

National Aeronautics and Space Administration



Explanatory Guide to the NASA Science Mission Directorate Education & Public Outreach Evaluation Factors

Version 3.1
November 2010

The most current version of this document can be downloaded at
<http://nasascience.nasa.gov/researchers/education-public-outreach/explanatory-guide-to-smd-e-po-evaluation-factors>

If you have comments or questions, please send email to
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Change History

<p>October 2006 Version 1.0</p>	<p><i>Explanatory Guide To The NASA Science Mission Directorate Education & Public Outreach Evaluation Factors</i> was released. It is based on update of the <i>Explanatory Guide To The Office Of Space Science Education & Public Outreach Evaluation Factors Version 3.0, (March 2004)</i> to account for the merger of the Office of Space Science and the Office of Education. Changes from the OSS Guide were to replace Office of Space Science with Science Mission Directorate throughout the text, to insert Earth science in places where only space science had been cited, update URLs, and to add reference materials from the Earth Science program.</p>
<p>December 2006 Version 2.0</p>	<p>Updated the Explanatory Guide To The NASA Science Mission Directorate Education & Public Outreach Evaluation Factors to Version 2.0. Evaluation Criteria were updated to align the evaluation factors with education policies as of December 2006. Additional Frequently Asked Questions were added.]</p>
<p>April 2008 Version 3.0</p>	<p>Deleted references to Broker/Facilitators and supplemental E/PO awards throughout. Added detail on Outreach goals. Clarified language in Evaluation Factors concerning linkage to SMD Science and target audience needs. Revised FAQ 13 to include discussion of “Continuity” Factor. Added links to new projects. Revised/deleted outdated links.</p>
<p>November 2010 Version 3.1</p>	<p>Updates to Glossary and Evaluation Factors to discuss compliance with laws concerning use of human subjects and data collection instruments. Clarification on acceptability of foreign travel and promotional items. Updated information on Forums. Renumbered FAQ and Revised Evaluation</p>

	Form in Appendix F. Revised /deleted outdated links. Renamed “Continuity” – “Connection to NASA E/PO”
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Preface

NASA's founding legislation, the Space Act of 1958, directs the Agency to expand human knowledge of Earth and space phenomena and to preserve the role of the United States as a leader in aeronautics, space science, and technology. High achievement in STEM education is essential to the accomplishment of NASA's mission. The NASA Science Mission Directorate has a portfolio of investments in Higher Education, Elementary and Secondary Education, Informal Education, and Outreach. It is a major contributor to the overall NASA education and outreach effort.

NASA continues the Agency's tradition of investing in the Nation's education programs and supporting the country's educators who play a key role in preparing, inspiring, exciting, encouraging, and nurturing the young minds of today who will manage and lead the Nation's laboratories and research centers of tomorrow.

In 2006 and beyond, NASA will pursue three major education goals:

- Strengthen NASA and the Nation's future workforce—NASA will identify and develop the critical skills and capabilities needed to ensure achievement of the Vision for Space Exploration. To help meet this demand, NASA will continue contributing to the development of the Nation's science, technology, engineering, and mathematics (STEM) workforce of the future through a diverse portfolio of education initiatives that target America's students at all levels, especially those in traditionally underserved and underrepresented communities.
- Attract and retain students in STEM disciplines—NASA will focus on engaging and retaining students in STEM education programs to encourage their pursuit of educational disciplines and careers critical to NASA's future engineering, scientific, and technical missions.
- Engage Americans in NASA's mission—NASA will build strategic partnerships and linkages between STEM formal and informal education providers. Through hands-on, interactive educational activities, NASA will engage students, educators, families, the general public, and all Agency stakeholders to increase Americans' science and technology literacy.

NASA delivers a comprehensive Agency education portfolio implemented by the Office of Education, the Mission Directorates, and the NASA Centers. Through the portfolio, NASA contributes to our Nation's efforts in achieving excellence in STEM education. The NASA Science Mission Directorate is a major contributor to the overall NASA education and outreach effort. The Directorate's Education and Public Outreach (E/PO) efforts are rooted in the efforts of its predecessor organizations, the Office of Space Science and the Office of Earth Science, that were merged in 2004 to become the Science Mission Directorate.

Three Outcomes serve to align all Agency education activities:

Outcome 1: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals through a portfolio of investments.

Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.

Outcome 3: Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA’s mission.

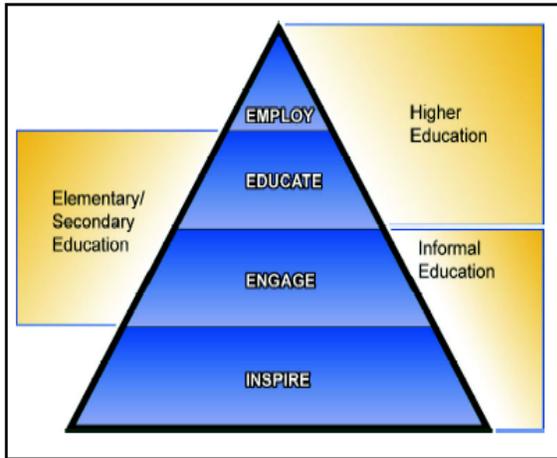


Figure 1

The Education Strategic Framework depicted in Figure 1 provides a conceptual basis for examining, guiding, and coordinating the NASA education portfolio.

