A composite image featuring an astronaut in a blue space suit in the foreground, with the Earth's horizon and a Mars rover in the background. The astronaut's helmet is visible, reflecting the scene. The NASA logo is on the suit. The overall color palette is dominated by blues and oranges.

NASA Advisory Council
Task Force on STEM Education
December 2, 2015

James Stofan

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Committee Membership



Mr. James Stofan (DC): Chief Operating Officer at Defenders of Wildlife. Former NASA Deputy Associate Administrator for Education Integration; served as Acting Associate Administrator for Education. Chair of Ad Hoc Task Force on STEM Education.

Dr. Carl Person (NC): Undergraduate Research Preceptor, Fayetteville State University. Former MUREP manager; retired NASA employee. 20 years of distinguished service to the U.S. Department of Education. Vice Chair of Ad Hoc Task Force on STEM Education.

Dr. Margaret Honey (NY): President and CEO of the New York Hall of Science. Chair of current National Research Council's Committee Toward Integrated STEM Education: Developing a Research Agenda. Previously chaired NRC's Committee on Learning Science.

Ms. Aimee Kennedy (OH): Vice President for Education, STEM Learning and Philanthropy at Battelle Memorial Institute. Manages STEM networks and programs including Ohio STEM Learning Network and national STEMx network. Previously Chief Academic Officer for Metro Early College High School.

Committee Membership (cont'd)



Dr. Anita Krishnamurthi (DC): Vice President of STEM Policy at the Afterschool Alliance in Washington, District of Columbia. Worked in education at NASA Headquarters and NASA's Goddard Space Flight Center in Greenbelt, Maryland, and was a program officer at the National Academy of Sciences. Her training is in astrophysics.

Dr. Michael Lach (IL): Director of STEM Policy and Strategic Initiatives at the University of Chicago. Formerly U.S. Dept. of Education STEM Advisor. Current work emphasizes a national, multisector effort to create and support 100,000 STEM teacher positions by 2021.

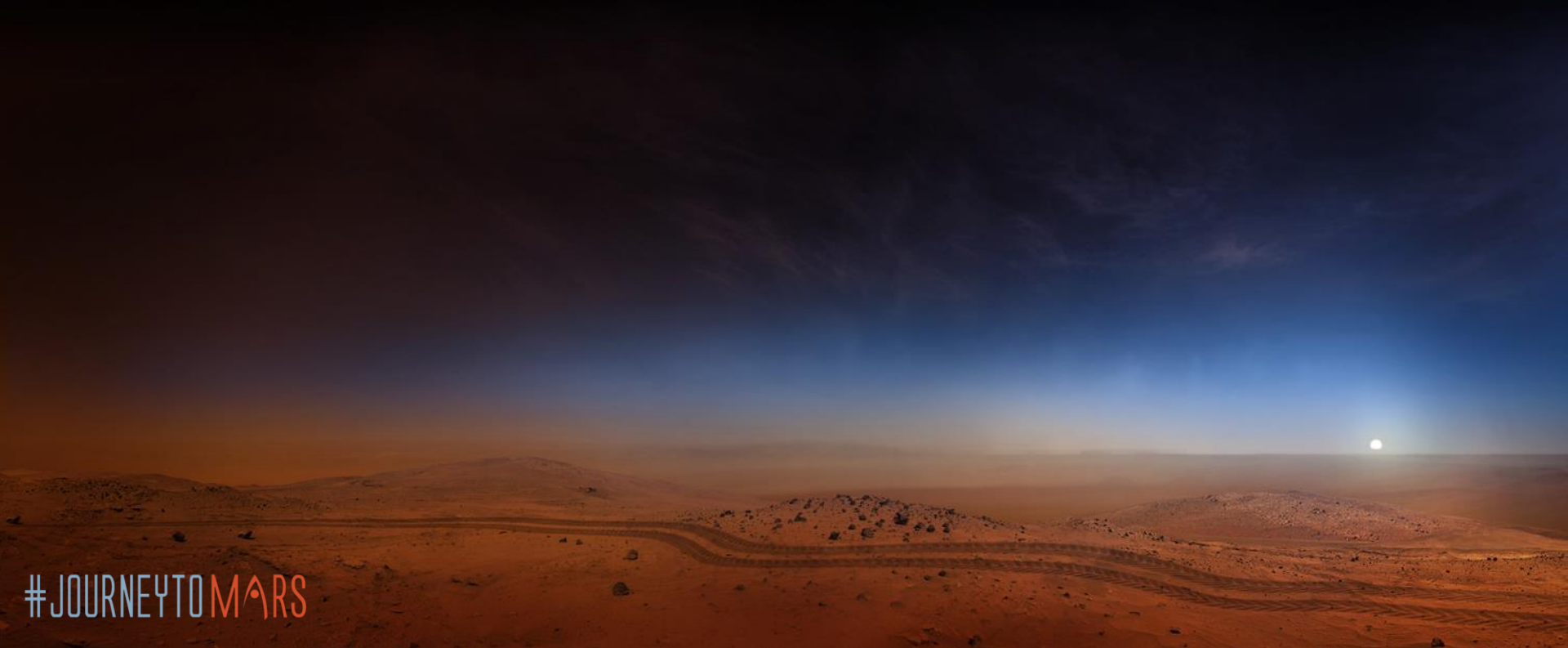
Mr. Ray Mellado (CA): Founder and Chairman of the Board, Great Minds in STEM™ (formerly HENAAC). Distinguished 21-year marketing/sales executive career with the Xerox Corporation. Awarded the 2009 NASA Exceptional Public Service Medal.



