National Aeronautics and Space Administration

Fiscal Year 2012

BUDGET ESTIMATES

Overview

The FY 2012 Budget totals $18.7 billion. It funds:

- All major elements of the ***NASA Authorization Act of 2010***.
- Key components of the Nation's priorities
  - ***Innovate.*** Supports long-term job growth and a vibrant economy by increasing R&D investment.
  - ***Educate.*** Uses NASA content to inspire learners/teachers.
  - ***Build.*** Invests in American industry and lessens our reliance on foreign providers with development of US-provided commercial access to the International Space Station, our long-term platform for human space flight.
- Tough choices, including holding many programs at FY 2011 authorized levels and elimination of exploration focused robotic precursors. All choices were made with the ***safety of the astronauts on the ISS*** as the highest priority.

2012 Highlights

- Maintains the commitment to the International Space Station, bringing nations together and enabling future exploration.
- Partners with the U.S. commercial space industry for ISS access for crew and cargo as soon as possible and to lessen our reliance on foreign services.
- Develops a heavy-lift rocket and crew capsule to carry explorers beyond Earth orbit, and invests in the R&D to enable deep space exploration.
- Allows for different destinations over time as we gain capabilities, including cis-Lunar space, the Moon, asteroids and Mars and its environs.

2012 Highlights

- Sends robotic missions to explore the solar system, supports space-based observatories, and studies the Earth.
- Invests in high payoff, high-risk technology that industry does not tackle today.
- Conducts cutting edge aeronautics research with increased focus on aviation safety/efficiency and environmental impacts.
- Educates the next generation.
- Focuses on long-term affordability and efficiency through rightsizing and renewing NASA capabilities and infrastructure.
- Protects the pensions of those who have devoted their careers to the space shuttle program.

Important Considerations

- ***FY11 is still an unknown***.
- ***Reorganization***: The Administrator intends to merge the Space Operations and Exploration Systems Directorates over the next few months and transfer a major portion of the Exploration Technology Program to Space Technology.
- ***Out-year funding assumptions are notional***.
- ***Funding for Federal Employees***. The budget assumes consolidation of labor funding into one program element per account in the execution year in order to:
  - Efficiently assign labor to projects,
  - Focus on strategic workforce issues, and
  - Provide funding stability for workforce.

FY 2012 Budget Request

Budget Authority ($M)	FY 2012
Science	5,017
Aeronautics	569
Space Technology	1,024
Exploration Systems	3,949
Space Operations	4,347
Education	138
Cross-Agency Support	3,192
CoF and ECR	450
Inspector General	38
NASA FY 2012	18,724

The FY 2012 Budget provides $18.7 billion in 2012 for NASA to support a diverse portfolio of programs even in austere times.

NASA Mission Launches

(Fiscal Years 2010-20)

- NASA Mission on US ELV
- Reimbursable for NOAA
- Reimbursable for USGS
- Joint NASA-International Partner Mission
- International Mission with NASA science instrument or related contribution
- Human Exploration Capabilities Mission
- Space Shuttle Mission (Current Manifest)
- Commercial Orbital Transportation Services Missions
- ISS Commercial Resupply Services Mission (on-contract)
- ISS Commercial Resupply Services Mission (CRS cargo delivery demand)
- Future ISS Cargo Delivery Demand (Vehicle A for notional cargo resupply demand)
- Future ISS Cargo Delivery Demand (Vehicle B for notional cargo resupply demand)

* Early science flights begin

✓ Mission successfully launched

^ Orbital Taurus-II First Flight is subject to appropriations

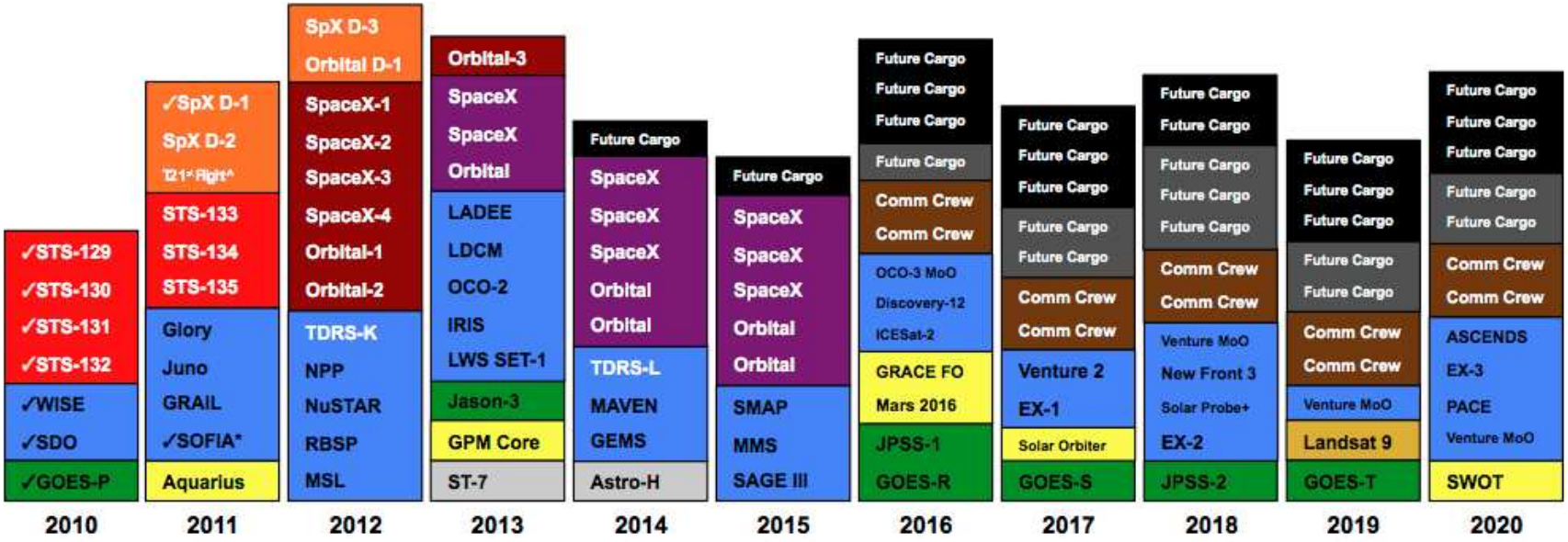
ESMD and SOMD missions denoted in white text.