The Education Strategic Framework is a strategic management tool that allows the Agency to monitor participant movement through education activities, with each category leading to the next. Education programs and projects draw from the category below them – as a key source for participants – and they connect participants to the category above them – providing a more experienced and focused group and creating a measurable pipeline. If a

participant’s imagination is captured by an inspirational activity, it will be far easier to interest that individual in more interactive engagement activities. As that individual becomes more engaged, he or she may search for opportunities to learn and eventually become employed in the aerospace industry - either in the private or public sector (e.g., NASA). Student opportunities at NASA include internships, scholarship programs, and student education employment programs (e.g., cooperative education). No matter where the individual decides to pursue their career, the goal is to direct a subset of the original audience through the pipeline to pursue a career in science, technology, engineering, or mathematics while drawing in new participants along the way.

In addition to education, outreach is an essential aspect of the SMD program. It directly connects to many aspects of NASA Public Affairs and NASA education efforts. It often provides an inspirational spark for participants to seek out education opportunities. The SMD Outreach Goal is to stimulate interest in science, engineering, and technology relevant to NASA SMD. Outreach can be directed at any audience including students, teachers, citizen scientists, and the general public.

The Evaluation Factors discussed in this guide are the means by which NASA SMD evaluates its education and outreach investments. They guide investigators in aligning their proposed efforts with the goals and objectives of NASA and SMD education and outreach. These Factors serve as the basis for evaluating proposed E/PO activities. It is vital that everyone concerned (i.e., proposers, E/PO partners and facilitators, reviewers) have a common understanding of what these factors mean in practice. This Explanatory Guide to the SMD E/PO Evaluation Factors is intended to support the development of such a common understanding. The Guide provides a brief elaboration of each of the SMD E/PO Evaluation Factors. These descriptions include references to pertinent information in the next section of

the Guide that addresses Frequently Asked Questions (FAQ), and they also include "Indicators" that may be used by both proposers and reviewers to assess how well an E/PO proposal segment meets the Evaluation Factors.

The Guide provides answers to questions frequently asked (FAQ) by members of the NASA SMD science community who are preparing an E/PO segment to an SMD proposal.

The information contained in this document is intended to give a flavor of what exemplary E/PO can be rather than a prescription for what to do. It is based on experience to date and thus the contents of the Guide will evolve over time with regular updates. For the latest version, please link to

<http://nasascience.nasa.gov/researchers/education-public-outreach/explanatory-guide-to-smd-e-po-evaluation-factors>

If you have comments or questions, please send E-mail to

HQ-SMD-ROSES-EPO@hq.nasa.gov

Glossary

- A. STEM – The disciplines associated with Science, Technology, Engineering, and Mathematics.
- B. NASA Education Program – NASA has established five overarching Education program areas under which NASA education efforts are undertaken. These are 1) Higher Education; 2) Elementary & Secondary Education; 3) Informal Education; 4) Minority Programs; and 5) e-Education.

Higher Education projects – beneficiaries are college/university faculty, undergraduate, graduate students, or postdoctoral researchers.

Elementary & Secondary Education projects – beneficiaries are educators and/or Kindergarten through grade 12 students.

Informal Education projects – beneficiaries may be of any age.

- C. Science Mission Directorate Education Project –The Science Mission Directorate has 10 education projects. These projects reflect ongoing SMD contributions to the NASA Education program.

The four SMD Higher Education projects are:

- (1) Early Career Scientists & Pre-Service Faculty Development
- (2) Research Experiences for Students Underrepresented in Earth and Space Science
- (3) Earth and Space Science Student Collaborations
- (4) Earth and Space Science Resources for Higher Education

The three SMD Elementary and Secondary Education projects are:

- (1) Earth and Space Science: Building Elementary and Secondary Teacher Skills
- (2) Earth and Space Science: Elementary and Secondary Resources
- (3) Earth and Space Science: Elementary and Secondary Student Opportunities

The three SMD Informal Education projects are:

- (1) Earth & Space Science: Informal Education Resources
- (2) Earth & Space Science: Building Informal Educator Skills
- (3) Earth & Space Science: Informal Education Opportunities

- D. Public Outreach – A term used to identify activities and projects whose intent is to raise awareness of, or interest in, NASA, its goals, missions and/or programs, and to develop an appreciation for and exposure to science, technology, research and exploration. The term is usually associated with outreach to the public but may also be used in relationship to activities targeting specific groups/individuals such as those underserved and underrepresented in the scientific, engineering, technology, and mathematics professions. It also includes efforts to engage members of these professions in NASA education and outreach efforts such as training of scientists and engineers in effective techniques for conducting education and outreach. *SMD has four Outreach Projects:*