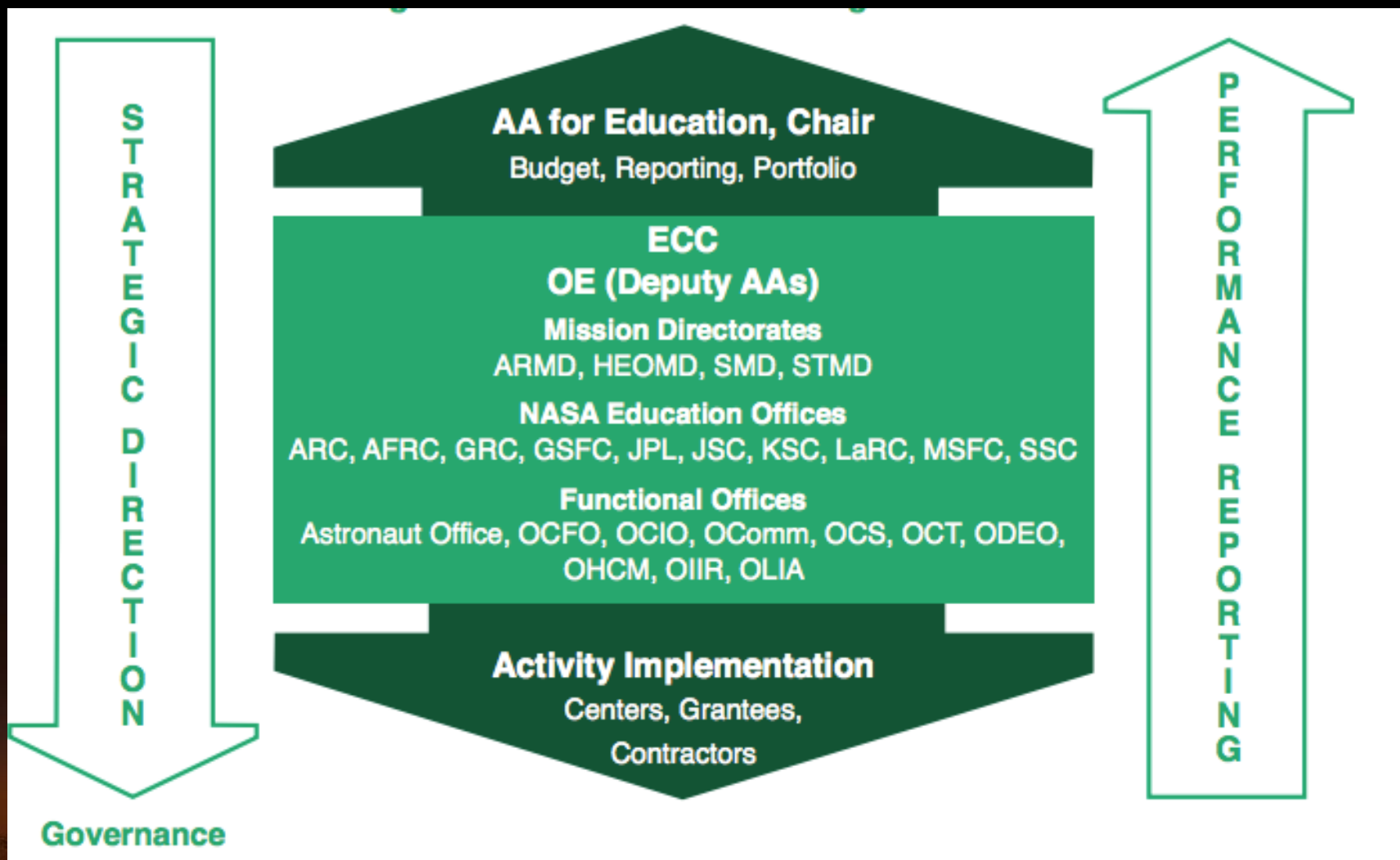
Committee Meetings



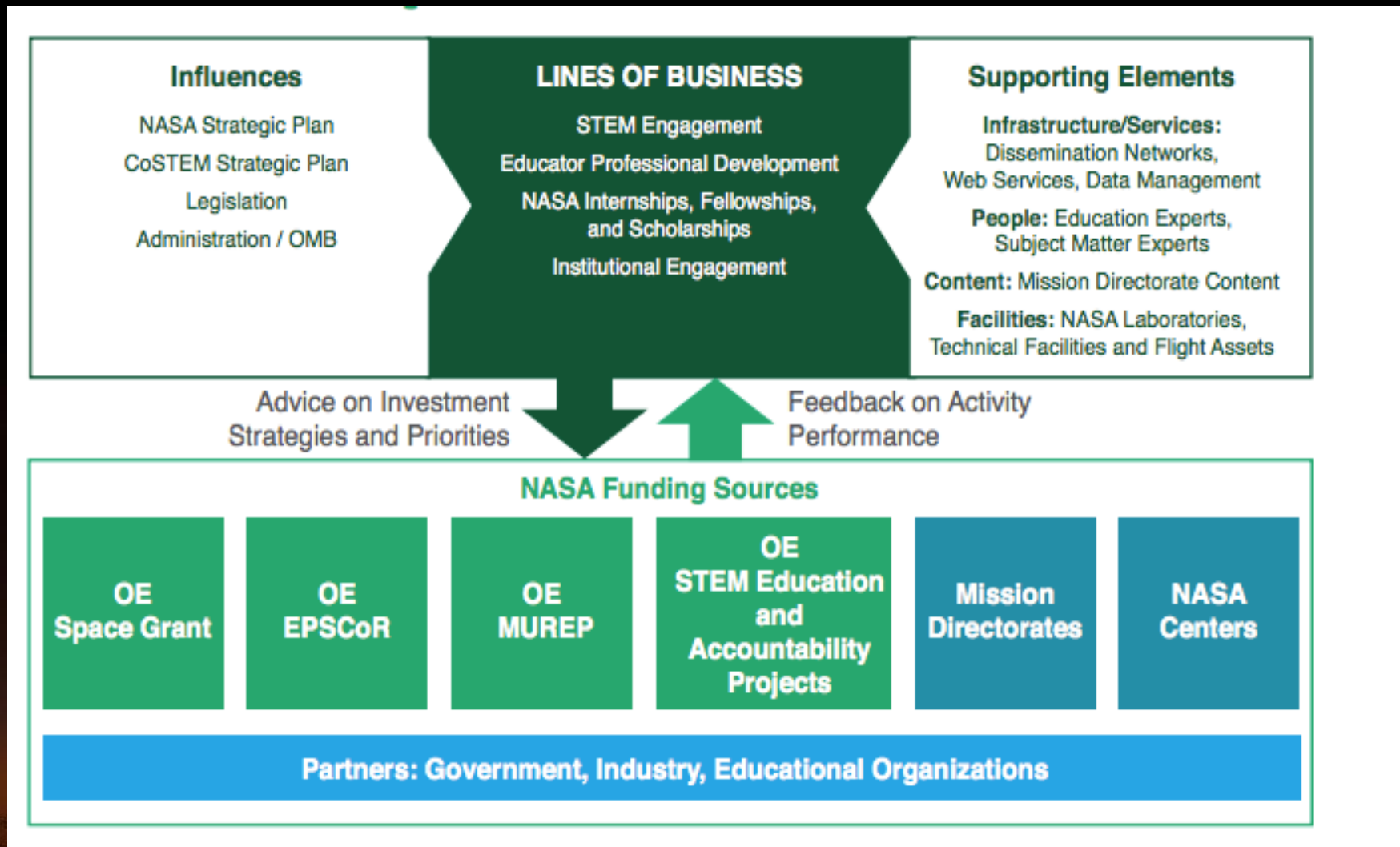
- **April 3, 2015**
- **July 16, 2015**
- **September 22, 2015**
- **November 19, 2015**



NASA Education Structure



NASA Education Structure (cont'd)



NASA Education Highlights--SEAP



- In response to an OMB requirement that NASA's internal projects and activities compete with one another for education funding in FY 2015 and thereafter, the Office of Education developed a competition to identify effective STEM education activities that deserve funding.
- The competition prioritized among entirely new and the roughly 40 NASA activities reported by the Headquarters Office of Education, Aeronautics Research Mission Directorate, Human Exploration and Operations Mission Directorate and NASA centers' education offices in the March 2014 Progress Report on Coordinating Federal Science, Technology, Engineering, and Mathematics Education.



NASA Education Highlights— Space Grant Rock On!



