar system and to the surface of Mars to advance exploration, science, innovation, benefits to humanity, and international collaboration.

Major Programs Include:
- Orion Multi-Purpose Crew Vehicle Program
- Space Launch System (SLS) Program
- Exploration Ground Systems (EGS) Program
- Advanced Exploration Systems (AES)

Outcomes:
- Achieve critical milestones in development of new systems for the human exploration of deep space.

- Develop a new transportation system that includes a crew capsule, a heavy-lift launch vehicle, and supporting ground facilities and systems.

- Develop the technologies and capabilities for in-space propulsion, in-space operations, long-duration habitation, and other systems to support humans in hostile environments.

Strategic Objective 1.2: Conduct research on the International Space Station (ISS) to enable future space exploration, facilitate a commercial space economy, and advance the fundamental biological and physical sciences for the benefit of humanity.

Major Programs Include:
- International Space Station Program
- Human Research Program
- Human Space Flight Operations Program

Outcomes:
- Sustain the operation and full use of the International Space Station (ISS) and expand efforts to utilize the ISS as a National Laboratory for scientific, technological, diplomatic, and educational purposes and for supporting future objectives in human space exploration.

- Advance benefits to humanity through research.

- Enable a commercial demand-driven market in low Earth orbit (LEO).

- Enable long-duration human spaceflight beyond LEO.

- Provide a basis for international exploration partnerships.

Strategic Objective 1.3: Facilitate and utilize U.S. commercial capabilities to deliver cargo and crew to space.

Major Programs Include:
- Commercial Crew Program
- Commercial Cargo Program

Outcomes:
- U.S. commercial space transportation capabilities will provide safe, reliable, and cost effective access to and from LEO and the ISS for crew and cargo.

Strategic Objective 1.4: Understand the Sun and its interactions with Earth and the solar system, including space weather.

Major Programs Include:
- Heliophysics Research Program
- Living with a Star Program
- Solar Terrestrial Probes Program
- Heliophysics Explorer Program

Outcomes:
- Increased understanding of the heliosphere (the extended atmosphere of the Sun), including what causes the Sun to vary, how do the geospace, planetary space environments and the heliosphere respond, and what are the impacts on humanity.

Strategic Objective 1.5: Ascertain the content, origin, and evolution of the solar system and the potential for life elsewhere.

Major Programs Include:
- Planetary Science Research Program
- Discovery Program
- New Frontiers Program
- Mars Exploration Program
- Outer Planets Program
- Planetary Technology Program

Outcomes:
- Continue to expand knowledge of the solar system, seeking to answer fundamental questions: How did our solar system form and evolve? Is there life beyond Earth? What are the hazards to life on Earth?

Strategic Objective 1.6: Discover how the universe works, explore how it began and evolved, and search for life on planets around other stars.

Major Programs Include:
- Astrophysics Research Program
- Cosmic Origins Program
- Physics of the Cosmos Program
- Exoplanet Exploration Program
- Astrophysics Explorer Program
- James Webb Space Telescope (Webb)

Outcomes:
- Further understanding of the universe and how it works, its history, as well as the continued search for life beyond our Solar System.

Strategic Objective 1.7: Transform NASA missions and advance the Nation's capabilities by maturing crosscutting and innovative space technologies.

Major Programs Include:
- Crosscutting Space Technology Development (CSTD)
- Exploration Technology Development (ETD)
- Small Business Innovation Research / Small Business Technology Transfer (SBIR/STTR)

Outcomes:
- Develop new pioneering technologies, increasing the Nation's capability to perform space science, operate in space, and enable deep space exploration.

- Strengthen our Nation's leadership in space-related science, technology, and industrial base.

- Foster a technology-based U.S. economy.

Strategic Goal 2: Advance understanding of Earth and develop technologies to improve the quality of life on our home planet.

Strategic Objective 2.1: Enable a revolutionary transformation for safe and sustainable U.S. and global aviation by advancing aeronautics research.

Major Programs Include:
- Airspace Operations and Safety Program
- Advance Air Vehicles Program
- Integrated Systems Research Program
- Transformative Aeronautics Concepts Program

Outcomes:
- Enable a revolutionary transformation of the aviation system to improve our quality of life and productivity on Earth.

- Contributes unique innovations to aviation through research activities. These innovations serve as key enablers for the role of U.S. commercial aviation in sustaining American commerce and safe, environmentally sustainable mobility, and hence the Nation's economic well-being.

Strategic Objective 2.2: Advance knowledge of Earth as a system to meet the challenges of environmental change, and to improve life on our planet.

Major Programs Include:
- Earth Science Research Program
- Earth Systematic Missions Program
- Earth System Science Pathfinders Program
- Earth Science Multi-Mission Operations Program
- Applied Sciences Program
- Earth Science Technology Program

Outcomes:
- NASA's Earth science programs shape an interdisciplinary view of Earth, exploring the interaction among the atmosphere, oceans, ice sheets, land surface interior, and life itself, which enables scientists to measure global and climate changes and to inform decisions by Government, organizations, and people.

Strategic Objective 2.3: Optimize Agency technology investments, foster open innovation, and facilitate technology infusion, ensuring the greatest national benefit.

Major Programs Include:
- Partnership Development and Strategic Integration

Outcomes:
- Optimization of NASA's technology portfolio.

- Enabling of critical technology development and open innovation.

- Maximized transfer of NASA technology to U.S. partners.

Strategic Objective 2.4: Advance the Nation's Science, Technology, Engineering, and Math (STEM) education and workforce pipeline by working collaboratively with other agencies to engage students, teachers, and faculty in NASA's missions and unique assets.

Major Programs Include:
- Aerospace Research & Career Development Program
- STEM Education and Accountability Program

Outcomes:
- Federal agencies work together to im-

prove the quality of science, technology, engineering, and math (STEM) education in the United States.

- NASA will increase impact on the Nation's STEM education and workforce pipeline through the extension of STEM based internships, scholarships, and fellowships and the contribution of unique NASA mission and asset driven institution engagement, experiential learning, and professional development opportunities.

Strategic Goal 3: Serve the American public and accomplish our Mission by effectively managing our people, technical capabilities, and infrastructure.

Strategic Objective 3.1: Attract and advance a highly skilled, competent, and diverse workforce, cultivate an innovative work environment, and provide the facilities, tools, and services needed to conduct NASA's missions.

Major Programs Include:
- Center Management and Operations
- Agency Management
- Institutional Construction of Facilities (CoF)
- Environmental Compliance and Restoration

Outcomes:
- Effective management of human capital, finance, information technology, infrastructure, acquisitions, security, real and personal property, occupational health and safety, equal employment opportunity and diversity, small business programs, external relations, internal and external communications, stakeholder engagement, and other essential corporate functions.
- Sustainable management of NASA's infrastructure.
- NASA will have a diverse workforce infused with the spirit of innovation.

Strategic Objective 3.2: Ensure the availability and continued advancement of strategic, technical, and programmatic capabilities to sustain NASA's Mission.

Major Programs Include:
- Space Communications and Navigation (SCaN)
- Launch Services Program (LSP)
- Rocket Propulsion Testing (RPT)
- Programmatic Construction of Facilities
- Strategic Capabilities Assets Program (SCAP)

Outcomes:
- Key capabilities and critical assets will be available to NASA and other entities in support of NASA's missions.

Strategic Objective 3.3: Provide secure, effective, and affordable information technologies and services that enable NASA's Mission.

Major Programs Include:
- Agency IT Services Program

Outcomes:
- IT enablement of NASA's mission and vision will be optimized.
- A seamless collaborative and mobile work environment that safeguards NASA's information assets will be created.

Strategic Objective 3.4: Ensure effective management of NASA programs and operations to complete the mission safely and successfully.

Major Programs Include:

- Office of the Chief Engineer (OCE)
- Office of Safety and Mission Assurance (OSMA)
- Office of the Chief Health and Medical Officer (OCHMO)

Outcomes:

- NASA will protect the health and safety of the NASA workforce.

- Safety and Mission Success will improve the likelihood that NASA's programs, projects, and operations are completed safely and successfully.

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Required Supplementary Information

Combining Schedule of Budgetary Resources
For the Fiscal Year Ended September 30, 2015

(In Millions of Dollars)	Space Operations	Science	Exploration	Aeronautics	Safety, Security and Mission Services	Education
Budgetary Resources:						
Unobligated Balance, Brought Forward, October 1	$ 196	$ 303	$ 115	$ 23	$ 232	$ 30
Recoveries of Prior Year Unpaid Obligations	45	41	63	7	61	2
Other Changes in Unobligated Balance	(3)	(12)	(4)	(2)	(18)	(4)
Unobligated Balance from Prior Year Budget Authority, Net	238	332	174	28	275	28
Appropriations	3,822	5,243	4,367	642	2,759	119
Spending Authority from Offsetting Collections	4	2	1	—	2,375	—
Total Budgetary Resources	**$ 4,064**	**$ 5,577**	**$ 4,542**	**$ 670**	**$ 5,409**	**$ 147**
Status of Budgetary Resources:						
Obligations Incurred	$ 3,844	$ 5,293	$ 4,482	$ 656	$ 5,151	$ 112
Unobligated Balance, End of Year:						
Apportioned	169	273	58	12	247	33
Unapportioned	51	11	2	2	11	2
Total Unobligated Balance, End of Period	220	284	60	14	258	35
Total Status of Budgetary Resources	**$ 4,064**	**$ 5,577**	**$ 4,542**	**$ 670**	**$ 5,409**	**$ 147**
Change in Obligated Balance:						
Unpaid Obligations:						
Unpaid Obligations, Brought Forward, October 1	$ 1,490	$ 3,172	$ 1,919	$ 251	$ 1,821	$ 158
Obligations Incurred	3,844	5,293	4,482	656	5,151	112
Outlays (Gross) (-)	(3,700)	(5,172)	(4,837)	(578)	(5,052)	(109)
Recoveries of Prior Year Unpaid Obligations (-)	(45)	(41)	(63)	(7)	(61)	(2)
Unpaid Obligations, End of Year	1,589	3,252	$ 1,501	322	$ 1,859	159
Uncollected payments:						
Uncollected Payments, Federal Sources, Brought Forward, October 1 (-)	—	—	—	—	(988)	—
Change in Uncollected Payments, Federal sources	—	—	—	—	(117)	—
Uncollected Payments, Federal Sources, End of Year (-)	—	—	—	—	(1,105)	—
Memorandum (Non-Add) Entries:						
Obligated Balance, Start of Year	**1,490**	**3,172**	**1,919**	**251**	**833**	**158**
Obligated Balance, End of Year	**$ 1,589**	**$ 3,252**	**$ 1,501**	**$ 322**	**$ 754**	**$ 159**
Budget Authority and Outlays, Net:						
Budget Authority, Gross	$ 3,826	$ 5,245	$ 4,368	$ 642	$ 5,134	$ 119
Actual Offsetting Collections (-)	(4)	(2)	(1)	—	(2,258)	—
Change in Uncollected Payments, Federal Sources	—	—	—	—	(117)	—
Budget Authority, Net	**3,822**	**5,243**	**4,367**	**642**	**2,759**	**119**
Outlays, Gross	3,700	5,172	4,837	578	5,052	109
Actual Offsetting Collections (-)	(4)	(2)	(1)	—	(2,258)	—
Outlays, Net	3,696	5,170	4,836	578	2,794	109
Distributed Offsetting Receipts (-)	—	—	—	—	—	—
Agency Outlays, Net	**$ 3,696**	**$ 5,170**	**$ 4,836**	**$ 578**	**$ 2,794**	**$ 109**

Combining Schedule of Budgetary Resources
For the Fiscal Year Ended September 30, 2015 (continued)

(In Millions of Dollars)	Office of Inspector General	American Recovery and Reinvestment Act	Space Technology	Construction and Environmental Compliance and Restoration	Other	Total
Budgetary Resources:						
Unobligated Balance, Brought Forward, October 1	$ 4	$ 3	$ 22	$ 203	$ 20	$ 1,151
Recoveries of Prior Year Unpaid Obligations	—	9	8	19	1	256
Other Changes in Unobligated Balance	(2)	(11)	—	—	—	(56)
Unobligated Balance from Prior Year Budget Authority, Net	2	1	30	222	21	1,351
Appropriations	37	—	596	427	1	18,013
Spending Authority from Offsetting Collections	1	—	—	8	420	2,811
Total Budgetary Resources	**$ 40**	**$ 1**	**$ 626**	**$ 657**	**$ 442**	**$ 22,175**
Status of Budgetary Resources:						
Obligations Incurred	$ 38	$ 1	$ 576	$ 495	$ 423	$ 21,071
Unobligated Balance, End of Year:						
Apportioned	—	—	49	162	13	1,016
Unapportioned	2	—	1	—	6	88
Total Unobligated Balance, End of Period	2	—	50	162	19	1,104
Total Status of Budgetary Resources	**$ 40**	**$ 1**	**$ 626**	**$ 657**	**$ 442**	**$ 22,175**
Change in Obligated Balance:						
Unpaid Obligations:						
Unpaid Obligations, Brought Forward, October 1	$ 4	$ 9	$ 344	$ 804	$ 152	$ 10,124
Obligations Incurred	38	1	576	495	423	21,071
Outlays (Gross) (-)	(38)	(1)	(535)	(545)	(403)	(20,970)
Recoveries of Prior Year Unpaid Obligations (-)	—	(9)	(7)	(19)	(2)	(256)
Unpaid Obligations, End of Year	4	—	378	735	170	9,969
Uncollected payments:						
Uncollected Payments, Federal Sources, Brought Forward, October 1 (-)	—	—	—	—	—	(988)
Change in Uncollected Payments, Federal sources	—	—	—	—	—	(117)
Uncollected Payments, Federal Sources, End of Year (-)	—	—	—	—	—	(1,105)
Memorandum (Non-Add) Entries:						
Obligated Balance, Start of Year	**4**	**9**	**344**	**804**	**152**	**9,136**
Obligated Balance, End of Year	**$ 4**	**$ —**	**$ 378**	**$ 735**	**$ 170**	**$ 8,864**
Budget Authority and Outlays, Net:						
Budget Authority, Gross	$ 38	$ —	$ 596	$ 435	$ 421	$ 20,824
Actual Offsetting Collections (-)	(1)	—	—	(8)	(420)	(2,694)
Change in Uncollected Payments, Federal Sources	—	—	—	—	—	(117)
Budget Authority, Net	**37**	**—**	**596**	**427**	**1**	**$ 18,013**
Outlays, Gross	38	1	535	545	$ 403	20,970
Actual Offsetting Collections (-)	(1)	—	—	(8)	(420)	(2,694)
Outlays, Net	37	1	535	537	(17)	18,276
Distributed Offsetting Receipts (-)	—	—	—	—	(4)	(4)
Agency Outlays, Net	**$ 37**	**$ 1**	**$ 535**	**$ 537**	**$ (21)**	**$ 18,272**

Combining Schedule of Budgetary Resources
For the Fiscal Year Ended September 30, 2014

(In Millions of Dollars)	Space Operations	Science	Exploration	Aeronautics	Safety, Security and Mission Services	Education
Budgetary Resources:						
Unobligated Balance, Brought Forward, October 1	$ 170	$ 192	$ 53	$ 15	$ 300	$ 18
Recoveries of Prior Year Unpaid Obligations	115	74	45	8	38	5
Other Changes in Unobligated Balance	—	—	—	—	—	—
Unobligated Balance from Prior Year Budget Authority, Net	285	266	98	23	338	23
Appropriations	3,774	5,148	4,113	566	2,793	117
Spending Authority from Offsetting Collections	15	1	2	—	2,083	—
Total Budgetary Resources	**$ 4,074**	**$ 5,415**	**$ 4,213**	**$ 589**	**$ 5,214**	**$ 140**
Status of Budgetary Resources:						
Obligations Incurred	$ 3,878	$ 5,112	$ 4,098	$ 566	$ 4,982	$ 110
Unobligated Balance, End of Year:						
Apportioned	136	282	107	19	211	25
Unapportioned	60	21	8	4	21	5
Total Unobligated Balance, End of Period	196	303	115	23	232	30
Total Status of Budgetary Resources	**$ 4,074**	**$ 5,415**	**$ 4,213**	**$ 589**	**$ 5,214**	**$ 140**
Change in Obligated Balance:						
Unpaid Obligations:						
Unpaid Obligations, Brought Forward, October 1	$ 1,604	$ 3,030	$ 1,665	$ 231	$ 1,816	$ 164
Obligations Incurred	3,878	5,112	4,098	566	4,982	110
Outlays (Gross) (-)	(3,877)	(4,895)	(3,799)	(538)	(4,940)	(111)
Recoveries of Prior Year Unpaid Obligations (-)	(115)	(74)	(45)	(8)	(38)	(5)
Unpaid Obligations, End of Year	1,490	3,173	1,919	251	1,820	158
Uncollected payments:						
Uncollected Payments, Federal Sources, Brought Forward, October 1 (-)	—	—	—	—	(1,049)	—
Change in Uncollected Payments, Federal sources	—	—	—	—	61	—
Uncollected Payments, Federal Sources, End of Year (-)	—	—	—	—	(988)	—
Memorandum (Non-Add) Entries:						
Obligated Balance, Start of Year	**1,604**	**3,030**	**1,665**	**231**	**767**	**164**
Obligated Balance, End of Year	**$ 1,490**	**$ 3,173**	**$ 1,919**	**$ 251**	**$ 832**	**$ 158**
Budget Authority and Outlays, Net:						
Budget Authority, Gross	$ 3,789	$ 5,149	$ 4,115	$ 566	$ 4,876	$ 117
Actual Offsetting Collections (-)	(15)	(1)	(2)	—	(2,144)	—
Change in Uncollected Payments, Federal Sources	—	—	—	—	61	—
Budget Authority, Net	**3,774**	**5,148**	**4,113**	**566**	**2,793**	**117**
Outlays, Gross	3,877	4,895	3,799	538	4,940	111
Actual Offsetting Collections (-)	(15)	(1)	(2)	—	(2,144)	—
Outlays, Net	3,862	4,894	3,797	538	2,796	111
Distributed Offsetting Receipts (-)	—	—	—	—	—	—
Agency Outlays, Net	**$ 3,862**	$ 4,894	**$ 3,797**	**$ 538**	**$ 2,796**	**$ 111**

Combining Schedule of Budgetary Resources
For the Fiscal Year Ended September 30, 2014 (continued)

(In Millions of Dollars)	Office of Inspector General	American Recovery and Reinvestment Act	Space Technology	Construction and Environmental Compliance and Restoration	Other	Total
Budgetary Resources:						
Unobligated Balance, Brought Forward, October 1	$ 4	$ 2	$ 12	$ 247	$ 31	$ 1,044
Recoveries of Prior Year Unpaid Obligations	—	2	14	20	18	339
Other Changes in Unobligated Balance	—	—	—	—	(27)	(27)
Unobligated Balance from Prior Year Budget Authority, Net	4	4	26	267	22	1,356
Appropriations	37	—	576	522	1	17,647
Spending Authority from Offsetting Collections	1	—	—	7	392	2,501
Total Budgetary Resources	**$ 42**	**$ 4**	**$ 602**	**$ 796**	**$ 415**	**$ 21,504**
Status of Budgetary Resources:						
Obligations Incurred	$ 38	$ 1	$ 580	$ 593	$ 395	$ 20,353
Unobligated Balance, End of Year:						
Apportioned	—	—	21	203	14	1,018
Unapportioned	4	3	1	—	6	133
Total Unobligated Balance, End of Period	4	3	22	203	20	1,151
Total Status of Budgetary Resources	**$ 42**	**$ 4**	**$ 602**	**$ 796**	**$ 415**	**$ 21,504**
Change in Obligated Balance:						
Unpaid Obligations:						
Unpaid Obligations, Brought Forward, October 1	$ 4	$ 10	$ 357	$ 723	$ 167	$ 9,771
Obligations Incurred	38	1	580	593	395	20,353
Outlays (Gross) (-)	(38)	—	(578)	(493)	(392)	(19,661)
Recoveries of Prior Year Unpaid Obligations (-)	—	(2)	(14)	(20)	(18)	(339)
Unpaid Obligations, End of Year	4	9	345	803	152	10,124
Uncollected payments:						
Uncollected Payments, Federal Sources, Brought Forward, October 1 (-)	—	—	—	—	(2)	(1,051)
Change in Uncollected Payments, Federal sources	—	—	—	—	2	63
Uncollected Payments, Federal Sources, End of Year (-)	—	—	—	—	—	(988)
Memorandum (Non-Add) Entries:						
Obligated Balance, Start of Year	**4**	**10**	**357**	**723**	**165**	**8,720**
Obligated Balance, End of Year	**$ 4**	**$ 9**	**$ 345**	**$ 803**	**$ 152**	**$ 9,136**
Budget Authority and Outlays, Net:						
Budget Authority, Gross	$ 38	$ —	$ 576	$ 529	$ 393	$ 20,148
Actual Offsetting Collections (-)	(1)	—	—	(7)	(394)	(2,564)
Change in Uncollected Payments, Federal Sources	—	—	—	—	2	63
Budget Authority, Net	**37**	**—**	**576**	**522**	**1**	**17,647**
Outlays, Gross	38	—	578	493	392	19,661
Actual Offsetting Collections (-)	(1)	—	—	(7)	(394)	(2,564)
Outlays, Net	37	—	578	486	(2)	17,097
Distributed Offsetting Receipts (-)	—	—	—	—	(5)	(5)
Agency Outlays, Net	**$ 37**	**$ —**	**$ 578**	**$ 486**	**$ (7)**	**$ 17,092**

Deferred Maintenance and Repairs For the Fiscal Years 2015 and 2014

Federal agencies are required to report information related to the estimated cost to remedy deferred maintenance of PP&E as required supplementary information in accordance with SFFAS No. 42, *Deferred Maintenance and Repairs*.

Maintenance and repairs (M&R) are activities directed toward keeping fixed assets in an acceptable condition. Activities include preventive maintenance; replacement of parts, systems, or components; and other activities needed to preserve or maintain the asset. M&R, as distinguished from capital improvements, excludes activities directed toward expanding the capacity of an asset or otherwise upgrading it to serve needs different from, or significantly greater than, its current use. Deferred maintenance and repairs (DM&R) are M&R activities that were not performed when they should have been or were scheduled to be and which, therefore, are put off or delayed for a future period. DM&R reporting enables the Government to be accountable to citizens for the proper administration and stewardship of its assets. Specifically, DM&R reporting assists users by providing an entity's realistic estimate of DM&R amounts and the effectiveness of asset maintenance practices the entities employ in fulfilling their missions.

Facilities, Buildings and Other Structures

It is NASA's policy to ensure that NASA-owned and operated assets are properly aligned with the NASA mission and are safe, environmentally sound, affordable, the right type and size, and in acceptable operating condition. NASA's facilities and equipment are maintained in the most cost effective fashion to minimize risk to processes and products, protect the safety and health of personnel and the environment, protect and preserve capabilities and capital investments, provide quality work places for NASA employees, and enable the Agency's mission. Estimates reported herein include DM&R for all facilities on-site or off-site that are owned, leased, occupied, or used by NASA (NASA Programs or Contractors) including heritage assets without regard to capitalization thresholds or depreciation status. NASA does not assess DM&R on general land parcels.

Equipment

Pursuant to the cost/benefit considerations provided in SFFAS No. 6 and SFFAS No. 42, NASA has determined that it is not cost beneficial to report DM&R on personal property (capital equipment).

Defining and Implementing M&R Policies

NASA uses a Deferred Maintenance parametric estimating method (DM method) in order to conduct a consistent condition assessment of its facilities, buildings and other structures (including heritage assets). This method measures NASA's current real property asset condition and documents real property deterioration. The DM method produces both a cost estimated of DM&R, and a Facility Condition Index (FCI). Both measures are indicators of the overall condition of NASA's facilities. The facilities condition assessment methodology involves an independent, rapid visual assessment of nine different systems within each facility to include: structure, roof, exterior, interior finish-

es, heating, ventilating and air conditioning (HVAC) systems, electrical, plumbing, conveyance, and program support equipment. The DM method is designed for application to a large population of facilities; results are not necessarily applicable for individual facilities or small populations of facilities.

Ranking and Prioritizing M&R Activities

NASA typically prioritizes the M&R activities for health, safety, life safety, fire detection and protection, and environmental requirements. NASA also prioritizes the M&R projects with a priority on mission critical facilities, followed by mission support, then Center support. The evaluation of the facility conditions by building type indicates that NASA continues to focus M&R activities on direct mission-related facilities and infrastructure.

Factors Considered in Determining Acceptable Condition Standards

NASA applies industry accepted codes and standards or equipment manufacturer's recommendations to all facilities related work. The standard of condition depends on the intended use, the mission criticality, utilization or health and safety aspects of that use.

Changes from Prior Year

As of September 30, 2015, $2.3 billion of DM&R was estimated to be required to return real property assets to an acceptable operating condition. This is an overall decrease of $27 million from September 30, 2014. The decrease in the DM&R estimate can be attributed to NASA's repair by replacement program.

Deferred Maintenance and Repair Costs

(In Millions of Dollars)	2015	2014
Asset Category		
General PP&E - Real Property	$ 2,320	$ 2,343
Heritage Assets - Real Property	6	10
Total Deferred Maintenance and Repair Costs	**$ 2,326**	**$ 2,353**

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NASA OFFICE OF INSPECTOR GENERAL

SUITE 8U37, 300 E ST SW
WASHINGTON, D.C. 20546-0001

November 13, 2015

TO: Charles F. Bolden, Jr.
Administrator

David P. Radzanowski
Chief Financial Officer

SUBJECT: *Audit of the National Aeronautics and Space Administration's Fiscal Year 2015 Financial Statements* (Report No. IG-16-006; Assignment No. A-15-004-00)

Dear Administrator Bolden and Mr. Radzanowski:

The Office of Inspector General contracted with the independent public accounting firm CliftonLarsonAllen LLP (CLA) to audit NASA's fiscal year (FY) 2015 financial statements. CLA performed the audit in accordance with the Government Accountability Office's *Government Auditing Standards* and the Office of Management and Budget's Bulletin No. 15-02, "Audit Requirements for Federal Financial Statements."

This audit resulted in an unmodified opinion on NASA's FY 2015 financial statements (see attached Enclosure). An unmodified opinion means the financial statements present fairly, in all material respects, the financial position and results of NASA's operations in conformity with U.S. generally accepted accounting principles.

CLA also reported on NASA's internal control and compliance with laws and regulations. For FY 2015, CLA identified two significant deficiencies: (1) accounting and reporting of Agency-wide asbestos-related cleanup costs and (2) information technology configuration management. CLA also reported noncompliance with the Single Audit Act, as amended.

CLA is responsible for the enclosed report and the conclusions expressed therein. Accordingly, we do not express an opinion on NASA's financial statements, internal control over financial reporting, or compliance with certain laws and regulations, including but not limited to the Federal Financial Management Improvement Act of 1996.

In fulfilling our responsibilities under the Chief Financial Officers Act of 1990, we provided oversight, coordination, and technical support to CLA and NASA personnel. We also monitored the progress of the audit, reviewed CLA's reports and related documentation, inquired of CLA's representatives, and ensured the firm met contractual requirements.

We appreciate the courtesies extended to our team during the audit. Please contact Jim Morrison, Assistant Inspector General for Audits, if you have any questions about the enclosed reports.

Sincerely,

Paul K. Martin
Inspector General

Enclosure

CliftonLarsonAllen LLP

www.cliftonlarsonallen.com

INDEPENDENT AUDITORS' REPORT

National Aeronautics and Space Administration:
Administrator
Inspector General

Report on the Financial Statements

We have audited the accompanying consolidated financial statements of the National Aeronautics and Space Administration (NASA), which comprise the consolidated balance sheet as of September 30, 2015, and the related consolidated statements of net cost and changes in net position, and the combined statement of budgetary resources for the year then ended, and the related notes to the consolidated financial statements (collectively referred to as financial statements).

Management's Responsibility for the Financial Statements

NASA management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America (U.S.); and this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the U.S.; the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States; and Office of Management and Budget (OMB) Bulletin No. 15-02*, Audit Requirements for Federal Financial Statements* (OMB Bulletin 15-02). Those standards and OMB Bulletin 15-02 require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of

INDEPENDENT AUDITORS' REPORT (Continued)

significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion on the Financial Statements

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of NASA as of September 30, 2015 and its net cost, changes in net position, and budgetary resources for the year then ended, in accordance with accounting principles generally accepted in the U.S.