- (1) Outreach: STEM Careers Opportunities for SMD
- (2) Outreach: Public Understanding of SMD STEM
- (3) Outreach: SMD Opportunities for Citizens Scientists
- (4) Outreach: Public Engagement in STEM Education

- E. Science Mission Directorate Education Project Activity – an Education Project Activity is an identifiable component contributing to at least one of the ten Science Mission Directorate Education Projects.
- F. Science Mission Directorate Outreach Project Activity – an Outreach Project Activity is an identifiable component contributing to at least one of the four Science Mission Directorate Outreach Projects.
- G. NASA Research Announcement (NRA) – An NRA is used to announce research interests in support of NASA's programs, and, after peer or scientific review using factors in the NRA, select proposals for funding. Unlike an RFP containing a statement of work or specification to which offerors are to respond, an NRA provides for the submission of competitive project ideas, conceived by the offerors, in one or more program areas of interest. NRAs may result in grants, contracts or cooperative agreements.
- H. Announcements of Opportunity (AO) - This is generally used to solicit proposals for unique, high cost research investigation opportunities that typically involve flying experimental hardware provided by the proposer on one of NASA's Earth-orbiting or free-flying space flight missions. Selections through AO's can be for periods of many years, involve budgets of many millions of dollars for the largest programs, and usually are awarded through contracts, even for non-profit organizations, although occasionally grants are also used.
- I. TCMCO Panel – A group of highly qualified subject area experts utilized by NASA to evaluate the Technical, Cost, Management, and Other Factors associated with major flight mission projects.

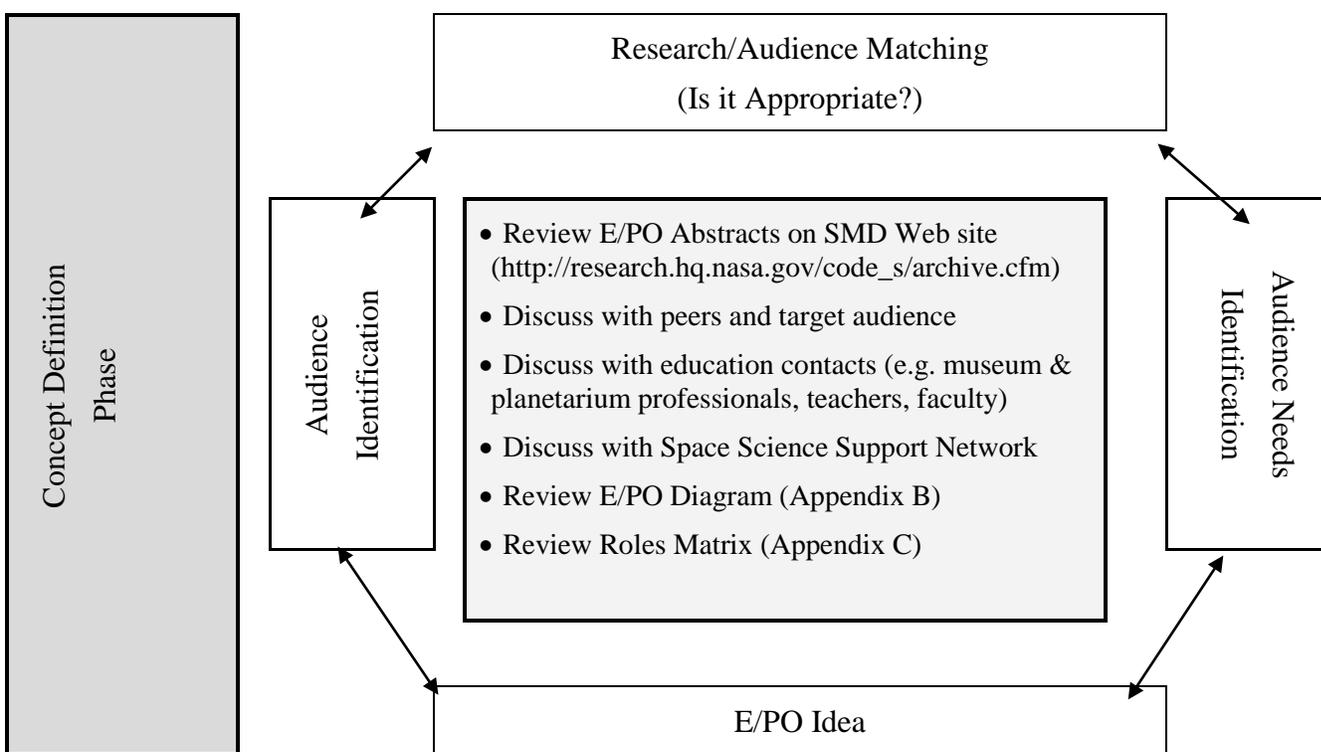
Quick Start Help

Developing a Science Mission Directorate (SMD) Education and Outreach (E/PO) proposal for the first time is a significant undertaking. Getting started in E/PO is fairly straight forward – you need an E/PO idea that the SMD E/PO program can fund, you need a team of people with the expertise to carry the idea out, and you need to write it all down in a concise proposal.