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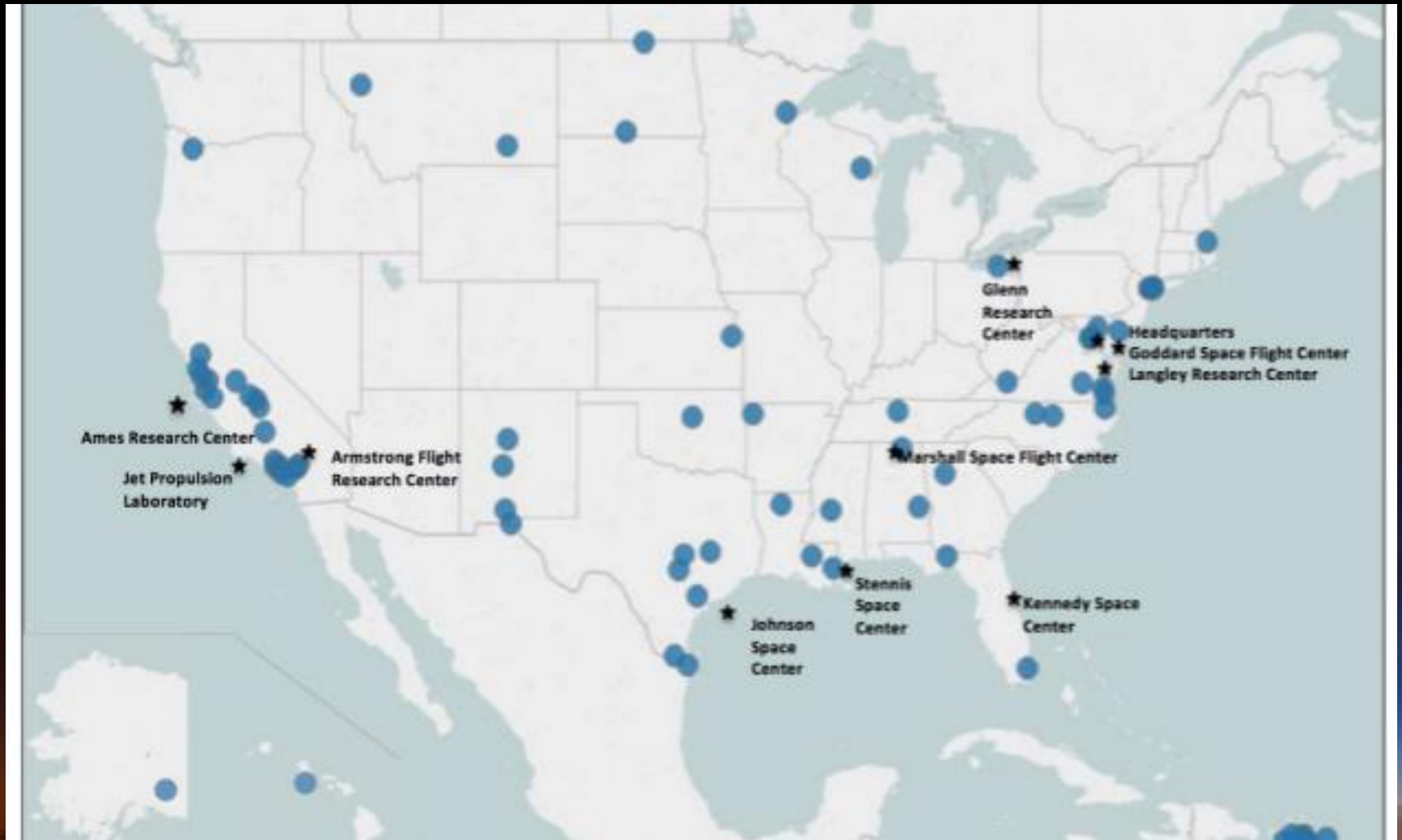
NASA Education Highlights--MUREP



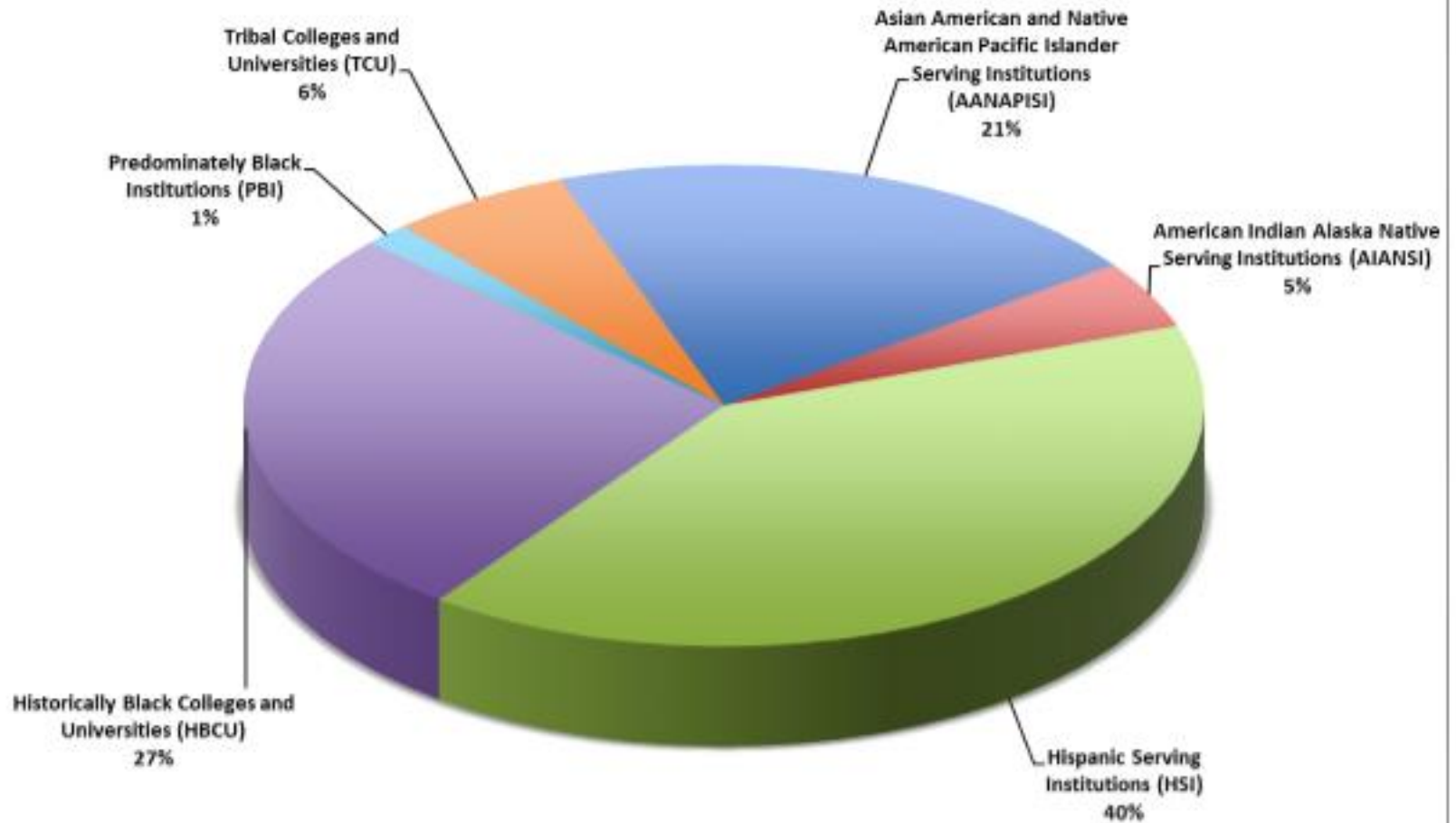
- MUREP provides competitive awards to MSIs and eligible community colleges as required by the five MSI focused Executive Orders. These institutions recruit and retain underrepresented and underserved students, including women and girls, and person with disabilities, into STEM fields.
- In fiscal year 2015, MUREP provided oversight to 111 active MSI awards across the United States.
- MUREP strives to ensure faculty and students are informed about NASA's competitive research and education opportunities with the focus of increasing retention rates and degree completion at each educational level at MSIs in NASA-related fields. In addition, these awards also provide opportunities for MSIs to improve educators' professional development and thereby better serve groups historically underrepresented and underserved in STEM.