Other Matters

Prior Year Financial Statements
NASA's financial statements as of and for the year ended September 30, 2014, were audited by other auditors, whose Independent Auditors' Report dated November 14, 2014 expressed an unmodified opinion on those financial statements.

Required Supplementary Information
Accounting principles generally accepted in the U.S. issued by the Federal Accounting Standards Advisory Board (FASAB) require that NASA's Management Discussion and Analysis (MD&A) in the Agency Financial Report (AFR), and Required Supplementary Information (RSI) and Required Supplementary Stewardship Information (RSSI) following the notes to the financial statements, be presented to supplement the financial statements. Such information, although not a part of the financial statements, is required by FASAB, who considers it to be an essential part of financial reporting for placing the financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the MD&A and other RSI in accordance with auditing standards generally accepted in the U.S., which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the financial statements, and other knowledge we obtained during our audit of the financial statements. We do not express an opinion or provide any assurance on the MD&A, RSI, and RSSI because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Other Information
Our audit was conducted for the purpose of forming an opinion on the financial statements as a whole. All other sections referred to in the AFR table of contents, exclusive of the Independent Auditors' Report, Financial Statements and Notes, MD&A, RSI, and RSSI, is presented for purposes of additional analysis and is not a required part of the financial statements. This information has not been subjected to the auditing procedures applied in the audit of the financial statements, and accordingly, we do not express an opinion or provide any assurance on it.

INDEPENDENT AUDITORS' REPORT (Continued)

Report on Internal Control over Financial Reporting and on Compliance and Other Matters, Based on an Audit of Financial Statements Performed in Accordance with Government Auditing Standards

Report on Internal Control Over Financial Reporting

In planning and performing our audit of the financial statements, we considered NASA's internal control over financial reporting (internal control) to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinion on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of NASA's internal control. Accordingly, we do not express an opinion on the effectiveness of NASA's internal control. We did not test all internal controls relevant to operating objectives as broadly defined by the Federal Managers' Financial Integrity Act of 1982.

A *deficiency* in internal control exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of NASA's financial statements will not be prevented, or detected and corrected on a timely basis. A *significant deficiency* is a deficiency, or combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies and therefore, material weaknesses or significant deficiencies may exist that were not identified. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, we did identify two deficiencies in internal control, listed below and described in **Exhibit A**, which we consider significant deficiencies:

- Accounting and Reporting for Asbestos-Related Cleanup Costs
- Information Technology Configuration Management

Report on Compliance and Other Matters

As part of obtaining reasonable assurance about whether NASA's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a material effect on the financial statements and related disclosures. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion.

The results of our tests disclosed one instance of noncompliance, which is required to be reported in accordance with *Government Auditing Standards* or OMB Bulletin 15-02. This noncompliance matter is listed below, and described in **Exhibit B**:

- Non-Compliance with the Single Audit Act (amended 1996) and Title 2 of the Code of Federal Regulations, *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards*

INDEPENDENT AUDITORS' REPORT (Continued)

Compliance with FFMIA Requirements

Under the Federal Financial Management Improvement Act (FFMIA), we are required to report whether the financial management systems used by NASA comply substantially with FFMIA Section 803(a) requirements. To meet this requirement, we performed tests of compliance with the (1) Federal financial management systems requirements, (2) applicable Federal accounting standards, and (3) the United States Standard General Ledger (USSGL) at the transaction level. However, providing an opinion on compliance with FFMIA was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests of FFMIA Section 803(a) requirements disclosed no instances in which NASA's financial management systems did not substantially comply with (1) Federal financial management systems requirements, (2) applicable Federal accounting standards, or (3) the USSGL at the transaction level.

Management's Responsibility for Internal Control and Compliance

Management is responsible for (1) evaluating the effectiveness of internal control over financial reporting based on criteria established under the Federal Managers' Financial Integrity Act (FMFIA), (2) providing a statement of assurance on the overall effectiveness on internal control over financial reporting, (3) ensuring NASA's financial management systems are in substantial compliance with FFMIA requirements, and (4) complying with other applicable laws, regulations, contracts, and grant agreements.

Auditors' Responsibilities

We are responsible for: (1) obtaining a sufficient understanding of internal control over financial reporting to plan the audit, (2) testing whether NASA's financial management systems comply substantially with the FFMIA requirements referred to above, and (3) testing compliance with certain provisions of laws, regulations, contracts, and grant agreements which could have a material effect on the financial statements.

We did not evaluate all internal controls relevant to operating objectives as broadly established by the FMFIA, such as those controls relevant to preparing statistical reports and ensuring efficient operations. We limited our internal control testing to testing controls over financial reporting. Because of inherent limitations in internal control, misstatements due to error or fraud, losses, or noncompliance may nevertheless occur and not be detected. We also caution that projecting our audit results to future periods is subject to risk that controls may become inadequate because of changes in conditions or that the degree of compliance with controls may deteriorate. In addition, we caution that our internal control testing may not be sufficient for other purposes.

We did not test compliance with all laws, regulations, contracts, and grant agreements applicable to NASA. We limited our tests of compliance to certain provisions of laws, regulations, contracts, and grant agreements which could have a material effect on the financial statements. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. We caution that noncompliance may occur and not be detected by these tests and that such testing may not be sufficient for other purposes. Also, our work on FFMIA would not necessarily disclose all instances of noncompliance with FFMIA requirements.

INDEPENDENT AUDITORS' REPORT (Continued)

Status of Prior Year's Control Deficiencies

The fiscal year (FY) 2014 Independent Auditors' Report dated November 14, 2014 did not identify any material weaknesses or significant deficiencies in internal control over financial reporting, or instances of noncompliance with tested provisions of laws, regulations, contracts, and grants.

Purpose of the Report on Internal Control Over Financial Reporting and the Report on Compliance and Other Matters

The purpose of the Report on Internal Control Over Financial Reporting and the Report on Compliance and Other Matters sections of this report is solely to describe the scope of our testing of internal control and compliance and the result of that testing, and not to provide an opinion on the effectiveness of NASA's internal control or on compliance. These reports are an integral part of an audit performed in accordance with *Government Auditing Standards* in considering NASA's internal control and compliance. Accordingly, these reports are not suitable for any other purpose.

Management's Response to Findings

Management's response to the findings identified in our report is presented in **Exhibit C**.

- We have met with certain NASA management officials to review their response and some additional information they provided, and we still maintain that these findings are significant deficiencies or reportable noncompliance matters, as defined by professional standards.

CliftonLarsonAllen LLP

CliftonLarsonAllen LLP

Calverton, Maryland
November 13, 2015

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT A
Significant Deficiencies
September 30, 2015

1. Accounting and Reporting for Asbestos-Related Cleanup Costs

The Federal Accounting Standards Advisory Board (FASAB) has issued a variety of technical communications beginning in 1998 relating to the accounting for environmental liabilities. FASAB Technical Release (TR) 02*, Determining Probable and Reasonably Estimable for Environmental Liabilities in the Federal Government*, set the tone for additional rules and guidance in future years for all environmental liabilities. TR 02 notes that federal agencies should make "*every effort ….. to develop an estimate* " of its environmental liabilities. It goes on to note the following – *"The fact that an agency does not have a department wide comprehensive study completed does not exempt an agency from making its best effort to estimate a liability for financial statement purposes, or for recognizing a liability for that portion of its obligation that can be estimated."* NASA is applying TR 02 principles in its accounting for its environmental liabilities, except with respect to asbestos, resulting in an environment liability of $1.4 billion at September 30, 2015. NASA has yet to complete its study of asbestos, but that should not prevent NASA from making its best effort to estimate a full liability for the abatement of asbestos.

Since 2006, the FASAB provided additional rules and specific implementation guidance for the recognition and measurement of Asbestos-related cleanup costs to further clarify previously issued pronunciations in the accounting standards. In 2006, the FASAB issued Technical Bulletin (TB) 2006-1, *Recognition and Measurement of Asbestos-Related Cleanup Costs,* (TB 2006-1). This TB made reference to FASAB TR 02 referred to above. In 2010, the FASAB issued Technical Release 10, *Implementation Guidance on Asbestos Clean Up Costs Associated with Facilities and Installed Equipment* (TR 10).

Even though TR 10 was issued in 2010, in order to provide federal agencies even more time (since 2006) to gather the information necessary to comply with the requirements, the implementation of TR 10 was delayed until fiscal year (FY) 2013. TR 10 provides federal agencies with a variety of methodologies for estimating asbestos-related cleanup costs for each real property or group of real properties, as follows:

1. A property-specific cost estimate based on survey data (most accurate, if available); or
2. An extrapolation of historical cost or cost estimates for asbestos cleanup of similar real property(ies); or
3. A cost model used for an individual real property or group of similar real properties and information from industry-specific cost estimation publications or standardized cost factors developed for each state; or
4. Other reasonable methodology.

Many federal agencies implemented this guidance in estimating the asbestos-related cleanup costs in FY 2013. In contrast, faced with the difficulties involved in coordinating the efforts of various offices at different operating locations throughout the United States, NASA relied on the following provision of TR 10 "[i]f the information … is either not available or not sufficient to support assumptions in lieu of actual data, yet the existence of asbestos has been identified …, then the removal of asbestos may be considered probable but not reasonably estimable at that time. The existence of asbestos and a statement that such an estimate cannot be made should be disclosed in the notes to the financial statements. The agency should estimate and recognize any other identifiable costs (e.g., asbestos survey)." As such, in FYs 2013 and 2014, NASA quantified and reported only the minimum identifiable costs required by TR 10 – those of

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT A
Significant Deficiencies
September 30, 2015

completing site-specific inventories (surveys) of asbestos, and gathering reliable cost estimates regarding the removal of asbestos at its 14 operating locations.

In 2015, NASA continued to use this basic methodology and did not make any substantial attempts to develop a process to gather the information necessary to be able to implement the full intended breadth of the requirements, to record an estimate of the anticipated future costs of the removal and disposal (abatement) of asbestos containing material at various NASA properties. At September 30, 2015, NASA's reported liability of $22 million is substantially the same amount as that recorded in both FYs 2014 and 2013 (the required implementation date of TR 10). NASA has taken this approach since FY 2013 based on its continued assessment that data was not sufficient to make a more reasonable estimate of the full cost of the asbestos abatement.

However, during our audit we concluded that sufficient information has been available for NASA to make a reasonable estimate of its future asbestos abatement costs at September 30, 2015. FASAB No. 5, *Accounting for Liabilities in the Federal Government*, provides guidance for agencies to develop estimates of types of liabilities in preparing their financial statements. Such guidance allows management to make assumptions in developing estimates with the information available at a point in time, and adjust such estimate in future years when actual or more extensive information becomes available. We do not believe management has used all information available to make a reasonable estimate of the full liability for the abatement of asbestos.

NASA engaged a variety of contractors over several years to conduct surveys in order to identify asbestos contamination in its old buildings. Based on these surveys, NASA identified substantial instances of asbestos at each of its 14 operating locations across the U.S., which currently comprise 46 million square feet in 1,727 buildings. During our site visits to three NASA operating locations, our engineers who specialize in the evaluation of asbestos abatement, conducted interviews with NASA personnel and inspected a sample of the asbestos surveys available for three buildings at one of the visited locations. Our engineers concluded that the existing survey information could serve as an excellent starting point for quantifying the asbestos abatement liability for financial accounting and reporting purposes. In order to prove this point, our engineers used *RSMeans*, which is an established and widely recognized cost estimation tool in the industry, and estimated the asbestos abatement costs for those buildings at September 30, 2015 to be approximately $1.6 million.

The total estimated abatement cost we calculated for just three buildings (360,225 square feet) we examined at one operating location was $1.6 million, compared to NASA's current cost estimate for surveys assigned to all of that operating location's buildings with asbestos containing material (121 buildings with 4,034,941 square feet) of $1.4 million. Our estimate equates to $4.40 per square foot for asbestos removal versus NASA's estimate of $0.34 per square foot for asbestos surveys. Applying the $4.40 square footage factor to all facilities with asbestos would result in a potential liability of $225 million. However, as provided for in professional accounting standards, assumptions in developing estimates with the information available at a point in time are allowed, with the expectation that such estimates would be adjusted in future years when actual or more extensive information becomes available. Accordingly, using other data and information available during our audit, we estimated NASA's

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT A
Significant Deficiencies
September 30, 2015

asbestos abatement liability to be approximately $144 million, which we believe would be more representative of the initial liability needed for all of NASA's operating locations.

We therefore suggested that NASA adjust its financial statements by $122 million, representing our estimated asbestos liability of $144 million versus the aforementioned $22 million that is reflected in the accompanying financial statements at September 30, 2015. NASA chose not to record this additional estimated liability ($122 million) in its FY 2015 financial statements. Since this estimated understatement of NASA's liabilities at September 30, 2015 was not material to the financial statements as a whole, we did not modify our opinion on NASA's FY 2015 financial statements.

Based on our audit work, we concluded that NASA has not proactively attempted to apply the guidance set forth in the standards issued since FY 2006, especially the specific guidance provided in TR 10 issued in FY 2010, to obtain the data necessary to estimate and recognize asbestos abatement costs. We believe this data could be provided by the operating locations from their site-specific asbestos surveys, similar to the data that we obtained from one operating location during our site visit. The survey information could be further enhanced with data gathered from NASA's procurement office and actual abatement projects that have been conducted annually at some or all of NASA's operating locations. NASA Headquarters management personnel have not adequately considered, obtained, and utilized information from those operating locations who reported to us that they could estimate the asbestos abatement costs using their surveys.

As demonstrated above, there is information available at NASA, at a minimum, to develop a cost model for groups of similar real properties with substantial amounts of asbestos. This approach is compliant with the methodologies set forth in TR 10, and is consistent with the methodologies used by other Federal agencies for the same purpose.

After we brought this matter to the attention of management and provided proposed solutions, NASA prepared a preliminary action plan that details how NASA will improve its asbestos liability estimation process, in order to record a liability, which reflects NASA's estimate for asbestos abatement at its operating locations, by September 30, 2016.

We have classified this matter as a significant deficiency in internal control pursuant to the American Institute of Certified Public Accountants (AICPA) Clarified Statements on Auditing Standards (AU-C). AU-C Section 265, *Communicating Internal Control Related Matters in an Audit* establishes standards and provides guidance on communicating matters related to an entity's internal control over financial reporting identified in an audit of financial statements. The Standard notes that *"The severity of the deficiency or combination of deficiency in internal control depends not only on whether a misstatement has actually occurred but also on:*

- *the magnitude of the potential misstatement resulting from the deficiency or deficiencies, and*
- *whether there is a reasonable possibility that the entity's controls will fail to prevent, or detect and correct, a misstatement of an account balance or disclosure. A reasonable possibility exists when the chance of the future event or events occurring is more than remote."*

The Standard further states that significant deficiencies *"may exist even though the auditor has not identified misstatements during the audit."*

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT A
Significant Deficiencies
September 30, 2015

As noted above, since FY 2013 when TR 10 was effective, NASA had not yet implemented an effective, robust process to obtain the necessary information to be able to adequately recognize and measure the cost of abating its substantial instances of asbestos at any of its 14 operating locations across the United States. Accordingly, this matter has been classified as a significant deficiency in internal control, meriting the attention by those charged with governance of NASA.

Recommendations:
We recommend that NASA management develop and then implement a comprehensive plan to record and report liability estimate for the asbestos-related cleanup costs at all operating locations, as follows:

1. NASA Headquarters personnel should obtain and review all completed asbestos surveys, as well as any documented asbestos removal costs, and coordinate with the operating locations to understand the information and develop a methodology for estimating asbestos removal costs. NASA should use one or more of the following methodologies outlined in TR 10 for determining, estimating, and recognizing asbestos cleanup costs:
    a) A property-specific cost estimate based on survey data (most accurate, if available); or
    b) An extrapolation of historical cost or cost estimates for asbestos cleanup of similar real property(ies); or
    c) A cost model used for an individual real property or group of similar real properties and information from industry-specific cost estimation publications or standardized cost factors developed for each state; or
    d) Other reasonable methodologies.

2. Benchmark with other federal agencies that have already implemented the standards relating to the accounting for asbestos and determine if and how those practices could be applied at NASA.

3. Document the newly established policies and procedures for fiscal year 2016, including the reviews that need to take place to ensure consistency of treatment between the various operating locations.

4. Provide adequate tools to facilitate the exchange of asbestos-related information between the NASA operating locations and the NASA Headquarters.

5. Implement an annual process that requires all operating locations to gather and review location-specific information, such as completed asbestos surveys and actual costs incurred to remove asbestos, including site preparation and disposal costs.

6. Implement an agency wide procurement policy to request contractors to break out the asbestos site preparation, abatement, and removal costs in the bids that they submit for such projects. Otherwise, request each operating location to obtain such information from local contractors with asbestos abatement experience.

7. For the period during which costs of actual abatement projects are not readily available, work with the procurement office to develop NASA's own estimates to use as a

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT A
Significant Deficiencies
September 30, 2015

benchmark for securing contracts to perform future asbestos abatement projects, and use such amounts in developing NASA's asbestos liability estimate.

8. To the extent that data specific to the operating locations is not available, utilize industry standards and tools (i.e. RSMeans) available to develop asbestos cleanup cost estimates.

9. Provide for the accrual estimate to be updated annually to reflect new information obtained from asbestos abatement projects, other industry data sources, and updated or newly performed asbestos surveys.

10. Provide for the annual revision of the newly implemented policies and procedures until the process fully matures.

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT A
Significant Deficiencies
September 30, 2015

2. Information Technology Configuration Management

Background

The Government Accountability Office (GAO) has stated that protecting government computer systems has never been more important because of the complexity and interconnectivity of systems (including Internet and wireless), the ease of obtaining and using hacking tools, the steady advances in the sophistication and effectiveness of attack technology, and the emergence of new and more destructive attacks. Furthermore, the boundary lines between internal and external networks are diminishing as a result of increased interconnectivity. Contributing to government organizations security program weaknesses are GAO cited challenges such as maintaining software with the current versions and latest security patches to protect against known vulnerabilities.

To address these issues throughout the government after the Office of Personnel Management breach reported in FY 2015, the Office of Management and Budget (OMB) required Federal agencies to further improve Federal cybersecurity and protect systems against evolving threats. The United States Chief Information Officer (CIO) launched a 30-day Cybersecurity Sprint on June 12, 2015, instructing Federal agencies to immediately take a number of steps to further protect Federal information and assets and improve the resilience of Federal networks. In addition, agencies were required to patch critical vulnerabilities immediately since the vast majority of cyber intrusions exploit well known vulnerabilities that are easy to identify and correct.

Configuration Management Conditions

NASA relies extensively on Information Technology (IT) system controls to initiate, authorize, record, process, summarize, and report financial transactions in the preparation of its financial statements. Internal controls over these operations are essential to ensure the integrity, confidentiality, and reliability of critical data while reducing the risk of errors, fraud, and illegal acts.

Financial applications rely on the protections provided by configuration controls to ensure application controls can be effective. IT controls provide reasonable assurance that information system resources are authorized, and systems are configured and operated securely as intended. Inadequate configuration controls over IT financial environments could lead to unauthorized individuals using system weaknesses to circumvent security controls to read, modify, or delete critical or sensitive information and programs. Such weaknesses seriously diminish the reliability of information produced by all of the applications supporting the IT financial environment and increase the risk of fraud and misstatement.

NASA's networks support workstations, servers, utilities, software tools, routers, databases, and communications that provide connectivity, availability, and integrity to NASA's financial system and its users. We found that NASA did not have an effective process for monitoring, detecting, and remediating known vulnerabilities. In addition, NASA did not have compensating controls to lessen the risk of compromise or to mitigate the risk of unsupported software, unpatched systems, and default settings and passwords. Alleviating these risks represent essential components of an effective configuration management program. Accordingly, such compensating controls cannot be relied upon for an extended period of time and the following core weaknesses should be addressed immediately:

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT A
Significant Deficiencies
September 30, 2015

a) ***Patch Management*** - We found that patches and fixes for critical and high severity vulnerabilities pertaining to the IT financial environment were not applied timely. The longer the known vulnerability is exposed on the network, the greater the risk that the vulnerability can be exploited. A significant number of critical and high severity vulnerabilities were noted but were not mitigated within the 30 – 90 day period required by NASA policy and National Institute of Standards and Technology (NIST) requirements.

b) ***Configuration Weaknesses and Default Passwords*** - We found that operating systems and applications were poorly configured with default settings, which placed the financial systems and supporting network at unnecessary risk of unauthorized access, alteration, or destruction.

c) ***Unsupported Software*** - We found unsupported software that is no longer fully maintained by the software vendors, which exposes NASA to vulnerabilities that cannot be fully mitigated. Unsupported or outdated software versions expose NASA systems to known vulnerabilities for an extended period of time.

NASA did not appropriately document, approve or include compensating controls in the system security plan to address the noted vulnerabilities. In addition, NASA did not provide an adequate rationale for how its compensating controls provide an equivalent security.

OMB Circular A-130, Appendix III, *Security of Federal Automated Information Resources*, states that Agencies shall implement and maintain a program to assure that adequate security is provided for all agency information collected, processed, transmitted, stored, or disseminated in general support systems and major applications.

NIST Special Publication 800-53, *Security and Privacy Controls for Federal Information Systems and Organizations,* Revision 4, security control: SI-2 Flaw Remediation, states that an organization must *"[i*]dentify information systems affected by announced software flaws, including potential vulnerabilities resulting from those flaws, and report this information to designated organizational personnel with information security responsibilities. Security-relevant software updates include, for example, patches, service packs, hot fixes, and anti-virus signatures. Organizations also address flaws discovered during security assessments, continuous monitoring, incident response activities, and system error handling. Organizations take advantage of available resources such as the Common Weakness Enumeration (CWE) or Common Vulnerabilities and Exposures (CVE) databases in remediating flaws discovered in organizational information systems. By incorporating flaw remediation into ongoing configuration management processes, required/anticipated remediation actions can be tracked and verified."

In addition, NIST Special Publication 800-18 Rev. 1 states *"Compensating security controls are the management, operational, or technical controls employed by an agency in lieu of prescribed controls in the low, moderate, or high security control baselines, which provide equivalent or comparable protection for an information system. Compensating security controls for an information system will be employed by an agency only under the following conditions:*

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT A
Significant Deficiencies
September 30, 2015

i. *the agency selects the compensating controls from the security control catalog in NIST SP 800-53;*
ii. *the agency provides a complete and convincing rationale and justification for how the compensating controls provide an equivalent security capability or level of protection for the information system; and*
iii. *the agency assesses and formally accepts the risk associated with employing the compensating controls in the information system. The use of compensating security controls must be reviewed, documented in the system security plan, and approved by the authorizing official for the information system."*

By not effectively implementing and enforcing a configuration management program that addresses serious security weaknesses, there is an increased risk financial information may be inadvertently or deliberately misused, which may result in improper information disclosure, manipulation, or theft. Additionally, inappropriate or unnecessary changes may be made to key financial information systems, which could result in the compromise of financial information.

We have classified these matters collectively as a significant deficiency in internal control pursuant to the American Institute of Certified Public Accountants Clarified Statements on Auditing Standards (AU-C). AU-C Section 265, *Communicating Internal Control Related Matters in an Audit,* establishes standards and provides guidance on communicating matters related to an entity's internal control over financial reporting identified in an audit of financial statements. The Standard notes that *"[t]he severity of the deficiency or combination of deficiencies in internal control depends not only on whether a misstatement has actually occurred but also on:*

- *the magnitude of the potential misstatement resulting from the deficiency or deficiencies, and*
- *whether there is a reasonable possibility that the entity's controls will fail to prevent, or detect and correct, a misstatement of an account balance or disclosure. A reasonable possibility exists when the chance of the future event or events occurring* ***is more than remote****."*

The Standard further states that significant deficiencies *"may exist even though the auditor has not identified misstatements during the audit."*

In the context of our review of NASA's systems, our evaluation of whether a significant deficiency exists is not that we were actually able to access NASA's financial applications and manipulate NASA's financial records. Instead, our tests of controls were concerned with whether controls provide reasonable assurance that configuration management controls are operating effectively to prevent unauthorized changes to network components that support NASA's financial systems.

We have provided NASA's management with a separate limited distribution report that further details the vulnerabilities in NASA's systems. Due to the sensitivity of the matters noted, we have not discussed those matters in this report.

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT A
Significant Deficiencies
September 30, 2015

Recommendations:
We recommend that NASA continue to analyze and prioritize remediation efforts to accomplish security and control objectives with a focus on these key tasks that include, but are not limited to:

1. Implement improved mechanisms to continuously identify and remediate security deficiencies on the NASA network infrastructure that supports financial systems.

2. Implement an improved patch and configuration management program to address security deficiencies identified during our evaluation of NASA's applications and network infrastructures.

3. Develop and implement a strategic plan to address outdated technology which are no longer supported by the vendor.

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT B
Non-Compliance with Laws and Regulations
September 30, 2015

Non-Compliance with the Single Audit Act (amended 1996) and Title 2 of the Code of Federal Regulations, *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards*

NASA management had not taken adequate steps to ensure that the responsibilities set forth under the Single Audit Act (amended 1996) and Title 2 of the Code of Federal Regulations, *Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards* (Uniform Guidance), were assigned within NASA's organizational structure, and are being acted upon in a timely manner.

Specifically, policies and procedures, including the NASA Federal Acquisition Regulation Supplement (NFS), were not properly designed to achieve compliance with all facets of the Single Audit Act (pursuant to the Office of Management and Budget (OMB) Circular No. A 133, *Audits of States, Local Governments, and Non-Profit Organizations*), and had not been subsequently updated to comply with the newly issued Uniform Guidance. For example, we noted that NASA is not adequately monitoring its grantees' single audit reports and has not implemented the structures and data gathering mechanisms necessary to achieve compliance with the Single Audit Act and the Uniform Guidance § 200.110, *Effective/applicability date*, and Section 200, Subpart F.

We did not find evidence that NASA personnel determined that all its grantees that met the requirements, had single audits performed pursuant to the requirements in the Uniform Guidance and, accordingly, submitted such audits to the Federal Audit Clearinghouse (FAC) in a timely manner. In addition, we did not find evidence that NASA management actively reviewed the FAC to identify whether the single audit reports of all its grantees contained findings that might have implications for NASA's grants. NASA management's review of the FAC is only performed during the pre-award risk assessment of its grant applicants. FAC reviews after the award phase have been delegated and are being performed in a limited manner as further described below.

NFS 1842.7301, "NASA External Audit Follow-up System," section (d)(2), requires the NASA Office of Inspector General (OIG) to report single audit findings and questioned costs on NASA's direct awards to NASA for issuance of management decisions. The OIG's compilation of the findings on NASA's direct awards is a management role that fulfils only one facet of management's responsibilities, whereas other facets of management's responsibilities related to grantee compliance and monitoring are not being performed. By way of example, the OIG does not monitor whether specific grantees have submitted their single audit reports when they are due. Also, the OIG does not monitor those high risk grantees that did not have NASA's direct awards tested as part of their single audits. Accordingly, follow up action on single audit findings and questioned costs was only performed on those grantees that have actually filed single audit reports in the FAC with findings on NASA's direct awards, but only when it was initiated by the NASA OIG.

Even though the Uniform Guidance § 200.513, *Responsibilities*, requirement for grant making organizations to assign a Single Audit Accountable Official and Key Management Single Audit Liaison has been in place since December 2013, NASA did not name and communicate the names of these officials to OMB until September 2015.

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT B
Non-Compliance with Laws and Regulations
September 30, 2015

Accordingly, NASA is not in compliance with the Single Audit Act (amended 1996) and Title 2 of the Code of Federal Regulations, *Uniform Administrative Requirement, Cost Principles, and Audit Requirements for Federal Awards* (Uniform Guidance). This situation has caused NASA's resources to be at risk as follows:

- Awardees may not be receiving single audits.
- Single audits may not be completed in a timely manner, which delays the oversight conducted for those awards and the corrective actions to address any internal controls deficiencies that were identified in the audit and the recovery of any questioned costs.
- NASA management may not have ensured that corrective actions resulting from all single audits performed have indeed been implemented or that questioned costs are recoverable. Without such timely follow-up, those awardee internal control weaknesses may continue and result in other unallowable costs.
- NASA may continue to award grants to those awardees that are not complying with the Single Audit Act. This situation continues to place those funds at risk.

Recommendations:
We recommend that NASA's management take appropriate and immediate steps to comply with the requirements of the Single Audit Act and the related Uniform Guidance, *2 CFR § 200.513, Responsibilities*. To begin to ensure that proper oversight is implemented, NASA must update its policies and procedures, including the NFS to require that NASA management perform the following regulatory oversight of its grants program:

1) Annually determine which grantees should be obtaining a single audit, and implement a system to monitor the timely receipt and review of the required audits.

