NASA Education 2008 Visitor Center Appropriation
Marshall Space Flight Center and the U.S. Space & Rocket Center

Abstract: NASA's Education program works to: foster a science, technology, engineering, and mathematics (STEM) workforce in fields that support NASA's strategic goals; attract students to the disciplines through a progression of education opportunities; and build strategic partnerships between formal and informal education providers.

Marshall Space Flight Center (MSFC) Academic Affairs Office (AAO) and the U.S. Space & Rocket Center (USSRC) propose to collaborate to provide relevant educational services and activities; included will be valuable education teaching tools, an informational exhibit on past and future space exploration initiatives, participation and personnel support at events (i.e.: National Folklife Festival and NASA 50th Anniversary functions), and the ability to develop staff and update infrastructure/exhibits/materials that will address one or more of the NASA Education Outcomes and align with NASA Education principles and National education standards.

Organizational Contacts:

Tammy B. Rowan
Manager Academic Affairs
Office of Human Capital
Marshall Space Flight Center
HS30, INT 500
Huntsville, AL 35812

Phone: 256-961-0954
FAX: 256-961-1521
tammy.rowan@nasa.gov

Jennifer Crozier
Executive Director
U.S. Space & Rocket Center Foundation
256-430-6702

Narrative: Marshall Space Flight Center and the U.S. Space & Rocket Center education offices will work closely to support one another on numerous events and education content development which will align with the NASA Education Outcomes and with NASA Education principles, and state or national standards/needs. We use Marshall's official NASA Visitor Center, the U.S. Space & Rocket Center (USSRC), as our primary facility for reaching our customers. The following information will identify each product, activity or project, training opportunity, staff professional development, or public outreach event affiliated with the proposal.

First, we intend to expand the reach to our informal audiences, professional development and student experiences, with a number of **educational products** which are of high value and interest to our customers:

“Great Nations Dare" Exploration Technologies Exhibit
Contract Administered by U.S. Space & Rocket Center
Contact: John Dumoulin
Marshall Space Flight Center
256.544.6541

“Great Nations Dare" Exploration Technologies Exhibit: “Great Nations Dare,” an interdisciplinary traveling exhibit, is about space exploration technologies. As a maze, however, it is also a physical object lesson in making choices and a hands-on experience that allows visitors to learn about how past, present and future civilizations used, use, and will use technologies to become great. NASA exhibit and artifact assets and subject expertise will be combined with those of the USSRC and their considerable marketing and operations capabilities to leverage NASA and USSRC education and outreach tools to reach museum audiences. The Maze development has been aligned to the National Standards for Geography, Technology, World History, History, and Social Studies for various grade levels and exhibit design has been beta-tested with students.

Project Goals: Approximately 20 percent of the 460 U.S. members of the Association of Science and Technology Centers, including museums, science centers, and planetariums, are members of NASA's Museum Alliance (MA). All members of the MA utilize NASA resources in their programs and/or exhibits. NASA's budget request reflects a reduction each year through FY 11. NASA's objective is to continue serving the same number of institutions, despite these funding reductions.

Outcomes and Measures:
Outcome 3.0: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA’s mission.
Outcome Measure: Percentage of museums and science centers that participate in NASA networks and that use NASA resources in programs and exhibits.

Project Accomplishments: The U.S. Space and Rocket Center has issued a Request for Proposal (RFP) of which two companies responded. They were both notified that the winner must pick up NASA's contributing hardware by April 3. However, the USSRC did not provide the following in the RFP: an opening date, a completion date or a delivery deadline schedule. The ambiguity has allowed the project to fall below other museum priorities. MSFC has twice informed the Alabama Space Science Exhibit Commission (ASSEC) Board of the project's slow progress. Meetings with the museum's Chief Operating Officer (COO) and ASSEC museum sub-committee chair have provided little results.

NASA Education Exhibit- NASA Window Shade
Purchase Order
Contact: Karla I. Miller, WILL Technology Inc.
Marshall Space Flight Center
256-544-5884
NASA Education Window Shade Exhibit: The development of a pop-up exhibit for use at public events and education conferences has become more a necessary requirement than in past years.

Because the USSRC and Marshall education teams have been proactive in developing relationships in the community and participate in numerous regional events within our 6-state K-12 and informal area of responsibility (i.e. Public Affairs events, State Fairs, Children's Expo Events, Career Expos, schools, etc), it was imperative that we design and build an exhibit that demonstrates the NASA Education infrastructure and categories of involvement.