SMD recognizes that many researchers are not experts in education and public outreach and has prepared this Explanatory Guide to help them understand what SMD is looking for in a proposal, suggest roles and ideas that they might consider, resources they can consult, and provided a network of people (the Science E/PO Forums – see FAQs 5-7) around the country to assist them.

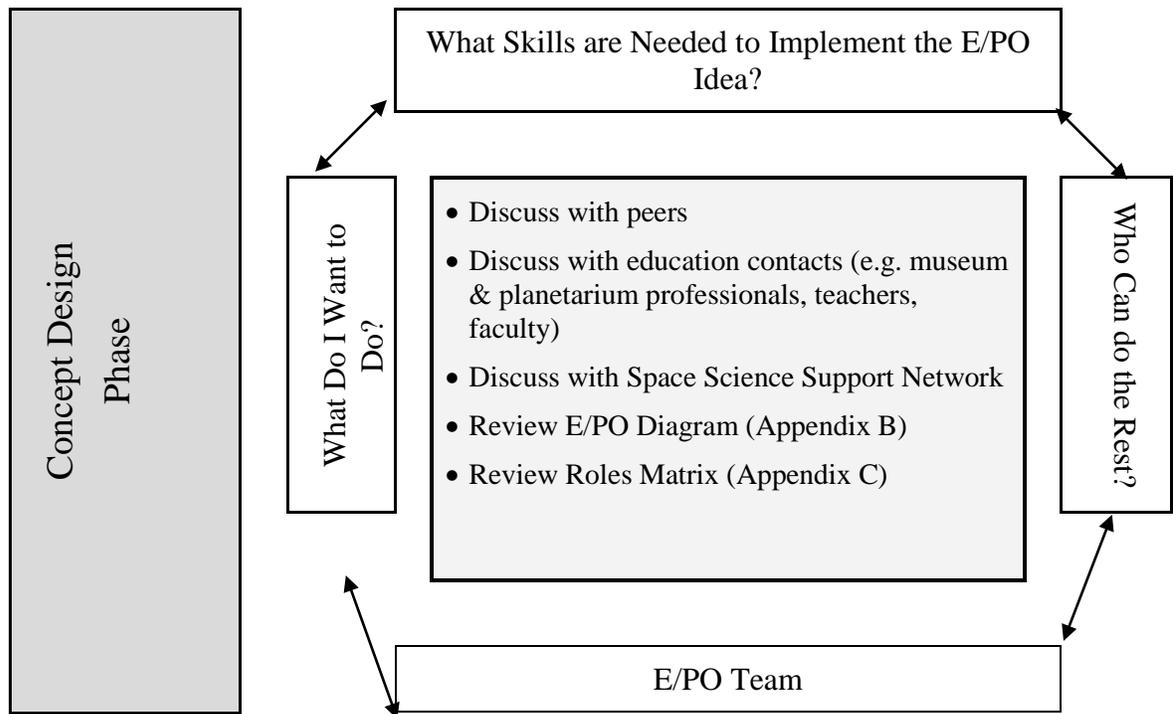
Step 1: Review the SMD E/PO Evaluation Factors (Section 1 of Guide). Understand what types of E/PO ideas can be funded by the SMD E/PO program.

Step 2: Generate an E/PO idea—this is usually an iterative process of identifying potential audiences and their needs and matching them against the science you are doing.



Step 3: Review the SMD E/PO Indicators of Alignment (Section 2 of Guide) and FAQs. Understand the details of SMD E/PO projects/activities and what the review panel will be looking for.

Step 4: Put Together Your E/PO Team—this is usually an iterative process to evaluate the skills needed for the project and then to identify who has them. Budget considerations can come into play.