SMD missions denoted in black text.

MPCV - TBD

SLS - TBD

JWST - TBD



As of 2/11/2011

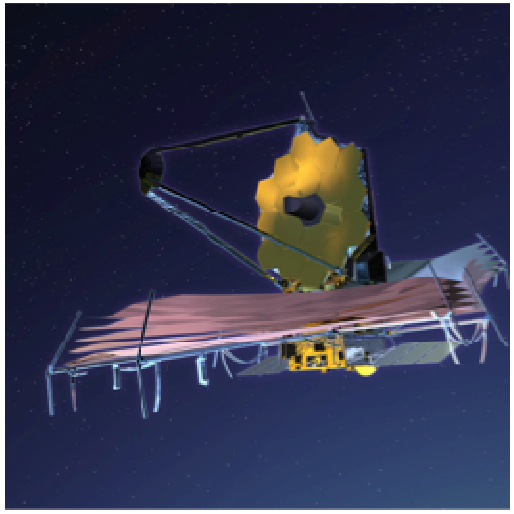
Technical Changes from FY2011 Budget

- **Significant technical changes from the FY 2011 PBR include transferring:**
  - *Labor funds* from all projects into the new Civil Service Labor and Expenses themes in all accounts; and
  - *Recapitalization funds* that were previously held as liens within the Mission Directorates to the Construction of Facilities account within the Institutional Construction of Facilities Program.

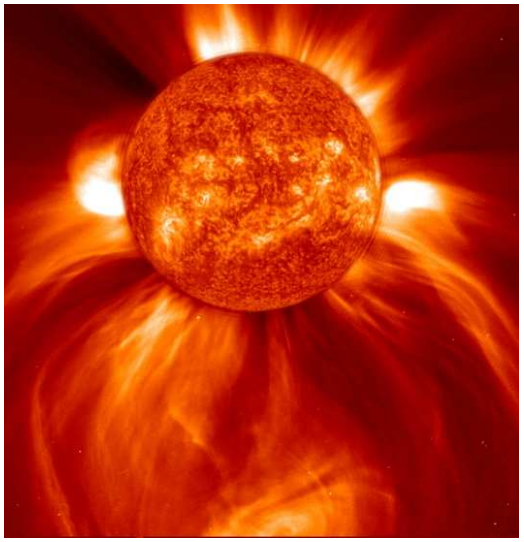
- **In addition, due to significantly higher launch vehicle costs for some vehicles, the Science Mission Directorate is reviewing its launch manifest.**

SCIENCE

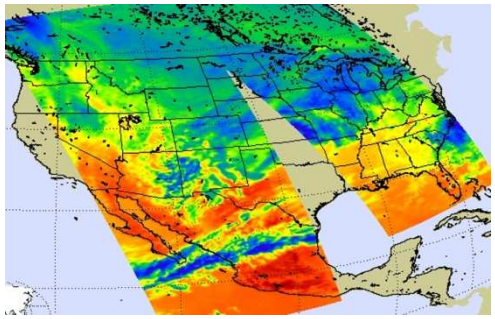
Science Programs, $5.0B



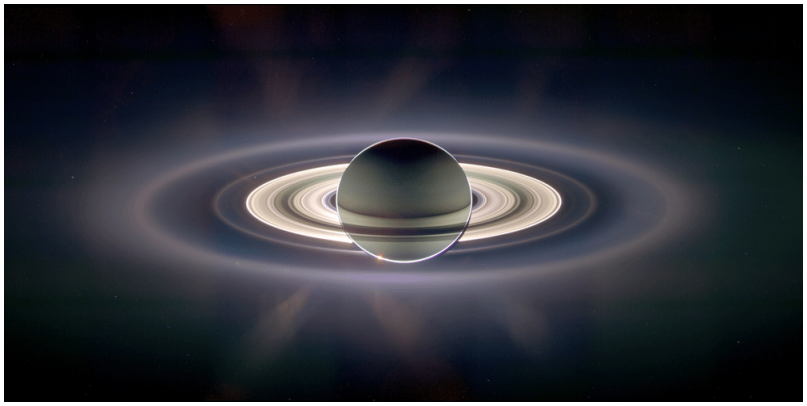
James Webb Space Telescope, $0.4B



Heliophysics, $0.6B



Earth Science, $1.8B



Planetary Science, $1.5B

Astrophysics, $0.7B

Science Changes from FY11 Budget

Programmatic Content changes:

- 2 major Earth Science Decadal Missions (DESDynI and CLARREO) are delayed with launches NET 2020. Other Earth science R&D expansions curtailed.
- Planetary mission portfolio will be replanned based on Decadal survey.
- Astrophysics able to fund only highest Decadal priorities; no large mission beyond JWST.
- Heliophysics descope of Solar Orbiter Collaboration may be required due to launch services cost increase.