2) Provide technical advice and counsel to auditees and auditors.

3) Follow-up on audit findings and questioned costs to ensure that the recipient takes appropriate and timely corrective action in accordance with the Uniform Guidance, and NASA management is timely and properly concluding on the adequacy of such actions, including whether the identified questioned costs are truly unallowable. As noted above, the existing processes are being initiated by the NASA OIG.

4) Evaluate annually whether a compliance supplement should be developed and submitted to OMB to provide guidance to auditors regarding specific NASA compliance requirements where noncompliance may have a direct and material effect on NASA's programs. After a compliance supplement has been submitted to OMB, then provide OMB annual updates to the compliance supplement and work with OMB to ensure that the compliance supplement focuses the auditor to test the compliance requirements most likely to cause improper payments, fraud, waste, abuse or generate audit findings for which NASA will take sanctions.

5) With respect to the required Single Audit Accountable Official and the Key Management Single Audit Liaison:
    a) Clearly identify the responsibilities of each role,
    b) Offer the necessary training and support to the individuals assigned to these roles, and
    c) Inform OMB of any changes in those assigned to each role.

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT C
Management's Response to Independent Auditors' Report
September 30, 2015

National Aeronautics and Space Administration

Headquarters
Washington, DC 20546-0001

November 13, 2015

Reply to Attn of: Office of the Chief Financial Officer

TO: Inspector General

FROM: Chief Financial Officer

SUBJECT: Management Response to Report of Independent Auditors

I am pleased to accept your audit report on the Consolidated Financial Statements of the National Aeronautics and Space Administration (NASA) for FY 2014 and FY 2015. The Agency's efforts and achievements toward improved financial management are clearly reflected in the audit opinion. For the fifth year in a row, NASA has received an unmodified "clean" opinion on its financial statements with no reported material weaknesses. Further, NASA continues to be in substantial compliance with the Federal Financial Management Improvement Act.

NASA's independent auditors (CliftonLarsonAllen (CLA)) reported two significant deficiencies related to 1) NASA's accounting and reporting for asbestos-related cleanup costs, and 2) Information Technology (IT) configuration management. The auditors also reported a non-compliance with the Single Audit Act. NASA concurs with the Single Audit Act non-compliance and has already implemented actions to remediate this finding. However, NASA does not concur with the auditor's classification of the two significant deficiencies for the reasons cited below.

Accounting and Reporting for Asbestos-related Cleanup Costs

NASA is in compliance with the accounting standards cited by CLA relative to estimating asbestos-related cleanup costs. NASA has identified real properties that reasonably contain asbestos, determined the type and quantity of asbestos in many of those buildings and facilities, and determined that sufficient or supportable cost information is *not* available to reasonably estimate an Agency-wide asbestos-related cleanup cost. Therefore, in compliance with Federal Accounting Standards Advisory Board (FASAB) guidance for situations in which the existence of asbestos is probable and the remediation costs are not be reasonably estimable at that time, NASA has recognized the anticipated cost of conducting future studies necessary to develop a reasonable estimate.

NASA management is ultimately responsible for all costs reported in its financial statements, and must be satisfied with the underlying assumptions used to develop those estimates before recording any amounts to those statements. The assumptions necessary for the independent auditor to develop its estimate do not meet NASA management's requirements for a fully supported financial statement estimate, including the ability to withstand audit scrutiny over time.

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT C
Management's Response to Independent Auditors' Report
September 30, 2015

Consequently, NASA has determined there is not a reasonable basis for recording CLA's recommended adjustment to its FY 2015 financial statements, and we do not concur that the accrued liability for asbestos-related cleanup cost is misstated. Therefore, NASA does not agree with CLA's classification of a significant deficiency in internal controls over financial reporting for asbestos cleanup costs.

NASA plans to continue pursuing reasonable measures to improve the estimate as reasonable and sufficient information is developed or identified. NASA appreciates the work and insights provided by the independent auditor on this matter, as it will assist in our efforts to review the asbestos cleanup cost estimation methodology in FY 2016.

Information Technology Configuration Management

NASA acknowledges that CLA has identified opportunities for improvement within MSFC's overall vulnerability management program. NASA has taken these findings seriously and has already addressed a substantial portion of the findings, while others NASA was aware of and had accepted the risk based on business need and compensating controls. While NASA does not dispute the general results of CLA's findings, NASA disagrees with the conclusion regarding the significance of these findings in terms of the likelihood that NASA's comprehensive set of controls would fail to prevent, or detect and correct, a misstatement of an account balance or disclosure on a timely basis.

CLA relied on the general Common Vulnerability Scoring System (CVSS) in their assessment of risk without considering the specific context of NASA's network architecture, inherent compensating controls, and overall monitoring and detection capabilities. CLA's conclusions are non-specific to NASA's environment and are based primarily on the general concept of exploiting a vulnerability and then moving laterally to compromise the financial system. However, CLA did not document specific paths from a vulnerability to the financial system, and did not adequately consider the probability of this occurring based on NASA's compensating controls.

Significant defense-in-depth controls are deployed to further protect the financial system. CLA's conclusion did not adequately consider NASA's implementation of NIST standards such as SP 800-54 Border Gateway Protocol Security, SP 800-94 Guide to Intrusion Detection and Prevention Systems (IDPS) and SP 800-53 Security and Privacy Controls in reaching their overall conclusion.

The layers of security that NASA has in place, when viewed comprehensively, provide a framework of internal controls (preventative and detective) that provide reasonable assurance that a security event will be detected and mitigated through the normal course of business.

Furthermore, NASA has a comprehensive series of financial internal controls including transaction reviews and approvals, monthly reconciliations, and account relationship monitoring activities that provide further decrease the likelihood that a misstatement of the financial statements will be prevented or detected.

In conclusion, in assessing the likelihood that an entity's controls will fail to prevent, or detect and correct, a misstatement of an account balance or disclosure it is important to consider the entirety and specifics of the control environment. CLA has not provided supporting rationale

INDEPENDENT AUDITORS' REPORT (Continued)
EXHIBIT C
Management's Response to Independent Auditors' Report
September 30, 2015

that adequately considers NASA's network and application controls nor our financial internal controls in reaching their conclusion.

I appreciate the efforts and leadership of NASA's OIG and of the auditors throughout the audit of NASA's financial statements and related internal controls over financial reporting. Please convey my sincere appreciation and thanks to your team for the professionalism and cooperation exhibited during this audit.

David P. Radzanowski
Chief Financial Officer

Concur:

Renee Wynn
Chief Information Officer

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Other Information

Image Caption: NASA astronaut Scott Kelly shared this photograph on social media, taken from the International Space Station on Sept. 10, 2015. (Credit: NASA)

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NASA OFFICE OF INSPECTOR GENERAL

SUITE 8U37, 300 E ST SW
WASHINGTON, D.C. 20546-0001

November 5, 2015

TO: Charles F. Bolden, Jr.
Administrator

SUBJECT: *2015 Report on NASA's Top Management and Performance Challenges*

Dear Administrator Bolden,

As required by the Reports Consolidation Act of 2000, this memorandum provides our views of the top management and performance challenges facing NASA for inclusion in its fiscal year (FY) 2015 Agency Financial Report.

In deciding whether to identify an issue as a top challenge, we considered its significance in relation to the Agency's mission; its susceptibility to fraud, waste, and abuse; whether the underlying causes are systemic in nature; and the Agency's progress in addressing the challenge. We previously provided a draft copy of our views to NASA officials and considered all comments received when finalizing this report. Management comments can be found in Appendix A of the enclosure.

Looking to 2016, we identified the following as the top management and performance challenges facing NASA:

- Space Flight Operations in Low Earth Orbit: Managing the International Space Station and the Commercial Cargo and Crew Programs
- Positioning NASA for Deep Space Exploration: Developing the Space Launch System, Orion Capsule, and associated Ground Systems, and Mitigating Health and Performance Risks for Extended Human Missions
- Managing NASA's Science Portfolio
- Ensuring the Continued Efficacy of the Space Communications Networks
- Overhauling NASA's Information Technology Governance
- Securing NASA's Information Technology Systems and Data
- Managing NASA's Aging Infrastructure and Facilities
- Ensuring the Integrity of the Agency's Contracting and Grants Processes

During the coming year the NASA Office of Inspector General will conduct audit and investigative work that focuses on NASA's continuing efforts to meet these challenges. Please contact Jim Morrison, Assistant Inspector General for Audits, if you have any questions.

Sincerely,

Paul K. Martin
Inspector General

cc: Dava Newman
Deputy Administrator

Robert Lightfoot
Associate Administrator

Lesa Roe
Deputy Associate Administrator

Michael French
Chief of Staff

Enclosure – 1

NASA's Top Management and Performance Challenges, November 2015

NASA's ability to sustain its ambitious exploration, science, and aeronautics programs continues to be driven in large measure by whether the Agency is able to adequately fund such high-profile initiatives as its commercial cargo and crew programs, Space Launch System rocket and Orion capsule, James Webb Space Telescope, and the personnel and infrastructure associated with these and other projects.

In October 2015, NASA and the rest of the Federal Government began another fiscal year without a full-year appropriation. This uncertainty about funding levels, while inconvenient for some NASA programs, may be significantly disruptive to others – most prominently the Agency's efforts to use American corporations to transport astronauts to the International Space Station (ISS or Station) instead of paying the Russian space agency upwards of $75 million per person.[1] Accordingly, we believe the principal challenge facing NASA leaders in fiscal year (FY) 2016 will be to effectively manage the Agency's varied programs in an uncertain budget environment.

In addition to this overarching challenge, NASA managers face a myriad of project- and facility-specific challenges. This annual report provides the Office of Inspector General's (OIG) independent assessment of the top management and performance challenges facing the Agency, which we organize under the following topics:

- Space Flight Operations in Low Earth Orbit: Managing the International Space Station and the Commercial Cargo and Crew Programs
- Positioning NASA for Deep Space Exploration: Developing the Space Launch System, Orion Capsule, and associated Ground Systems, and Mitigating Health and Performance Risks for Extended Human Missions
- Managing NASA's Science Portfolio
- Ensuring the Continued Efficacy of the Space Communications Networks
- Overhauling NASA's Information Technology Governance
- Securing NASA's Information Technology Systems and Data
- Managing NASA's Aging Infrastructure and Facilities
- Ensuring the Integrity of the Agency's Contracting and Grants Processes

In deciding whether to identify an issue as a top challenge, we considered the significance of the challenge in relation to NASA's mission; whether its underlying causes are systemic in nature; the challenge's susceptibility to fraud, waste, and abuse; and the Agency's progress in addressing the challenge. We have not listed the challenges in priority order.

[1] The Office of Inspector General is conducting a follow-up audit examining the status of NASA's Commercial Crew Program and as part of that review will examine the effects of funding reductions on NASA's plans to begin commercial crew launches by late 2017.

Finally, the eight challenges described in this report track in most major respects to the seven challenges identified in our November 2014 report. For presentation purposes, we divided last year's challenge of "Managing NASA's Human Space Exploration Programs" into two separate challenges – crewed space flight in low Earth orbit and human exploration in deep space – to focus on the programs associated with each of these separate but related challenges.

Space Flight Operations in Low Earth Orbit – Managing the International Space Station and the Commercial Cargo and Crew Programs

NASA has been operating the ISS in low Earth orbit, an orbit with an altitude of less than 1,200 miles above the Earth, for more than 15 years and plans to extend Station operations until at least 2024.[2] Over the past decade, the Agency has entered into contracts worth billions of dollars with private companies to develop commercial transportation systems to supply the ISS with cargo and end U.S. dependency on Russia for crew transportation.

The International Space Station

The result of an international effort to build and operate a permanently crewed space station in low Earth orbit, the ISS is a unique technological achievement and a key part of NASA's plans to send humans to Mars. Specifically, the Agency utilizes the ISS as a research platform to study and develop countermeasures to mitigate a variety of risks associated with human travel and long-term habitation in space. In addition to NASA research, the Station serves as a laboratory for other Government agencies and private entities to conduct scientific research in fields such as health and medicine, robotics, manufacturing, and propulsion.

International Space Station

Source: NASA.

In August 2015, the Senate endorsed NASA's proposal to extend Station operations until at least 2024.[3] As NASA moves forward with this plan, it faces the challenge of ensuring a spacecraft originally designed and tested for a 15-year life span will continue to operate safely and economically for an additional 11 years. Moreover, as it prepares to send astronauts deeper into space for extended periods of time, NASA must continue to be strategic in how it utilizes the Station's limited research capabilities.

[2] NASA has asked The Boeing Company, the primary ISS support contractor, to examine the feasibility of extending Station operations until 2028.

[3] U.S. Commercial Space Launch Competitiveness Act, S1297 114th Congress, first session, August 4, 2015. As of October 2015, the House of Representatives had not passed similar legislation extending Station operations.

ISS Costs

The United States has invested almost $81 billion in the ISS over the last 22 years.[4] In FY 2015, NASA's annual cost to operate the Station – including for on-orbit vehicle operations, research, crew transportation, and cargo resupply missions – was almost $3 billion. The Agency projects this figure will increase to $4 billion by 2020. In May 2014, the U.S. House of Representatives Committee on Appropriations noted that "in order for the Station to remain a sustainable long-term program, NASA must continue to seek and implement cost savings measures with the goal of reducing the ISS operations budget or, at a minimum, slowing the growth in such budget."[5] However, several factors may make it difficult for NASA to accomplish this goal.

We believe the Agency's estimate that it will cost between $3 and $4 billion annually to operate the Station is based on overly optimistic assumptions, and that for a number of reasons costs are likely to be higher. By late 2017, NASA hopes to be sending astronauts to the Station in commercially provided transportation systems and therefore included the costs of these services in its estimate. NASA based that estimate on the cost of a Russian Soyuz seat in FY 2016 – $70.7 million per seat for a total cost of $283 million per mission for four astronauts.[6] However, the Program's independent Government cost estimates project significantly higher costs when NASA purchases flights from commercial companies rather than from Russia. Moreover, over the life of the Station the Agency's international partners – the European Space Agency, Canada, Japan, and Russia – have contributed to operations and shared associated expenses by providing astronauts, ground facilities, launch vehicles, and other items and services. While the Canadians and Russians have indicated they intend to continue their participation through 2024, as of September 2015 the Europeans and Japanese had not yet committed to Station operations beyond 2020. Should they decide not to participate, NASA and the remaining partners will likely face higher costs.

NASA also utilizes more than 30 contracts valued at approximately $39 billion to operate and maintain the ISS. This past year we examined whether NASA's contract administration and oversight processes are sufficient to avoid incurring unnecessary costs on these contracts.[7] We found that over the past several years, NASA has taken steps to control costs, including openly competing and eliminating requirements from some of these contracts, and that between FYs 2011 – 2015 the ISS Program reduced costs by $1.8 billion. However, given the unique operating environment of the ISS and the inherent challenge of operating with a flat operations and maintenance budget of $1.3 billion beginning in FY 2018, it is unclear to what extent the Agency's cost-reduction strategies will result in future cost savings.

ISS Research

A significant amount of research aboard the ISS is related to understanding and mitigating the health and performance risks associated with human space travel. NASA's Human Research Program is managing 25 such risks, and the Station is a suitable platform for conducting mitigation-related research for 23 of these risks. However, even with an extension of Station operations until 2024 NASA only

[4] This figure includes $49.7 billion for construction and program costs through 2014 and $30.7 billion for 37 supporting Space Shuttle flights, the last in July 2011.

[5] H. Rep. No. 113-448, Commerce, Justice, Science, and Related Agencies Appropriations Bill, 113th Cong. (2014).

[6] NASA purchased additional Soyuz seats for astronaut transportation to the ISS through 2018, with returns in 2019. The total cost was $490 million at approximately $82 million for each of the six seats.

[7] NASA OIG, "Audit of NASA's Management of International Space Station Operations and Maintenance Contracts" (IG-15-021, July 15, 2015).

expects to have time to fully mitigate 11 of these risks. Although the Agency can use other research techniques such as ground-based analogs to develop risk-mitigation procedures, these methods do not provide the same advantages as an actual space environment. Accordingly, in a September 2014 report examining extension of the ISS we recommended NASA prioritize Station research to address the most important risks before Station operations end. NASA agreed and has taken responsive action.[8]

In August 2011, NASA signed a cooperative agreement with the Center for the Advancement of Science in Space (CASIS) to manage non-NASA research aboard the ISS. Pursuant to the agreement, NASA provides CASIS $15 million annually and the organization is expected to raise additional funds from private entities and encourage companies to self-fund research. Further progress on expanding ISS research depends on CASIS's ability to attract private funding and encourage companies and other organizations to conduct research. In an April 2015 assessment of the group's activities, the Government Accountability Office (GAO) reported that CASIS needs to establish better metrics for measuring program performance, including measurable targets.[9]

When we interviewed CASIS officials as part of our ISS extension audit, they told us that provisions in the agreement with NASA requiring researchers to assign patent licenses and data rights to the Government were deterring commercial stakeholders from conducting research on the ISS. To address this issue, NASA submitted proposed legislation to Congress in June 2013 that would allow researchers to retain "all rights in inventions made… during the conduct of [Station] activities." As of October 2015, the legislation has not moved forward.

While utilization of the ISS for research has increased over the past 6 years, several factors continue to pose limits to fully utilizing the Station. For example, until a seventh crew member is brought onboard NASA will not be in a position to maximize the amount of crew time dedicated to research on the Station.[10] Moreover, the crew will devote substantial time in 2016 to reconfiguring the ISS to accommodate the commercial vehicles NASA hopes will be ready to transport astronauts beginning in late 2017.

Another key factor to maximizing research on the Station is developing a U.S. capability to transport cargo and crew. For many years, NASA used the Space Shuttle to ferry astronauts and materials to the Station – first for construction and then for resupply. With the Shuttle's retirement in 2011, NASA has looked to a new model for transporting cargo and crew to low Earth orbit by working with U.S. corporations to develop privately-owned and operated transportation systems. Unlike with the Shuttle, NASA does not own these systems but rather purchases flights from the companies to carry NASA supplies and astronauts. We discuss the challenges associated with commercial transportation to the ISS below.

[8] NASA OIG, "Extending the Operational Life of the International Space Station Until 2024" (IG-14-031, September 18, 2014).

[9] GAO, "International Space Station: Measurable Performance Targets and Documentation Needed to Better Assess Management of National Laboratory" (GAO-15-397, April 27, 2015).

[10] Although the ISS is capable of supporting a seven-person crew, currently only six individuals can be on Station at one time to accommodate evacuation in case of an emergency. The Russian Soyuz capsule, currently the only vehicle transporting astronauts to the Station, has a three-person capacity and only two Soyuz capsules can be attached to the Station simultaneously.

Commercial Cargo Transportation

Between 2006 and 2008, NASA entered into a series of funded Space Act Agreements with Orbital Sciences Corporation (Orbital), Space Exploration Technologies Corporation (SpaceX), and other private companies to stimulate development of transportation systems capable of transporting cargo to the ISS. NASA selected two companies to ensure redundancy if one was unable to perform.[11]

In 2008, while development efforts were still underway, NASA awarded fixed-price contracts valued at $1.9 billion and $1.6 billion to Orbital and SpaceX, respectively, for a series of resupply missions to the ISS (Commercial Resupply Services or CRS-1 contracts). The contracted services include delivery of supplies and equipment (upmass) to the Station and, depending on the mission, return of equipment and experiments and disposal of waste (downmass) to Earth.[12] Since signing the initial agreements, NASA has extended SpaceX's contract into 2017 and issued task orders for three additional missions and Orbital's contract into 2018 and added three missions.[13] As of June 2015, Orbital had completed two cargo resupply missions and received $1.6 billion from NASA, while SpaceX had completed six resupply missions and received $1.4 billion.

Unfortunately, both companies have also experienced launch failures. In October 2014, Orbital's third delivery mission failed during lift-off, causing the vehicle to crash near the launch pad and destroying the company's Antares rocket and Cygnus spacecraft as well as all cargo aboard. The Virginia Commercial Space Flight Authority's launch pad and supporting facilities at NASA's Wallops Flight Facility on Virginia's Eastern Shore also sustained $15 million in damage. In the aftermath of the failure, Orbital suspended its cargo resupply missions until completion of an investigation and acceptance by NASA of the company's Return to Flight Plan.

Similarly, in June 2015, SpaceX's seventh resupply mission exploded shortly after takeoff from Cape Canaveral Air Force Station in Florida, resulting in a total loss of all cargo aboard. Like Orbital, SpaceX suspended resupply missions until completion of an investigation and acceptance by NASA of a Return to Flight Plan.

In a September 2015 report, we found Orbital's Return to Flight Plan contains technical and operational risks and may be difficult to execute as designed and on the timetable proposed.[14] First, Orbital will restart deliveries to the ISS initially by launching its capsule with an Atlas V rocket. Although the Atlas V has a strong flight record and is a suitable rocket for Orbital cargo deliveries, the company will be integrating its Cygnus capsule with the Atlas rocket for the first time. Second, Orbital must accelerate development of its modified Antares launch system, refitting it with new engines in order to meet its plans for two launches in 2016. This tight schedule does not include a test flight for the modified system and provides limited opportunities for qualification and certification testing. Third, although NASA has increased monitoring of Orbital's milestone plan and engine testing for the modified Antares, the

[11] In addition, NASA barters with the Japan Aerospace Exploration Agency (JAXA) for cargo transportation on JAXA's H-II Transfer Vehicle and can place a small amount of upmass on the Russian space agency's Progress cargo vehicle. In the past, NASA sent cargo to the ISS on the European Space Agency's Automated Transfer Vehicle, which made its final delivery to the ISS in July 2014.

[12] The SpaceX capsule returns to Earth intact and therefore can carry experiments and other cargo back to Earth. In contrast, Orbital's capsule burns up upon reentry to Earth's atmosphere and therefore removes only waste from the Station.

[13] As a result of these additions, contract values increased to more than $2 billion for each company.

[14] NASA OIG, "NASA's Response to Orbital's October 2014 Launch Failure: Impacts on Commercial Resupply of the International Space Station" (IG-15-023, September 17, 2015).

Agency has not conducted detailed technical assessments of the modified system and the associated qualification testing results. Finally, we believe Orbital's plan to drop one of its five previously scheduled resupply flights and carry the promised cargo in four missions may disadvantage NASA by decreasing the Agency's flexibility in choosing the type and size of cargo the company transports to the ISS, particularly given that NASA officials said they will limit the cargo on the first return flight to non-essential items.

SpaceX's failed mission was carrying 2,393 kilograms (kg) of cargo, including 676 kg of crew supplies, 529 kg of science investigations, 526 kg of docking equipment, 461 kg of vehicle hardware, 166 kg of extravehicular activity equipment, and 35 kg of computer resources. Among the lost equipment was one of the adapters needed to dock the commercial spacecraft NASA hopes will begin transporting astronauts to the Station in late 2017 and replacement parts for the Station's water purification system. The company has formed an Accident Investigation Board pursuant to its commercial space launch license and NASA is conducting an independent investigation through its Launch Services Program. Initial reports from SpaceX suggest failure of a support strut in the second stage liquid oxygen tank as the cause. We are conducting a review of NASA's response to the SpaceX loss similar to our review of Orbital's October 2014 launch failure.

In addition to the Orbital and SpaceX failures, a Russian Progress cargo mission failed to reach the ISS in April 2015. According to NASA officials, despite three unsuccessful cargo resupply missions over 8 months, the ISS crew is in no immediate danger of running out of food or water. Current projections indicate that even without further resupply, food supplies on Station will be sufficient until January 2016 and water supplies until June 2016.

With the exception of a Japanese resupply mission in August 2015 that delivered 4.5 tons of cargo to the ISS, NASA must rely on the Russian Progress until Orbital and SpaceX restart their cargo resupply flights. However, Russian rockets have carried an average of only 65 kg per flight on their past six missions. Moreover, in our judgment the Orbital and SpaceX launch failures have affected research abroad the ISS in three ways: (1) a reduction in available crew time due to a temporary delay in returning the Station's crew complement to six, (2) the cost to regenerate the lost research, and (3) a delay in the return of experiments due to the suspension of flights by SpaceX, the only company using a capsule capable of returning experiments and other cargo to Earth from the Station.

NASA is currently evaluating proposals from commercial companies for CRS-2, the multi-billion dollar follow-on resupply contract the Agency is expected to award in November 2015. According to NASA officials, the contractors selected will perform cargo resupply missions beginning as early as 2018 and continuing through 2024.

Commercial Crew Transportation

Since retirement of the Space Shuttle, the United States has lacked a domestic capability to transport astronauts to the ISS. Instead, between 2012 and 2018 NASA will pay Russia $2.2 billion to ferry 30 NASA astronauts and international partners to and from the Station at prices ranging from $47 million to almost $82 million per round trip. To address this lack of U.S. capacity, NASA has provided approximately $2.8 billion in funding since 2010 to U.S. commercial space flight companies to spur development of a crew transportation capability. NASA originally hoped commercial flights would be operating by 2016, but due to funding constraints, the Agency adjusted this goal to late 2017.

As with the Commercial Cargo Program, NASA worked with private companies – Sierra Nevada Corporation, SpaceX, and The Boeing Company (Boeing) – using a combination of funded Space Act Agreements and contracts to develop commercial crew transportation capabilities. A fourth company, Blue Origin, is conducting developmental work under an unfunded Space Act Agreement with the Agency.

The fourth and final phase of NASA's Commercial Crew Program began in September 2014 with the award of $6.8 billion in firm-fixed-price contracts to Boeing ($4.2 billion) and SpaceX ($2.6 billion) to complete development of and certification for operation of their space flight systems. In these contracts, NASA will provide Boeing and SpaceX with specific requirements for launch systems, spacecraft, and related ground support. The contracts include at least one crewed flight test with a NASA astronaut to verify that the fully integrated rocket and spacecraft system can launch, maneuver in orbit, and dock to the ISS, as well as validate that all systems are performing as expected. Once each company's test program has been successfully completed and its system certified, they will conduct at least two and as many as six crewed missions to the Station. The spacecraft also will serve as a lifeboat for astronauts aboard the Station in case of an emergency.

In 2012, NASA planned to transition from Space Act Agreements to firm-fixed-price contracts governed by the Federal Acquisition Regulation (FAR) for final design work, testing, evaluation, and certification of crew transportation systems. Thereafter, NASA planned to enter into individual FAR based contracts to acquire specific transportation services. However, in FY 2012 NASA received only $397 million for its Commercial Crew Program, less than half of its $850 million request. As a result, NASA revised its acquisition strategy and continued to rely on funded Space Act Agreements for the integrated design phase of the Commercial Crew Program rather than FAR-based contracts. This situation was further exacerbated in 2013 when the Program again received significantly less than requested – $525 million compared to the $830 million requested. Although the Commercial Crew Program received $696 million of $821 million requested in FY 2014, funding shortfalls in previous years contributed to delaying the expected completion date of the Program's development phase from 2016 to 2017.

In FY 2015, the Program received $805 million out of $848 million. Looking ahead to FY 2016, the NASA Administrator sent a letter to Congress in August 2015 attributing Program delays and the decision to pay Russia for six additional seats on upcoming Soyuz flights to funding shortfalls. He warned that failure to fund the Program at the requested levels could result in further delays.

In a November 2013 audit report, we identified four challenges to NASA's Commercial Crew Program: (1) unstable funding, (2) integration of cost estimates with the Program schedule, (3) providing timely requirement and certification guidance, and (4) space flight coordination issues with other Federal agencies.[15] Since that time, the Agency has made progress in these areas by publishing a Funded Space Act Agreement Best Practices Guide that includes guidance for cost estimating under those types of agreements, closely tracking deviations and waivers of requirements, and establishing a tri-agency Launch and Entry Steering group to better coordinate with other Federal agencies involved in commercial launches. NASA expects to complete the last of the corrective actions to respond to the recommendations in our report by late 2015. In May 2015, we began a follow-on audit examining whether the Commercial Crew Program is meeting its planned cost and schedule goals and how it is managing risks and certification requirements.

[15] NASA OIG, "NASA's Management of the Commercial Crew Program," (IG-14-001, November 13, 2013).