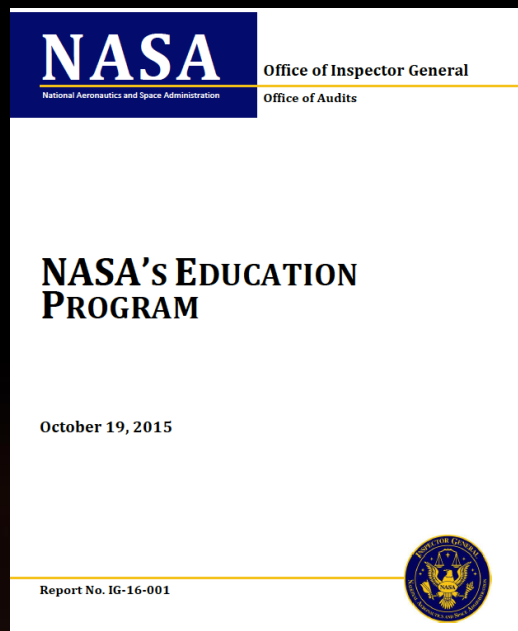
FY2015 MUREP Awards by Location



MUREP FY2015 Investments by MSI Designation



IG Report Recommendations



In order to improve the effectiveness of the Office of Education's management of its education portfolio, we recommended that NASA's Associate Administrator for Education:

(1) issue an Implementation Plan that aligns and remains current with NASA's Strategic Plan, accurately reflects the Office of Education's strategic direction, and includes measures to meet long-term goals and methodologies to gauge success;

(2) improve accessibility to the OEPM system to ensure project managers have an adequate and timely opportunity for data entry at the start of each fiscal year;

IG Report Recommendations (cont'd)



(3) establish internal control procedures to ensure all required education activity data is collected, entered, verified, and validated in the OEPM system for accurate and reliable reporting in the Annual Performance Report;

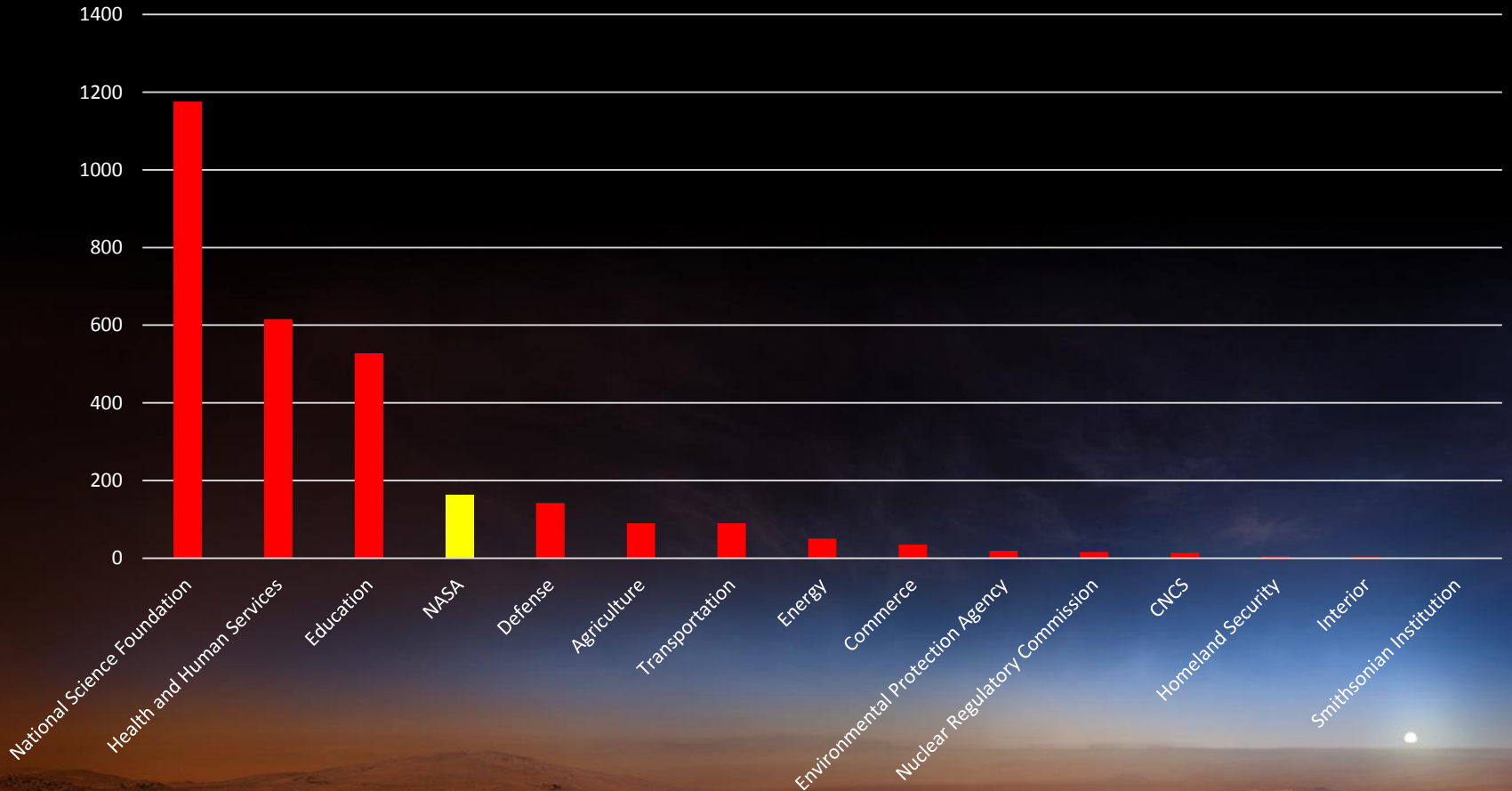
(4) establish a reasonable timeframe for project managers' data entry after completion of individual education activities and ensure it is documented in the internal control procedures; and

(5) assist Center Education Offices in developing coordinated activities for future competitions prior to the Office of Education reviewing all submissions and making selections.