Transfers:

- JWST from Astrophysics to create a new theme
- Portion of Future Explorers in Heliophysics were designated for Astrophysics

Earth Science

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	1,439	NA	1,802	1,797	1,822	1,819	1,858	1,915

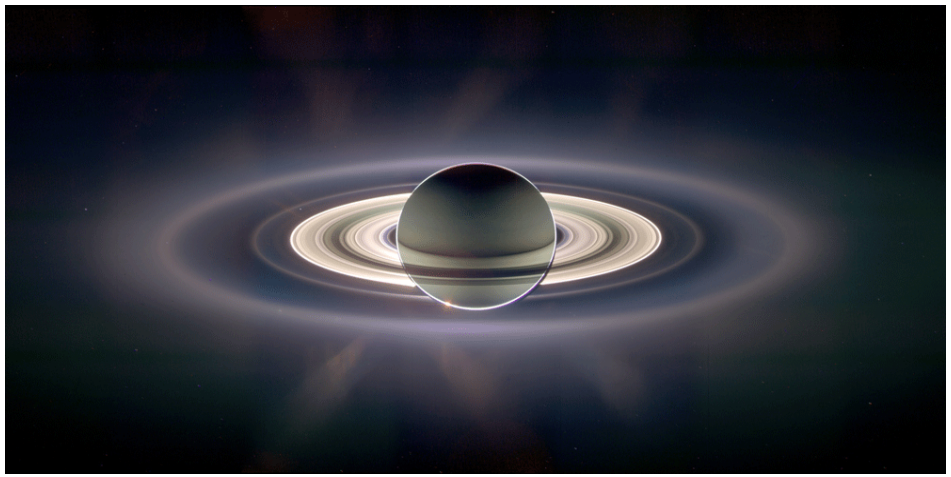
- Supports launch of NPP and completion and launch of LDCM and GPM.
- Continues development of OCO-2.
- Formulates and develops SMAP and ICESat-2.

- Continues pre-formulation of DESDynI, CLARREO and Climate Continuity missions.
- Maintains climate modeling capabilities to enhance forecasts of regional and other effects.
- Operates 16 Earth-observing spacecraft.

Planetary Science

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	1,364	NA	1,486	1,541	1,429	1,395	1,344	1,257

- Launches Mars Science Laboratory in fall of 2011.
- Continues work toward on LADEE, MAVEN, and Mars 2016 Trace Gas Orbiter with ESA and outer planet missions concept development.
- Supports ongoing Near Earth Object identification and study.
- Enables restart of Plutonium-238 production with Dept. of



- Continues work on the Advanced Stirling Radioisotope Generator.
- Operates 13 Planetary missions.

Astrophysics

Budget Authority ($M)	FY 2010	FY 2011	FY 2011*		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	647	NA	1,076	683	758	776	780	811

* includes $445 M for JWST

- Reflects the priorities of the NRC's Decadal Survey for Astrophysics, including technology funding for strategic missions beyond JWST, core research support, and increased funding for Explorer missions.

- Terminates work on the Joint Dark Energy Mission. This effort will evolve to respond to the priorities in the Astrophysics Decadal Survey for dark energy.

- Continues work on all missions in development.

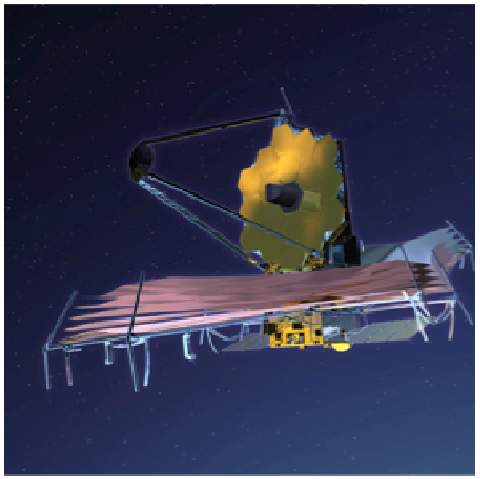
- Operates 10 Astrophysics missions.

James Webb Space Telescope

Budget Authority ($M)	FY 2010	FY 2011	FY 2011*		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	439	NA	NA	374	375	375	375	375

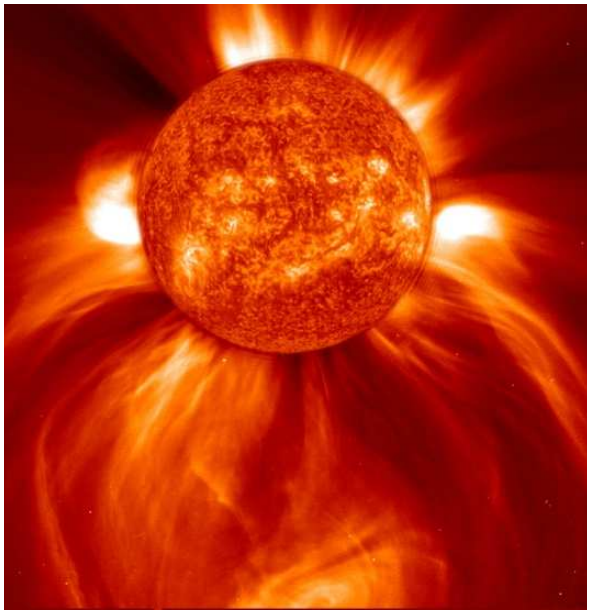
* $445 M included in Astrophysics

- Independent review concluded additional funds would be needed and has resulted in a significant change in the JWST management approach.
- The budget provides stability to JWST in FY 2012 while protecting the budgets of other science missions.
- NASA is developing a revised program plan that includes an assessment of schedule & lifecycle cost by this Summer.
- The Program's technical achievements are substantial, and progress continues during the re-planning process.



Heliophysics

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	608	NA	642	622	633	653	660	659



- Works toward launch of RBSP and MMS and continues development of the IRIS Small Explorer mission.
- Funds the next Heliophysics Explorer mission selection, planned for 2012.
- Continues formulation of the highest priority “large” mission, Solar Probe Plus.
- Maintains commitments to international partners and continues the formulation of the Solar Orbiter Collaboration mission.
- Operates 16 Heliophysics missions.