Positioning NASA for Deep Space Exploration: Developing the Space Launch System, Orion Capsule, and Associated Ground Systems, and Mitigating Health and Performance Risks for Extended Human Missions

NASA's long-term objective for its human exploration program is a crewed mission to Mars. To meet this challenging goal, the Agency must develop both more sophisticated rockets, capsules, and other hardware, and strategies to mitigate the risks posed by radiation and other space-born hazards that could prevent astronauts from performing their missions or affect their long-term health. In the short- to mid-term, successful development of the Space Launch System (SLS), the Orion Multi-Purpose Crew Vehicle (Orion), and related launch infrastructure while simultaneously addressing health and human performance risks to extended space flight are critical to helping achieve NASA's human exploration goals beyond low Earth orbit.

Developing the Space Launch System, Orion, and Related Ground Systems

Although the NASA Authorization Act of 2010 set a goal for NASA to achieve operational capability for the SLS and Orion by December 31, 2016, NASA will not meet this timetable.[16] Noting technical and funding uncertainties, NASA has adjusted its planning schedule to reflect an SLS launch readiness date of no later than November 2018, with the first crewed flight of Orion expected no later than 2023.

NASA is using the Space Shuttle's main engine, the RS-25, on the SLS and designing the vehicle with an evolvable architecture that can be tailored to accommodate longer and more ambitious missions. Initial versions of the SLS will be capable of lifting 70-metric tons and use an interim cryogenic propulsion stage to propel Orion around the Moon on its first exploration mission. Later versions will be designed to lift 130-metric tons and incorporate an upper stage to travel to deep space. Orion will be mounted atop the SLS and serve as the crew vehicle for up to six astronauts. NASA is developing the capsule using an existing contract with Lockheed Martin Corporation and basing its design on requirements for the crew exploration vehicle that was part of NASA's predecessor Constellation Program.

[16] The National Aeronautics and Space Administration Authorization Act of 2010, Pub. L. No. 111-267, 124 Stat. 2805.

Artist's Rendering of the Space Launch System

Source: NASA.

On December 5, 2014, Orion flew its first test flight, launching without a crew from Cape Canaveral Air Force Station on a Delta rocket. The mission successfully completed a 4-hour, two-orbit trip around Earth. In September 2015, NASA approved the Orion Program's progression from formulation to implementation for a crewed mission after completing a review known as Key Decision Point C (KDP-C). As part of that process, NASA committed to a launch readiness date for Orion of no later than April 2023, about 20 months later than had been planned. Based on the new target date, NASA expects to spend more than $11 billion to launch the first crew on Orion. The Agency noted that although the 2023 date represents NASA's readiness commitment, the Orion team will continue working toward the original launch date of 2021. In a 2013 report, we examined the Orion Program and are currently conducting a follow-up review evaluating NASA's management of the Program relative to achieving technical objectives, meeting milestones, and controlling costs.[17]

In addition to the SLS and Orion, NASA's Ground Systems Development and Operations Program (GSDO) is modifying launch infrastructure at Kennedy Space Center formerly used for the Space Shuttle, including refurbishing the crawler transporter that will transport the SLS from the Center's Vehicle Assembly Building to the launch pad and modifying the mobile launcher and tower (originally built for the Constellation Program's Ares I rocket), the Vehicle Assembly Building, and Launch Pad 39B. This past year, we issued a report on the status of GSDO's efforts.[18] We found that GSDO has made steady progress on the major equipment and facilities modernization initiatives needed to launch SLS and Orion, but significant technical and programmatic challenges remain to meet a November 2018 launch date. For the most part, these challenges originate from interdependencies between the GSDO, SLS, and Orion Programs. In short, GSDO cannot finalize and complete its requirements without substantial input from the other two Programs, but NASA is still finalizing the requirements for those Programs. Specifically, GSDO must overcome (1) a short timeframe for performing verification and validation testing between the Mobile Launcher, Vehicle Assembly Building, and Launch Pad 39B; (2) receipt of data and hardware regarding Orion later than planned; (3) the potential that integrated operations for the first test flight (Exploration Mission 1) may take longer than expected; and (4) most significantly, delays associated with development of command and control software. Given the criticality of the software, we are conducting a separate review examining NASA's management of GSDO's software development effort.

[17] NASA OIG, "Status of NASA's Development of the Multi-Purpose Crew Vehicle (IG-13-022, August 15, 2013).

[18] NASA OIG, "NASA's Launch Support and Infrastructure Modernization: Assessment of the Ground Systems Needed to Launch SLS and Orion" (IG-15-012, March 18, 2015).

At the time of our GSDO audit, the program was scheduled to complete a significant development milestone known as Critical Design Review in March 2015, several months before SLS (May 2015) and Orion (August 2015). The purpose of the Critical Design Review is to demonstrate a project's design is sufficiently mature to proceed to full scale fabrication, assembly, integration, and testing and technical aspects are on track to meet performance requirements within identified cost and schedule constraints. In our judgment, given the many interdependencies between the Programs, a schedule that has GSDO completing Critical Design Review prior to the other two Programs increases the risk GSDO may experience schedule delays or be required to perform costly redesign work.

Finally, coordinating and integrating development of the three individual Programs to meet a common milestone date presents a challenge, particularly since NASA historically has used a single program structure to manage similar efforts such as Apollo and the Space Shuttle. In lieu of central management, NASA established a cross-program integration structure that designates leaders from each Program to coordinate and align the Programs' development schedules. It is too early to say whether these substantial coordination challenges will result in cost or schedule issues for the Exploration Mission 1 launch. Moreover, new issues are likely to be uncovered during integration – the point at which most projects encounter technical problems that impact cost and schedule. Given these challenges, coordination efforts among the GSDO, SLS, and Orion Programs are essential to successfully meeting NASA's human exploration goals on the schedule and at the funding levels promised.

In order to decrease the risk that the GSDO Program will experience cost increases or schedule delays, we recommended the Associate Administrator for Human Exploration and Operations reevaluate allowing GSDO to complete Critical Design Review before the SLS and Orion Programs. NASA management concurred with our recommendation and indicated it had changed the dates of the Programs' Critical Design Reviews so that the SLS and Orion reviews will precede the GSDO review. NASA should closely monitor the Programs to ensure any such risks identified during these reviews are mitigated so as to avoid significant cost increases or schedule delays.

Funding uncertainties continue to challenge the SLS and its associated Programs. For example, the Orion Program anticipates receiving a flat budget of approximately $1.1 billion per year into the 2020s. Given this budget profile, NASA is using an incremental development approach under which it allocates funding to the most critical systems necessary to achieve the next development milestone rather than developing multiple systems simultaneously as is common in major spacecraft programs. Prior work by the OIG has shown that delaying critical development tasks increases the risk of future cost and schedule problems.[19] Moreover, NASA Program officials admit that this incremental development approach is not ideal, but contend that it is the only feasible option given current funding levels.

Mitigating Human Health and Performance Risks

Space flight is an inherently risky endeavor. Apart from the tremendous engineering challenges in launching and returning astronauts safely to Earth, humans living in space experience a range of physiological changes that can affect their ability to perform necessary mission functions and, in the longer term, lead to cancers, damaged vision, reduced bone strength, and other harm to their health and wellbeing. NASA has identified 30 human health and performance risks and two concerns associated with space travel, including behavioral health and performance, inadequate food and

[19] NASA OIG, "NASA's Challenges to Meeting Cost, Schedule, and Performance Goals" (IG-12-021, September 27, 2012) and "Status of NASA's Development of the Multi-Purpose Crew Vehicle" (IG-13-022, August 15, 2013).

nutrition, space radiation, and vision impairments and intracranial pressure.[20] And, although NASA has developed mitigation strategies to reduce the impact of most of the risks associated with travel in low Earth orbit, its plans to send humans deeper into space for extended periods of time will expose astronauts to new and increased hazards. With respect to human travel, the deep space environment differs from low Earth orbit in several important respects: (1) it likely poses risks that have not yet been identified (unknown risks), (2) ways to mitigate many of the known risks have yet to be developed, and (3) humans will not be able to communicate with Earth in real-time or return to Earth quickly in case of emergency.

Astronaut Scott Kelly during his 1-year mission on the International Space Station

Source: NASA.

To further understand the risks to human health and performance associated with space travel, NASA and its partners are performing a variety of studies on Earth and on the ISS. For example, in March 2015 NASA launched astronaut Scott Kelly on the first 1-year U.S. mission to the ISS. NASA will compare health data taken from Scott Kelly with that of his twin brother and former astronaut, Mark Kelly, in the hope of advancing knowledge about the effects on the human body of longer duration habitation in space.

In October 2005, NASA established the Human Research Program at the Johnson Space Center to focus Agency research investment on investigating and mitigating the highest risks to astronaut health and performance. The Program conducts basic, applied, and operational research with the goal of increasing understanding of and developing countermeasures for 23 of the human health and performance risks and the two concerns NASA has identified. In 2014, the Program completed a detailed schedule, known as the Path to Risk Reduction, setting forth the rate by which it expects to complete development of countermeasures for the 23 risks assigned to it. In February 2015, the Program reported that the majority of risks for ISS missions up to a year in duration could be mitigated to an acceptable level. However, more than half of the risks for a 3-year planetary mission, such as a trip to Mars, remain unmitigated.

In an October 2015 audit, we examined NASA's efforts to manage the health and human performance risks posed by space exploration.[21] Although NASA continues to improve its process for identifying and managing health and human performance risks associated with space flight, we believe that given the current state of knowledge, NASA's risk mitigation schedule is optimistic and the Agency will not develop countermeasures for many deep space risks until the 2030s at the earliest. One of the major factors limiting more timely development of countermeasures is uncertainty about the mass, volume, and weight requirements of deep space vehicles and habitats. Moreover, even as NASA gains additional knowledge about those vehicles and habitats, and the effects of radiation and other space conditions on the human body, the Agency may be unable to develop countermeasures that will lower the risk to deep

[20] Concerns are issues the Agency has not yet accepted as risks.

[21] NASA OIG, "NASA's Efforts to Manage Health and Human Performance Risks for Space Exploration" (IG-16-003, October 29, 2015).

space travelers to a level commensurate with Agency standards for low Earth orbit missions. Accordingly, the astronauts chosen to make at least the initial forays into deep space may have to accept a higher level of risk than those on missions to the ISS. We also found that NASA cannot accurately report the true costs of developing countermeasures for the identified risks.

Furthermore, NASA's management of crew health risks could benefit from increased efforts to integrate expertise from all relevant disciplines. While many life science specialists attempt to utilize the range of available expertise both inside and outside the Agency, NASA lacks a clear path for maximizing expertise and data at both the organizational and Agency level. For example, NASA has no formalized requirements for integrating human health and research among life sciences subject matter experts nor does it maintain a centralized point of coordination to identify key integration points for human health. Moreover, integrating the experiences of NASA's engineering and safety efforts would benefit the outside life sciences community. The lack of a coordinated, integrated, and strategic approach may result in more time consuming and costly efforts to develop countermeasures to the numerous human health and performance risks associated with deep space missions.

According to NASA's Space Flight Human System Standards, the human system should be viewed as an integral part of overall vehicle design. In other words, the standards of the human system should be centrally incorporated into vehicle design, mission architecture, countermeasures, and research. Several senior Agency officials we met with noted that although NASA has traditionally and successfully operated with a vehicle-centered design focus, a shift to a more human-centered design is necessary for Mars and other exploration class missions. While Agency officials agreed that a shift in the Agency's focus is required, they offered little insight into how NASA would effectively utilize human-centered design for long-term decision making in mission planning and vehicle design. However, many Agency officials pointed to astronaut input in the configuration of the Orion capsule in areas such as seating placement and lighting options.

Long duration missions will likely expose crews to health and human performance risks for which NASA has limited effective countermeasures. Accordingly, for these missions NASA will have to determine the level of risk that is acceptable and clearly communicate the Agency's decisions to astronauts, Congress, and the public. Moreover, NASA needs to continue to explore whether its current health care model for astronauts is sufficient to meet both the long-term health needs of the astronaut community and the research needs of the Agency.

Managing NASA's Science Portfolio

With a relatively constant annual budget of approximately $5 billion since FY 2009, NASA's Science Mission Directorate (SMD) oversees more than 100 projects and programs in various phases of development and operation. However, throughout its history NASA has struggled with accurately estimating the amount of time and money required to complete these projects. The resulting cost and schedule overruns have, in turn, led to challenges in the project development process, diverted funding from other projects, and reduced the number and scope of projects the Agency can undertake. For example, in September 2011 NASA rebaselined the largest program in SMD's portfolio – the James Webb Space Telescope (JWST) – increasing its life-cycle budget from $4.96 billion to $8.84 billion and delaying its launch 4 years from June 2014 to October 2018. Consequently, in FY 2012 NASA moved $156 million from other SMD projects and the Cross Agency Support account to help cover the cost increases. In addition, several other missions including the Wide-Field Infrared Survey Telescope were postponed to make additional funding available for JWST.

Over the years, studies have identified several root causes for NASA's challenges in producing accurate cost and schedule estimates. In 2012, we conducted an extensive review examining NASA's project management practices in an effort to identify the primary challenges the Agency faces achieving its cost, schedule, and performance goals.[22] This review identified four factors that appear to present the greatest challenges to successful project outcomes at NASA: a culture of optimism; underestimating technical complexity; funding instability; and limited opportunities for project managers' development. NASA itself and other outside groups have pointed to these and additional factors such as inadequate risk assessments, inadequate reserves, and changes in project scope (design/content).

While some root causes are outside the Agency's control, NASA has developed tools to help improve the fidelity of its cost and schedule estimates. To this end, since 2006 NASA has incorporated progressively more sophisticated estimating techniques into Agency policy, culminating in 2009 with formal adoption of a Joint Cost and Schedule Confidence Level (JCL) requirement.

A JCL analysis generates a representation of the likelihood a project will achieve its objectives within budget and on time. The process uses software tools and models that combine cost, schedule, risk, and uncertainty to evaluate how expected threats and unexpected events affect a project's cost and schedule. To generate this data, project managers develop comprehensive project plans, inputs, and priorities that integrate costs, schedules, risks, and uncertainties. NASA officials contend that gathering this data encourages better communication among project personnel; improves cost, schedule, risk, and uncertainty analyses; and fosters an understanding of how project elements impact one another. Accordingly, a JCL analysis not only establishes the basis for proposing project and program budgets, but may improve project planning and provide stakeholders the rigor and documentation to better justify funding requests. Since 2009, NASA has completed a JCL analysis for 22 projects with a combined price tag of more than $49 billion.

We examined NASA's JCL process in a September 2015 audit report.[23] Based on our review of these 22 projects, it appears the JCL policy is having a positive impact on NASA's historical challenges with cost and schedule fidelity. That said, the process is relatively new, still evolving, and not a one-stop solution to solving all root causes of cost overruns and schedule delays. Specifically, the process has inherent limitations in that, like any estimating practice, it does not fully address the issue of predicting "unknown/unknowns" or address some of the root causes of NASA's project management challenges such as funding instability and underestimation of technical complexity.[24]

We also identified varied expectations and understandings among Agency stakeholders about the JCL process, ranging from those who see JCL as a multifunctional tool that can significantly improve cost and schedule management to others who view it as just another task projects must complete before moving into the development phase. There were also issues with the quality of some JCL cost, schedule, and risk data inputs for several of the projects we reviewed. In-depth assessments of 9 of the 22 projects revealed 5 projects that had significant weaknesses in project scheduling, risk assessment, and cost estimating. Remedying these weaknesses would improve the overall accuracy of JCL analyses.

[22] NASA OIG, "NASA's Challenges to Meeting Cost, Schedule, and Performance Goals" (IG-12-021, September 27, 2012).

[23] NASA OIG, "Audit of NASA's Joint Cost and Schedule Confidence Level Process" (IG-15-024, September 29, 2015).

[24] "Unknown/unknowns" are future situations that are impossible to predict.

Moreover, the effectiveness and consistency of the process NASA uses to review projects' JCL analyses could be improved. For example, the extent and type of review varied widely from project to project. We attributed this inconsistency to a lack of formal guidance, inadequate training for review board members, and inconsistent expectations among the review board chairs regarding how projects should consider and incorporate the results of board reviews. We also found training for project personnel could be improved.

As of August 2015, 10 of the 22 projects for which NASA performed a JCL analysis – all SMD projects – have launched.[25] As shown in Table 1, four of the projects came in under budget, one met its budget, and five exceeded their budgets.[26] However, only two of the overruns exceeded 10 percent.

Table 1: Projects with JCLs Completed That Have Launched

Project	Baseline Development Cost (millions of dollars)	Actual Development Cost (millions of dollars)	Percent Change
MSL[a]	$1,720	$1,769	3%
SOFIA[b]	1,118	1,120	0
MMS	857	877	2
LDCM	588	503	(14)
MAVEN	567	472	(17)
GPM[c]	519	484	(7)
SMAP	486	479	(1)
OCO-2[d]	249	329	32
LADEE	168	188	12
NuStar	110	116	6

Source: NASA OIG analysis.

[a] MSL development cost reflects project rebaseline after October 2009 launch date was missed. In 2006, NASA baselined development costs at $969 million.

[b] SOFIA development cost reflects the project's second rebaseline value. Historical development cost estimates are difficult for comparative purposes due to changing programmatic milestones. However, in 1997 NASA estimated costs for the project to reach its Operational Readiness Review of $265 million.

[c] GPM development cost reflects the project's rebaseline value. NASA descoped the project and set the initial baseline at $555 million with a launch date of July 2013. The Project was further descoped and rebaselined to launch in February 2014.

[d] OCO-2 baseline development cost reflects initial Agency Baseline Commitment, which for comparison purposes is analogous to the other projects listed in the table.

The JWST – the scientific successor to the Hubble Space Telescope – is SMD's largest and most expensive program and is expected to be the premier space-based observatory of the next decade when it is launched aboard an Ariane 5 launch vehicle provided by the European Space Agency in October 2018. The observatory is designed to help understand the origin of the first stars and galaxies in the universe, the evolution of stars, the formation of stellar systems, and the nature of celestial objects in our own solar system. JWST consists of a 25-square-meter mirror composed of 18 smaller mirrors, an

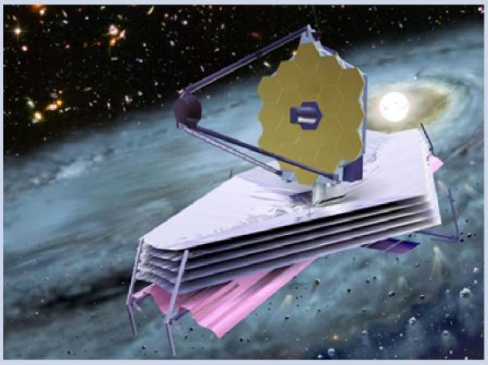
[25] The 10 projects are: Global Precipitation Measurement (GPM); Lunar Atmosphere and Dust Environment Explorer (LADEE); Landsat Data Continuity Mission (LDCM); Mars Atmosphere and Volatile EvolutioN (MAVEN); Magnetospheric Multiscale Mission (MMS); Mars Science Laboratory (MSL); Nuclear Spectroscopic Telescope Array (NuStar); Orbiting Carbon Observatory-2 (OCO-2); Soil Moisture Active Passive (SMAP); Stratospheric Observatory for Infrared Astronomy (SOFIA).

[26] The JCL analyses for MSL, SOFIA, and GPM were performed in connection with rebaselines rather than initial estimates.

integrated science instrument module that houses the telescope's four instruments, and a tennis-court size sunshield. JWST's instruments are designed to work primarily in the infrared range of the electromagnetic spectrum, allowing for unprecedented observing capability.[27]

JWST has faced significant challenges meeting cost, schedule, and performance goals throughout its development life cycle. Program cost estimates in the late 1990s and early 2000s ranged from $1 billion to $3.5 billion, with an expected launch date between 2007 and 2011. However, following a change in the launch vehicle and revisions to other requirements, in 2005 NASA estimated life-cycle costs at $4.5 billion with a launch date in 2013. A year later, an independent review team reported that although the Program was technically sound, funding reserves were too low, phased too late in development, and insufficient to support such a complex Program. The review team also reported that a 2013 launch date was not achievable. In 2009, NASA rebaselined JWST with a life-cycle cost estimate of $4.9 billion and a June 2014 launch date.

Artist's Concept of James Webb Space Telescope



Source: NASA.

Unfortunately, it soon became clear that neither this cost estimate nor the 2014 launch date were attainable. At the request of Congress, NASA commissioned another independent review and in October 2010 this panel reported that while JWST's technical performance was "commendable and often excellent," the Program's budget and contingency funding reserve was severely understated and improperly phased, Program management was ineffective, and the Program could not meet its cost and schedule commitments.[28] Subsequently, NASA restructured the JWST Program, and in September 2011 established a revised baseline life-cycle cost estimate of $8.84 billion and an October 2018 launch date.

Out of 48 milestones the JWST Program planned to complete in FY 2015, 44 were completed and 4 deferred to next year. This is an improvement over the previous year, which saw 11 of 36 tasks deferred to FY 2015. Significant accomplishments include integration of several instruments on the Integrated Science Instrument Module, which completed vibration, acoustics, and electromagnetic compatibility and electromagnetic interference testing; integration of major telescope structural components; and delivery of one of the five sunshield membrane layers from the manufacturer. Though not unanticipated, unexpected issues have arisen during integration and testing that require time and money to address. In particular, the cryo-cooler, a compressor designed to keep JWST's Mid-Infrared Instrument at its operating temperature of minus 267 Celsius, remains on the critical path.[29] However, the Program is maintaining funded schedule reserve above the established plan. In the next year, the

[27] The electromagnetic spectrum is the full range of frequencies from radio waves to gamma rays.

[28] Independent Comprehensive Review Panel, "James Webb Space Telescope (JWST) Independent Comprehensive Review Panel (ICRP): Final Report" (October 29, 2010).

[29] The term "critical path" describes sequential tasks in a program's development schedule. Any significant slippage of tasks in the critical path would delay development efforts, launch date and most likely increase the project's cost.

Program plans to concentrate on completing the three main components of the observatory (instruments, telescope, spacecraft) and continue integration and testing of major components, which may reveal new challenges managers will have to address for the mission to successfully launch on time and within its current budget.

We will continue to monitor NASA's use of the JCL process as it manages ongoing science projects. In addition, we recently opened an audit examining NASA's management of its Earth Science mission portfolio to assess whether it is achieving established goals and priorities and meeting stakeholder needs.

Ensuring the Continued Efficacy of the Space Communications Network

NASA's satellites and other spacecraft are significantly more sophisticated than their predecessors, capable of acquiring huge amounts of data and employing rudimentary artificial intelligence to make autonomous decisions. However, even after decades of space flight one key requirement has not changed – spacecraft must be able to communicate with Earth to receive commands from human controllers and to return scientific data for study. To meet this need and provide communications, navigation, and transmission of scientific data to space flight missions NASA operates the Space Communications and Navigation (SCaN) Program.

SCaN is comprised of three networks: (1) the Near Earth Network, which covers low Earth orbit and portions of geosynchronous and lunar orbit; (2) the Space Network, which controls the Tracking and Data Relay Satellites (TDRS) through a network of geographically diverse ground systems; and (3) the Deep Space Network, which covers NASA communications beyond low Earth orbit, including planetary exploration missions to Mars and beyond. Without SCaN services, NASA could not receive data transmissions from its satellites and robotic missions or control such missions from Earth, and space hardware worth tens of billions of dollars would be little more than orbital debris. While NASA has provided these services for over 30 years, many of its current satellite communications systems are aging and increasingly difficult to repair.

In 2006, NASA initiated the SCaN Program to create an integrated Agency-wide space communications and navigation architecture. The evolution of the integrated system will take place in phases. With a planned FY 2016 budget of $632 million, the Near Earth, Space, and Deep Space Networks initially will remain independent. In the interim, SCaN is investigating different approaches to equipment commonality and adding new capabilities that extend the functionality of each Network. SCaN also manages the Spectrum Program for NASA and is deeply involved in this issue with other space-faring nations. The Spectrum Program ensures all NASA activities comply with national and international laws applicable to the use of the electromagnetic spectrum. Nearly every endeavor NASA undertakes requires communications or data transfer via the electromagnetic spectrum.

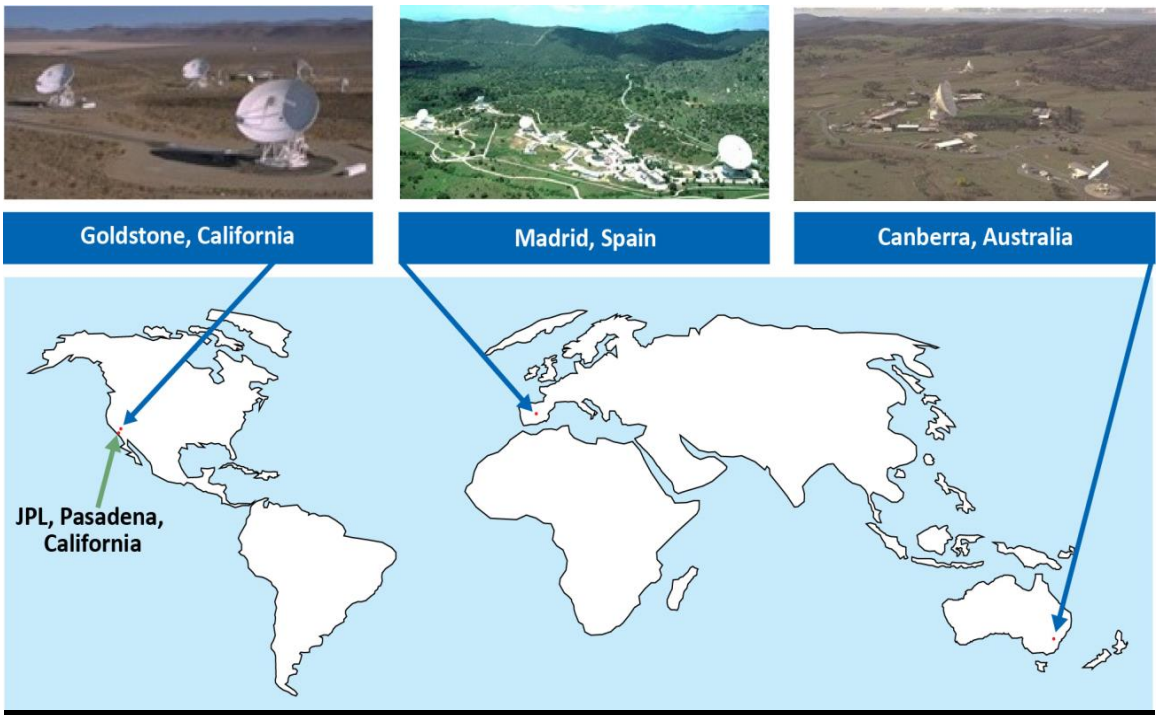
We are examining each of the major aspects of the SCaN Program and in March 2015 issued the second audit in this series, which focused on NASA's Deep Space Network.[30] Established in 1963 to provide communications for NASA robotic missions operating outside of Earth orbit, the Network provides deep space missions with the tracking, telemetry, and command services required to control and maintain spacecraft and transmit science data. Although the Network primarily services NASA missions, it also

[30] NASA OIG, "NASA's Management of the Deep Space Network" (IG-15-013, March 26, 2015).

supports missions by the Agency's international partners and because of its importance, NASA has designated the Network as NASA Critical Infrastructure.[31] During FY 2015, the Deep Space Network supported more than 30 missions, including the flyby of Pluto by NASA's New Horizons mission.

To allow for continuous communication with spacecraft traveling through deep space, the Deep Space Network operates communications complexes in three locations: Goldstone, California; Madrid, Spain; and Canberra, Australia (see Figure 1), with one 70-meter antenna and multiple 34-meter antennas at each location for around-the-clock coverage. NASA pays operating costs for all three sites and has contracts with Spanish and Australian government entities to manage day-to-day operations for the foreign sites and with the Jet Propulsion Laboratory (JPL), a federally funded research and development center operated pursuant to contract by the California Institute of Technology, for the Goldstone site.

Figure 1: Locations of Primary Deep Space Network Communications Complexes



Source: NASA OIG representation of Deep Space Network information.

Much of the Deep Space Network's hardware is more than 30 years old, costly to maintain, and requires modernization and expansion to ensure continued service for existing and planned missions. Accordingly, in 2009 management proposed an upgrade project to build new antennas and transmitters between 2009 and 2025. Moreover, the Network has significant information technology (IT) and physical infrastructure components it must protect against compromise from cyber attack, espionage, and terrorism. To this end, the JPL, Madrid, and Canberra agreements require each contractor to follow specified Federal and NASA security policies.