Project Goals: Approximately 20 percent of the 460 U.S. members of the Association of Science and Technology Centers, including museums, science centers, and planetariums, are members of NASA's Museum Alliance (MA). All members of the MA utilize NASA resources in their programs and/or exhibits. NASA's budget request reflects a reduction each year through FY 11. NASA's objective is to continue serving the same number of institutions, despite these funding reductions.

Outcomes and Measures:
Outcome 3.0: Build strategic partnerships and linkages between STEM and informal education providers that promote STEM literacy and awareness of NASA's mission
Outcome Measure: The percentage of museums and science centers that participate in NASA networks and use NASA resources in programs and exhibits.

Project Accomplishments: Completed development of seven window shades for each of the six NASA Educator Resource Centers in Marshall's K-12/informal education service region and for the USSRC.

Student Launch/Moonbuggy Exhibit
Administered by NASA Office of Strategic Analysis and Communications
Contact: John Dumoulin
Marshall Space Flight Center
256.544.6541

Student Launch/Moonbuggy Exhibit: In conjunction with MSFC's Office of Strategic Analysis and Communications (OSAC), design and install a significant upgrade to the Student Launch/Moonbuggy exhibit at the USSRC that introduces an interactive component to engage museum visitors in NASA's suite of engineering design challenges for students. A key goal will be to create a richer educational experience in the STEM disciplines for K-12 students and their teachers. These engineering design challenges link hands-on engagement to high profile NASA content such as Ares projects and our lunar robotics missions.

Project Goals: A prerequisite to student achievement in STEM subjects is a high level of interest. Therefore, NASA's Student Launch and Moonbuggy projects are designed to take advantage of NASA's mission to enhance students' interest in aerospace-related, STEM subjects. Interest is measured by surveys of students conducted before and after participation in the NASA education project, event or activity. NOTE: This measure will report the percentage of students who report a post-participation increase in interest in science, technology, engineering, or mathematics.

Outcomes and Measures:

Outcome 2.0: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.
Outcome Measure: Level of student interest in science and technology careers resulting from elementary and secondary NASA education programs.

Project Accomplishments: OSAC has completed Phase I of this exhibit prior to the 2009 NASA Great Moonbuggy Race at the VIC and the exhibit was on display during the event. Phase II, which will use the remaining FY08 VC appropriation previously set aside for this project, will resume after the Race and is expected to be completed by the end of May 2009. Phase II includes a helmet-cam DVD, which was filmed during the Race.

Time for Courage Video
Administered by NASA Office of Strategic Analysis and Communications
Contact: John Dumoulin
Marshall Space Flight Center
256.544.6541

Time for Courage Video: In conjunction with MSFC's OSAC, produce a significant upgrade to the "Time for Courage" video used by MSFC and the USSRC. Captured footage from NASA's suite of engineering design challenges for students will create a richer educational video and experience for K-12 students and teachers who view and/or use the video. The plan is to feature high profile missions such as Ares projects, lunar robotics, and others.

Project Goals: Equip [informal] educators with skills/knowledge to attract and retain students in STEM disciplines. Note: Targets reflect a percentage step increase from baseline (FY07 Actuals).

Outcomes and Measures:
Outcome 2.0: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.
Outcome Measure: Percentage increase in number of elementary and secondary student participants in NASA instructional and enrichment activities.

Project Accomplishments: The Time for Courage video was completed in mid-January and is currently running in the VIC. Additional copies were provided to Marshall's Academic Affairs' and USSRC's offices.

Pathfinder Exhibit Repairs
Grant Administered by U.S. Space & Rocket Center
Project Manager Jennifer Crozier
Marshall Space Flight Center
256.430.6702

Pathfinder Exhibit Repairs: The Pathfinder Shuttle Exhibit has been outdoors in Rocket Park for more than 16 years. Due to the constant exposure to the elements the Shuttle had deteriorated to a point where a large section of the body had fallen off and other sections were in imminent

danger of coming off. The scope of work for this project was to repair and restore the Shuttle Exhibit to like-new condition. This involved fabricating and installing sections of the Shuttle that were damaged or deteriorating as well as painting and sealing it.

Project Goals: The goal of restoring the Pathfinder Shuttle Exhibit was to once again be able to use the exhibit as an educational component of classroom field trips and SPACE CAMP. Many components and simulations of the Space Shuttle are used in the educational programs at the Space & Rocket Center so being able to view the full scale Shuttle is vital to the authenticity of the overall experience.