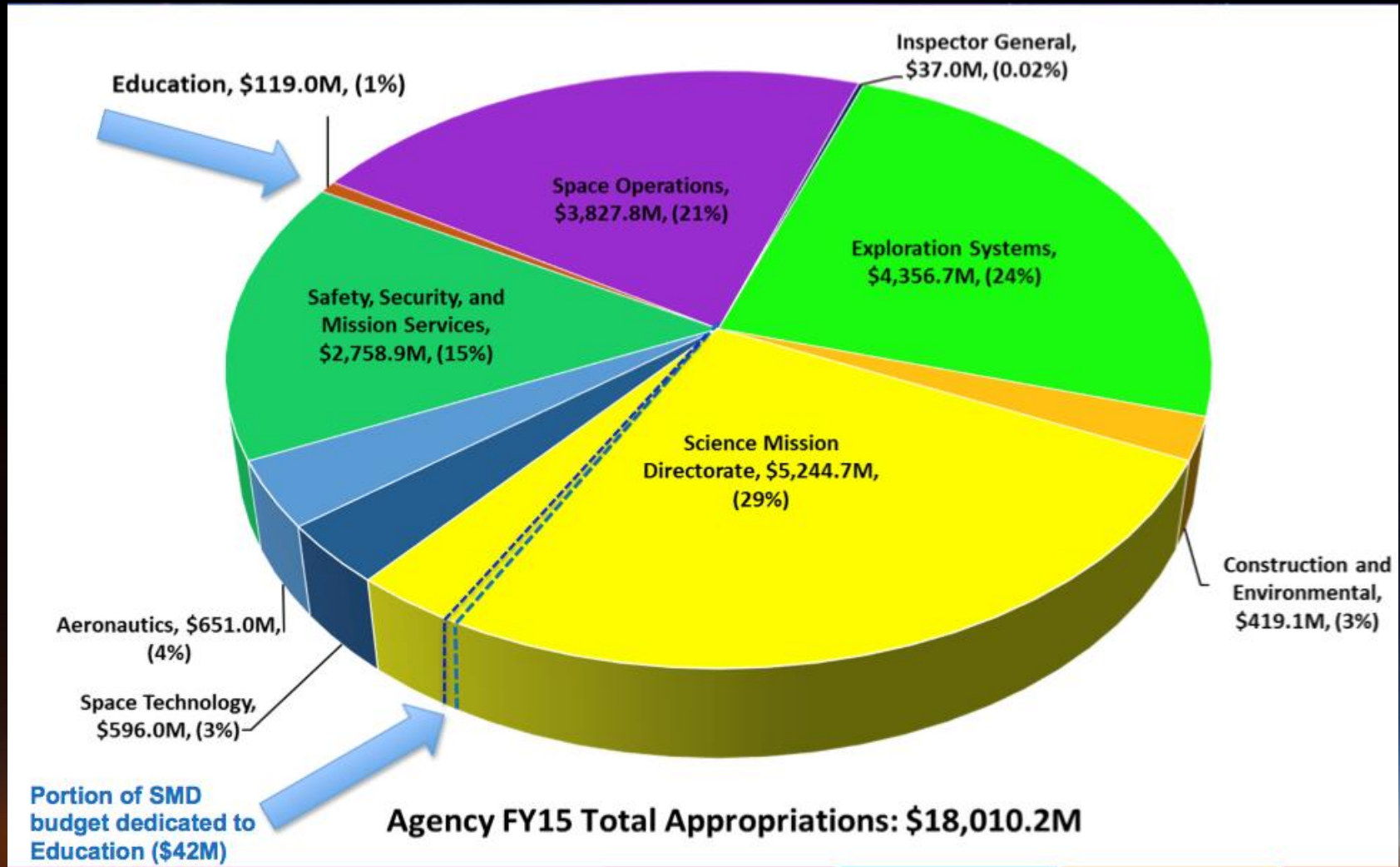
Federal STEM Education Funding By Agency



Progress Report on Coordinating Federal Science, Technology, Engineering, and Mathematics (STEM) Education--FY2015 Estimate