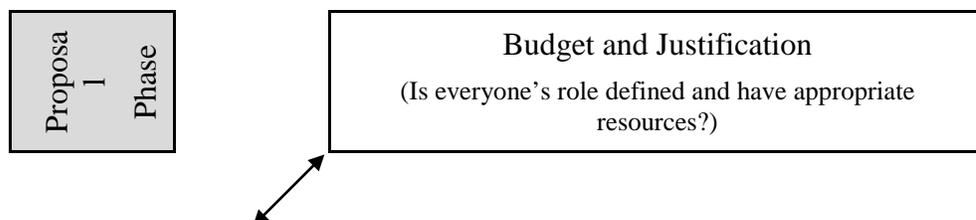


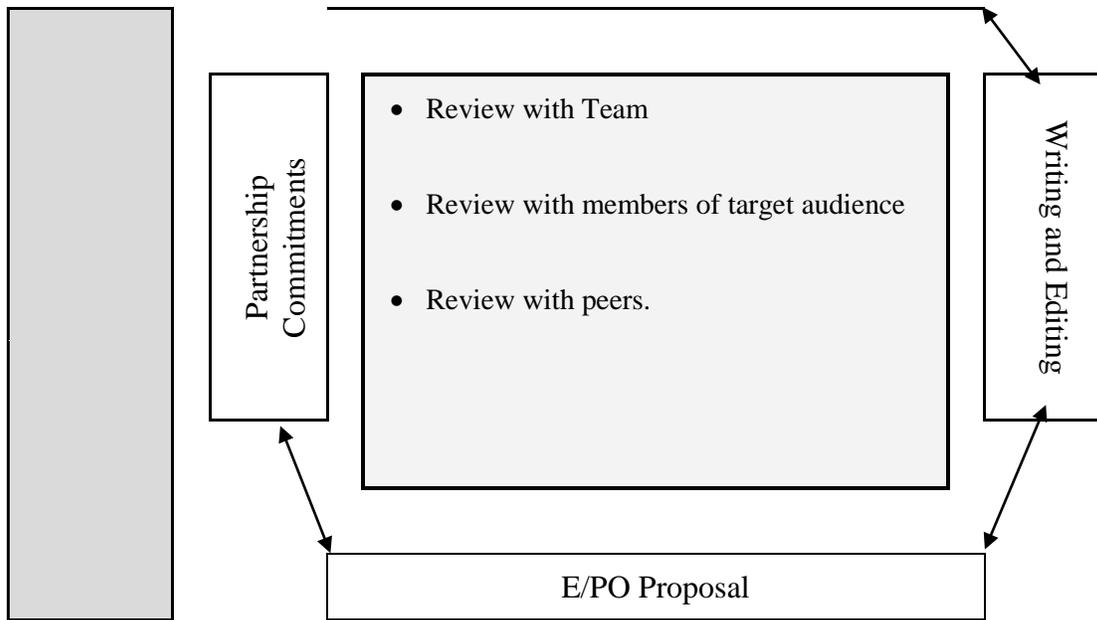
Don't overlook program evaluation—Evaluation should be geared to the scale and type of a proposed E/PO effort. Smaller E/PO activities, such as those responding to an NRA, might use simple, informal, or very specific evaluation methods like pre- and post-tests, questionnaires, or a focus group. The person doing the evaluation should be knowledgeable in the use of the selected evaluation approach. Space Science E/PO Support Network members can assist in identifying potential reviews.

The Space Telescope Science Institute IDEAS program provides an excellent primer on evaluation that is relevant to NASA SMD E/PO programs. The URL is: <http://ideas.stsci.edu/Evaluation.shtml>

Step 5: “Sanity Check” – discuss your E/PO Idea and Partners with a representative of the target audience and/or the Space Science Support Network.

Step 6: Prepare Your Proposal—this is usually an iterative process between the team members. Reviews by the target audience can help clarify goals and objectives. They can also help ensure that sufficient detail is provided for reviewers who may be unfamiliar with the science or particular approach to implementing the E/PO project/activity.





Step 7: The Review Process

To ensure quality and consistency in the review process, review panels for the E/PO segment include both educators and researchers.

The process of handling E/PO proposal segments follows the known best and fair practices for proposal review in current use throughout SMD. (See the *Guidebook for Proposers Responding to NASA Research Announcements, Appendix C*, which is available at [http://www.hq.nasa.gov/office/procurement/nraguidebook/.](http://www.hq.nasa.gov/office/procurement/nraguidebook/))

The panel reviews are conveyed to proposers along with the funding decision.

E/PO projects/activities proposed to the Science Mission Directorate are required to make a valuable contribution to Higher Education, Elementary/Secondary Education, Informal Education and/or Public Outreach.

SMD E/PO Evaluation Factors

The principal elements considered in evaluating an E/PO proposal are its intrinsic merit, relevance to NASA's objectives, and its cost. **The failure of a proposal to be rated highly in any one of these elements is sufficient cause for the E/PO proposal to be declined.**

[Intrinsic Merit and Relevance are equally weighted and approximately twice that of Cost. NASA also has a strong interest and commitment to meeting the needs of underserved and underrepresented groups in STEM. As part of this commitment SMD will use the program balance factors in selecting among EPO proposals of essentially equivalent overall rating based on Intrinsic Merit, Relevance, and Cost Factors noted above.]

Sub-factors indicate areas of evaluation where strengths and weaknesses will be identified. The collection of strengths/weaknesses under each principal element will determine the rating for that principal element.

Intrinsic Merit

1. Quality, Scope, Realism, and Appropriateness: Projects and activities have a clear intellectual linkage to SMD science/technology and the science/technology of any associated research effort, are clearly organized, consistent with the requested budget, have clear lines of management responsibilities, and demonstrate a high probability for successful implementation.

2. Connections to Other NASA E/PO Activities: Projects and activities draw from audiences that have demonstrated interest in NASA and connect participants to the next level of engagement.