Outcomes and Measures: (outcome 3/measure 2)
Outcome 3.0: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.
Outcome Measure: Percentage increase in number of elementary and secondary student participants in NASA instructional and enrichment activities.

Project Accomplishments: The repairs have been made to the Pathfinder. They were begun in June 2008 and completed by July 2008.

Project Contributions: The U.S. Space and Rocket Center has over 500,000 visitors each year that are able to view the restored Pathfinder.

Project Improvements: Several improvements were made to the infrastructure of the Pathfinder. Also painting of the entire orbiter was completed as part of the restoration.

The next component of the shared endeavor between USSRC and MSFC Education teams is to provide the resources and staffing in the development or redesign of critical education content or support materials for curriculum development.

Teacher/Student Workshop Videoconferencing Equipment and Materials
Purchase Order with U.S. Space and Rocket Center
Contact: Jeff Ehmen
Academic Affairs Office
Marshall Space Flight Center
256-961-1567

Teacher/Student Workshop Videoconferencing Equipment and Materials:
Both the USSRC and the MSFC Educator Resource Center (ERC) provide workshops to students and teachers. An important part of these workshops is demonstrating STEM concepts with unique NASA mission materials. Digital Learning Network (DLN) videoconferencing equipment and educational materials purchased in this activity will be available to both organizations to utilize as needed. The DLN makes it possible to bring NASA and USSRC unique facilities, equipment, and employees to traditionally underserved populations. Items purchased will enhance both formal and informal workshops and demonstrations of NASA missions such as the Ares projects, lunar robotics, Hubble servicing, ISS construction, etc. The age-appropriate education kits can also be used by NASA employees when they visit school groups.

Project Goals:
Equip educators with context-rich resources to support curricular needs and STEM standards; used to inspire student interest in STEM disciplines and careers. The percentage of the educators who use these resources is an important measure of their utility, effectiveness, and relevance.

Outcomes and Measures:
Outcome 2: Percentage of elementary and secondary educators who obtain NASA content-based education resources or participate in short-duration education activities and use NASA resources in their classroom instruction.

Project Accomplishments:
Equipment required has been identified. Room modifications will be required to create a second broadcast area in the ERC area. A rough order of magnitude estimate has been provided by the USSRC for building modifications. Detailed building modification plans are not complete.

Project Contributions:
Project has yet to be implemented.

Project Improvements:
MSFC is examining how equipment can be used to also expand DLN offerings when the MSFC DLN studio is saturated.

NASA Lunar/ Meteorite Certification/ Loan
Grant Administered by U.S. Space & Rocket Center
Katrine Balch
256.721.7151

NASA Lunar/ Meteorite Certification/ Loan: USSRC and MSFC education staff to periodically conduct Lunar/Meteorite Certification Workshops. Workshops are open to all K-12 educators, college instructors, museums and planetariums for educational purposes. USSRC will be responsible for tracking authorized borrowers, scheduling loans and disk storage, mailing and handling.

Project Goals:

- Provide MSFC region educators, lunar and meteorite professional development opportunities
- Establish a procedures for tracking authorized borrowers
- Establish procedures and infrastructure for scheduling loans, storage, mailing, and handling.
- Provide NASA content and samples to MSFC region.

Outcomes and Measures:
Outcome 2.0: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.

Outcome Measure: Percentage of elementary and secondary educators using NASA content-based STEM resources in the classroom.

Project Accomplishments: The samples were delivered to the U.S. Space & Rocket Center on January 23, 2009. Phone calls and meetings began being held in early February with Goddard and MSFC to establish procedures and forms to be used for the loan program. All paperwork was completed and approved by MSFC in early March 2009. USSRC began to send email announcements to certified educators in the MSFC region to let them know about the changes to the loan program. Infrastructure has been put in place, and project was to begin implementation in April 2009. On April 3, 2009, USSRC was notified that NASA Headquarters had requested all samples be returned to Johnson Space Center to have a centralized loan program. The loan samples will be picked up on April 22, 2009. USSRC will continue to manage disk sets for AAO and USSRC education staff use.

Project Contributions: Since this is a new program at MSFC/ USSRC, there is not yet data or measures to report.

Project Improvements: Through the discussions with MSFC and Goddard a system was established that would work with both USSRC needs and MSFC. Since all forms and procedures had to be created it is to be expected that improvements and tweaks will be made when the full procedures are up and running. Both MSFC and Goddard have been extremely helpful in providing information and feedback.

Project Partners: For the project moving forward, the only anticipated partner is the U.S. Space and Rocket Center and MSFC. Other partnership might be established as the program gets fully operational.