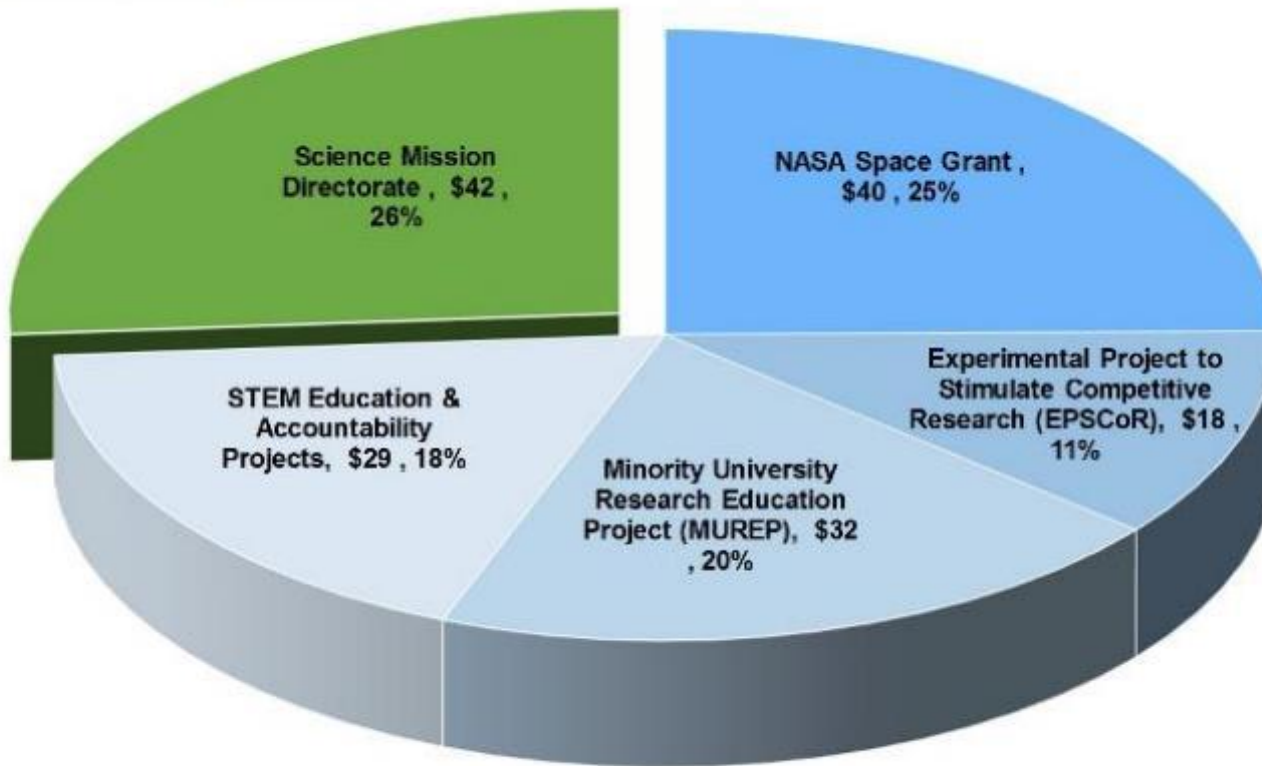
NASA FY2015 Budget



Agency FY15 Total Appropriations - Education

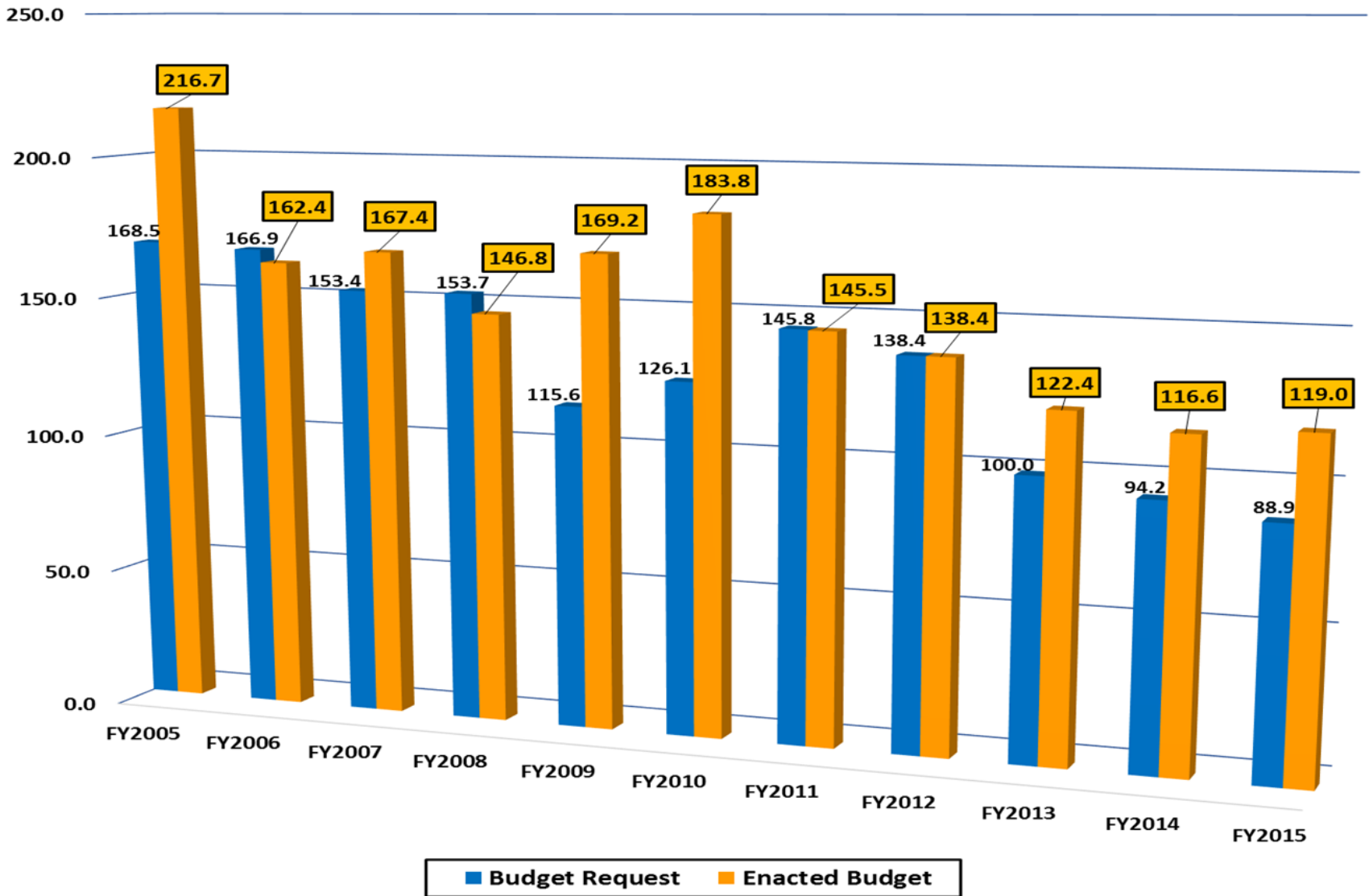


- Office of Education
- Science Mission Directorate

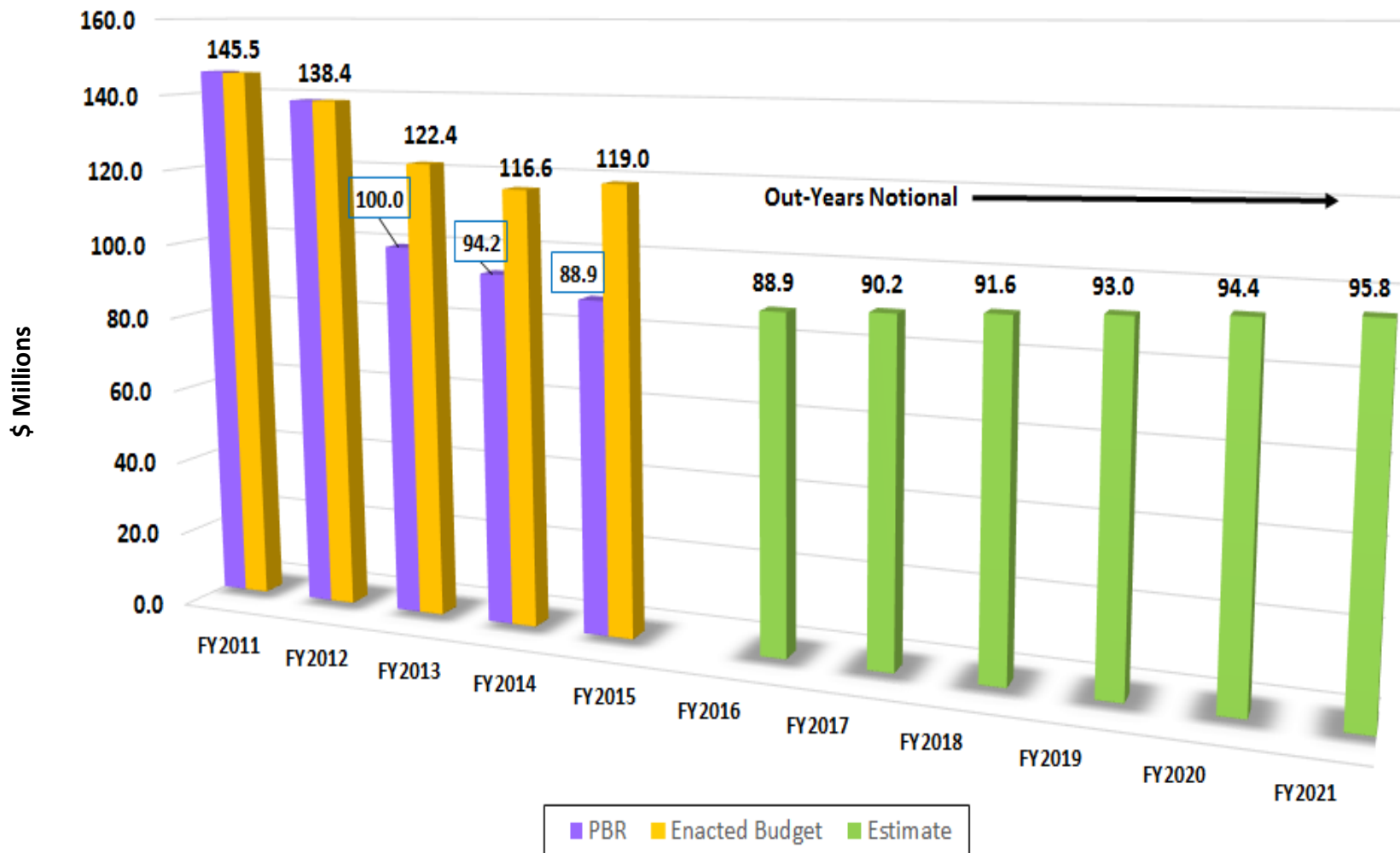


Agency FY15 Total Appropriations: \$161M

Office of Education FY 2005 - 2015 Budget Data



FY 2011 – 2021 NASA Education Office Budget Overview



Program Structure and Lines of Business



\$119M (FY15 enacted)

PROGRAMS	Aerospace Research & Career Development (ARCD) \$58M		STEM Education & Accountability (SEA) \$61M	
PROJECTS	Space Grant \$40M	EPSCoR \$18M	MUREP \$32M	SEAP \$29M
Description	Enhances science & engineering education/research for educators & learners through Univ./Consortia in 50 States + DC and PR.	Strengthens research capability of jurisdictions that haven't participated equitably in competitive aero research activities.	Enhances research and academic capabilities at MSIs to improve quality of STEM programs for underrepresented and underserved populations.	Competitive consolidation of NASA's Office of Education historic formal and informal education activities
Funding Examples	Stipends and scholarships, hands-on experience on variety of authentic platforms.	Fund faculty research, post-docs and Univ. capability; travel to NASA Centers work w/ SMEs.	Funds internships and multi-year cooperative agreements research at MSI's. Support events like SASE, SWE, etc.	NASA internal competition; In FY15, \$108M requests for ~\$11M. Delta is liens on prior commitments (e.g. Aero Scholars).
Educator Professional Development (EPD)	X		X	X
STEM Engagement (SE)	X		X	X
NASA Internships, Fellowships, & Scholarships (NIFS)	X		X	X
Institutional Engagement (IE)	X	X	X	X

Task Force on STEM Education Observations



Revisions to the NASA Education Implementation Plan (NEIP)

Observation:

- The NEIP should be revised so that it:
 - Explains the unique role that NASA plays in the Federal STEM education efforts, and identifies how NASA education activities and investments work with other entities (including State Education Administrations and Local Education Administrations) to improve Science, Technology, Engineering and Mathematics (STEM) education.
 - Explicitly states the STEM education goals and outcomes that NASA intends to achieve, the specific contributions of each Mission Directorate, Office and Center to the Agency's education goals, and the metrics NASA will use to measure performance.
 - Details how each Mission Directorate, Office and Center will contribute to these goals and how they are accountable for contributing to the Agency goals. Budgets and key grant competitions should be highlighted.
 - Is clear to key audiences (including students, parents, teachers, K-12 administrators, university faculty, and scientists) what NASA is doing (and not doing) to help their efforts.
- Create an additional streamlined Agency document that communicates the top-level goals and specific assets that NASA will make available to key audiences.
- Clearly articulate the difference in goals between education and outreach.

Task Force on STEM Education Observations



Strengthen the structure of NASA's education efforts and its ability to execute and communicate on them.

Observation:

- In order to ensure that NASA STEM education work has support across the engineering scientific, and education communities, NASA should explore ways to further leverage external advisors in both formal and informal roles to ensure that both the strategic guidance and content expertise is available to accomplish the ambitions NASA aspires to.
- NASA should revisit the organizational structure and governance to clarify the decision-making processes about STEM education:
 - Mission Directorates and Centers should invest and make transparent their contributions to NASA's education efforts.
 - To ensure Agency coordination, the Associate Administrator for Education should have explicit authority and accountability for ensuring mission directorate and Center involvement and participation in the overall Education Strategy.