[31] NASA Critical Infrastructure are operations, functions, physical assets, or information technology resources essential to the success of the Agency's mission. NASA considers the Deep Space Network Critical Infrastructure because of its high public visibility, importance to the accomplishment of NASA missions, high dollar value, and the difficulty of replacing the Network in a reasonable amount of time.

We found that although the Deep Space Network is meeting its current operational commitments, budget reductions have challenged the Network's ability to maintain these performance levels and threaten its future reliability. Specifically, in FY 2009 the Network implemented a plan to achieve $226.9 million in savings over 10 years and use most of those savings to build new antennas and transmitters. However, in FY 2013 the SCaN Program reduced the Network's budget by $101.3 million, causing management to delay upgrades, close antennas, and cancel or re-plan tasks. In addition, SCaN officials are considering additional reductions for the Network in FY 2016 that could further delay maintenance and upgrade tasks. Finally, despite these reductions the Network has not revised life-cycle cost estimates for the upgrade project or performed a detailed funding profile beyond FY 2018, making it difficult to effectively plan and justify funding for the project and the Network's future commitments. If budget reductions continue, the Network faces an increased risk that it will be unable to meet future operational commitments or complete the upgrade project on schedule.

We also found that NASA, JPL, and the Deep Space Network have significantly deviated from Federal and Agency policies, standards, and governance methodologies for the security of the Network's IT and physical infrastructure. For example, the Network's system security categorization process did not consider all Network mission functions, vulnerability identification, and mitigation practices and the IT security configuration baseline application did not comply with Federal and Agency policy. Further, required physical security controls were missing or inconsistently implemented at the three Complexes, procedures to assign security level designations did not comply with NASA policy, required facility security assessments had not been completed, and security waivers or other risk acceptance documentation were not consistently in place. As a result, the Network's IT and physical infrastructure may be unnecessarily vulnerable to compromise.

Finally, NASA has not required the Madrid contractor to provide detailed cost support for contract expenses on a timely basis or ensured the Defense Contract Audit Agency performs incurred cost audits of the Madrid and Canberra contracts on a routine basis. Consequently, NASA cannot ensure approximately $37 million in annual payments made to these contractors is allocable, allowable, and reasonable.

We made 12 recommendations, including that NASA develop a realistic, accurate, and transparent budget that supports the Network's ability to provide communication services; ensure the Network follows established IT security policies, standards, and governance methodologies; develop a strategy for implementing evolving IT and physical security policies at JPL through means that minimize time-consuming negotiation of formal contract modifications; ensure physical security requirements are implemented consistently across the Network Complexes; and improve oversight of the foreign contracts. Management concurred with our recommendations and described planned corrective actions. The Agency has completed corrective actions for three of the recommendations and continues to work to implement the recommendations related to improving IT and physical security.

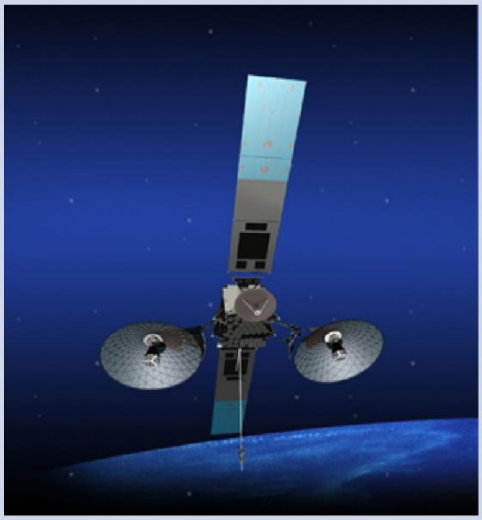
Issued in April 2014, our first SCaN audit focused on the Space Network.[32] In that report, we found key components of the Network were not meeting planned cost, schedule, and performance goals, and that taken together the delays and cost growth increased the risk the Network would be unable to continue to provide adequate communication services to NASA missions and its customers.

[32] NASA OIG, "Space Communications and Navigation: NASA's Management of the Space Network" (IG-14-018, April 29, 2014).

NASA is upgrading the Space Network through the Space Network Ground Segment Sustainment (SGSS) Project, with the goal of implementing a modern ground system that will enable delivery of high quality services while significantly reducing operations and maintenance costs. To complement the ground system, NASA maintains the TDRS fleet of satellites that transmit the tracking, data, voice, and video services from the ground station to the ISS, NASA's space and Earth science missions, other Federal agencies, and commercial users. The Space Network is in the process of upgrading and replenishing failing satellites, many of which are operating well beyond their planned lives.

At the time of our audit, NASA's baseline commitment for the SGSS Project was $862 million and the scheduled completion date was June 2017. We found the Project could cost $329 million more than this commitment and the schedule for completion slip more than 18 months. Consistent with our finding, in June 2015 NASA's Agency Program Management Council approved a new agency baseline commitment of $1.2 billion and a Project completion date of September 2019.

Artist's Concept of Tracking and Data Relay Satellite



Source: NASA.

We also reported that because of budget reductions and the loss of other expected revenue, in FY 2016 the Space Network would not have sufficient funding to meet all planned service commitments. Although NASA agreed to provide free access to Space Network services for some customers beginning in FY 2014 in exchange for their contributions to the development of two satellites several years earlier, the Agency failed to adequately plan for the resulting loss of approximately $70 million per year in revenue. Consequently, the Space Network projected a $63 million budget shortfall in FY 2016 and even larger estimated shortfalls in subsequent years. However, as the Agency worked through the FY 2016 budget process, the Network received a budget that will allow it to meet its obligations. Finally, as we had reported in a prior audit, we found that NASA had not kept current the rate it charges customers for use of the Space Network and, as a result, may be absorbing costs for services used by other Federal agencies and commercial customers.[33] The Agency has since updated the rate and put a policy in place to ensure periodic reviews of the rate.

We opened the third audit in our SCaN series in April 2015. In this audit, we are examining how NASA's Near Earth Network, which provides science missions in low Earth orbit with tracking, telemetry, and command services needed to control spacecraft and transmit data, is managing risks and adjusting capabilities to meet current and future requirements within its cost, schedule, and performance goals. The Network operates antennas and transmitters at four locations: Wallops Flight Facility, Virginia; White Sands Complex, New Mexico; Alaska Satellite Facility, Fairbanks, Alaska; and the U.S. McMurdo Antarctic Station. By 2017, the Near Earth Network will increase its capacity to support human space flight activities associated with the SLS and Orion Programs by operating new antennas in Florida. To meet increasing demand for communications services, the Network procures communications and navigation services from commercial communications providers. Specifically, the Network obtains

[33] NASA OIG, "Review of NASA's Tracking and Data Relay Satellite System" (IG-10-023, September 21, 2010).

about half of its services using commercial providers for ground stations in Australia, Chile, Germany, Norway, South Africa, and Sweden, and it is not clear whether NASA's reliance on commercial providers is less expensive than using Government-owned services. At the same time, the Network's assets are aging, located in extreme environments, and require maintenance and modernization to ensure continued services for existing and planned missions. And, similar to our audit of the Deep Space Network, we believe that the Near Earth Network may face IT security risks.

We plan to complete our series of audits on the SCaN Program with a review of Spectrum Management and a capping report on the overall Program.

Overhauling NASA's Information Technology Governance

NASA spends more than $1.5 billion annually on a portfolio of IT assets that includes approximately 500 information systems the Agency uses to control spacecraft, collect and process scientific data, and enable its personnel to collaborate with colleagues around the world. IT plays an integral role in every facet of Agency operations, and hundreds of thousands of individuals, including NASA personnel, contractors, members of academia, and the public rely on NASA IT systems daily.

IT governance is a process for designing, procuring, and protecting IT resources. Because IT is intrinsic and pervasive throughout NASA, the Agency's IT governance structure directly affects its ability to attain its strategic goals. For this reason, effective IT governance must balance compliance, cost, risk, security, and mission success to meet the needs of internal and external stakeholders. However, for more than 2 decades NASA has struggled to implement an effective IT governance approach that appropriately aligns authority and responsibility commensurate with the Agency's overall mission. Since at least 1990, the OIG and GAO have highlighted a series of challenges stemming from the limited authority of NASA's Chief Information Officer (CIO), decentralization of Agency IT operations, ineffective IT governance, and shortcomings in IT security.

In a June 2013 audit, we examined whether NASA's Office of the Chief Information Officer (OCIO) has the organizational, budgetary, and regulatory framework needed to effectively meet the Agency's varied missions.[34] We found the decentralized nature of NASA's operations and its longstanding culture of autonomy hinder its ability to implement effective IT governance. The CIO had limited visibility and control over a majority of the Agency's IT investments, operated in an organizational structure that marginalizes the authority of the position, and could not enforce security measures across NASA's computer networks. Moreover, the IT governance structure in place at the time was overly complex and did not function effectively. As a result, Agency managers tended to rely on informal relationships rather than formalized business processes when making IT-related decisions. While other Federal agencies were moving toward a centralized IT structure under which a senior manager has ultimate decision authority over IT budgets and resources, NASA continued to operate under a decentralized model that relegated decision making about critical IT issues to numerous individuals across the Agency, leaving such decisions outside the purview of the NASA CIO. As a result, NASA's current IT governance model weakens accountability and does not ensure that IT assets across the Agency are cost effective and secure.

[34] NASA OIG, "NASA's Information Technology Governance" (IG-13-015, June 5, 2013).

With mission critical assets at stake and in an era of shrinking budgets, NASA must take a holistic approach to managing its portfolio of IT systems. To overcome the barriers that have resulted in the inefficient and ineffective management of the Agency's IT assets, we made a series of recommendations to overhaul NASA's IT governance structure by centralizing IT functions and establishing the Agency CIO as the top management official responsible for the Agency's entire IT portfolio. This would include empowering the CIO to approve all IT procurements over a monetary threshold that captures the majority of IT expenditures and making the CIO a direct report to the NASA Administrator. We also recommended the Administrator reevaluate the relevancy, composition, and purpose of NASA's primary IT governance boards in light of the changes made to the governance structure and require the use of reconstituted governance boards for all major IT decisions and investments. Finally, we suggested the NASA Administrator reevaluate the resources of the OCIO to ensure that the Office has the appropriate number of personnel with the appropriate skills.

Effective implementation of the recommendations will require a cultural shift and significant changes to the Agency's IT management decision-making regime, including the realignment of authority and responsibilities. NASA management has acknowledged the need for change and in our view is taking a considered approach in implementing corrective action. To date, NASA has made the Agency CIO a direct report to the NASA Administrator and completed an organizational assessment to determine if the OCIO has the appropriate number of personnel with the proper capabilities. In addition, IT Governance was the subject of the first Business Services Assessment under NASA's Technical Capabilities Assessment Team (TCAT) process.[35] The Assessment took nearly 7 months to complete and addressed many of the issues discussed in our report. For example, the Assessment reviewed the IT governance board framework including the relevancy, composition, and purpose of existing IT boards. The associated recommendations included creating a senior-level IT Council and eliminating the existing IT Management and Business Systems Management Boards. Agency officials have directed the CIO to develop an implementation plan to address the results of the Assessment. NASA anticipates completing corrective action to address all the recommendations in our report by January 2016. Within the next 18 months, we plan to open a follow-up audit to examine whether the changes the Agency implements have improved its IT governance process.

Securing NASA's Information Technology Systems and Data

The large number of NASA networks and websites coupled with the Agency's statutory mission to share scientific information present unique IT security challenges. For FYs 2013 and 2014, NASA reported 3,413 computer security incidents resulting in the installation of malicious software on or unauthorized access to Agency computers. These incidents included individuals testing their skills to break into NASA systems, well-organized criminal enterprises hacking for profit, and intrusions that may have been sponsored by foreign intelligence services seeking to further their countries' objectives. Moreover, NASA's vast connectivity with outside organizations – most notably nongovernmental entities such as educational institutions and research facilities – offers cybercriminals a larger target than most other Government agencies. From October 2013 through June 2015, NASA reported the following trends:

[35] TCAT was tasked with establishing a more efficient Agency operating model that maintains critical capabilities and meets current and future mission needs.

- Incidents related to unauthorized access have increased primarily due to lost and stolen equipment.
- Incidents related to installation of malicious software have declined; however, they continue to represent the largest type of incidents at the Agency. Phishing campaigns continue to be the most significant method of attack for incidents related to installation of malicious software.[36]
- Agency websites are constantly scanned to identify vulnerabilities and exploit weaknesses.

NASA manages approximately 1,200 publicly accessible web applications, or about half of all publicly accessible, nonmilitary Federal Government websites, to share scientific information with the public, collaborate with research partners, and provide Agency civil servant and contractor employees with remote access to NASA networks.[37] Hundreds of these web applications are part of IT systems NASA characterizes as high- or moderate-impact, meaning that a security breach could result in the loss of sensitive data or seriously impair Agency operations.

In June 2015, the Office of Personnel Management disclosed that it had been the target of a data breach targeting millions of sensitive civil servant and contractor personnel records. Federal officials described this as among the largest breaches of Government data in history. In light of this event and to further improve Federal cybersecurity, the Office of Management and Budget launched a 30-day Cybersecurity Sprint, requiring Federal agencies to patch critical vulnerabilities, tighten access for privileged users, and increase the use of multi-factor authentication. We plan to review the results of NASA's efforts in our next annual Federal Information Security Management Act (FISMA) evaluation. We also are planning to open audits examining security over NASA's information systems and critical infrastructure.

NASA must also ensure that its IT systems and associated components are regularly safeguarded, assessed, and monitored to protect against inevitable attacks on those systems. To assist in this effort, NASA completed a series of initiatives over the past 2 years to address IT security concerns, including

- modernizing and expanding continuous monitoring and network penetration testing;
- deploying intrusion detection systems across mission, corporate, and research networks;
- increasing web application security scanning; and
- implementing intrusion prevention systems.

While the completion of these initiatives improves NASA's security posture, as we have reported in our last four annual FISMA evaluations, NASA officials have not developed an Agency-wide risk management process specific to information security. Risk management is a comprehensive process that requires an organization to describe the environment in which risk-based decisions are made to access, respond to, and monitor risk over time. Ongoing monitoring is a critical part of an agency's risk management program.

[36] Phishing refers to the use of deceptive computer-based means to trick individuals into disclosing sensitive personal information. In a phishing attack, an attacker creates a website or e-mail that looks as if it is from a well-known organization like a credit card company or financial institution.

[37] NASA's publicly accessible web applications consist mainly of websites, but also include web-based login portals and administrative systems that provide authorized personnel remote access to Agency IT resources.

Over the past 5 years, the OIG has issued 19 audit reports containing 75 recommendations designed to improve NASA's information security program. In a 2014 report, we examined NASA's efforts to identify and assess vulnerabilities on its publicly accessible web applications and mitigate the most severe vulnerabilities before hackers exploit them.[38] Reducing the Agency's extensive web "footprint" is one of the more effective ways NASA can reduce the threat of cyber-attacks. To this end, the OCIO and Center IT security officials are working to reduce NASA's web presence by eliminating unused and duplicative web applications and moving Agency websites to a public cloud-computing environment.[39] NASA developed an inventory of all publically available web applications maintained by NASA Headquarters and Centers and identified vulnerabilities through automated scanning coupled with manual testing. In addition, during the 15-month period ending March 2014, NASA reduced the number of its publicly accessible web applications by 15 percent.

While NASA's ongoing efforts to reduce its web presence and to identify and scan for vulnerabilities on its publicly accessible web applications have improved Agency IT security, the Agency's remaining 1,200 publicly accessible web applications continue to present a large target for hackers. NASA needs to close remaining security gaps, strengthen program oversight, and further reduce the number of publicly accessible web applications. To address security concerns over publicly accessible applications under development or in testing mode, NASA plans to deploy an enterprise web application firewall in May 2016.

In a review completed in 2014, we evaluated NASA's management of smartphones, tablets, cell phones, and AirCards.[40] These mobile devices pose security threats because of their size, portability, constant wireless connection, physical sensors, and location services. Further, the diversity of available devices, operating systems, carrier-provided services, and applications present additional security challenges. We found that although NASA began enforcing security requirements on all smartphones and tablets that connect to NASA's e-mail systems in September 2013, the Agency still needed to implement a technical tool to mitigate risks when those devices connect to NASA systems other than e-mail. The Agency is still reviewing various technical tools and plans to complete corrective action in FY 2016.

In an August 2012 audit, we examined the effectiveness of NASA's Security Operations Center (SOC) in managing the Agency's computer security incident detection and handling program to prevent unauthorized cyber intrusions into Agency networks.[41] NASA consolidated its previously Center-based computer security incident detection and response programs into the SOC in November 2008 in an effort to improve its capability to detect and respond to evolving threats posed by increasingly sophisticated cyber-attacks. Located at Ames Research Center, the SOC provides centralized, continuous monitoring of computer network traffic entering and leaving NASA Centers and includes an information system for Agency-wide coordination, tracking, and reporting of IT security incidents. In general, we found that the SOC has improved NASA's computer security incident handling capability by providing continuous incident detection coverage for all NASA Centers. However, NASA still needs to improve overall SOC availability and plans to complete related corrective actions by September 2016.

[38] NASA OIG, "Security of NASA's Publicly Accessible Web Applications" (IG-14-023, July 10, 2014).

[39] A public cloud-computing environment consists of a third-party IT service provider (e.g., Amazon) that delivers services such as website hosting or data storage to consumers over the Internet.

[40] NASA OIG, "NASA's Management of its Smartphones, Tablets, and Other Mobile Devices" (IG-14-015, February 27, 2014). An AirCard is a device that provides the user with access to wireless broadband cellular services.

[41] NASA OIG, "Review of NASA's Computer Security Incident Detection and Handling Capability," (IG-12-017, August 7, 2012).

In our March 2015 report on NASA's Deep Space Network, we found that NASA's SOC was not adequately integrated into JPL's computer network operations.[42] Although JPL is required to report computer security incidents on its network to the NASA SOC, we found NASA lacks the ability to verify the accuracy or completeness of JPL's reporting. Further, we found JPL has network connections that NASA is not monitoring because JPL and NASA have not come to an agreement on plans for comprehensive monitoring. As a result, NASA lacks the ability to monitor a large portion of JPL network traffic – which may be destined for or originate from Network associated components – for suspicious activity, provide timely assistance in the event of an incident, and ensure its information systems and data are fully protected. The Agency agreed to take action on our recommendation to ensure the NASA SOC has appropriate oversight at JPL to support NASA's Agency-wide incident management program by February 2016.

In addition to our audit work, the OIG expends substantial resources investigating IT security issues. OIG investigators have conducted more than 100 investigations of breaches of NASA IT networks over the past 5 years and helped to secure convictions of hackers operating from such wide-ranging locations as Australia, England, Italy, Nigeria, Portugal, Romania, and Turkey. In one notable example, an OIG investigation recently resulted in an Estonian national accused of directing an Internet fraud scheme pleading guilty to hacking-related charges associated with operating a sophisticated Internet fraud scheme that infected more than four million computers located in over 100 countries. The malware secretly altered the settings on infected computers, enabling the individual and others to digitally hijack Internet searches and re-route computers to specific websites and advertisements. In another case, OIG agents successfully investigated an insider threat involving a former contract employee who illegally accessed and attempted to destroy NASA systems.

Managing NASA's Aging Infrastructure and Facilities

NASA controls approximately 5,000 buildings and structures with an estimated replacement value of more than $35 billion, making the Agency among the larger Federal Government property holders. More than 80 percent of the Agency's facilities are 40 or more years old and thus beyond their design life. NASA strives to maintain these facilities in an efficient operational status, and when not operational, in sufficient condition not to pose a safety hazard. However, NASA has not been able to fully fund required maintenance for its facilities and in 2015 estimated its deferred maintenance costs at $2.3 billion.

The OIG has dedicated substantial resources over the last 5 years to examining NASA's infrastructure challenges.[43] This past year we added to this body of work with reports on Plum Brook Station and

[42] NASA OIG, "NASA's Management of the Deep Space Network" (IG-15-013, March 26, 2015).

[43] NASA OIG, "NASA's Independent Verification and Validation Program" (IG-14-024, July 16, 2014); "Audit of NASA's Environmental Restoration Efforts" (IG-14-021, July 2, 2014); "NASA's Management of Energy Savings Contracts" (IG-13-014, April 8, 2013); "Review of NASA's Explosives Safety Program" (IG-13-013, March 27, 2013); "NASA's Environmental Remediation Efforts at the Santa Susana Field Laboratory" (IG-13-007, February 14, 2013); "NASA's Efforts to Reduce Unneeded Infrastructure and Facilities" (IG-13-008, February 12, 2013); "NASA's Plans to Modify the Ares I Mobile Launcher in Support of the Space Launch System" (IG-12-022, September 25, 2012); "NASA's Infrastructure and Facilities: An Assessment of the Agency's Real Property Leasing Practices" (IG-12-020, August 9, 2012); "NASA's Infrastructure and Facilities: An Assessment of the Agency's Real Property Master Planning" (IG-12-008, December 19, 2011); "NASA Infrastructure and Facilities: Assessment of Data Used to Manage Real Property Assets" (IG-11-024, August 4, 2011); "NASA's Hangar One Re-Siding Project" (IG-11-020, June 22, 2011); and "Audit of NASA's Facilities Maintenance" (IG-11-015, March 2, 2011).

NASA's Pressure Vessel and Pressurized Systems Program.[44] As in our prior work, in both reports we found infrastructure that requires substantial resources to maintain and, in several instances, is significantly underutilized.

Plum Brook Station, located about 50 miles west of NASA's Glenn Research Center in Sandusky, Ohio, is home to several unique space-related test facilities, including the Space Power Facility (SPF), an environmental simulation chamber used to test hardware in a simulated space or planetary environment. However, a majority of Plum Brook's test facilities are underutilized and the level of use and funding they receive depends on whether individual NASA programs or external customers choose to perform testing there rather than at other NASA or private facilities. Over the past 10 years, Plum Brook has eliminated approximately 1.3 million square feet of buildings and structures from its property inventory. However, it continues to maintain several major testing facilities – most prominently the SPF and the Spacecraft Propulsion Research Facility (B-2), the world's largest thermal vacuum chamber that is also capable of testing rocket engines. Of these facilities, only the SPF has a full slate of testing planned over the next several years. In contrast, Plum Brook's Hypersonic Tunnel Facility and Cryogenic Components Laboratory have not been utilized for at least 4 years while a third facility – the Combined Effects Chamber designed for large-scale liquid hydrogen experiments – is unusable in its current condition. As of February 2015, NASA had not identified any customers for these three facilities. Moreover, although NASA's Solar Electric Propulsion Project plans to perform testing in the B-2 vacuum chamber in 2015, future utilization of the facility's rocket testing capabilities is uncertain. While NASA officials told us the B-2 could be used to test the SLS's upper stage rockets, such testing would require $15 million in basic refurbishment to the facility – costs the SLS Program or any other potential customer would be expected to cover in addition to potentially significant program-specific test costs.

To conduct its space and science operations, NASA uses a variety of pressure vessels and pressurized systems (PVS) such as storage tanks, cylinders, and piping that deliver compressed gas or liquid under significant pressure. Because of the nature of these gasses and liquids and how they are used, PVS may fail and cause harm to people, facilities, and the surrounding environment if not properly operated and maintained. NASA has experienced PVS failures in the past that resulted in loss of mission, injury, and property damage.

As of February 2015, NASA managed 10,109 active PVS and spent approximately $22 million annually to inspect and maintain these systems. Most PVS failures occur when a vessel or piping wall fails or ruptures because the internal pressure of the material inside exceeds the strength of the wall. Similar to the skin of a balloon that progressively grows thinner as inflated and weaker after multiple inflation-deflation cycles, over-pressurization or repeated pressurization and depressurization can gradually weaken the skin or walls of PVS, eventually leading to failure. Internal or external corrosion and physical damage (scratches, dings, and dents) can also increase the risk of PVS failure.

We found NASA Centers could benefit from stronger oversight and clarification of policies and procedures to ensure reliable operation of their PVS, which in turn could reduce risk to personnel and facilities. Specifically, NASA policy and standards for the management, operation, inspection, and maintenance of PVS are intentionally written at a fairly high level and do not contain specific guidance

[44] NASA OIG, "Audit of NASA's Requirements for Plum Brook Station" (IG-15-014, April 23, 2015); "Review of NASA's Pressure Vessels and Pressurized Systems Program" (IG-15-019, June 30, 2015).

regarding the application of national consensus codes and standards or the level of experience, education, and training sufficient to qualify an individual to serve as a Center Pressure Systems Manager. In addition, NASA's Office of Safety and Mission Assurance did not provide adequate oversight of Center PVS Programs.

We also found multiple issues of concern at each of the Centers we visited, including corrosion on a large number of PVS, inadequate inventory and property controls, and unclear assignment of Pressure Systems Manager roles and responsibilities. For example, at Langley Research Center we identified significant corrosion on high pressure piping and components, ground water penetration, and obstructed piping and systems in an underground utility corridor that contains high pressure steam piping, electrical conduit, and fiber optic communication lines (as shown in figure 2). If a rupture were to occur in this corridor, the resulting damage could cause power and communications outages that would impact Center operations. In our judgment, NASA's PVS Program could be improved by establishing clear lines of communication for resolving issues, implementing corrosion prevention and mitigation programs, and evaluating and providing the PVS Programs sufficient resources to meet Center mission goals and objectives.

Figure 2: High Pressure Lines in a Langley Research Center Utility Corridor

Source: NASA OIG.

Given the disparity between the Agency's infrastructure and its mission-related needs, as well as the likelihood of continued constrained budgets, it is imperative NASA move forward aggressively with its infrastructure assessment and reduction efforts. To achieve this goal, the Agency will need to move away from its longstanding "keep it in case you need it" mindset and overcome historical incentives for the Centers to build up and maintain unneeded capabilities. In addition, NASA officials need to manage the concerns of political leaders about the impacts eliminating or consolidating facilities will have on Centers' missions, their workforces, and the local communities. Moreover, abrupt changes in the strategic direction of the Nation's space policy by the President, Congress, and NASA will continue to add an element of uncertainty regarding the missions the Agency will pursue and therefore the facilities it will need to achieve those missions.

As we noted in our February 2013 report on underused facilities, NASA's best efforts to address its infrastructure challenges may ultimately be insufficient to overcome the cultural and political obstacles that have impeded past efforts to reduce Agency infrastructure.[45] Accordingly, an outside process similar to the Department of Defense's Base Realignment and Closure Commission may be necessary to make the difficult but necessary decisions.

In 2014, NASA embarked on an effort to strategically address the technical capabilities required to support Agency goals. Referred to as the Technical Capabilities Assessment Team (TCAT) and championed by the NASA Associate Administrator, this effort aims to provide NASA leadership with the information needed to make informed decisions about investing and divesting to ensure the Agency has the right mix of people and assets to carry its mission forward. Personnel from all 10 NASA Centers and 4 Mission Directorates, as well as the senior managers responsible for executing the decisions, participated in the process.

As of September 2015, TCAT has assessed 18 technical capabilities, including Mission Operations and Propulsion, and issued 11 formal decisions. As a result of these decisions, the Agency has excessed some aircraft, eliminated internal microgravity flight operations, and updated several external and internal memorandums of agreement. Agency decision-makers are considering what additional actions to take based on TCAT's work.

We plan to open a review early in 2016 examining the impact of TCAT and the status of the Agency's other strategic infrastructure initiatives.

Ensuring the Integrity of the Contracting and Grants Processes

Approximately 74 percent of NASA's $17.6 billion FY 2014 budget was spent on contracts to procure goods and services, and the Agency awarded another $868 million in grants and cooperative agreements. Accordingly, NASA managers face the ongoing challenge of ensuring the Agency pays contractors in accordance with contract terms and receives fair value for its money, and that grants and cooperative agreements are administered appropriately and recipients are accomplishing stated goals. For its part, the OIG seeks to assist NASA by examining Agency-wide procurement processes; auditing individual contracts, grants, and cooperative agreements; and investigating potential misuse of Agency contract and grant funds.

During the past year, the OIG continued to uncover fraud and other problems related to NASA contracts. For example:

- The OIG and the Internal Revenue Service investigated the validity of consulting fees charged to a NASA contract. The investigation identified a tax evasion scheme whereby the Chief Executive Officer (CEO) of a NASA contractor used the consulting fees as a vehicle to avoid paying taxes on large portions of his personal income. Ultimately the CEO pled guilty to making false statements on a Federal income tax return, was sentenced to 3 years in Federal prison, and agreed to make $294,300 in restitution and pay $99,000 directly to NASA.

[45] NASA OIG, "NASA's Efforts to Reduce Unneeded Infrastructure and Facilities" (IG-13-008, February 12, 2013).