3. Partnerships/Sustainability: Projects and activities leverage and achieve sustainability through their intrinsic design and the involvement of appropriate local, regional, and/or national partners in their design, development, or dissemination. As appropriate, key aspects of projects and activities are replicable, scalable, and demonstrate potential for continuation beyond the period of direct NASA funding.

Science Mission Directorate E/PO projects/activities require the active involvement and participation partners with appropriate expertise.

4. Evaluation: Projects and activities document their intended outcomes and use metrics to demonstrate progress toward and achievement of these outcomes and annual performance goals. Evaluation methodology is based on reputable models and techniques appropriate to the content and scale of the targeted activity, product, or project.

Relevance to NASA's Objectives

5. Customer Needs Focus: Projects/activities have been designed to respond to a need identified by the education community, a customer, or a customer group.

6. Content: Projects and activities use NASA content, people or facilities to involve educators, students, and/or the public in NASA science, technology, engineering, and/or mathematics.

Proposals that include Elementary/Secondary education must demonstrate alignment with appropriate educational standards.

Cost

7. Resource Utilization—The adequacy, reasonableness, and realism of the proposed budget including demonstration of effective use of funds.

Program Balance Factors

8. Pipeline: Through the use of NASA Earth and space science, projects/activities/products make a demonstrable contribution to attracting diverse populations to careers in science, technology, engineering, and mathematics (STEM).

9. Diversity: Through the use of NASA Earth and space science, projects/activities/products reach identified targeted groups. They contribute to the involvement, broad understanding, and/or training of underserved and/or underutilized groups in science, technology, engineering, and mathematics (STEM).

Indicators of Alignment with the SMD E/PO Evaluation Factors

To aid proposers in the preparation of their proposals, as well as to ensure that reviews are carried out on a consistent basis aligned with the NASA Education Goals and SMD implementation, this section offers further elaboration of each of the Evaluation Factors. Note that although creativity and innovation are certainly encouraged where appropriate, the factors do not focus on the originality of the proposed effort. This is a fundamental departure from standard scientific review factors and allows Earth and space scientists to become actively involved in the kinds of education and public outreach activities that have already proven to be meaningful, effective, and credible.

INTRINSIC MERIT

1. Quality, Scope, Realism, and Appropriateness: Projects and activities have a clear intellectual linkage to SMD science/technology and the science/technology of any associated research effort, are clearly organized, consistent with the requested budget, have clear lines of management responsibilities, and demonstrate a high probability for successful implementation. Indicators of alignment include:

- Project objectives are clearly and succinctly described. Project activities clearly flow from the goals and objectives.
- There is a clear intellectual linkage between the E/PO project (objectives and proposed activities) and SMD science and the science of any associated research efforts. (see [FAQ 8](#))
- Essential information about each proposed E/PO activity and product is provided (e.g., who, what, when, where, why, how).
- E/PO project implementation is feasible and appropriate for the specified intended audiences.
- The E/PO project management is clearly defined with clear lines of authority. Areas of responsibility are defined and specified. All key personnel (including the E/PO lead for AOs) are identified and have institutional authorization ([FAQ 22](#), [24](#)) to participate.
 - One or more science/research team members are directly involved in overseeing the proposed E/PO project (see [FAQ 20](#)).
 - One or more science/research team members are directly involved in meaningful and appropriate E/PO roles in addition to oversight (see [Appendix C](#)). [Active involvement of scientists and /or researchers is required on SMD E/PO projects]
 - Members of the target audience are actively involved in the design and execution of the project.
- There is a schedule and/or timeline for proposed E/PO activities or other clear indication of how E/PO activities will be phased (with appropriate mission milestones in the case of AOs) that is clearly aligned to the budget request.

- There are clear plans for dissemination of the product(s) or results of the project/activities.

2. Connections to Other NASA E/PO Activities: Projects and activities draw from audiences that have demonstrated interest in NASA and connect participants to the next level of engagement.

Indicators of alignment include:

- Methods are identified that will draw project participants from other NASA educational and/or outreach opportunities.
- Methods are identified that will connect project participants to other NASA educational and/or outreach opportunities.

3. Partnerships/Sustainability: Projects and activities leverage and achieve sustainability through their intrinsic design and the involvement of appropriate local, regional, and/or national partners in their design, development, or dissemination. As appropriate, key aspects of projects and activities are replicable, scalable, and demonstrate potential for continuation beyond the period of direct NASA funding.

Active involvement of appropriate and qualified partners is required for Science Mission Directorate E/PO projects/activities.

Indicators of committed, qualified, and capable partnerships include:

- There are well-defined roles and specific tasks that are substantively related to the design, development, dissemination, implementation, or evaluation of E/PO activities and/or products for the E/PO partners and members of the Earth and/or space science community that are sufficient to ensure successful program implementation (see [FAQ 20](#), [21](#)).
- E/PO partners are specifically identified; letters of partnership intent, specific support, or other evidence of partnership is included or attached to the proposal. [Given space restrictions in AO proposals, this evidence may be included in the text of commitment/support letters or in a brief summary of support letters.]
- The proposal clearly defines the terms of the partnership and the nature of the collaboration between researchers and partnering E/PO organizations or individuals is clearly stated. ([See FAQ 23](#)).
- The proposal clearly demonstrates that the proposer and partners have relevant and appropriate experience applicable to the proposed effort.