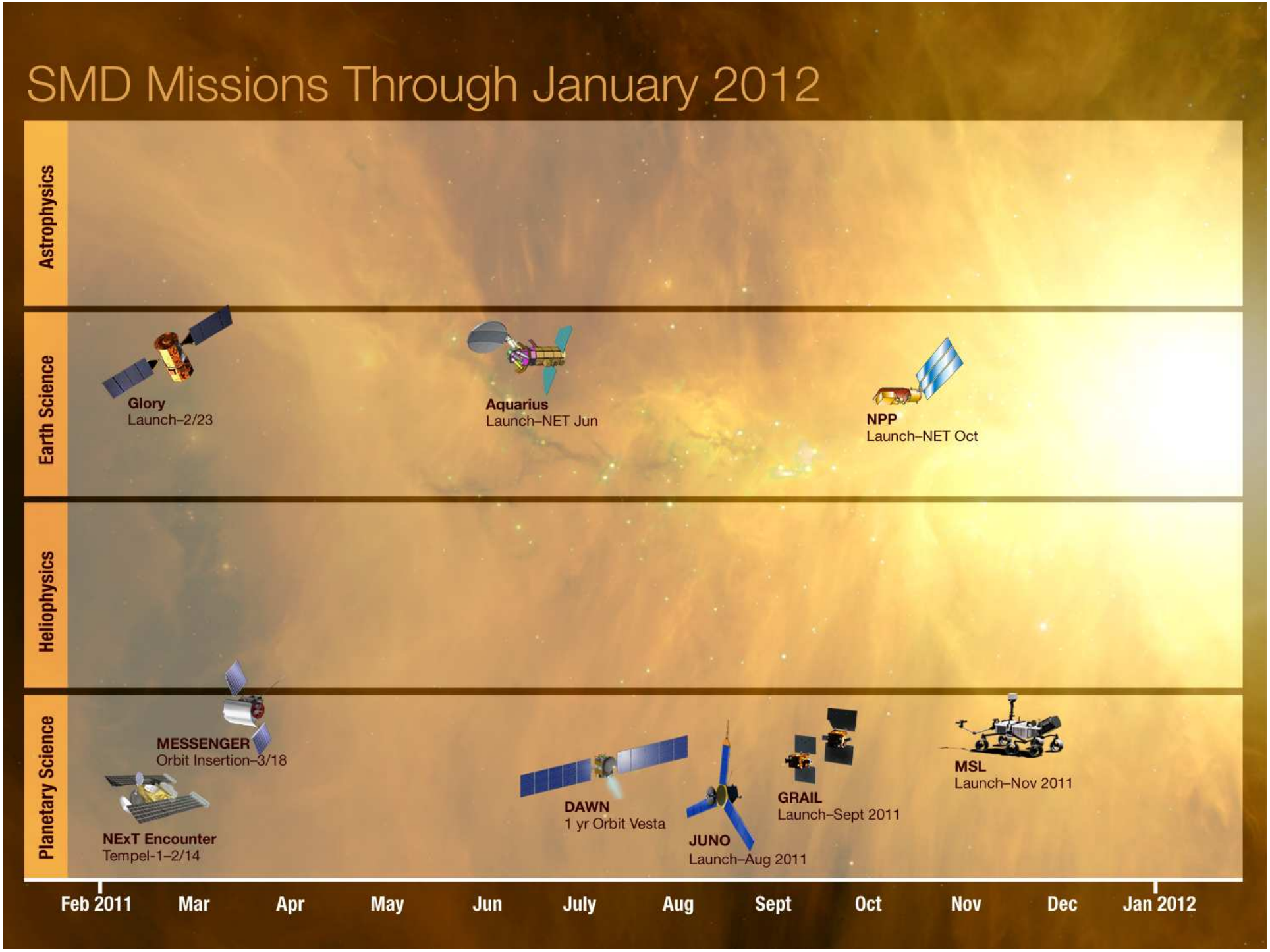
Joint Agency Satellite Programs

NASA established a Joint Agency Satellite Division within the Science Mission Directorate at Headquarters, to manage NASA work conducted for other agencies on a fully-reimbursable basis. This Division:

- Implements requirements from our reimbursable customers – NOAA and USGS.
  - Continues development of JPSS, GOES-R, and Jason 3 for NOAA.
  - Initiates Landsat 9 and 10 for USGS.

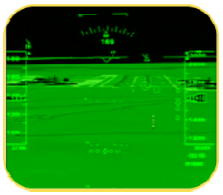
- Applies standard NASA project management processes to ensure mission success for our customers with a focus on efficiently managing operational satellite acquisitions.

SMD Missions Through January 2012



AERONAUTICS

NASA Aeronautics Programs


Aviation Safety Program

Airspace Systems Program





Fundamental Aeronautics Program

Integrated Systems Research Program



Aeronautics Test Program

Aeronautics

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	497	501	580	569	569	569	569	569

- Increases research in advanced ground-based/flight-deck technologies and automation of airport surface operations; the effects of high altitude ice crystal on aircraft; and utilization of alternative fuels for fuel-flexible engine development.

- Continues support for new FY 2011 initiatives.