 - Budget and spending decisions should be coordinated across all funding sources to achieve the overall NASA Education goals.
- The NASA Education website should be updated to allow participants simple unified access to information from all Mission Directorates, Centers and Offices.

Task Force on STEM Education Observations



Competitive allocation of funds to elicit projects that meet the objectives of the NASA Education Implementation Plan (NEIP).

Observation:

- The budget for NASA's education efforts should be commensurate with achievement of the goals articulated in the NEIP.
- All solicitations released by NASA for STEM education activities (Mission Directorates, Centers, Offices) should have explicit ties to the NEIP, and include questions about how responders will address the stated goals. It is ok that NASA doesn't invest in all levels of the education system. With the limited funding that NASA has, solicitations should be targeted to make the most impact on specific sectors (depth vs. breadth) of the education community.
- NASA should actively cultivate the network of earth and space science educators and researchers, and connect those individuals to the broader STEM education community, learning scientists, and school and district administrators.
- NASA should continue to expand the publication of abstracts from funded projects and the evaluation data gathered.



Back up Slides/Additional Info



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Achievements in FY 2015



- In a follow-on collaboration, NASA and the Department of Education entered into a second reimbursable Space Act Agreement aligned with near-term CoSTEM priorities to increase and sustain youth and educator engagement in STEM. The partnership supported STEM objectives and activities within Department of Education's 21st Century Community Learning Center (21CCLC) program. NASA customized online STEM challenges and associated curriculum materials aligned to 21CCLC objectives and implemented them in 10 states including: California, Colorado, Florida, New Jersey, Michigan, Montana, New Jersey, Oklahoma, Rhode Island, Virginia and Wisconsin.
- In collaboration with SMD, the Office of Education National Space Grant College and Fellowship Program (Space Grant) released the Undergraduate Student Instrument Project (USIP) Student Flight Research Opportunity (SFRO) to solicit proposals from U.S. institutions of higher education to develop an undergraduate-led Project Team that will fly a science and/or technology payload relevant to NASA strategic goals and objectives on a sounding rocket, balloon, aircraft, suborbital reusable launch vehicle (sRLV), or CubeSat launched on an orbital launch vehicle.

Achievements in FY 2015 (cont'd)



- NASA's Office of Education, in cooperation with Headquarters' Offices of Communications, Chief Scientist, and Chief Technologist, and the Mission Directorates issued the Competitive Program for Science Museums, Planetariums, and NASA Visitor Plus Other Opportunities (NASA Research Announcement NNH15ZHA001N) that fully aligns to the NASA and Federal STEM 5-Year Strategic plan. Youth-serving organizations, museums, planetariums and NASA visitor centers may submit proposals until December 7, 2015.
- NASA executed a competition across the Mission Directorates, NASA Offices of Education at the Centers, and JPL. The Priorities Competition for SEAP used criteria in an internal-to-NASA Request for Information (i-RFI). The FY 2015-2016 i-RFI for SEAP used these broad criteria: 1) Background; 2) Focus; and 3) Evidence of Effectiveness. The SEAP i-RFI ensured all submitters answered the same items and identified the priorities for selection. Between Dec 2014 and Aug 2015, NASA awarded ten education partnerships and one NASA Space Act Agreement, bringing the total number to more than 40 active space act and interagency agreements with diverse entities around the country.