- The CEO of another NASA contractor agreed to pay $4.5 million to settle civil claims relating to his involvement in a fraudulent scheme whereby he created a front company to obtain contracts through the Small Business Administration's Section 8(a) Program. The Section 8(a) Program allows qualified small businesses to receive sole-source and competitive-bid contracts set aside for minority-owned and disadvantaged small businesses. The CEO was also criminally prosecuted for the scheme and received a 72-month prison sentence and ordered to forfeit $6.1 million.

Given NASA's continued reliance on contractors to provide essential services, the Agency will remain susceptible to contract fraud schemes at any stage of the procurement and acquisition process. Typical schemes involve collusion among bidders, employers, and contractors; corrupt payments in the form of bribes and kickbacks; bid manipulation; failure to meet contractual specifications; substitution of products or materials of lesser quality than specified in the contract; use of counterfeit, defective, or used parts in an attempt to increase profits or comply with contract time schedules; submission of false, inflated, or duplicated invoices; making false claims regarding a contractor's abilities or level of experience; establishing fictitious vendors; and conflicts of interest. Government-wide spending reductions may result in additional exposure to fraud, as fewer opportunities will undoubtedly result in enhanced competition among contractors and reduced top-line and bottom-line growth. Given its potential susceptibility, NASA must ensure proper controls are utilized to mitigate the risk of falling victim to contract fraud and must strive to proactively identify potential fraud that deprives the Agency of critically-needed funds that would otherwise be utilized to finance its initiatives.

The OIG's audit work during the past year illustrated that NASA has work to do to improve its multibillion dollar contracting and procurement operations. For example, NASA can improve its utilization of Blanket Purchase Agreements (BPA) which are a simplified method of acquiring goods and services and establish terms and conditions (including prices) between a Federal agency and vendors for commonly used goods and services. NASA uses two types of BPAs: General Services Administration (GSA) schedule agreements that incorporate the terms and conditions of an underlying GSA contract, and NASA-specific agreements to purchase items, such as copier paper, and services, such as engineering research support.[46] In FYs 2011 and 2012, NASA obligated more than $248 million through 5,529 BPA orders. In a December 2014 audit, we found that by not consistently seeking price reductions on orders, establishing single- rather than multiple-award agreements without appropriate justification, and failing to perform required annual reviews to ensure established BPAs still represent the best value to the Government, NASA contracting officials failed to maximize competition and missed potential cost savings.[47] We also found deficiencies in NASA's use of GSA schedule agreements and NASA-specific agreements issued by Goddard Space Flight Center's Advanced Manufacturing Branch. In our judgment, the Branch missed opportunities to obtain lower costs by not seeking greater competition.

We also continue to work with NASA to improve the Agency's practices relating to cost-type contracts. More than half of the $15.6 billion NASA spent in FY 2013 acquiring goods and services was associated with cost-type contracts pursuant to which NASA reimburses contractors for allowable costs they incur producing or delivering the contracted goods or service. Cost-type contracts pose a financial risk to NASA because they do not promise delivery of a good or service at a set price.

[46] GSA schedule BPAs follow procedures defined by Federal Acquisition Regulation Subpart 8.4, "Federal Supply Schedules," and NASA-specific BPAs follow Part 13, "Simplified Acquisition Procedures."

[47] NASA OIG, "NASA's Use of Blanket Purchase Agreements," (IG-15-009, December 16, 2014).

To mitigate the risk involved with the use of cost-type contracts, Federal regulation requires contractors to submit annual cost data – commonly referred to as an incurred cost proposal – for review and potential audit. Audits of incurred cost proposals assess whether costs contractors charge the Government are properly applied to the contracts, sufficiently supported, and allowable. NASA generally has 6 years to recover any unallowable costs from the date an adequate incurred cost proposal is submitted. The Defense Contract Audit Agency (DCAA) performs incurred cost audits for NASA under a reimbursable agreement and estimates it has a 6-year backlog of more than 19,000 proposals awaiting review, including 1,153 proposals related to NASA contracts, about 39 percent of which predate 2009. In an effort to reduce this backlog, in 2012 DCAA changed its methodology for determining which proposals to select for incurred cost audits.

In an audit issued in December 2014, we found NASA is at increased risk of paying unallocable, unallowable, and unreasonable incurred costs and of losing the opportunity to recoup improper costs because Agency contracting officers rely too heavily on DCAA's incurred cost audit process.[48] Under its new, risk-based methodology, DCAA has significantly decreased the number of contractor proposals it audits in an effort to reduce its 6-year backlog of incurred cost proposals awaiting review. However, NASA contracting officers generally wait for a DCAA audit and do not perform additional oversight to ensure the appropriateness of contractor costs. Meanwhile, the Agency has not strengthened its internal controls to account for the significant reduction in DCAA oversight of Agency cost-type contracts. In addition, NASA's reliance on DCAA is inhibiting the Agency's efforts to timely close out awards, which further delays the identification of questionable costs and limits availability of excess funds for other uses.

Moreover, similar to findings in several previous audits our work this year found instances in which final award-fee scores and payments were not supported by the written evaluations. For example, in our audit of ISS contracts we identified a contract for which the award-fee evaluations did not support the overall award-fee scores.[49] Specifically, in two consecutive award-fee periods the written performance evaluation stated, "Contractor performance did not meet expectations in the Cost Control Factor"; rated the Factor as a "significant weakness" due, in part, to a significant cost overrun; and noted, "There were no strengths identified in this area." Nevertheless, the contractor received a rating of "satisfactory" for the Cost Control Factor in both performance periods. Overall, we questioned between $500,000 and $700,000 of award-fee payments made on ISS contracts between October 2012 and February 2014.

NASA also faces the ongoing challenge of ensuring the grant and cooperative agreement funds the Agency distributes each year are administered appropriately and that recipients are accomplishing stated goals. NASA awards approximately $850 million in grants and cooperative agreements annually to facilitate research and development and to fund scholarships, fellowships, and stipends to students and teachers, as well as research by educational institutions or other nonprofit organizations. The OIG conducted several audits during the past year to examine NASA's management of grants and cooperative agreements. In one review, NASA awarded cooperative agreements worth a combined $8.08 million to the Wise County Clerk of Circuit Court (Wise County) in Wise, Virginia, in 2008 and 2014 to support the Agency's DEVELOP National Program. DEVELOP is a capacity building program that seeks to address environmental management and public policy issues through interdisciplinary research projects that apply NASA Earth observations to community concerns around the globe. DEVELOP

[48] NASA OIG, "Costs Incurred on NASA's Cost-Type Contracts," (IG-15-010, December 17, 2014).

[49] NASA OIG, "Audit of NASA's Management of International Space Station Operations and Maintenance Contracts," (IG-15-021, July 15, 2015).

participants conduct applied science research projects under the guidance of science advisors from NASA and partner organizations. Projects funded through the Wise County agreements include a study of the weather in southwest Virginia, an aerosol climatology project, and using data obtained by NASA's Gravity Recovery and Climate Experiment Mission to help water managers in North Africa measure ground water storage.

Although Wise County satisfied the overall performance goals and objectives of its cooperative agreements with NASA, we identified substantial deficiencies in the County's management of award funds that caused us to question the total amount of the awards.[50] Specifically, for the 2008 cooperative agreement, Wise County improperly combined cooperative agreement revenues and expenditures with those relating to other County business in its accounting records. As a result, the County's accounting system could not identify transactions by award, impairing the audit trail required to ensure the County spent cooperative agreement funds appropriately. In addition, the County failed to disclose in required financial reports unexpended funds and improperly retained and used those funds to pay for activities carried out pursuant to subsequent agreements. Moreover, we identified $65,446 in unallocable, unallowable, or unsupported expenses, including tuition payments for courses not related to DEVELOP and extermination fees. We also found $165,325 in award funds Wise County spent outside approved budget periods. Further, without prior NASA approval, Wise County reprogrammed $540,000 of the 2014 award budget for program support purposes, reducing the amount of funds available for actual research projects.

In another example, NASA procurement officials awarded a 1-year cooperative agreement valued at $1.4 million to the City of New Orleans in September 2011 to provide fire protection services to the Michoud Assembly Facility (Michoud). NASA subsequently modified the agreement, increasing its value to $2.1 million and extending the period of performance through March 31, 2013. In April 2013, NASA and the City entered into an interagency agreement valued at $8.5 million for fire protection services through March 31, 2018. Our review of the cooperative agreement awarded to the City of New Orleans found that NASA did not have an adequate system of controls in place to ensure proper administration of the cooperative agreement for fire protection services at Michoud.[51] The City received approval from NASA to bill for services using the costs set forth in its proposed award budget, which were calculated using the highest rate of pay for positions at the Michoud Fire Station with an additional 15 percent indirect cost rate. An analysis comparing the actual payroll costs for the personnel who staffed the Fire Station with the quarterly invoiced amount determined that the Agency had overpaid the City by $185,621 for the period January 17, 2012, through April 16, 2012. Subsequent analysis found that NASA had overpaid the City by as much as $1.07 million over the six quarters invoiced under the cooperative agreement.

NASA also did not verify that the City of New Orleans performed required tests and inspections or consistently staffed the Michoud Fire Station with the number of personnel specified in the cooperative agreement. Without establishing and implementing oversight procedures and adequately documenting the City's performance, NASA had little assurance that the objectives of the cooperative agreement were accomplished.

[50] NASA OIG, "Audit of NASA's Cooperative Agreements Awarded to Wise County Circuit Court," (IG-15-022, July 16, 2015).

[51] NASA OIG, "Audit of NASA's Cooperative Agreement Awarded to the City of New Orleans," (IG-15-018, June 29, 2015).

Over the past 5 years, the OIG has conducted 41 grant fraud investigations resulting in 5 indictments, 7 prosecutions, $967,000 in recoveries, and $22.9 million in civil settlements. For example, an ongoing investigation determined a university in West Virginia billed administrative costs as direct costs, charged costs that were not allowable, and misused Federal funds and property acquired with Federal funds. The university has agreed to a $2.3 million civil settlement.

Given the large sums of money at stake, we intend to continue to monitor NASA's administration of its contracts, grants, and cooperative agreement awards as we work with the Agency to develop solutions to address the deficiencies identified in our reports.

APPENDIX A: MANAGEMENT COMMENTS

National Aeronautics and Space Administration
Office of the Administrator
Washington, DC 20546-0001

October 28, 2015

TO: Inspector General

FROM: Administrator

SUBJECT: Agency Response to Office of Inspector General Memorandum "NASA's 2015 Top Management and Performance Challenges"

Thank you for the opportunity to review and comment on "NASA's 2015 Top Management and Performance Challenges." This product, along with those issued in conjunction with the audits and investigations conducted by your office, provides valuable perspective into, and insight and oversight of the programs, projects, and activities that NASA is entrusted to execute. The senior leadership and I appreciate and recognize the efforts of your office as a key partner in driving efficiency and effectiveness across NASA's wide-ranging, ambitious, and challenging portfolio.

While the challenges outlined in this year's memorandum are closely aligned with those highlighted in 2014, I am pleased to note that you no longer report Space Act Agreements as an element of the contracting and grants challenge. I believe this small but important step is an indication of NASA's commitment to addressing the top management and performance challenges facing the Agency.

Please find as an enclosure, NASA's response to the one overarching and eight specific challenges articulated in your 2015 Top Management and Performance Challenges memorandum.

If you have any questions regarding NASA's response to the 2015 Top Management and Performance Challenges, please contact Paul Roberts on (202) 358-2260.

Charles F. Bolden, Jr.

Enclosure

Appendix A

MANAGEMENT'S RESPONSE
TO THE OFFICE OF INSPECTOR GENERAL'S MEMORANDUM ON
"NASA's 2015 TOP MANAGEMENT AND PERFORMANCE CHALLENGES"

Overarching Challenge:

Effective Management of NASA's Varied Programs in an Uncertain Budget Environment

NASA shares the OIG's concerns about the challenges that come with managing our programs in an uncertain budget environment. As the OIG notes, several of NASA's largest development programs have acquisition strategies that are highly sensitive to fluctuations in funding from year to year. Given the lack of additional available funding, and to be effective stewards of taxpayer dollars, it is imperative that programs and projects be delivered within their cost and schedule baselines. We believe the steps NASA has taken in response to the recommendations from the OIG, as outlined in this letter, are important components of that work.

In addition, NASA has implemented significant changes over the past several years to improve the fidelity of our cost estimates when a project is confirmed at Key Decision Point (KDP)-C and to provide surveillance of contractor performance through improved Earned Value Management (EVM) capabilities. In addition to responding to the OIG's recommendations with regards to our Joint Cost and Schedule Confidence Level (JCL) capabilities, we have also made significant progress over the past year implementing recommendations issued by the Government Accountability Office (GAO) in their 2012 report[1] on EVM. I am pleased to report that based on specific actions taken by NASA with respect to these recommendations, the GAO closed all remaining recommendations in September 2015.

Specific Management and Performance Challenges:

Space Flight Operations in Low Earth Orbit: Managing the International Space Station and the Commercial Cargo and Crew Programs

The International Space Station: In January 2014, the Administration and NASA announced the extension of the operations and utilization of the International Space Station (ISS) until at least 2024. In August, the U.S. Senate passed the Commercial Space Launch Competitiveness Bill by unanimous consent. Among the issues dealt with in this bill related to commercial space launch, it extends operation of the ISS to 2024. However, the House and Senate versions are different and remain to be reconciled before final passage an enactment. ISS extension to 2024 allows NASA to continue to make progress toward the goals of the ISS, specifically: 1) extending human spaceflight beyond low-Earth orbit (LEO); 2) enabling the development of the commercial market in LEO; 3) conducting research to benefit humanity in areas such as medicine, physical and life sciences, and Earth and space sciences; and 4) providing the basis for exploration international partnerships. Of the ISS International Partners, the U.S., Russian, and

[1] GAO Report: "NASA: Earned Value Management Implementation across Major Spaceflight Projects Is Uneven" (GAO-13-22; November 19, 2012)

Enclosure

Canadian space agencies have committed to supporting the ISS until at least 2024, and the Japanese and European Space Agencies are moving toward the same commitment.

NASA and its international partners have conducted extensive operational and maintenance analyses to determine the appropriate level of spares, maintenance cycles, and logistics necessary to maintain the ISS on-orbit platform to at least 2024. The partnership has also conducted structural and performance analyses to ensure that the ISS is structurally viable to at least 2028. System upgrades needed to operate the ISS to at least 2024, including docking systems and new lithium ion batteries for the electrical power system, are already under development. Larger external equipment and spares, such as the lithium ion batteries, are planned to launch on the Japanese HII Transfer Vehicle (HTV) prior to its retirement. Occasional failures of external hardware are to be expected, and NASA prepares for these with on-orbit spares and spacewalk preplanning. In response to faster-than-expected degradation of the solar arrays, NASA is assessing a variety of options to improve power generation/balance in the out years.

NASA has partnered with the Center for the Advancement of Science in Space (CASIS) to advance the development of the commercial market in LEO through development activities across private industry including pharmaceuticals, material sciences, biomedicine, and earth science. CASIS continues to expand its development activities and has now filled its 50 percent allocation of National Laboratory resources on the ISS.

As of 2015, CASIS is utilizing its 50 percent of the ISS resources dedicated to the National Lab and has filled the pipeline with a wide variety of commercial and other Government agency projects. Regarding metrics, it has always been NASA's intent to implement target metrics once CASIS has developed enough of a track record to make the targets not only effective but also reasonable. FY 2016 marks the beginning of CASIS's fourth year at full staffing level, so it is a reasonable time to begin agreeing to targets with CASIS.

Commercial Cargo Transportation: Despite the launch failures of both Orbital-ATK and SpaceX in the past year, the ISS remains well supplied with both consumables and research, thanks to a robust provisioning strategy. With the successful launch of the Japanese HTV-5 in August 2015, supplies onboard the ISS are in excellent shape to reach return-to-flight of both CRS companies. Orbital-ATK has procured two Atlas V launch vehicles that will fly two enhanced Cygnus missions prior to resuming flights on the upgraded Antares rocket, scheduled for June 2016. Both Orbital-ATK and NASA have completed investigations into the October 2014 failure, and Orbital-ATK has a plan in place to resume launches from Wallops Flight Facility with its new Antares launch vehicle configuration. While SpaceX's failure report is not yet complete, they have indicated that they are nearing being able to return to flight. Both CRS companies should be delivering cargo in the next few months, as well as disposing of trash and returning vital science results to Earth.

The ISS program is currently in the process of procuring additional commercial cargo transportation services. Once actual costs for transportation beyond the current Commercial Resupply Services (CRS) contract are known through the procurement process, the ISS will update its budget requests accordingly. Contracted commercial crew costs have already been incorporated into the ISS FY 2016 President's Budget request.

Commercial Crew Transportation: NASA has largely addressed the four challenges identified by the OIG regarding the Commercial Crew Program. "Unstable Funding" is, and will continue to be, an ongoing challenge mostly outside of NASA's control. NASA believes that it has addressed the remaining three commercial crew challenges. Also, the Agency looks forward to continuing to work with the OIG during the new audit initiated earlier this year.

Positioning NASA for Deep Space Exploration: Developing the Space Launch System, Orion Capsule, and Associated Ground Systems, and Mitigating Health and Performance Risks for Extended Human Missions

Developing the Space Launch System, Orion Capsule, and Associated Ground Systems: Exploration Systems Development (ESD) continues to make steady and sustained progress in preparing the Orion crew vehicle, the Space Launch System (SLS), and Exploration Ground Systems (EGS) to support deep space exploration. NASA recognizes the challenges of pursuing concurrent development of these three foundational programs. Therefore, and in addition to the comprehensive and rigorously reviewed development activities at the program level, ESD has made technical and programmatic integration a top focus for the enterprise. At the program level, all three programs have reached the level of technical and programmatic maturity needed to establish their Agency Baseline Commitments. These commitments were made based on the programs' demonstrated progress to date, including the successful test flight of Orion, SLS hardware, and GSDO systems and processes on Exploration Flight Test 1 (EFT-1) in December 2014; successful testing of the booster and engine that will power SLS on its maiden flight on Exploration Mission 1 (EM-1); and modernization of facilities at Launch Complex 39 (LC-39) at the Kennedy Space Center. These and many other hardware and testing milestones validated the designs, plans, and processes that were reviewed during the programs' preliminary design reviews. A single Standing Review Board (SRB) provided an independent Agency assessment during these reviews, and the same SRB also supported the enterprise-level integrated review that looked specifically at all technical and cross-program related issues. At both the program and integrated reviews, though forward work requiring attention was noted in a number of areas, the SRB validated the overall program and enterprise approach to both program-level and cross-program integration and noted that the process continues to mature.

In addition to the review work by the programs, enterprise, and SRB (and noting the leveraging of the capabilities of the NASA Engineering and Safety Center and Independent Verification and Validation [IV&V] Center on an issue-by-issue basis), the GAO and OIG have conducted over thirteen focused audits of ESD programs, after which nearly all recommendations were concurred upon and either have already been or will be implemented at the appropriate time. Integration will continue to be a primary focus across the enterprise, both near term, as the three programs complete their critical design reviews (SLS in July 2015; Orion in September 2015; and EGS in December 2015) and the enterprise-wide integration review in 2016, and long term, through preparation for integrated testing, integration, and operations leading to first flight on EM-1 and beyond. Funding instability and uncertainty (both in terms of total dollars and timing of full-year appropriations) remains a critical challenge to success, resulting in limited options to accelerate or modify our development approach. In summary, challenges remain as Orion and SLS begin large-scale hardware production and testing, and preparation continues for

integration at KSC. However, based on substantial and independent review of all aspects of enterprise operations, NASA is confident that the proper designs and processes are in place to overcome these challenges, and that SLS, Orion, and EGS will form the core of the Agency's exploration capability for decades to come.

Mitigating Health and Performance Risks for Extended Human Missions: The successful mitigation of human system risks for space flight is essential for NASA to conduct long duration space missions in and beyond LEO. This mitigation approach requires the integration of human health and performance, engineering, mission management and policy disciplines to enable the safe conduct of human space flight missions and the protection of the long-term health of astronauts. The Human Exploration and Operations Mission Directorate (HEOMD), Office of the Chief Health and Medical Officer (OCHMO), and the Human Health and Performance Directorate (HHPD) at the Johnson Space Center (JSC) have worked diligently for the past decade to achieve an integrated approach to human health in space that incorporates the human system into spacecraft design and operations, following an occupational health model, as recommended by the National Academies of Science, Engineering, and Medicine. The Health and Medical Technical Authority has promulgated health standards and evidenced-based risk management, which address integrated space health risks that drive spacecraft design as well as the Human Research Program's (HRP) research and development (R&D) priorities and investments.

Ensuring the Continued Efficacy of the Space Communications Networks

NASA's Space Communications and Navigation (SCaN) Program enters its tenth year focused on its mission of creating the integrated Agency-wide space communications and navigation architecture necessary to assure continued efficacy of the Agency's space communication networks. As NASA's missions require larger and larger amounts of data delivered reliably and accurately, SCaN continues its evolution of the integrated system. The SCaN Network Integrated Project is currently in pre-phase A, working towards full integration of all three networks. The Near Earth Network (NEN), Space Network (SN) and Deep Space Network (DSN) initially will remain independent. In the interim, SCaN is adding new capabilities that extend the functionality of the networks and will be incorporated into the integrated architecture.

During FY 2016, SCaN will continue addressing the critical challenges that must be met in order to meet NASA's requirements for space communications and navigation necessary for the success of all space missions, specifically:

- Completing a new generation of communication satellites (the Tracking and Data Relay Satellites [TDRS] project) to the Space Network fleet.
- Upgrading Space Network ground infrastructure through the Space Network Ground Segment Sustainment (SGSS) Project.
- Upgrading the deep space communication capability through the Deep Space Aperture Enhancement Project (DAEP).

To address these issues in FY 2015, SCaN accomplished the following:

- TDRS-L transitioned into full operations as part of the Tracking and Data Relay Satellite System.
- The NEN AS-3 11-meter antenna entered operations at the University of Alaska Fairbanks Station.
- The first DAEP antenna, DSS-35, also entered operations.

SCaN will continue to address these challenges in FY16, with the addition of the following:

- Upgrading NASA NEN ground antenna capabilities.
- Completion of development of the TDRS-M satellite, and storage pending availability of a launch vehicle.

SCaN also manages NASA's Spectrum Management Program (SMP) and is deeply involved with other space-faring nations in this area. SMP ensures that all NASA activities comply with national and international laws applicable to the use of the electromagnetic spectrum. The program continues to address competing interests for use of the electromagnetic spectrum, including commercial broadband services, to assure necessary spectrum resources are available for NASA missions. In early FY 2016, SCaN's SMP will participate in the State Department-led U.S. delegation to the International Telecommunication Union's World Radio Communication Conference to negotiate the critical radiofrequency spectrum for NASA's missions.

SCaN is responsible for coordinating between the U.S. and our international partners on the communication and navigation standards to assure cross-utilization of both ground infrastructure and spacecraft. This includes the critical issue of the development of optical communication standards, which represents a paradigm shift in space communications. Optical communication will make possible the transmission of a vastly increased amount of data, including video images, which will change how scientific data is managed and studied. SCaN continues to collaborate within NASA and with external partners on the development of this exciting new technology. The Laser Communication Relay Demonstration mission is now slated to launch in 2017.

Managing NASA's Science Portfolio

The Science Mission Directorate (SMD) develops and implements an extensive portfolio of scientific projects and programs that are inherently complex and present unique challenges. Still SMD continues to develop and implement the cutting-edge missions necessary to advance science and produce the incredible discoveries for which NASA has long been recognized.

The *2010 Science Plan for NASA's Science Mission Directorate* outlined the Agency's efforts to revise and implement new policies to constrain mission costs and meet schedule goals. One of these measures included "Establishing confidence level-based mission life cycle budgets" – the Joint Cost and Schedule Confidence Level (JCL) requirement. As the recent OIG report[2] on the

[2] NASA OIG Report, "Audit of Joint Cost and Schedule Confidence Level Process" (IG-15-024; September 29, 2015)

JCL process pointed out, the JCL policy is having a positive impact on NASA's historical challenges with cost and schedule fidelity.

NASA agrees with the OIG's observation that "the JCL policy is having a positive impact on NASA's historical challenges with cost and schedule fidelity" and recognizes that JCL is not a one-stop solution for addressing all cost and schedule challenges. NASA is undertaking numerous efforts aimed at continuous improvement of the JCL process, consistent with the recommendations of the recent OIG audit on the JCL process. These efforts include an ongoing scheduling initiative to strengthen NASA's scheduling capabilities, a detailed training course for estimators/programmatic analysts that includes a significant JCL training component, and enhanced training of project managers and SRB chairs/members.

In the specific case of the James Webb Space Telescope (JWST) which was re-baselined in 2011, the GAO stated in its 2015 report[3] "JWST project continues to report that it remains on schedule and budget with its overall schedule reserve currently above its plan." SMD will continue to rigorously maintain practices to improve cost and schedule performance.

SMD looks forward to working with the OIG on the recently opened audit examining NASA's management of its Earth Science mission portfolio.

Overhauling NASA's Information Technology Governance

NASA's Office of the Chief Information Officer (OCIO) has continued to address remediation of Information Technology (IT) Governance, initially identified in the OIG's June 2013 report. Specifically, two of the eight OIG recommendations were implemented by NASA and closed by the OIG during FY 2015.

In recognition of the importance of IT management in meeting NASA's mission, senior leadership initiated the first-ever Business Services Assessment (BSA) of Information Technology across NASA. The BSA provided multiple recommendations to improve IT management and strengthen IT governance. As a result of the BSA recommendations, the Agency Mission Support Council (MSC) decided to: 1) Establish a senior leader/stakeholder IT Council as the top decision-making governing board; 2) Develop IT Strategic Sourcing guidance; 3) Conduct an annual capital investment review for all NASA IT spending; 4) Conduct Center functional reviews to assess compliance and; 5) Strengthening the role of the Chief Information Officer (CIO).

The MSC made these decisions to strengthen visibility and enable a stronger approval process for all NASA IT spending, which also fulfills the requirements of Federal Information Technology Acquisition Reform Act (FITARA).

[3] GAO Report: "James Webb Space Telescope: Project Facing Increased Schedule Risk with Significant Work Remaining" (GAO-15-483T; March 24, 2015)

The CIO expects to complete implementation of management actions in response to the OIG's 2013 audit report in early 2016.

Securing NASA's Information Technology Systems and Data

Advancing NASA's IT Security posture in response to the ever-growing threats and attack vectors remains a priority for the Agency. Significant threats include stolen identity credentials, phishing, malware, and an aging IT infrastructure. Building upon the tools and capabilities already deployed, NASA is implementing an integrated approach through enhancements to continuous monitoring and mitigation, network intrusion detection and prevention, data loss detection and prevention, Personal Identity Verification (PIV)-based authentication, and developing a risk-based process to inform decisions at all levels.

In FY 2015, NASA significantly improved the Security Operations Center (SOC) capabilities with enhanced intrusion detection systems (IDS), intrusion prevention, and strengthening security of the Agency Trusted Internet Connection (TIC) boundaries. Actions taken using the Department of Homeland Security's (DHS) Cyber Hygiene Report have greatly reduced vulnerabilities on internet facing systems. An agency-wide effort to implement PIV authentication on both privileged and unprivileged accounts, has also contributed greatly to our security posture through strong user authentication.

Priority actions in FY 2016 include: 1) implementing a National Institute of Standards and Technology (NIST) compliant risk management framework, to process and manage the volume of data being collected by tools and sensors; 2) deployment of DHS' Continuous Diagnostics & Mitigation (CDM) enterprise services; 3) increasing in PIV usage; 4) implementing an anti-phishing and secure mobile device management service; 5) planning budgets to replace ageing infrastructure and; 6) reducing NASA's publically exposed IT infrastructure. Finally, we will focus on improving the speed of response to identified IT security vulnerabilities.

We continue to work toward addressing all OIG recommendations and welcome their support in our work to maintain the security of all NASA's information assets.

Managing NASA's Aging Infrastructure and Facilities

NASA recognizes the challenges associated with managing its diverse and unique infrastructure. NASA continues to implement its strategy to reduce and modernize its infrastructure within available and anticipated budget levels.