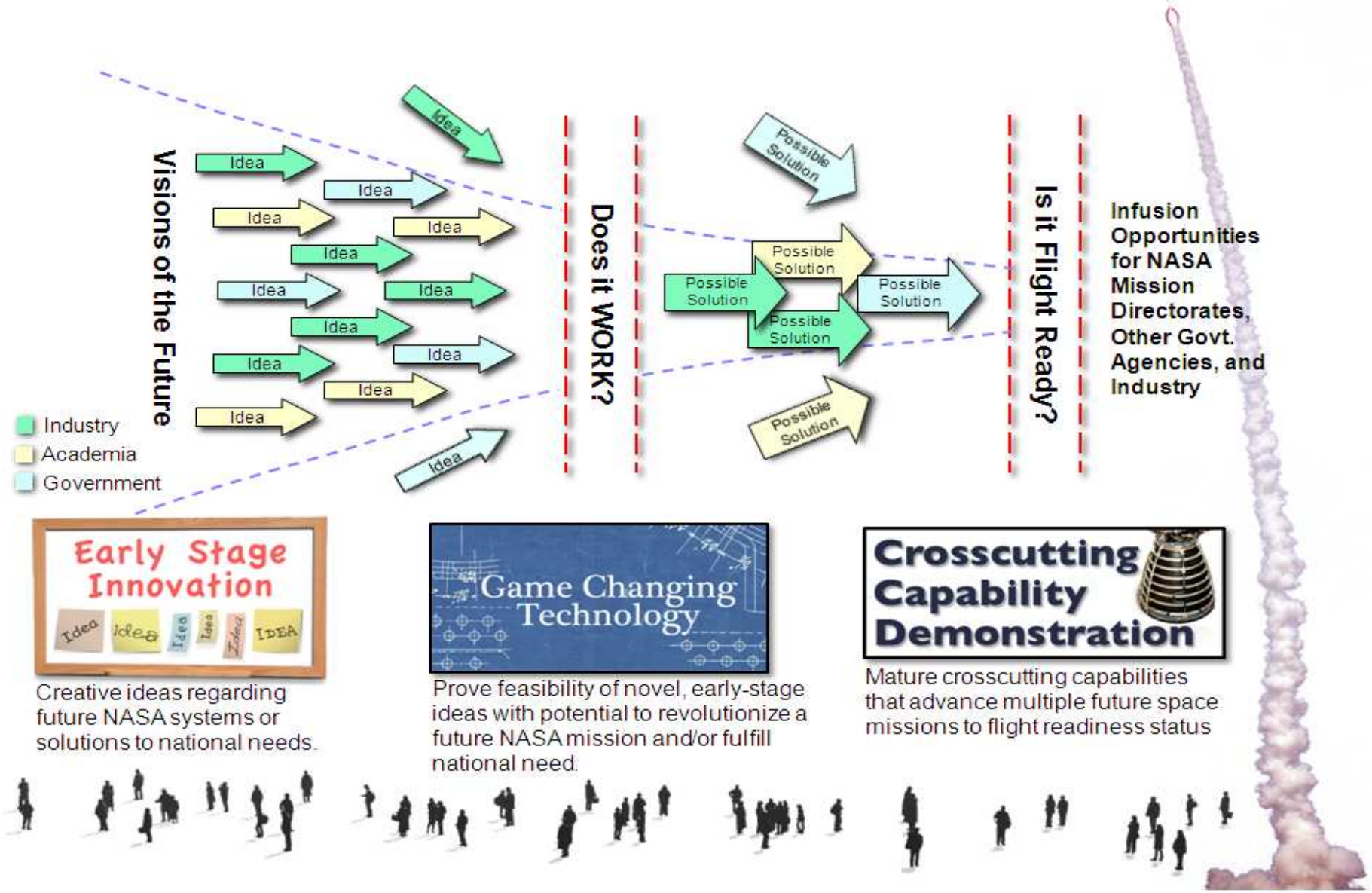
- Refocuses a smaller Hypersonics project on foundational research in which NASA has unique competencies.

Aero Changes from FY11 Budget

- **Programmatic Content changes:**
  - Increased research in Aviation Safety for high altitude icing
  - Internal realignment of
    - Integrated Systems Research and Fundamental Aeronautics activities to establish the Aeronautics Strategy and Management Program, for more effective management of directorate level activities
    - Integrated Systems Research activities to Airspace Systems Program for air traffic management demonstration activities
  - In Fundamental Aeronautics, Hypersonics program is refocused on foundational research

SPACE TECHNOLOGY

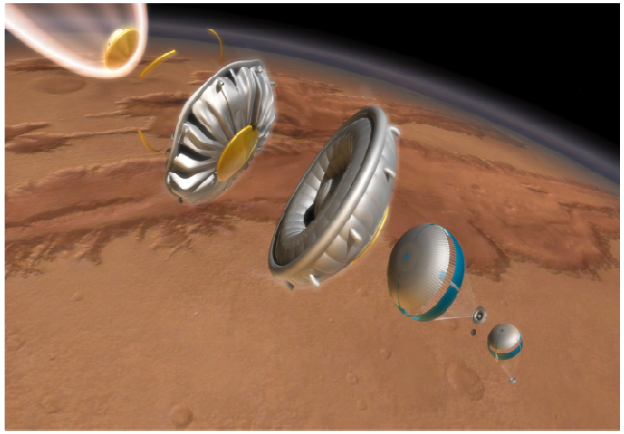
Space Technology Portfolio



Space Technology

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	275	327	512	1,024	1,024	1,024	1,024	1,024

- The central NASA contribution to a revitalized research, technology and innovation agenda for our Nation. Includes SBIR/STTR ($184M) and exploration technology ($310M).
- Funds advancements and innovations in next-generation technologies, to make NASA, other government and commercial space activities more capable and affordable.



- Uses grants, prizes and alternative funding mechanisms to spur innovation.
- Funds technology fellowships for graduate students to develop solutions to space technology grand challenges.

Space Technology Changes from FY11 Budget

Programmatic Content changes:

- Re-estimation of extramural R&D resulted in an increase in SBIR and STTR
- Partnership Development and Strategic Integration, Crosscutting Space Tech Development, and other technology development activities have decreased due to an overall reduction in NASA's top-line budget and an approach which is aligned with the Authorization Act of 2010.

Transfers:

- NASA will move a significant portion of exploration technology activities, from ESMD to Space Technology in order to capitalize on the synergy between these activities and those in the Crosscutting Space Technology Development.

HUMAN SPACE FLIGHT

Human Space Flight

Human Space Flight includes Exploration….