Indicators for High Leverage and/or Sustainability include:

- The E/PO activity can achieve high leverage by having an impact beyond the direct beneficiaries, reaching large audiences, being suitable for replication or broad dissemination, or drawing on resources beyond those directly requested in the proposal. (see [FAQ 18](#) for specific examples).
- The program is sustainable beyond initial NASA funding by showing the potential for continuation, adoption by the target audiences, and/or incorporation into institutional programmatic efforts.

- The program is replicable in other educational institutions.

4. Evaluation: Projects and activities document their intended outcomes and use metrics to demonstrate progress toward and achievement of these outcomes and annual performance goals. Evaluation methodology is based on reputable models and techniques appropriate to the content and scale of the targeted activity, product, or program.

Proposals to extend previously funded SMD E/PO efforts are required to provide evaluation results of the prior effort.

Evaluation efforts should reveal lessons learned, and whether the proposed E/PO project meets the stated goals and objectives and/or had other unanticipated effects. The formality and comprehensiveness of the evaluation will depend on the scope of the proposed activity and will be different for responses to a NASA Research Announcement (NRA) and Announcement of Opportunity (AO) (see [FAQ 15](#)). The project must collect, analyze, and report output and outcome data to a common NASA database to determine project effectiveness and meet the requirements of stakeholders. Directions will be provided upon selection. All SMD projects must include a project evaluation plan.

Indicators of appropriate evaluation include:

- Evaluation is based on models and techniques appropriate to the scale and type of E/PO products and activities that are a part of the E/PO project.
- Evaluation methods provide useful information on the effectiveness of the proposed project and the project implements improvements based on evaluation evidence.
- There is evidence that the forms of evaluation are based upon reputable models and techniques or are designed and applied by a reputable project partner who is knowledgeable in research and evaluation methods applicable to education and outreach efforts. Where appropriate, the evaluation plan includes field-testing and modifications before broad dissemination.
- The project is evaluated regularly by credible sources following professionally accepted standards for educational evaluations.

Evaluation efforts should reveal lessons learned, and whether the proposed Project Activity meets the stated goals and objectives and/or had other unanticipated effects. The formality and comprehensiveness of the evaluation will depend on the scope of the proposed activity. *All SMD Project Activities must include an evaluation plan and all components of a project activity must be evaluated.*

The proposed evaluation should be appropriate for the scale and type of each project activity component; for instance, a small outreach effort might measure web page views, or audience attendance on an event; a larger effort might include an online survey for a website, viewer tracking, or audience feedback from an event. A small education effort might use pre-test/post-tests at a workshop or web surveys; a larger effort might include an educator survey conducted by education students at a local university to determine longer-term impact. It is useful to follow standard methods or consult an individual trained in research and evaluation

methods when designing an evaluation procedure, even when the evaluation is to be done informally by the proposer(s).

Awardee institutions have the responsibility for budgeting and documenting compliance with Code of Federal Regulations commonly referred to as “the Common Rule for the Protection of Human subjects.” Activities to develop NASA exhibits, programs, curriculum products etc. may involve full human subjects review through an institutional review board (IRB) or it may be exempt. An IRB will certify when an activity is exempt. Activities using surveys, observational or ethnographic methods, cognitive and educational tests, etc. is "exempt" unless two things apply: the information would allow subjects to be identified, and disclosure of the data would reasonably place the subject at risk of harm. It is assumed that most SMD education and outreach activities will be exempt and that non-exempt activities will not involve NASA facilities, personnel or equipment. As soon as NASA has approved the Final E/PO plan, the project should begin the IRB process as determine whether any proposed activities require IRB approval or is exempt. This is done by working with a Department of Health and Human Services Office of Human Research Protection (HHS OHRP) approved non-NASA IRB. Information on how to locate an approved IRB is at:

<http://ohrp.cit.nih.gov/search/>. Most research institutions have IRB policies in place and proposers are encouraged to seek out local expertise.

In addition to compliance with the “Common Rule for the Protection of Human subjects”, the use of data collection instruments, such as surveys, must also comply with OMB regulation *Controlling Paperwork Burdens on the Public* (5 CFR §1320). For details see the

[http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=5bab499c91c938b4586b9fb356da606b;rgn=div5;view=](http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=5bab499c91c938b4586b9fb356da606b;rgn=div5;view=text;node=5%3A3.0.2.3.9;idno=5;cc=ecfr)
<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr;sid=5bab499c91c938b4586b9fb356da606b;rgn=div5;view>

In essence, if a recipient of a Cooperative Agreement or Contract wishes to obtain information from ten or more persons in a 12-month period by means of identical questions, this regulation requires NASA to obtain prior approval of their data collection instruments. Grantees are generally exempt, and are affected only if

- (i) the grantee is collecting the specific information at the specific request of NASA; or
- (ii) the terms of the grant require specific approval by NASA of the collection or its procedures.