NASA continues to work to identify underutilized assets, consolidate capabilities into a suite of core facilities and dispose of facilities that are no longer needed. NASA has completed Technical Capability Assessment Team (TCAT) assessments. To assess technical capabilities, NASA has transitioned from TCAT to the enduring technical capability leadership model. NASA has established Technical Capability Leaders who report recommendations about core technical capabilities annually. These recommendations become input to the Agency's annual Agency Strategy Implementation Planning meeting which establishes budget planning guidance

for the next budget planning cycle. In one of the early capability reviews under this new process, NASA evaluated space environments test capabilities. As a result of the evaluation, NASA made divestment and consolidation decisions for a number of space environments test facilities. The facilities identified for disposal will be integrated into NASA's five-year demolition plan. In 2015, NASA completed its Real Property Efficiencies Plan. This plan integrated the Agency's building consolidation and disposal plans into a single integrated five-year plan focused on reducing the Agency's building footprint within available resources. NASA will use this plan to manage square foot reduction efforts over the next five years.

When major technical facilities have extended time periods between test programs, NASA moves the facility to an inactive status when practical. This allows NASA to minimize the annual operating costs. When a new test program is identified, the cost to bring the facility back on line, along with any costs to modify the facility to meet the new test requirements become the responsibility of the test program. This allows NASA to minimize operating expenses during extended inactive periods.

NASA maintains a large inventory of pressure systems. NASA manages this inventory through an active pressure systems program which includes remaining life and risk assessments. The management program includes a community of practice of technical experts who share information and best practices. NASA is revising its pressure systems standard to provide more specific guidance in areas where no national standard exists.

Ensuring the Integrity of the Agency's Contracting and Grants Processes

NASA's Office of Procurement (OP) appreciates the investigative and audit work cited by the OIG and acknowledges the importance of this effort, particularly where fraud is uncovered and process improvements can be made.

NASA procurement is continuing to strengthen and improve contracting and grants processes throughout the Agency. For the areas identified by the OIG, OP published procurement guidance regarding Blanket Purchase Agreement (BPA) requirements specifically in the areas of requesting vendor price discounts and conducting annual reviews. We published contract administration guidance regarding the monitoring of incurred cost reportable audits that will strengthen our administration of contracts.

We have strengthened training and issued policy guidance relative to the award-fee process and believe NASA's approach to award fee is sound and compliant with the Federal Acquisition Regulation and statute.

Finally, we continued to strengthen the management of grants through our issuance of a completely revised 2 CFR 1800 "*Uniform Administrative Requirements, Cost Principles, and Audit Requirements For Federal Awards,*" which implemented the requirements of 2 CFR 200 and included revised new technology terms and conditions, and eliminated the allowance of a "fee" for assistance awards.

APPENDIX B: NASA RECIPIENTS

Office of the Administrator

Administrator
Deputy Administrator
Associate Administrator
Deputy Associate Administrator
Chief of Staff
Senior Advisor to the Administrator for Strategy and Policy Implementation
White House Liaison

Administrator Staff Offices

Chief Financial Officer
Chief Information Officer
Chief Engineer
Chief Health and Medical Officer
Chief Safety and Mission Assurance
Chief Scientist
Chief Technologist
General Counsel
Associate Administrator for Communications
Associate Administrator for Diversity and Equal Opportunity
Associate Administrator for Education
Associate Administrator for International and Interagency Relations
Associate Administrator for Legislative and Intergovernmental Affairs
Associate Administrator for Small Business Programs

Mission Directorates

Associate Administrator for Aeronautics Research Mission Directorate
Associate Administrator for Human Exploration and Operations Mission Directorate
Associate Administrator for Science Mission Directorate
Associate Administrator for Space Technology Mission Directorate
Associate Administrator for Mission Support Directorate
- Deputy Associate Administrator
- Assistant Administrator for Human Capital Management
- Assistant Administrator for Procurement
- Assistant Administrator for Protective Services
- Assistant Administrator for Strategic Infrastructure
- Executive Director, Headquarters Operations
- Executive Director, NSSC
- Director, NASA Management Office

Appendix B

NASA Centers

Director, Ames Research Center
Director, Armstrong Flight Research Center
Director, Glenn Research Center
Director, Goddard Space Flight Center
Director, Jet Propulsion Laboratory
Director, Johnson Space Center
Director, Kennedy Space Center
Director, Langley Research Center
Director, Marshall Space Flight Center
Director, Stennis Space Center

FY 2015 Inspector General Act Amendments Report

Background

The Inspector General Act Amendments of 1988 (P.L. 100-504), require that heads of Federal agencies submit semi-annual reports to Congress on the actions taken in response to Office of Inspector General (OIG) audit reports. Specifically, agency heads are required to report on:

1. OIG reports containing monetary benefits (i.e., questioned costs or funds to be put to better use) for which:

    - final management decisions were made during the reporting period;
    - final management decisions have been made, but final management action is still pending;
    - final management action was taken during the reporting period;
    - no final management action was taken during the reporting period.

2. OIG recommendations pending final management action more than one year after the issuance of the corresponding audit report.

Additionally, the Office of Management and Budget (OMB) has issued specific "action requirements" to Federal agencies through their Circular No. A-50, "Audit Follow-up." These requirements include that Federal agencies ensure that final management decisions on OIG audit recommendations are reached within six months after the issuance of an audit report and that corresponding corrective actions begin as soon as practicable.

Finally, the Reports Consolidation Act of 2000 (P.L. 106-531), provides Federal agencies with the flexibility to annualize and consolidate semi-annual reports, such as this one, into the annual Agency Financial Report (AFR).

The following definitions are provided for the purpose of enhancing the readability and utility of NASA's FY 2015 Inspector General Act Amendments Report:

Final Management Decision is reached when management evaluates the OIG's findings and recommendations, and determines whether or not to implement a proposed recommendation.

Final Management Action is the point in time when corrective action, taken by management in conjunction with a final management decision, is completed.

Corrective Action consists of management's planned or proposed remediation efforts intended to mitigate an audit finding.

Questioned Costs are those identified by the OIG as being potentially unallowable because of either: a) a purported violation of law, regulation, contract, grant, cooperative agreement, or other device governing the incurrence of cost; b) a finding that, at the time of the audit, such cost is not supported by adequate documentation, or; c) a finding that the cost incurred for the intended purpose is unnecessary or unreasonable.

Disallowed Costs are questioned costs that management has sustained or agreed should not be charged to the Government.

Funds to be Put to Better Use (FPTBU) are potential cost savings, identified by the OIG, that could be realized through the implementation of an audit recommendation.

NASA's Audit Follow-up Program

NASA is firmly committed to ensuring timely and responsive final management decisions, along with timely and complete final management action, on all audit recommendations issued by the NASA OIG. To this end, NASA has implemented a comprehensive program of audit follow-up intended to ensure that audit recommendations issued by the OIG are resolved and implemented in a timely, responsive, and effective manner. NASA's audit follow-up program is an integral component of the Agency's integrated internal control framework, and is a key element in improving the overall efficiency and effectiveness of NASA's programs, projects and operations.

NASA's Mission Support Directorate (MSD) is designated as the Agency's office of primary responsibility for policy formulation, oversight, and functional leadership of NASA's audit follow-up program. MSD implements audit follow-up program activities through an Agency-wide network of Audit Liaison Representatives (ALRs) who, in turn, are responsible for executing program activities at the Mission Directorate, Field Center and Headquarters Office levels. In conjunction with NASA's network of ALRs, MSD provides the functional structure to support NASA's audit follow-up program. The program leverages the Audit and Assurance Information Reporting System (AAIRS) to track and monitor OIG audit reports and recommendations, as well as to support internal and external reporting of audit follow-up program activities.

In accordance with requirements outlined in OMB Circular A-50, MSD monitors audit recommendations issued by the OIG to ensure that a final management decision is reached within six months of the issuance of a final audit report. A final management decision is reached when either: a) management agrees to implement corrective actions in response to an OIG audit recommendation or b) management determines that implementing a particular audit recommendation is imprudent, impractical, not cost

beneficial, etc. In those instances where agreement between the OIG and management cannot be reached, a final management decision (resolution) is achieved in conjunction with NASA's Audit Follow-up Official (AFO), consistent with provisions of OMB Circular A-50.

When a final management decision has been made to implement an audit recommendation, corrective action is pursued as rapidly as practicable. In some instances, the corrective action associated with a final management decision may span multiple fiscal years due to factors such as the complexity or cost of the planned corrective action; or unexpected delays in the formulation, review and approval of NASA policies, procedural requirements, or regulations. In these instances, MSD works with the OIG and respective Mission Directorate, Field Center, or Headquarters Office to ensure communication and coordination regarding necessary revisions to timelines and milestones associated with the implementation of these recommendations.

FY 2015 Audit Follow-up Results

The Inspector General Act Amendments of 1988 require that heads of Federal agencies report on corrective actions taken, or remain to be taken in response to OIG audit reports containing monetary benefits.

The amendments also require that management report on those OIG recommendations for which a final management decision had been made in a prior reporting period, but final management action is still ongoing.

In addition to the statutory reporting requirements delineated in the Inspector General Act Amendments of 1988, OMB Circular A-50, requires that final management decisions on OIG audit recommendations be made within six months of the issuance of a final audit report. NASA's FY 2015 reporting in conjunction with the requirements of the Inspector General Act Amendments of 1988 and OMB Circular A-50, follows:

1. OIG Audit Reports with Monetary Benefits

During FY 2015, the OIG issued four audit reports[1] to NASA containing monetary benefits in the aggregate amount of $99 million. These four reports contain OIG identified questioned costs and FPTBU in the amounts of $5.6 million and $93.4 million, respectively (see **Table 1**).

[1] "*Audit of Cooperative Agreement with the City of New Orleans*" (IG-15-018; June, 29, 2015); "*Audit of NASA's Management of International Space Station Contracts*" (IG-15-021; July 15, 2015); "*Audit of NASA's Cooperative Agreements Awarded to Wise County Circuit Court*" (IG-15-022; July 16, 2015); and "*NASA's Response to Orbital's October 2014 Launch Failure: Impacts on Commercial Resupply of the International Space Station*" (IG-15-023; August 17, 2015)

In addition to the monetary benefits reported during FY 2015, $9.9 million in monetary benefits identified by the OIG in audit reports[2] issued in prior fiscal years (FY 2012 and FY 2014) required final management action at the beginning of FY 2015. These prior year monetary benefits consisted of $216,920 and $9.7 million in questioned costs and FPTBU, respectively.

Total monetary benefits subject to final management action in FY 2015 were $108.8 million, consisting of $5.8 million and $103 million in questioned costs and FPTBU, respectively.

As of September 30, 2015, $108.8 million in OIG identified monetary benefit remains subject to final management action. Final management action with regards to $99 million of questioned costs and FPTBU identified in the OIG's four audit reports issued in third quarter of FY 2015 is anticipated during the second quarter of FY 2016. Final management action associated with $216,920 in FY 2012 questioned costs and $9.7 million in FY 2014 FPTBU is anticipated during the first quarter of FY 2016.

Audit Reports with Monetary Benefits
(Questioned Costs and Funds Put to Better Use)
For the Year Ended September 30, 2015

	Category	Questioned Costs		Funds to be Put To Better Use	
		Number of Reports	(Dollars)	Number of Reports	(Dollars)
Line 1	Beginning Balance: Audit reports with monetary benefits issued in prior years (FY 2012 & FY 2014) requiring final management action in FY 2015 (prior year carry-over)	1	$216,920	1	$9,653,020
Line 2	Plus: Audit reports with monetary benefits issued during FY 2015 requiring final management action during FY 2015	3	$5,562,827	2	$93,400,000
Line 3	Total audit reports with monetary benefits (prior year and current year) requiring final management action in FY 2015 [line 1 + 2]	4	$5,779,747	3	$103,053,020
Line 4	Less: Audit reports with monetary benefits on which final management action was taken during FY 2015	0	$0	0	$0
Line 5	Ending Balance: Audit reports with monetary benefits pending final management action at the end of FY 2015 [line 3- line 4] (carry-over into FY 2016)	4	$5,779,747	3	$103,053,020

Table 1

[2] "*Audit of NASA Grants Awarded to the Philadelphia College Opportunity Resources for Education"* (IG-12-018; July 26, 2012) and *"NASA's Independent Verification and Validation Program"* (IG-14-024; July 16, 2014)

2. OIG Audit Recommendations Open More Than One Year After Report Issuance

As of September 30, 2015, a total of 56 recommendations in 19 OIG audit reports remain open, pending completion of final management action, more than one year since the issuance of the corresponding final audit reports (see **Table 2**).

Although these 56 recommendations remain open more than one year after issuance of the respective audit reports, NASA management continues to aggressively pursue agreed-upon corrective actions intended to fully implement the OIG's recommendations. In summarizing these 56 open, prior year recommendations, the following four broad categories of the nature of outstanding corrective actions were identified:

1) Policy Development/Revision (63 percent);
2) Oversight/Monitoring/Program Review (30 percent)
3) Remedy Questioned Costs (5 percent); and
4) Program/ Project Operations (2 percent)

By way of comparison and perspective, as of September 30, 2014, 50 recommendations in 15 OIG audit reports were open, pending completion of final management action, more than one year after issuance of the corresponding audit reports. During the period FY 2011 through FY 2015, the number of OIG recommendations pending completion of final management action, more than one year after issuance of the corresponding audit reports, at fiscal year-end, has ranged between 33 and 59.

Summary of OIG Audit Reports Pending Final Management Action One Year or More After Issuance of a Final Report *(As of September 30, 2015)*				
Report No.		**No. of Recommendations**		
(Report Date)	**Report Title**	**Open**	**Closed**	**Total**
IG-12-013 (3/01/2012)	***Audit of NASA's Process for Transferring Technology to the Government and Private Sector***	3	4	7
IG-12-017 (8/08/2012)	***Review of NASA's Computer Security Incident Detection and Handling Capability***	2	1	3
IG-12-018 (7/26/2012)	***Audit of NASA Grants Awarded to the Philadelphia College Opportunity Resources for Education***	3	5	8
IG-13-006 (3/18/2013)	***NASA's Process for Acquiring Information Technology Security Assessment and Monitoring Tools***	2	2	4
IG-13-008 (2/12/2013)	***NASA's Efforts to Reduce Unneeded Infrastructure and Facilities***	2	3	5
IG-13-015 (6/05/2013)	***NASA's Information Technology Governance***	6	2	8
IG-14-001 (11/13/2013)	***NASA's Management of the Commercial Crew Program***	1	3	4
IG-14-003 (11/19/2013)	***NASA's Use of Award Fee Contracts***	7	8	15
IG-14-009 (1/08/2014)	***NASA's Decision Process for Conducting Space Launch System Core Stage Testing at Stennis***	3	1	4
IG-14-010 (1/15/2014)	***NASA's Strategic Sourcing Program***	1	5	6
IG-14-015 (2/27/2014)	***NASA's Management of Its Smartphones, Tablets, and Other Mobile Devices***	2	0	2
IG-14-020 (6/05/2014)	***NASA's Use of Space Act Agreements***	4	3	7
IG-14-021 (7/02/2014)	***Audit of NASA's Environmental Restoration Efforts***	4	0	4
IG-14-023 (7/10/2014)	***Security of NASA's Publicly Accessible Web Applications***	2	3	5
IG-14-024 (7/16/2014)	***NASA's Independent Verification and Validation Program***	2	1	3
IG-14-026 (7/22/2014)	***Audit of the Space Network's Physical and Information Technology Security Risks***	4	0	4
IG-14-028 (8/04/2014)	***Audit of NASA's Cooperative Agreement with BioServe Space Technologies - University of Colorado at Boulder***	1	2	3
IG-14-030 (9/15/2014)	***NASA's Efforts to Identify Near-Earth Objects and Mitigate Hazards***	5	0	5
IG-14-031 (9/18/2014)	***Extending the Operational Life of the International Space Station Until 2024***	2	1	3
19	**Totals**	**56**	**44**	**100**

Table 2

3. Final Management Decisions Not Made Within Six Months of a Report Date

During FY 2015, the OIG issued 17 reports containing 187 recommendations which required a final management decision within six months of the respective final report dates. Final management decisions were made within six months of issuance of the corresponding audit reports on 185 (99 percent) of the OIG recommendations issued during FY 2015. Final management decisions on two recommendations in two OIG audit reports[3] issued in late FY 2015 remain unresolved (final management decision pending) as of September 30, 2015. However, resolution of these two recommendations is anticipated during the first quarter of FY 2016.

Additionally, during FY 2015 final management decisions were made on two audit recommendations issued in a prior year (FY 2014) OIG report[4]. Resolution of one FY 2014 recommendation was achieved during an April 1, 2015, AFO Resolution Meeting, during which the initial recommendation was closed in favor of issuing three alternative recommendations agreed to between management and the OIG. The remaining recommendation was resolved outside the AFO resolution process. As of September 30, 2015, two of the three alternative recommendations remain open, pending completion of final management action which is targeted for the third quarter of FY 2016. No prior year final management decisions were outstanding as of September 30, 2015.

For the five-year period ended September 30, 2015, 793 OIG audit recommendations were issued. Ninety-nine percent of final management decisions on these recommendations were made within six months of the issuance of the corresponding final audit report date.

4. Audit Recommendation Closure Efficiency

During FY 2015, 176 OIG-issued audit recommendations (including 154 recommendations issued in prior fiscal years) were closed based on responsive management action. Of these 176 recommendations:

- 121 recommendations (69 percent) were closed within one year of issuance of the associated audit report;
- 29 recommendations (16 percent) were closed between one and two years of issuance of the associated audit report; and
- 26 recommendations (15 percent) were closed in excess of two years of issaunce of the associated audit report (see **Table 3**)

[3] *"Audit of NASA's Management of International Space Station Contracts"* (IG-15-021; July 15, 2015) and *"NASA's Response to Orbital's October 2014 Launch Failure: Impacts on Commercial Resupply of the International Space Station"* (IG-15-023; September 17, 2015)
[4] "*NASA's Use of Award Fee Contracts*" (IG-14-003; November 19, 2013)

For comparative purposes, during FY 2014, 154 OIG-issued audit recommendations (including 146 recommendations issued in prior fiscal years), were closed based on responsive management action. Twenty OIG recommendations (13 percent) were closed within one year of issuance of the associated audit report; 119 recommendations (77 percent) were closed between one and two years of issuance of the associated audit report; and 15 recommendations (10 percent) were closed in excess of two years of issuance of the associated audit report.

For the five-year period ended September 30, 2015, an average of 48 percent of OIG-issued audit recommendations were closed within one year of issuance of the associated audit report; 40 percent were closed within two years of issuance of the associated audit report, and 12 percent were closed in excess of two years of issuance of the associated audit report.

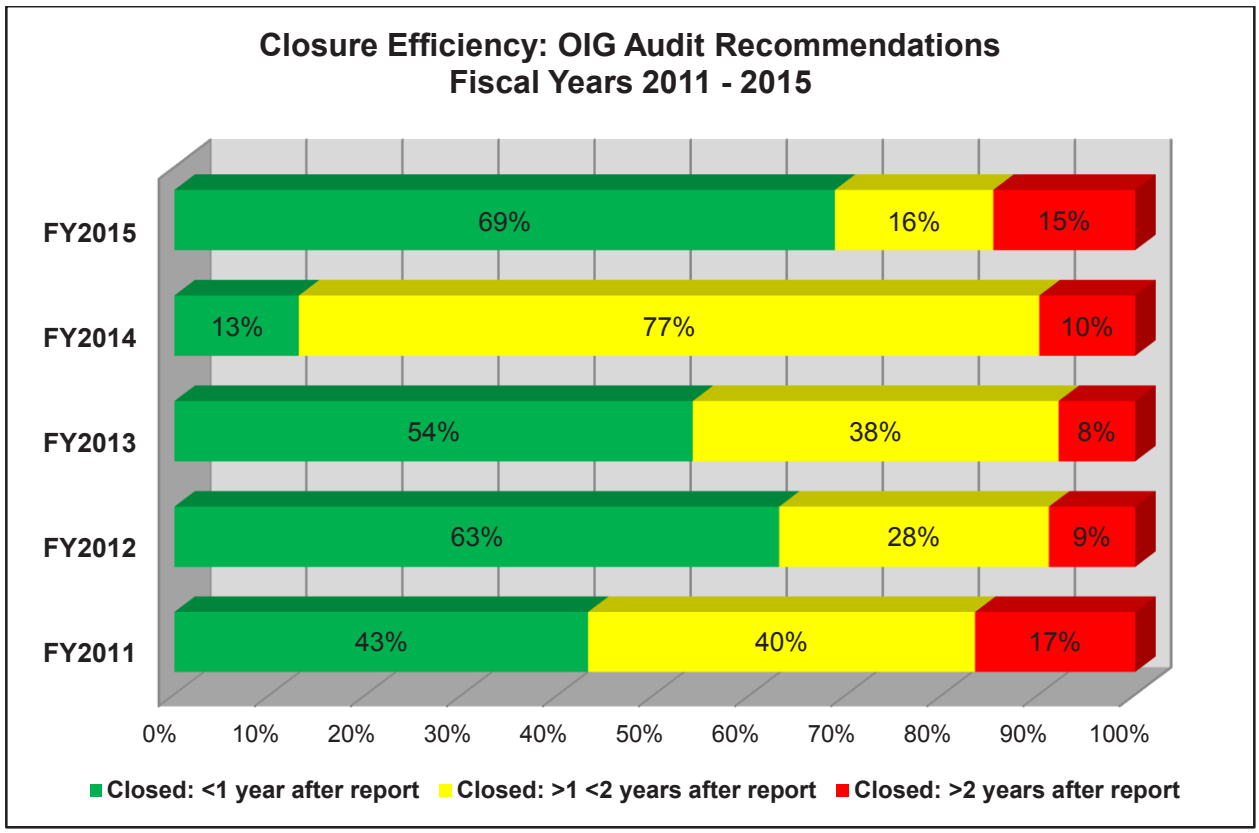


Table 3

Improper Payments Information Act (IPIA) Assessment

Improper Payments Information Act (IPIA) Assessment

The National Aeronautics and Space Administration (NASA) is dedicated to reducing fraud, waste, and abuse by adequately reviewing and reporting programs susceptible to improper payments in accordance with the Office of Management and Budget (OMB) Circular A-123 *Management's Responsibility for Internal Control,* Appendix C, *Requirements for Effective Measurement and Remediation of Improper Payments*. To improve the integrity of the Federal government's payments and the efficiency of its programs and activities, Congress enacted the Improper Payments Information Act (IPIA) of 2002 (Public Law (P.L.) 107-300). The IPIA contains requirements in the areas of improper payment identification and reporting. It requires agency heads to annually review all programs and activities, identify those that may be susceptible to significant improper payments, estimate annual improper payments in susceptible programs and activities, and report the results of their improper payment activities.

The Improper Payments Elimination and Recovery Act (IPERA) amended the IPIA and generally repealed the Recovery Auditing Act (Section 831, Defense Authorization Act, for FY 2001; P.L. 107-107). Subsequently, OMB issued Memorandum M-15-02, *Issuance of Revised Parts I and II to Appendix C of OMB Circular A-123,* modifying Circular A-123 Appendix C, Part I and Part II (which was issued in August 2006 as OMB Memorandum M-06-23). OMB Memorandum M-15-02 requires each Executive branch agency to:

- Review all of its programs and activities to identify those susceptible to significant improper payments. OMB defines significant improper payments as gross annual improper payments (i.e., the total amount of overpayments plus underpayments) in the program exceeding (1) both 1.5 percent of program outlays and $10,000,000 of all program or activity payments made during the fiscal year reported or (2) $100,000,000 (regardless of the improper payment percentage of total program outlays).

- Obtain a statistically valid estimate of the annual amount of improper payments in programs and activities for those programs that are identified as susceptible to significant improper payments.

- Implement a plan to reduce improper payments.

- Report estimates of the annual amount of improper payments in programs and activities and progress in reducing them.

The Improper Payments Elimination and Recovery Improvement Act of 2012 (IPERIA), P.L. 112-248, became law on January 10, 2013, and was designed to amend and improve on IPERA (Public Law No. 111-204). IPERIA requires agencies to determine improper payments,

improve recovery of improper payments, and reinforces and accelerates the President's "Do Not Pay" efforts as outlined in the OMB issued Memorandum M-13-20, *Protecting Privacy while Reducing Improper Payments with the Do Not Pay Initiative*. Additionally, OMB issued Memorandum M-15-02, *Requirements for Effective Estimation and Remediation of Improper Payments*, to assist agencies with IPERIA implementation.

Furthermore, on January 29, 2013, the President signed into law the Disaster Relief Appropriations Act, (P.L. 113-2 (127 Stat. 4) (Act)), which provides aid for Hurricane Sandy disaster victims and their communities. This Act requires Federal agencies supporting Sandy recovery and other disaster-related activities to ensure sufficient internal controls are in place to prevent waste, fraud, and abuse of these funds. Section 904(b) of the Act provides that all programs and activities receiving funds under this Act shall be deemed to be "susceptible to significant improper payments" for the purposes of IPIA, notwithstanding IPIA section 2(a). This requires all Federal programs or activities receiving funds under this Act to be automatically considered susceptible to significant improper payments, regardless of any previous improper payment risk-assessment results, and are required to calculate and report an improper payment estimate. The OMB issued Memorandum M-13-07 *Accountability for Funds Provided by the Disaster Relief Appropriations Act*, to provide guidance for the Act.

The IPIA defines an improper payment as any payment that should not have been made or that was made in an incorrect amount (including overpayments and underpayments) under statutory, contractual, administrative, or other legally applicable requirements. It includes any payment to an ineligible recipient, any payment for an ineligible service, any duplicate payment, payments for services not received, and any payment that does not account for credit for applicable discounts. Moreover, when an agency's review is unable to discern whether a payment is proper as a result of insufficient or lack of documentation, this payment must also be considered an improper payment.

Throughout the past decade, NASA has diligently met IPIA compliance by executing OMB-compliant risk assessments, reviewing and updating NASA payment process documentation, selecting OMB-compliant statistical samples for testing, drafting comprehensive test procedures (as applicable), reporting results in the annual Agency Financial Report (AFR) formerly the Performance and Accountability Report (PAR), and documenting the IPIA review process and results. NASA has reviewed its programs annually and has not identified significant improper payments for any of its programs as evidenced by extensive improper payment results.

NASA performed its FY 2015 IPIA review on FY 2014 disbursements; during this period, payments were made for Hurricane Sandy disaster relief funds. Therefore, for the FY 2015 review, the Hurricane Sandy payments were tested and reported upon as required in OMB Memorandum M-13-07.

Total payments related to the Hurricane Sandy project within the Construction of Facilities (CoF) program amounted to approximately $4.98 million in FY 2014. NASA performed an improper payment review of the project disbursements in accordance with Appendix C of OMB Circular A-123 and identified no improper payments. Although the testing performed found

that the program did not have improper payments, as defined by OMB A-123, Appendix C, NASA will continue to monitor payments and take appropriate corrective action should future improper payments be identified.

Improper Payments Information Act Reporting Details

To conduct the FY 2015 IPIA assessment, NASA considered lessons learned from past IPIA assessments, including NASA's OIG recommendations, and updated the prior year risk assessment methodology. In order to satisfy the IPIA requirements the following tasks and activities were executed:

- Reviewed and updated the FY 2014 risk assessment of all Programs;
- Selected a statistically valid sample of payments for High Risk Programs (Hurricane Sandy Disaster Relief only);
- Conducted a test of all transactions selected in the sample and extrapolated the results to make a valid estimate; and
- Reported on the details of testing and findings (for which there where zero identified) of the program.

Risk Assessment

NASA's risk assessment methodology was developed using criteria established for determining levels of risk and evaluating all major programs against this criteria. Risk factors included conditions related to financial processing and internal controls, internal and external monitoring and assessments, human capital risk, operating environment and volume of payments.

In FY 2015, NASA performed a comprehensive qualitative and quantitative risk assessment to identify programs susceptible to a high risk of significant improper payments. NASA's risk assessment methodology is illustrated in **Table 1**, along with a brief summary of steps and results.

Table 1: NASA's Risk Assessment Methodology and Results

Identify Programs Eligible for Assessment	Validate Programs Identified	Analyze Risk Conditions and Prepare Risk Assessment
• Identified – 112 programs encompassing $17.1B in FY 2014, some of which were combined, resulting in 91 distinct programs • Estimated maximum error rate of program disbursements at 12.5% • Set materiality level for low risk programs at <$85M	• Reviewed NASA budget submissions • Cross-walked programs identified to budget documentation	• Evaluated FY 2014 audit reports, findings and recommendations • Evaluated internal control review results • Evaluated risk conditions including control environment, human capital risk, operating environment and volume of payments • Reviewed Agency budget trends • Updated risk assessment based on information gathered from NASA financial management reports and independent reviews • Conducted survey using the OMB M-15-02 risk factors • Populated risk assessment matrix with feedback from OMB-based risk factor questionnaire • No programs identified as high risk based on risk ratings

1. Identify Programs Eligible for Assessment

To determine the scope of the Risk Assessment, NASA prepared a comprehensive list identifying 112 programs based on the FY 2014 total disbursements. NASA generated and provided the disbursement totals for each program from its financial management system.