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	3,626	3,594	3,706	3,949	3,949	3,949	3,949	3,949

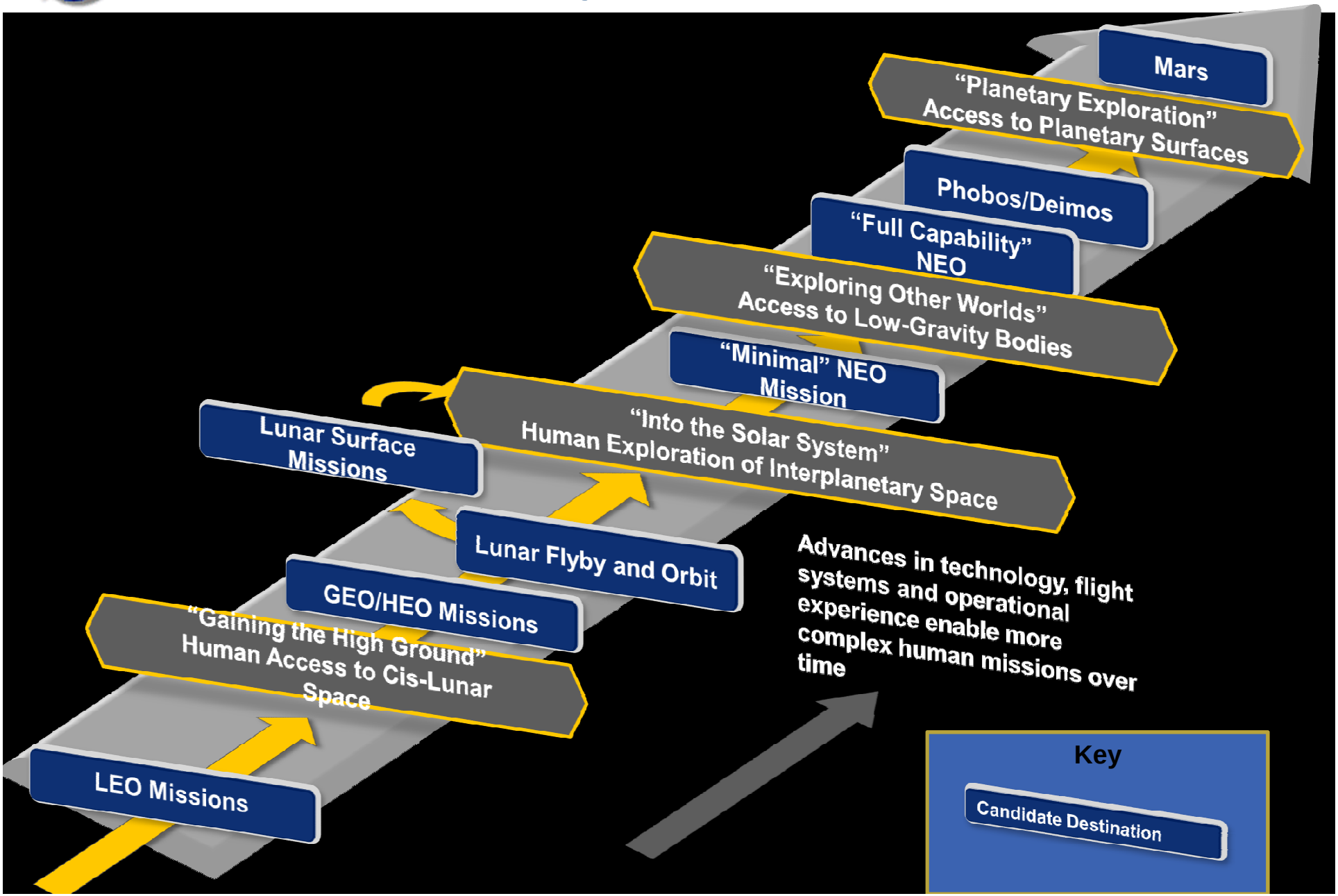
- Human Exploration Capabilities
- Commercial Spaceflight
- Exploration Research & Development

And Space Operations….

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	6,142	6,147	5,509	4,347	4,347	4,347	4,347	4,347

- Space Shuttle
- International Space Station
- Space and Flight Support

Destinations for Expansion of Humans Into the Solar System Enabled by FY 2012 Investments



Exploration
Changes from FY11 Budget

Programmatic content changes:

- Human Exploration Capabilities (HEC) succeeds Constellation and focuses on the Space Launch System & Multi-Purpose Crew Vehicle.
- Commercial Spaceflight transitions from completing cargo capability milestones to expanding commercial crew capability to LEO and the ISS.
- AES program pursues key capabilities for future human exploration including advanced life support and EVA.
- In FY 2013, ESMD and SMD will pursue missions of opportunity to gather required data for human exploration.

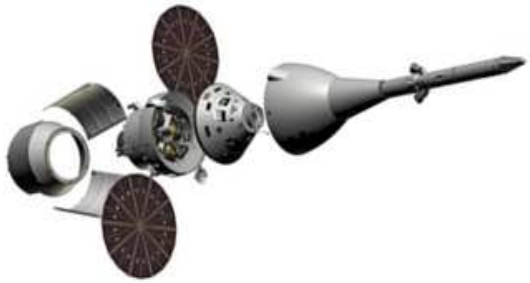
Transfers:

- Exploration Technology Development (ETD) transferred to Space Technology.
- ISS Research transferred to Space Operations.

Human Exploration Capabilities

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	NA	NA	2,751	2,810	2,810	2,810	2,810	2,810

- Provides steady funding for SLS ($1.8B) and MPCV ($1.0B) at approximately the 2011 Authorized level, which is a solid foundation from which to develop these important systems.
- Uses recently-awarded BAA study contracts and Government Requirements Analysis Cycle to evaluate design decisions.
- Prioritizes work on existing contracts to maintain progress and minimize workforce disruptions.
- Develops a plan that meets available funding, pacing MPCV to optimize with SLS.
- Final decisions on plans for SLS/MPCV will be made during the Acquisition Strategy review process this Spring or summer.