Educator Resource Center Labor/Travel/Professional Development Conference
Contract with WILL Technology Inc., and Purchase Order with U.S. Space and Rocket Center
Contact: Jeff Ehmen
Academic Affairs Office
Marshall Space Flight Center
256-961-1567

Educator Resource Center Labor/Travel/Professional Development Conference
This cross-cutting element will provide contractor support to oversee the implementation of each activity proposed and be responsible for ensuring evaluation data is planned/collected and aggregated. Work will be done under the direction of the MSFC Education Technology & Products Lead in Academic Affairs. Additionally, this item will support the continued development of USSRC and ERC staff in the K-12 and informal 6-state service region. There are a few opportunities annually that provide invaluable experiences for our staff to become knowledgeable or updated on space exploration content. In order for our local workshops to have accurate information and for our staff to update content for our support materials, we feel it absolutely necessary to provide our staff with appropriate professional development experiences. By enhancing their knowledge, the content they deliver will be of even greater value to our

workshop attendees. This will include attendance at National conferences and training related to Hubble, working on the moon (spacesuits, nutrition, etc.), lunar missions, and others.

Project Goals:
Explanation: Result in deeper content understanding and confidence in teaching STEM disciplines. The percentage of the educators who use these resources is an important measure of their utility, effectiveness, and relevance

Outcomes and Measures:
Outcome 2: Percentage of elementary and secondary educators who obtain NASA content-based education resources or participate in short-duration education activities and use NASA resources in their classroom instruction.

Project Accomplishments:
The MSFC Educator Resource Center and the USSRC Education Department hosted a meeting for staff of the regional Educator Resource Centers in the six-state MSFC education service region on October 8 and 9. Eight staff members attended. The meeting combined best business practices discussions as well as learning opportunities on new NASA education products, materials, and MSFC-managed missions. Conference training for ERC staff was not pursued due to the congressionally directed restrictions on conference attendance. ERC staff expanded offerings to area education organizations such as the Sci-Quest children's science center. ERC staff visit Sci-Quest to conduct educator training as a way to expand the services to teachers.

Project Contributions:
Educator feedback and participation numbers are pending report development capabilities on the NASA Education Performance Measurement system.

Project Improvements:
The MSFC ERC staff and USSRC staff continue to look for collaborative opportunities to take advantage of the audiences that visit the USSRC.

The USSRC and MSFC education teams have numerous opportunities to support one another during **conferences and events** examples include:

Folklife Festival
Administered by: WILL Technology, Inc.
Robotics: Cheryl Guilbeau, 256-961-0248
Moonbuggy: Durlean Bradford, 256-961-1335

Folklife Festival: The theme of the 2008 Smithsonian Folklife Festival was *NASA: Fifty Years and Beyond.* The event showcased the role that the men and women of NASA have played in broadening the horizons of American science and culture, as well as the role that they will continue to play in helping to shape the future by stirring the public imagination.

The NASA program at the Festival included living presentations, hands-on educational activities, demonstrations of skills, techniques, and knowledge, narrative "oral history" sessions, and

exhibits that explored the spirit of innovation, discovery, and service embodied by the agency and its personnel. The Festival program encouraged visitors to participate actively—to ask questions of astronomers, astronauts, astrophysicists, educators, engineers, and other experts: a cross-section of NASA's 18,000 employees and 40,000 contractors and grantees. Visitors came away from the Festival with a better understanding and appreciation of NASA's history and mission through a celebration of the people whose knowledge has made those achievements possible.

The 2008 Folklife Festival provided NASA the opportunity during our 50th Anniversary year to promote our mission activities and to present the heritage of our scientists, engineers, astronauts and craftspeople to a huge, ethnically diverse audience. NASA was the featured Federal Government Agency for festival.

Marshall Space Flight Center supported Academic Affairs Office Education Specialists and Moonbuggy and FIRST Robotics' Team members/teachers to staff the event and to ship their moonbuggy to the event. Moonbuggy activities included members/teachers demonstrating the moonbuggy course. Robotics activities included team members/ teachers leading children in hands-on VEX robot activities. During the Moonbuggy and Robotics activities, team members/teachers inspired/engaged children with their individual/team story and work with NASA engineers.

Project Goals: Visitors to gain a better understanding and appreciation of NASA's history and mission through the celebration of people whose knowledge has made those achievements possible.
Folklife Education Goals: Visitors to learn more about NASA through hands-on, family friendly activities.