A review of the 112 programs, some of which were combined, yielded 91 programs[1] eligible for assessment.

[1] The total number of distinct programs identified started at 112 and was reduced by 21 due to combining 5 Education Mission programs, 17 Institution and Management programs and 2 Commercial Crew and Cargo programs into one program for each of the combined programs which brought the number to 91 programs. These programs were selected for consolidation based on analysis of the budget: the individual Education programs are historically too insignificant to meet the threshold for review; Institutions and Management programs have unique funding; and Commercial Crew and Cargo are combined under the aegis of Commercial Spaceflight.

Programs Assessed (91 Combined Programs)		
Aeronautics Strategy and Management	Independent Verification & Validation - Reimbursable	Heliophysics Explorers Program
Aeronautics Test Program	Space Technology Programmatic - Reimbursable	Heliophysics Research
Airspace Systems Program	Science Mission Directorate Institution - Reimbursable	James Webb Space Telescope
Aviation Safety Program	Science Mission Directorate Programmatic - Reimbursable	Living with a Star
Fundamental Aeronautics	Space Operations Mission Directorate Institution - Reimbursable	Lunar Quest Program
Integrated Systems Research Program	Space Operations Mission Directorate Programmatic - Reimbursable	Mars Exploration
Aeronautics Research Mission Directorate Institution Program - Reimbursable	Safety and Mission Success	New Frontiers
Aeronautics Research Mission Directorate Programmatic Program - Reimbursable	Strategic Capabilities Assets Program	New Millennium
Enhanced Use Lease - Construction & Environmental Compliance and Restoration	Education	Outer Planets
Environmental Compliance and Restoration - Construction & Environmental Compliance and Restoration	Advanced Exploration Systems	Physics of the Cosmos
Exploration Construction of Facilities	Commercial Cargo & Crew	Planetary Science Research
Institutional Construction of Facilities - Construction & Environmental Compliance and Restoration	Constellation System	Science Mission Directorate Institutional Program - Reimbursable
Science Construction of Facilities	Exploration Ground Systems	Science Mission Directorate Programmatic Program - Reimbursable
Space Operations Construction of Facilities	Exploration Technology Development Program	Solar Terrestrial Probes
Agency Information Technology Services	Human Research	Technology
Agency Management and Operations	Lunar Precursor Robotic Program	21st Century Space
Center Management and Operations	Orion Multi-Purpose Crew Vehicle	Human Space Flight Operations
Congressionally Directed Items	Exploration Systems Mission Directorate Programmatic Program - Reimursable	International Space Station Program
Enhanced Use Lease - Cross Agency Support Programs	Space Launch System	Launch Services
Environmental Compliance and Restoration - Cross Agency Support Programs	Institutions and Management	Space Operations Mission Directorate Institutional Program - Reimbursable
Innovative Partnership Program	Applied Sciences Program	Space Operations Mission Directorate Programmatic Program - Reimbursable
Institutional Construction of Facilities - Cross Agency Support Programs	Astrophysics Research	Rocket Propulsion Testing
Aeronatuics Research Mission Directorate Institution - Reimbursable	Astrophysics Explorer	Space Communication and Navigation
Aeronatuics Research Mission Directorate Programmatic - Reimbursable	Cosmic Origins	Space Shuttle Program
Canadian Atlantic Storm Program Institution Program - Reimbursable	Discovery	Space Technology
Canadian Atlantic Storm Program Institution- Reimbursable	Earth Science Multi-Mission Operations	Crosscutting Space Technology Development
Canadian Atlantic Storm Program Programmatic Program - Reimbursable	Earth Science Research	Exploration Technology Development
Canadian Atlantic Storm Program Programmatic - Reimbursable	Earth Science Technology Program	Partnerships, Innovation and Commercial Space & Strategic Integration
Education Programmatic - Reimbursable	Earth Systematic Missions	Small Business Innovative Research/Small Business Technology Transfer Resources
Exploration Systems Mission Directorate Institution - Reimbursable	Earth System Science Pathfinder	
Exploration Systems Mission Directorate Programmatic - Reimbursable	Exoplanet Exploration	

2. Validate Programs Identified

All amounts identified via the disbursement file were confirmed as NASA Programs by reviewing the approved Agency budget, and matching identifying data from the accounting system to Programs officially recognized by NASA and Congress in the budget.

3. Prepare Risk Assessment

The control environment, internal and external monitoring, human capital, operating environment and volume of payments risk conditions were analyzed during the risk assessment in conjunction with the following risk factors identified by OMB in M-15-02, Part I.A Section 9, Step 1b (pgs. 9 – 10):

i. Whether the program or activity reviewed is new to the agency;
ii. The complexity of the program or activity reviewed, particularly with respect to determining correct payment amounts;
iii. The volume (dollar value or amount) of payments made annually;
iv. Whether payments or payment eligibility decisions are made outside of the agency;
v. Recent major changes in program funding, authorities, practices, or procedures;
vi. The level, experience, and quality of training for personnel responsible for making program eligibility determinations or certifying that payments are accurate;
vii. Inherent risks of improper payments due to the nature of agency programs or operations;
viii. Significant deficiencies in the audit reports of the agency including, but not limited to the Agency Inspector General or the Government Accountability Office (GAO) report audit findings, or other relevant management findings that might hinder accurate payment certification;
ix. Results from prior improper payment work; and
x. Other Risk Susceptible Programs, i.e. those programs determined by OMB on a case by case basis to be susceptible to high risk of improper payment.

NASA also reviewed pertinent improper payment related documents and reports, including the NASA OIG Report NASA's Compliance with the Improper Payments Information Act for Fiscal Year 2014 (Report No. IG-15-015), the Agency's FY 2014 OMB A-123, Appendix A, Internal Control over Financial Reporting Summary Report and NASA's Executive Budget documents[2]. Once this review and analysis was complete, the FY 2015 Risk Assessment

[2] National Aeronautics and Space Administration FY 2013, FY 2012, FY 2011 and FY 2010 *Budget Estimates*

was updated to reflect whether or not any NASA programs were found to be susceptible to significant improper payments.

No programs were identified as susceptible to significant improper payments for FY 2015 based upon NASA's risk assessment methodology. However, per OMB M-15-02 and M-13-07, one program/project, the Hurricane Sandy Disaster Relief Program, was deemed as being susceptible to a high risk of improper payment for all Federal programs or activities receiving funds under the Disaster Relief Act.

Statistical Sampling

The Hurricane Sandy Disaster Relief Program was selected for testing because it was deemed as being susceptible to high risk of improper payment by OMB. NASA developed a statistically valid random sample of program payments, in accordance with OMB guidelines. NASA prepared a stratified, random sample to yield an estimate with a 90 percent confidence level with a margin of error of plus or minus 1.5 percent for the program. The sample was drawn from the universe of disbursements that occurred from October 1, 2013, through September 30, 2014. The number of transactions and dollar value of the total population of Hurricane Sandy Disaster Relief Program – Construction of Facilities (CoF) and the sample is illustrated in **Table 2**.

A random sample was selected for the Hurricane Sandy Disaster Relief Program – (CoF), identified as susceptible to high risk of significant improper payments.

Table 2: Population and Sample Amounts by Program

	Contracts		Totals	
Program	**Population**	**Sample**	**Population**	**Sample**
Hurricane Sandy Disaster Relief Program – (CoF)				
Transactions	37	28	37	28
Dollar Amount	$4,982,974	$4,938,867	$4,982,974	$4,938,867

Improper Payment Recording

As a result of the testing, NASA identified zero (0) improper payments. The table that follows is required for each agency that identified programs susceptible to significant improper payments or had programs that OMB deemed susceptible to significant improper payments. Therefore, NASA is reporting on the Hurricane Sandy Disaster Relief Program (CoF) that was deemed susceptible to significant improper payments by OMB.

Table 3 shows the projected reduction in improper payments for the program; because FY 2014 is the first year that the Hurricane Sandy Disaster Relief measurements were conducted, the table does not contain prior year results. Accordingly, **Table 3** displays results for the current year FY 2014 outlays (CY Outlays $), the error rate (CY IP%), dollars paid or projected to

be paid improperly (CY IP$); the amount of overpayments (CY Overpayments $); the amount of underpayments (CY Underpayments $); and the projections for FY 2015 through FY 2017.

Table 3: Improper Payment Reduction Outlook
(A-136 Table 1)
($ in millions)

Program	2013 Outlays	2013 IP%	2013 IP$	2014 Outlays	2014 IP%	2014 IP$	2014 Underpayment	2014 Overpayment $	2015 Est. Outlays	2015 Est. IP%	2015 Est. IP$	2016 Est. Outlays	2016 Est. IP%	2016 Est. IP$	2017 Est. Outlays	2017 Est. IP%	2017 Est. IP$
Hurricane Sandy Disaster Relief Program – (CoF)	n/a	n/a	n/a	$4.98	0.00%	$0	$0	$0	$10.02	0.00%	$0	$0	0.00%	$0	$0	0.00%	$0

* NASA performed its Risk Assessment on FY 2014 disbursements. For FY 2015 reporting, the data reported for current year outlays occurred in FY 2014.

Improper Payment Root Cause Categories

Table 4 is required for each agency that identified programs susceptible to significant improper payments or had programs that OMB deemed susceptible to significant improper payments. Therefore, NASA is reporting on the Hurricane Sandy Disaster Relief Program (CoF) that was deemed susceptible to significant improper payments by OMB.

Table 4: Improper Payments Root Cause Category Matrix by NASA Program
(A-136 Table 2)
($ in millions)

Reason for Improper Payment		Type of Improper Payment	
		Overpayments	Underpayments
Program: Hurricane Sandy Disaster Relief Program (CoF)			
Program Design or Structural Issue		$0	$0
Inability to Authenticate Eligibility		$0	$0
Failure to Verify:	Death Data	$0	$0
	Financial Data	$0	$0
	Excluded Party Data	$0	$0
	Prisoner Data	$0	$0
	Other Eligibility Data	$0	$0
Administrative or Process Error Made by:	Federal Agency	$0	$0
	State or Local Agency	$0	$0
	Other Party	$0	$0
Medical Necessity		$0	$0
Insufficient Documentation to Determine		$0	
Other Reason		$0	$0
TOTAL		$0	$0

Corrective Actions and Barriers

As illustrated below, an extrapolation of the payments over the entire universe resulted in $0 of estimated improper payments with an estimate percentage of 0.00% during the period October 1, 2013, through September 30, 2014. Consequently, NASA is not required to submit a written corrective action plan; however, NASA will continue to monitor its program payment processes and related controls in FY 2016 to limit exposure to improper payments. While no corrective actions are currently required, there are no known statutory or regulatory barriers that might limit any such future actions.

Table 5 below shows the total payments by population, sample amount, and annual estimate of improper payments (as applicable) by program.

Table 5: Population and Sample Amounts by Program

Program	Transactions		Dollars		FY 2015 $ Estimate of Improper Payments	FY 2015 % Estimate of Improper Payments
	Population	Sample	Population	Sample		
Hurricane Sandy Program - (CoF)	37	28	$4,982,974	$4,938,867	$0	0.00%
Total	37	28	$4,982,974	$4,938,867	$0	0.00%

Internal Control Over Payments

Establishing and maintaining effective internal controls – including an internal control system that prevents improper payments from occurring and promptly detects and recovers any improper payments that are made – is a priority. NASA did not identify any programs or activities with improper payments exceeding statutory thresholds as determined under OMB Circular A-123 Appendix C.

Accountability, Agency Information Systems and Other Infrastructure, and Barriers

Not applicable – no programs had improper payments exceeding statutory thresholds.

Conclusion

The results of the FY 2015 risk assessment process, along with NASA's history of positive improper payment testing results, concluded that none of NASA's programs were susceptible to a high risk of significant improper payments. However, NASA will continue to monitor payments and take appropriate corrective actions for any improper payments that may be identified in the future. NASA attributes much of the positive results to the centralized procurement and payment activities executed at the NASA Shared Services Center (NSSC). Centralized processing provides a sound internal control environment that mitigates the risk of improper payments across the Agency.

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Recapture Audit

On July 22, 2010, the President signed into Law the Improper Payment Elimination and Recovery Act (IPERA; Pub. L. No. 111-204). IPERA requires all Federal agencies to conduct payment recapture audits as part of its overall program to ensure effective internal controls over payments. NASA continues to perform recapture audits over fixed price contracts only, (excluding cost type contracts, grants and cooperative agreements) as part of its overall program to ensure effective internal control over payments.

This approach is in accordance with the amended Office of Management and Budget (OMB) Circular A-123, Appendix C guidance, which allows agencies to make the determination to exclude certain programs and activities from the recapture audit if the Agency determines that recapture audits are inappropriate or not a cost-effective method for identifying and recovering improper payments. NASA employs the Defense Contract Audit Agency (DCAA) to perform auditing procedures on cost-type contracts. Performing a separate recapture audit on these cost type contracts would be duplicative and not cost-effective as determined in prior years. NASA does not consider it cost-effective to conduct payment recapture audits for cost type contracts or grants and cooperative agreements as these payments are made through our centralized procure to process, which provides reasonable assurance of proper payment. Additionally, OMB was notified of this decision in April 2007.

NASA attributes much of the positive results of its improper payment program to the centralized procurement and payment activities executed at the NASA Share Services Center. Centralized processing provides a sound internal control environment that mitigates the risk of improper payments across the Agency, as such, grants and cooperative agreements are not included as part of its recapture audit efforts.

In FY 2014, NASA awarded the contingency based Recapture Audit contract to an industry leading consultant. The Recapture Audit scope entailed the review of FY 2013 and FY 2014 disbursements to identify and recover overpayments, duplicate payments, erroneous payments, lost credit memos, and internal transaction errors of NASA's fixed price contracts.

In addition to the Recapture Audit activities described above, the Agency conducted activities outside of the FY 2015 Agency Recapture Audit. Examples of such activities include Agency post-payment review/audits, single audit and self-reported overpayments.

Table 6: Improper Payment Recaptures with and without Audit Programs (A-136 Table 4)

($ in millions)

Program or activity (Type of Payment)*	Overpayments Recaptured through Payment Recapture Audits							Overpayments Recaptured outside of Payment Recapture Audits	
	Contracts					Total			
	Amount Identified-FY13 & FY14**	Amount Recaptured***	CY Recapture Rate	CY + 1 Recapture Rate Target	CY + 2 Recapture Rate Target	Amount Identified – FY13 & FY14	Amount Recaptured	Amount Identified****	Amount Recaptured
Fixed Price Contracts	0.14	0.13	93%	98%	98%	0.14	0.13	5.10	4.79
Travel	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01	0.01
Payroll	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.07	0.07
Other	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01	0.01

* NASA's Recapture Audit is performed by payment type instead of by Program or Activity.
** NASA performs the Recapture Audit on the previous year disbursements. For FY 2015 reporting, the data reported is for disbursements that occurred in FY 2013 and FY 2014.
*** The Amounts Recaptured are for recoveries identified in prior years but collected in FY 2014 and FY 2015.
**** Overpayments Recaptured outside of Payment Recapture Audits were identified or recaptured in FY 2014.

Table 7: Disposition of Funds Recaptured Through Payment Recapture Audits (A-136 Table 5)

($ in millions)

Program or Activity (Type of Payment)	Amount Recaptured	Payment Recapture Auditor Fees	Original Purpose	Office of Inspector General	Returned to Treasury
Fixed Price Contracts	0.129	0.023	0.101	0.00	0.005

Table 8: Aging of Outstanding Overpayments Identified in the Payment Recapture Audits (A-136 Table 6)

($ in millions)

Program or Activity (Type of Payment)	Amount Outstanding (0-6 months)	Amount Outstanding (6 months to 1 year)	CY Amount Outstanding (over 1 year)
Fixed Price Contracts	0.01	0.00	0.00

NASA has taken steps through Improper Payment Reviews and recapture audits to continue efforts already embedded in the control environment for reducing and recovering improper payments. The recapture audit process is monitored by the Office of the Chief Financial Officer to ensure compliance with NASA's Recapture Audit Guidance. In addition, all collection and disbursement functions are centralized which ensures consistent application of the control environment and reduction of improper payments. There are no statutory or regulatory barriers limiting NASA's ability to reduce improper payments.

Do Not Pay Initiative

Public Law 112-248, Improper Payments Elimination and Recovery Improvement Act of 2012 established the Do Not Pay Initiative and directed the Office of Management and Budget (OMB) oversight of the program. OMB issued Memorandum M-13-20 dated August 16, 2013, *Protecting Privacy while Reducing Improper Payments with the Do Not Pay Initiative* providing guidance to help Federal agencies protect privacy while reducing improper payments with the Do Not Pay (DNP) Initiative.

NASA fully integrated into the Treasury's DNP portal process on September 27, 2014. The DNP portal is used by NASA for the review of improper payments and utilizes the following data sources within the DNP portal: the Social Security Administration Death Master File (SSA-DMF) and the System for Award Management Exclusion Record-Private (SAM-EPLS).

The cumulative results of these monthly reviews reported in Table 7 are for the period of October 2014 through August 2015. During this time period, there were 117,003 potential improper payments initially identified by Treasury with a dollar value of $12.002 billion. This initial volume was a result of Treasury's sort criteria which compiled the data using the vendor name in SAM. NASA further refined that initial sort, validating the data using the Tax Identification Number (TIN), full name or address which resulted in the list being reduced to 22 potential improper payments with a dollar amount of $833,387. NASA then verified these were false positives and reported the information back to Treasury. The term false positive indicates items that were initially flagged but upon further review it was determined that they were in fact not improper payments.

Additionally, prior to NASA's integration into the DNP portal process its adjudication process reflected a three month lag with the collection and reporting of improper payments data. This lag time has been eliminated and at present the improper payments data being reported is the most current and accurate data available.

Table 9: Implementation of the Do Not Pay Initiative to Prevent Improper Payments (A-136 Table 7)

Month	Number (#) of payments reviewed for possible improper payments *Note 1*	Dollars ($) of payments reviewed for possible improper payments *Note 1*	Number (#) of payments stopped	Dollars ($) of payments stopped	Number (#) of improper payments reviewed and determined accurate	Dollars ($) of improper payments reviewed and determined accurate
Oct 14	11,620	1,102,677,042	0	0	12	677,895
Nov 14	9,877	983,781,012	0	0	0	0
Dec 14	11,358	1,897,147,847	0	0	0	0
Jan 15	8,465	946,518,655	0	0	3	52,694
Feb 15	9,602	877,331,503	0	0	0	0
Mar 15	10,801	1,259,058,310	0	0	0	0
Apr 15	10,705	1,002,001,639	0	0	2	3,360
May 15	10,625	92,836,982	0	0	2	6,757
Jun 15	11,650	1,657,693,331	0	0	0	0
Jul 15	11,535	1,062,245,244	0	0	1	5,000
Aug 15	10,765	1,120,895,935	0	0	2	87,681
Totals	**117,003**	**12,002,187,500**	**0**	**0**	**22**	**833,387**

	Number (#) of payments reviewed for possible improper payments *Note 1*	Dollars ($) of payments reviewed for possible improper payments *Note 1*	Number (#) of payments stopped	Dollars ($) of payments stopped	Number (#) of potential improper payments reviewed and determined accurate *Note 1*	Dollars ($) of potential improper payments reviewed and determined accurate *Note 1*
Reviews with the IPERIA specified databases	117,003	12,002,187,500	0	0	22	833,387
Reviews with databases not listed in IPERIA	N/A	N/A	N/A	N/A	N/A	N/A

Note 1: All data is from **October 2014 - August 2015**. During this time period there were a total of 117,003 potential improper payments initially identified by Treasury with a dollar value of $12.002 billion. This initial volume is a result of Treasury's sort criteria which compiles the data using the vendor name in the System for Award Management (SAM). NASA further refined that initial sort, validating the data using the Tax Identification Number (TIN), full name and address which resulted in the list being reduced to 22 potential improper payments with a dollar amount $833,387. NASA then verified these were false positives and reported the information back to Treasury.

Schedule of Spending

The Schedule of Spending (SOS) presents an overview of how and where agencies are spending (obligating) money for the reporting period. The data used to populate the SOS is the same underlying data that is used to populate the Statement of Budgetary Resources (SBR). The SOS table presents budgetary data in general terms, but corresponds to amounts shown on the SBR. See table below:

Schedule of Spending Line Item Title		Statement of Budgetary Resources Line Item Title
Total Resources	→	Total Budgetary Resources
Total Amounts Agreed to be Spent	→	Obligations Incurred
Total Spending	→	Gross Outlays

USASpending.gov is a Federal Web site designed in accordance with the Federal Funding Accountability and Transparency Act of 2006. The information for this web site is gathered from the Federal Procurement Data System (FPDS) which contains information about Federal Contracts, and the Federal Assistance Awards Data System (FAADS) which contains information about Federal financial assistance such as grants, loans, insurance and direct subsidies. Information from these two systems is also captured by the Agency's Financial System through Procurement Information Systems for Management (PRISM), which is an acquisition management system used by agencies Governmentwide. The Agency's financial system is used to generate the SBR.

(In Millions of Dollars)	2015	2014
Section I: What Money is Available to Spend?		
Total Resources	$ 22,175	$ 21,504
Less Amount Available but Not Agreed to be Spent	1,016	1,018
Less Amount Not Available to be Spent	88	133
Total Amounts Agreed to be Spent	**$ 21,071**	**$ 20,353**
Section II: How was the Money Spent?		
Space Operations		
Personnel compensation and benefits	$ 321	$ 325
Contractual services and supplies	3,231	3,472
Acquisition of assets	21	18
Grants and fixed charges	25	21
Other	—	2
Total Spending	3,598	3,838
Science		
Personnel compensation and benefits	$ 305	$ 306
Contractual services and supplies	3,996	3,700
Acquisition of assets	27	46
Grants and fixed charges	570	556
Other	—	3
Total Spending	4,898	4,611

(In Millions of Dollars)	2015	2014
Section II: How was the Money Spent? (ctd.)		
Exploration		
Personnel compensation and benefits	$ 464	$ 450
Contractual services and supplies	4,241	3,219
Acquisition of assets	60	61
Grants and fixed charges	67	65
Other	—	1
Total Spending	4,832	3,796
Aeronautics		
Personnel compensation and benefits	$ 193	$ 188
Contractual services and supplies	289	263
Acquisition of assets	22	22
Grants and fixed charges	32	30
Other	—	—
Total Spending	536	503
Safety, Security and Mission Services		
Personnel compensation and benefits	$ 1,239	$ 1,224
Contractual services and supplies	3,417	3,403
Acquisition of assets	80	65
Grants and fixed charges	31	29
Other	26	35
Total Spending	4,793	4,756
Education		
Personnel compensation and benefits	$ 8	$ 7
Contractual services and supplies	22	22
Grants and fixed charges	81	84
Total Spending	111	113
Office of Inspector General		
Personnel compensation and benefits	$ 31	$ 31
Contractual services and supplies	6	6
Other	1	1
Total Spending	38	38
Space Technology		
Personnel compensation and benefits	$ 114	$ 124
Contractual services and supplies	367	399
Acquisition of assets	4	7
Grants and fixed charges	33	30
Total Spending	518	560
Construction and Environmental Compliance and Restoration		
Personnel compensation and benefits	$ —	$ —
Contractual services and supplies	208	192
Acquisition of assets	327	298
Other	7	—
Total Spending	542	490
Other		
Personnel compensation and benefits	$ 19	$ 18
Contractual services and supplies	1,072	925
Acquisition of assets	11	11
Grants and fixed charges	2	2
Other	—	—
Total Spending	1,104	956
Total Spending	**$ 20,970**	**$ 19,661**
Section III: Who did the Money go to?		
Federal	$ 1,353	$ 1,319
Non-Federal	19,718	19,034
Total Amounts Agreed to be Spent	**$ 21,071**	**$ 20,353**

Freeze the Footprint

The National Aeronautics and Space Administration (NASA) is committed to the goal of reducing the total square footage of its domestic office and warehouse inventory compared to its FY 2012 baseline. This reduction in square footage contributes to reducing the costs associated with real property in accordance with Section 3 of the Office of Management and Budget (OMB) Memorandum-12-12, *Promoting Efficient Spending to Support Agency Operations* and OMB Management Procedures Memorandum 2013-02, the "Freeze the Footprint" policy implementation guidance. NASA continues to meet its national responsibilities, fully leveraging retained assets to increase their functionality in support of mission success while disposing of unneeded Federal real estate, increasing the use of under-utilized assets, minimizing operating costs, and improving efficiency.

NASA has implemented several initiatives that complement the goals of the Freeze the Footprint policy including recapitalization, enhanced Center master planning, capital investment program planning, sustainability policies, construction of facilities, and disposal. NASA evaluates its real property, both through the Master Planning process and through periodic special studies to identify facilities that are no longer needed. Center master plans identify requirements for new construction as well as buildings that can be demolished. Consolidations, renovations and new construction aim to utilize space and energy more efficiently in all classes of NASA buildings.

NASA has an active demolition program. Since 2004, NASA has disposed of more than 1.4 million square feet of office and warehouse space. This demolition program has been an important tool in eliminating nonessential facilities. NASA has reduced maintenance and utility costs by consolidating functions previously performed in these disposed facilities into new, smaller facilities. Studies conducted by NASA on its new consolidated facilities validate measurable savings in utility costs over the buildings that they have replaced.

NASA will continue identifying, implementing and executing facility efficiency and effectiveness through management, development and operational strategies that reduce life cycle cost and risk while ensuring safety and mission success.

Freeze the Footprint Baseline Comparison	FY 2012 Baseline	FY 2014	Change (FY 2012 Baseline - FY 2014)
Square Footage *(SF in Millions)*	15.714	15.408	(0.306)

Reporting of O&M Costs – Owned and Directly Leased Buildings	FY 2012 Baseline	FY 2014	Change (FY 2012 Baseline - FY 2014)
Operation and Maintenance Costs *($ in Millions)*	$ 95	$ 79	$ (16)

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Summary of Financial Statement Audit and Management Assurances

The following tables summarize the Agency's FY 2015 Financial Statement Audit and Management Assurances. Table 1 summarizes the status of prior year—FY 2014 material weaknesses identified, if any by the Financial Statement Auditor. Table 2 summarizes the status of prior year material weaknesses, if any identified by NASA Management.

Table 1: Summary of Financial Statement Audit

Audit Opinion	Unmodified				
Restatement	No				
Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Ending Balance
None	0	0	0	0	0
Total Material Weaknesses	0	0	0	0	0

Table 2: Summary of Management Assurances

Effectiveness of Internal Control over Financial Reporting (FMFIA 2)						
Statement of Assurance	Unqualified					
Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
None	0	0	0	0	0	0
Total Material Weaknesses	0	0	0	0	0	0

Effectiveness of Internal Control over Operations (FMFIA 2)						
Statement of Assurance	Unqualified					
Material Weaknesses	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
None	0	0	0	0	0	0
Total Material Weaknesses	0	0	0	0	0	0

Conformance with Financial Management System Requirements (FMFIA 4)						
Statement of Assurance	Systems conform					
Non-Conformances	Beginning Balance	New	Resolved	Consolidated	Reassessed	Ending Balance
None	0	0	0	0	0	0
Total Non-Conformances	0	0	0	0	0	0

Compliance with Federal Financial Management Improvement Act (FFMIA)		
	Agency	Auditor
1. System Requirements	No lack of substantial compliance noted	No lack of substantial compliance noted
2. Accounting Standards	No lack of substantial compliance noted	No lack of substantial compliance noted
3. USSGL at Transaction Level	No lack of substantial compliance noted	No lack of substantial compliance noted

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NASA Armstrong Flight Research Center currently flies an F-15D Eagle aircraft for research support and pilot proficiency. NASA research support aircraft are commonly called chase planes and fill the role of escort aircraft during research missions. Chase pilots are in constant radio contact with research pilots and serve as an “extra set of eyes” to help maintain total flight safety during specific tests and maneuvers. (Credit: NASA/Jim Ross)

Taking a Closer Look at NASA’s Orion Spacecraft After Successful Flight Test. (Credit: NASA)

Artist concept of NASA’s Space Launch System (SLS) 70-metric-ton configuration launching to space. (Credit: NASA)

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