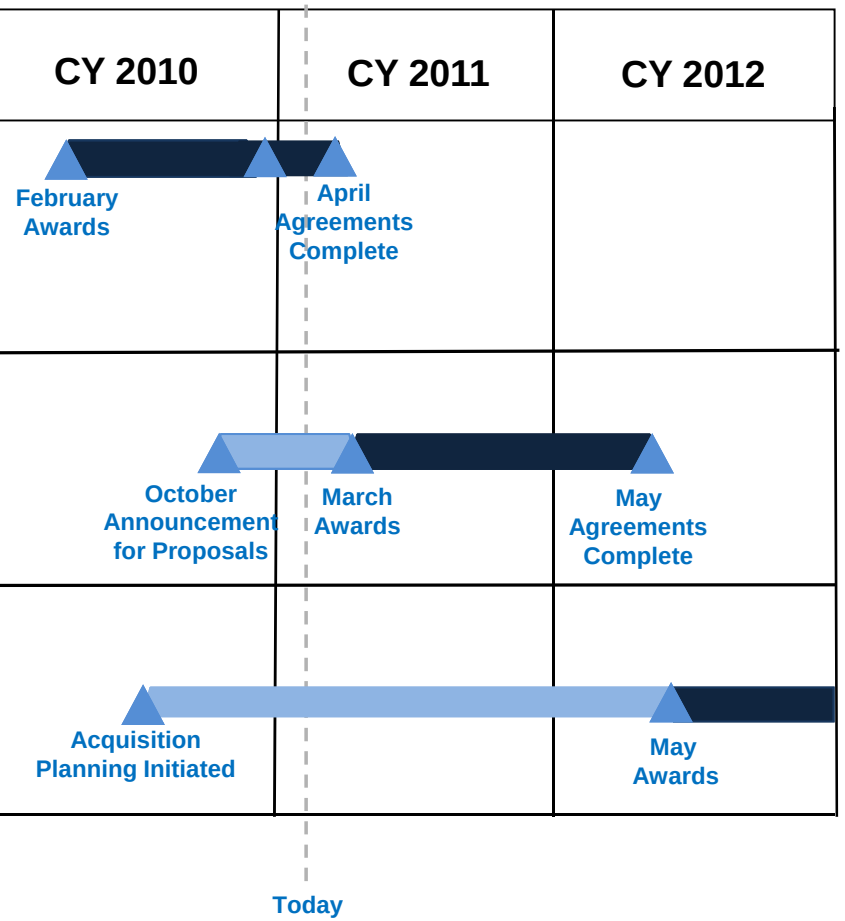
Commercial Spaceflight

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	39	NA	612	850	850	850	850	850

- Leverages significant private sector investments to spur the development of U.S. commercial human spaceflight systems and end our dependence on Russian spaceflight capabilities.
- Builds off successful progress in the development of commercial cargo capabilities and the Commercial Crew Development (CCDev) activity.
- Supports award of multiple, competitive, milestone-based agreements that support the development, testing, and demonstration of multiple commercial crew systems.
- Ensures that eventual contracted services meet the Agency's stringent crew transportation system certification requirements.

Commercial Crew Structure and Timeline

Title	Purpose
Commercial Crew Development (CCDev)	Develop and demonstrate technologies that enable commercial human spaceflight capabilities.
CCDev Round 2	Mature the design and development of elements of the system, such as launch vehicles and spacecraft.
CCDev Round 3	Facilitate the development and demonstration of multiple, integrated, end-to-end commercial crew systems.



Commercial Crew Acquisition Strategy

- **Based on the strategy pioneered under COTS/CCDev**
  - Incentivize commercial providers to build and operate safe, reliable and cost-effective commercial crew and cargo transportation systems.
- **Key elements of the CCDev 3 strategy include:**
  - Multiple competitive awards; increased design ownership
  - Pay for performance milestones; fixed government investment; requirement for private capital
  - Negotiated service goals, not detailed design requirements; tailored human rating requirements, standards, and processes
  - NASA Insight/Oversight model based on discipline experts; NASA provided final crew transportation system certification

Exploration Research and Development

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	146	NA	343	289	289	289	289	289

- Expands fundamental knowledge and develops advanced human spaceflight capabilities required to explore space in a more sustainable and affordable way.
- Comprises the Human Research Program and the Advanced Exploration Systems program.
- Transfers the Enabling Technology Development and Demonstration (ETDD) to the Space Technology program.
- Tough choices – eliminated funding for exploration focused robotic precursors. Supports Joint effort with Science to identify and prioritize robotic data collection to enable future human exploration beyond low Earth orbit.

Space Operations
Changes from FY11 Budget

Programmatic Content changes:

- Includes Space Shuttle Program prime contractor pension liability
- Re-phased Space Shuttle transition and retirement activities
- Reduced International Space Station, Space communication and 21st Century Space Launch Complex content to support other priorities
- Includes Mission Operations Sustainment activities beginning in FY 2013

Space Shuttle

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	3,101	NA	1,610	665	80	1	1	1

- Continues disposition of property and capabilities culminating in disposition of most Space Shuttle assets by FY 2013.
- Supports Shuttle workforce and facility transition efforts including funding contractually required ($548M) pension costs related to Shuttle retirement.

International Space Station

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	2,313	NA	2,780	2,841	2,960	3,005	3,098	3,175

- Extends ISS lifetime to 2020 or beyond
- Expands ISS utilization, including National Laboratory and non-profit organization oversight activities.
- Enhances functionality to lower costs or increase efficiency, reduce demands on crew time, improve safety, & benefit future exploration programs or capabilities.
- Includes crew & cargo transportation contracts.

- The goal is to fully use the Station's R&D capabilities to conduct scientific research, improve our ability to operate in space, and demonstrate new technologies.

Space and Flight Support

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	728	NA	1,119	841	1,307	1,341	1,248	1,171

- Supports modernization plans for a 21st Century Launch Complex.
- Provides space communication and navigation capabilities to all missions; crew expertise for future missions; and launch services for NASA and NASA-sponsored payloads using ELVs.
- Supports commercial rocket propulsion testing at NASA test facilities.
- Includes future ISS transportation and space communication needs, e.g., future purchases of commercial seats and crew services.