An Out-of-gravity Experience Exhibition



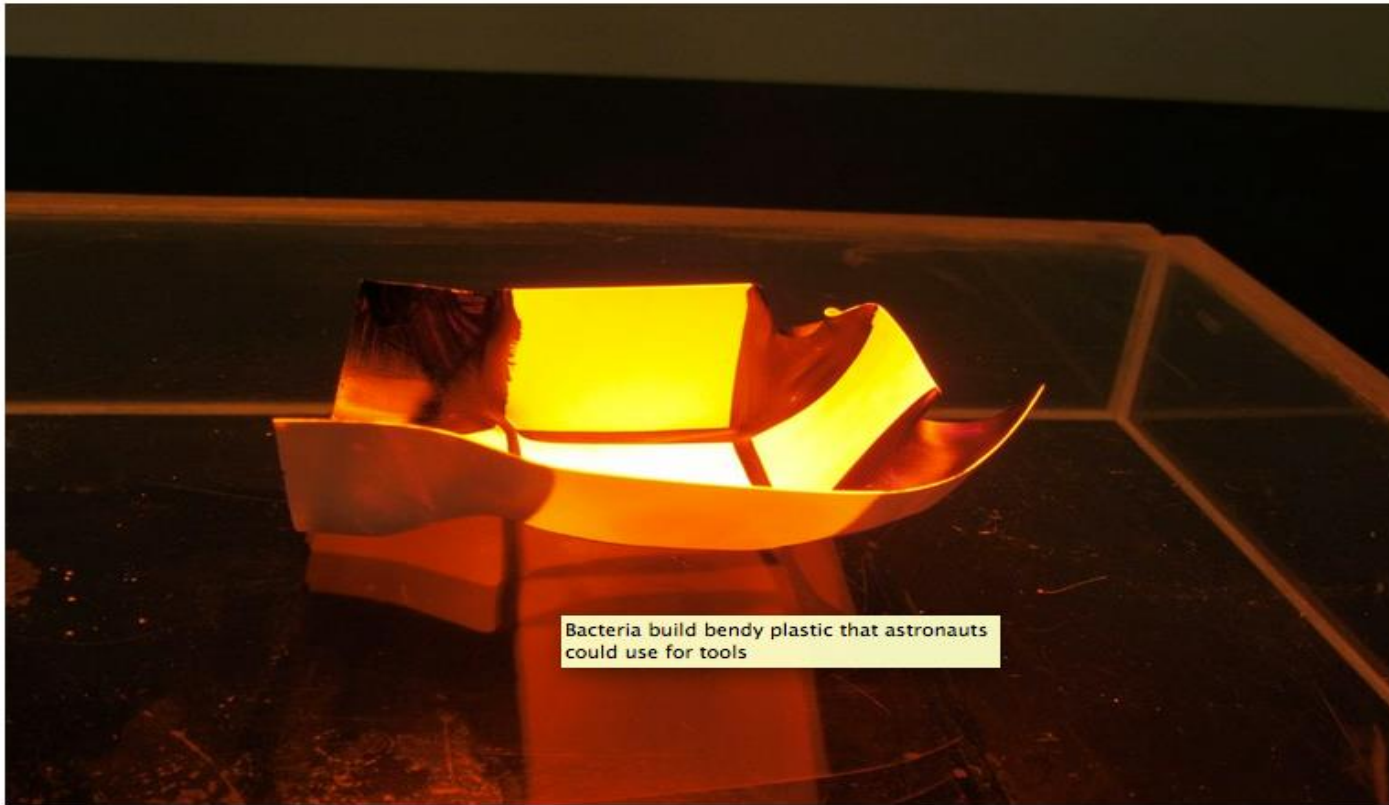
- In February 2015 More than 6,000 Visitors for the Friday-Saturday Public Premiere of *Space: An Out-of-gravity Experience Exhibition* in Saint Paul, MN. 610 Boy Scouts who “camped in” at the Science Museum of Minnesota were among the thousands who attended the first two days the exhibit was open to the public. The exhibit incorporates ISS-provided footage of astronauts living and working in space, other short films and hands-on activities that explain complex STEM concepts. As reported by the Minneapolis papers “there’s a full-scale, climb-aboard, rotating mockup of the Space Station’s Destiny Lab . . . It’s the first of its kind, the only one in the world.” In addition, the Museum’s Kitty Anderson Youth Science Center (KAYSC), presented *A Celebration of Space Saturday and Sunday, February 21-22, offering special hands-on activities for children designed and created by the “Space Crew” and funded by a NASA Education grant. KAYSC annually engages over 100 youth annually in grades 7-12 in out-of-school-time science programming afterschool, Saturdays, and during the summer. 75% of KAYSC participants are from low-income families, 60% are girls and 90% are youth of color. On Sunday morning the 10-member Space Crew hosted a breakfast workshop for approximately 65 of their KAYSC colleagues. The exhibit closed in September in MN opened in CA in October. Exhibit components are: Section 1: Space can kill you; Section 2: Traveling to and in space; Section 3: Weightlessness; Section 4: Living in space; Section 5: Working in space; Section 6: Rotating Destiny Lab; and Section 7: Our future in space Travel schedule, Educator Guide. Floor plan and 90 second video visit*
- <https://www.smm.org/exhibitrental/space-out-gravity-experience>



Education Highlights--Space Grant



Bacteria build bendy plastic that astronauts could use for tools



Bacteria build bendy plastic that astronauts could use for tools

Sheets of plastic made by *E. coli* can fold into whatever shape you desire. Astronauts on long missions might one day rely on such bacterial origami to make tools on the go.

NASA Education Highlights—SEAP (cont'd)

- The i-RFI and subsequent SEAP Estimated Price Report Guidance are two steps toward improving and restructuring the Agency's management of the its diverse education portfolio in order for it to better align with Federal guidance. For additional details, go to: <http://www.nasa.gov/offices/education/about/seap-overview.html/>. At the September quarterly SEAP briefing with OMB, desk officers for NASA and the Department of Education speculated that the changes at NASA embodied by the SEAP competition may turn out to be a major accomplishment or legacy of the Obama Administration's goal to improve Federal STEM Education.



Federal STEM Education Funding By Agency



	2014	2015	2016
	Enacted	Estimate	Budget
National Science Foundation	1179	1176	1231
Health and Human Services	619	616	601
Education	507	528	685
NASA	127	164	121
Defense	132	142	117
Agriculture	89	90	83
Transportation	86	90	108
Energy	49	50	54
Commerce	35	35	22
Environmental Protection Agency	20	19	9
Nuclear Regulatory Commission	20	16	1
CNCS	14	14	15
Homeland Security	6	5	5
Interior	3	3	3
Smithsonian Institution	0	0	5
Total Federal STEM Education	2886	2948	3060