Moonbuggy and Robotics Alliance Project Goals:

- To increase the number of elementary and secondary student participants in NASA instructional and enrichment activities.
- To increase student interest in STEM careers.

Outcomes and Measures: (Outcome 2/Measure 3?)
Outcome 2.0: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.
Outcome Measure: Number of museums and science centers across the country that actively engage the public in major NASA events.

Project Accomplishments:

- 92.5%; 970 of participant surveys reported that activities helped them understand the work that NASA employees do.
- Most visitors reported that they liked hands-on activities as a "best activity;" specifically stating robots as one of the activities.
- Pearson product correlation indicated the strongest relationship between: NASA programs/activities helping them understand the work that NASA employees do and

NASA programs/activities giving them a better understanding of the skills needed to work at NASA.

Space Camp Tuition for MSFC's Teachers of the Year
For International Space Camp
Administered by U.S. Space & Rocket Center
Grant and Cooperative Agreement
Katrine Balch
256.721.7151

Space Camp Tuition for MSFC's Teachers of the Year: USSRC and MSFC have historically collaborated to host the nation's Teachers of the Year and provide them with a unique educational experience. Participating annually are U.S. teachers -- including National Teacher of the Year -- and educators from other countries. While attending Space Camp, the educators participate in simulated Space Shuttle and International Space Station missions, train on a variety of astronaut simulators and attend workshops to learn innovative hands-on techniques for teaching students about NASA's space program.

Educators also attend a series of lectures and labs provided by MSFC, the University of Alabama in Huntsville, meet members of the local aerospace community and tour Marshall.

Project Goals: Provide the Teachers of the Year, first hand exposure to NASA and MSFC resources.

Outcomes and Measures:
Outcome 2.0: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.
Outcome Measure: Percentage of elementary and secondary educators who participate in NASA training programs who use NASA resources in their classroom instruction.

This project benefits all three outcomes.

Project Accomplishments: The six educators have been selected from their states and will be attending the program July 25 – Aug 1, 2009. Speakers and events for the International Space Camp are in the scheduling phase. Speakers will be from NASA, MSFC and others from around the country to highlight what is new in STEM education.

Project Contributions: There will be six teachers participating from MSFC, included along with the other 80 participants.

Project Improvements: A special luncheon will be held during the week to introduce the senior management at MSFC and highlight MSFC contributions to NASA. We are working with MSFC education contacts to arrange the presenters/ agenda for this event. The meal is not sponsored by NASA, it is part of the educators program.

Project Partners: There are several sponsors for International Space Camp. Each plays a role in either funding tuition, travel, or special events. Sponsors include, Toyota Motor Manufacturing, ING, Chief Council of School State Officers, Coca-Cola, and U.S. Space & Rocket Center along with NASA.

Proposed Allocation of Visitor Center Funds from FY08 Budget			
	NASA Education Portion of Visitor Center Funds	**USSRC Portion of Visitor Center Funds**	
NASA's 50th Folk Life Festival - Great Moon Buggy	$5,800.00		
USSRC Education staff travel/participation in NASA-Sponsored ERC professional Development Workshop		previous funding request redirected in this proposal per USSRC	
USSRC Education staff, in coordination with MSFC Academic Affairs conducts Workshops for Educators		previous funding request redirected in this proposal per USSRC	
USSRC/ERC Workshop calendar and other printed materials to support workshops	$5,000.00	previous funding request redirected in this proposal per USSRC	
USSRC Education staff reinstates NASA Lunar Sample Education activities		$2,500.00	
Space Camp Tuition for TN, AL, AR, LA, MO and IA State teachers of the year		$4,200.00	
Great Nations Dare traveling exhibit completion		$69,000.00	
NASA Education windshield/pop-up exhibits for USSRC Education and ERC	$2,000.00		
Development and production of age appropriate education kits for use by USSRC Education and ERC Staff	$6,000.00	previous funding request redirected in this proposal per USSRC	
Upgrade Student Launch Initiative/Moonbuggy Engineering Design challenges	$21,000.00		
USSRC/MSFC ERC staff host the MSFC Regional Educator Resource Center Network Conference		$18,000.00	
Upgrade Existing "Time for Courage" video	$6,000.00		
ERC Salaries and MSFC ERC/DLN-USSRC Lease payment FY09	$155,000.00	$33,000.00	
Upgrade ERC videoconferencing system to add second stage	$22,000.00		
Pathfinder Exhibit (emergency repairs)		$180,500.00	
Total Appropriation	**$222,800.00**	**$307,200.00**	**$530,000.00**