EDUCATION

Education

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	180	183	146	138	138	138	138	138

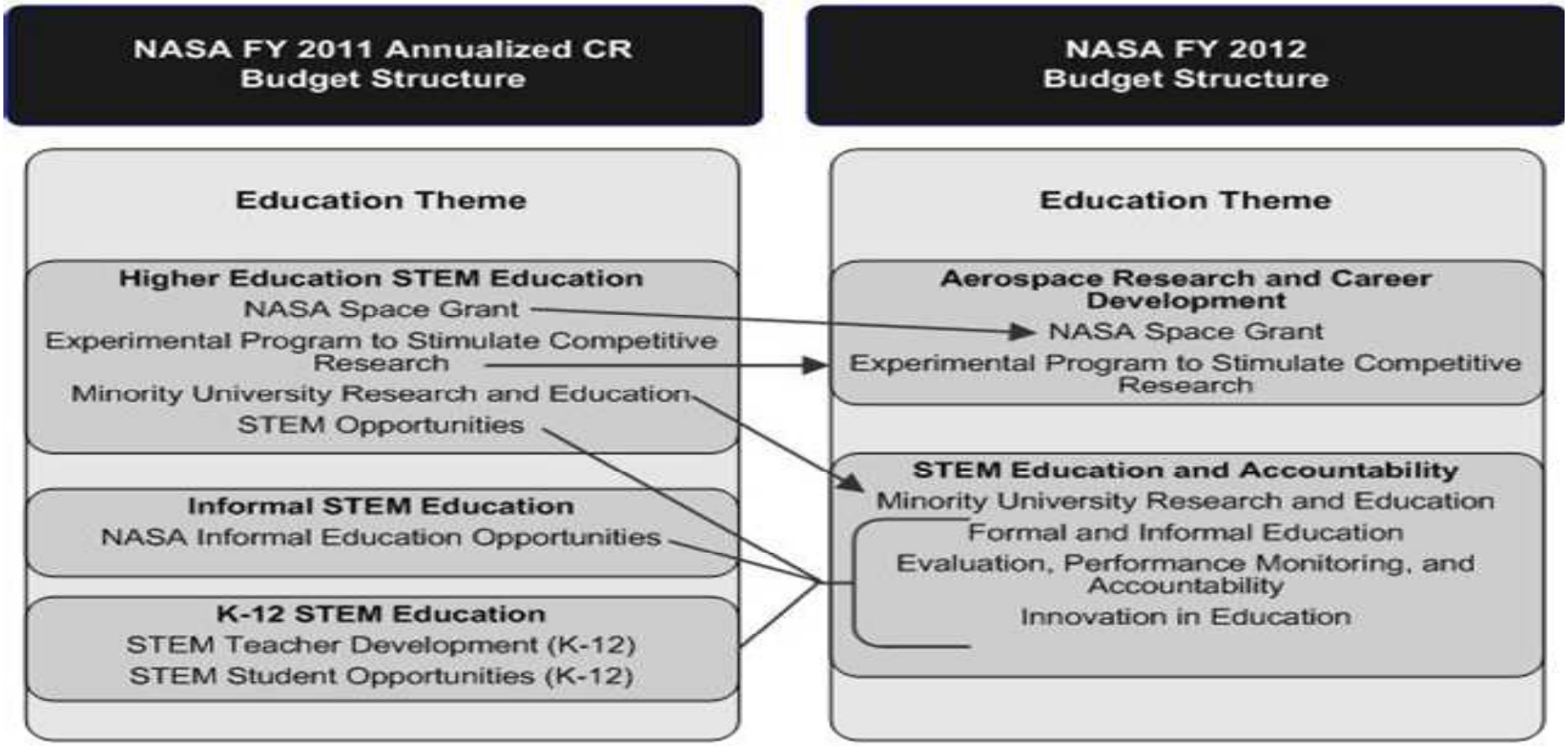
- Continues the Summer of Innovation pilot.
- Incorporates the recent design team recommendations.
- Expands educator professional development and pre-service preparation related to NASA missions.
- Increases community college involvement in NASA research and prepares students for jobs in the twenty-first century.
- Continues MUREP, EPSCoR and Space Grants.

Design Team Recommendations

Programmatic recommendations

1. Focus the NASA Education Program to improve its impact on areas of greatest national need.
   - Professional training and development of educators working with middle-school age students;
   - Higher Education program that provides experimental opportunities for students
2. Identify and strategically manage NASA Education Partnerships.
3. Participate in National and State STEM Education policy discussions.

Education Budget Crosswalk



INSTITUTIONAL

Cross-Agency Support and Construction

➢ Cross-Agency Support

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	3,018	3,019	3,111	3,192	3,192	3,192	3,192	3,192

- Continues to fund operations/maintenance of NASA's centers, facilities and headquarters
- Conducts safety and reliability activities to assure safety and mission success
- Works to find efficiencies and drive down operating costs

➢ Construction and Environmental Compliance and

Budget Authority ($M)	FY 2010	FY 2011	FY 2011		Outyears are notional			
	Actual	CR	Auth Act	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016
FY 2012 Budget Request	453	448	394	450	450	450	450	450

- Implements multi-decadal strategy to reduce/renew infrastructure and funds major repairs/construction as required to conduct NASA's program missions, and manages NASA's environmental clean-up responsibilities

CAS/CECR Changes from FY11 Budget

Cross-Agency Support

- Reduces by $13M for Independent Verification and Validation, $7.2M for IT Services, $19.5M for Management, and $60.2M for Center Institutional Capabilities.
- Includes labor for 700 additional civil service full time equivalent as NASA transitions to the program portfolio contained in the NASA Authorization Act of 2010.

Construction & Environmental Compliance & Restoration

- Demolishes excess capacity and constructs smaller more sustainable facilities; includes Hangar 1 re-skinning.
- Provides cleanup funds for Santa Susanna Field Laboratory.
- Asks for enhanced EUL authority for renewable energy projects.

Summary

- NASA had to make especially tough budget choices this year.
- Throughout we funded the elements and strategies laid out in the NASA Authorization Act of 2010.
- We also prioritized the safety and viability of our astronauts in Space aboard the ISS.
- The Agency looks forward to working with the Congress and others to further the nation's goals for the Agency.