If either of these conditions is met, OMB approval of the data collection is generally required and grantees need to obtain the necessary control number from the NASA Program Officer.

Obtaining approval for a data collection instrument is a significant effort and OMB clearance typically takes 6 to 9 months. See Appendix I for a flow chart. An E/PO plan must account for this time and effort. Affected awardees must submit the data collection instrument and supporting documentation to the cognizant NASA Program Officer via OMB Form 83-I (<http://www.whitehouse.gov/omb/inforeg/83i-fill.pdf>). NASA will then review the submitted information, and either request revisions or submit it to OMB. OMB may request additional revisions prior to initiating the approval process.

NASA is in the process of securing OMB approval of several standardized data collection instruments for education activities. The draft instruments are provided in Appendix J. These

instruments will be utilized in conjunction with the OEPM System. When approved by OMB, all awardees will be expected to utilize the instruments for data collection and reporting as appropriate to their activities. Additional data collection instruments will be developed and approved as needs arise.

Proposers, including those from NASA Centers, that anticipate the need for OMB approval of data collection instruments must include in their E/PO plan, a discussion of alternative evaluation techniques that will be used if the instruments are not approved.

All NASA-sponsored awardees are required to submit their Earth and space science education products and resources for review and potential broader dissemination. This review does not take the place of formative evaluation of education materials and it is expected that products have been reviewed for scientific accuracy and educational value, as well as field-tested by teachers and/or students as appropriate. Earth and Space Science products should be submitted to <http://www.strategies.org/nasareviews>

The project must collect, analyze, and report output and outcome data to a common NASA database (Office of Education Program Management (OEPM) System) to determine project effectiveness and meet the requirements of stakeholders. It is anticipated that this will be nominally a four person-day effort to format and submit the data annually. Directions are provided in award documentation.

RELEVANCE TO NASA OBJECTIVES

5. Customer Needs Focus: Projects and activities have been designed to respond to a need identified by the education community, a customer, or a customer group.

Indicators of alignment include:

- The project is based on a clearly expressed, compelling mutual need between NASA and the audience. [**Evidence of target audience need is required for SMD E/PO projects**]. (See [FAQ 9](#))
- NASA funded researchers can make an effective content contribution.
- Target audience participants will find the program valuable.
- The project is accessible and appropriate to its intended audience.

The specific interest and needs of the target audience can be documented through a variety of approaches including published documents, surveys, interviews, letters of interest, etc. from members of the target audience.

Interest and need by NASA may be established by reference to appropriate portions of the NASA strategic plan or similar SMD documents.

6. Content: Projects and activities use NASA content, people or facilities to involve educators, students, and/or the public in NASA science, technology, engineering, and mathematics.

Indicators of alignment include:

- The project is based on NASA's scientific and technical activities.
- The project ensures that the content is technically accurate.

- Public Outreach projects/activities engage the public in shaping and sharing the experience of exploration and discovery.
- Elementary/Secondary Education projects/activities are aligned (as described below) with education standards.

Any proposed E/PO product or activity that includes elementary/secondary education via a curricular product or educator workshop must demonstrate a substantive and informed alignment with educational standards (see [FAQ 11](#)) appropriate to the target audience and scale of the project/activity. National or regional (multi-state) projects/activities should align with the National Research Council's *National Science Education Standards* and/or the American Association for the Advancement of Science's *Benchmarks for Science Literacy*, and/or the mathematics education standards provided by the National Council of Teachers of Mathematics, and/or *Technology Foundation Standards for All Students* from the International Society for Technology in Education (see [Appendix D](#) for links to these and other relevant education standards). **This is done by providing specific reference to at least one of the standards publications cited above, citing specific standards to be addressed, and as appropriate providing evidence of use of standards for professional development.** Similarly local (single state) projects/activities may choose to align with national or appropriate state standards by providing the same level of documentation. Indicators of appropriate alignment with elementary/secondary education efforts include the following:

- Descriptions of the content of curricular products and/or educator training opportunities explicitly demonstrate alignment with education standards in one or more of the following educational fields: science (Earth and space science or physical science), mathematics, or technology.
- Evidence that the E/PO partners engaged in developing and evaluating curricular products or educator training are knowledgeable about how to align E/PO products and activities with relevant education standards (see [FAQ 11](#)).

COST

7. Resource Utilization—The adequacy, reasonableness, and realism of the proposed budget including demonstration of effective use of funds.

Indicators of alignment include:

- The expected E/PO project/activity outcomes justify/are worth the total project/activity costs.
- Proposers provide evidence that the scale of E/PO activity is appropriate to project/activity funding. For example, a \$1.0 million E/PO project/activity is multifaceted and reaches an appropriately large and diverse audience (statewide, regional, or national scope); and a \$15,000 E/PO project/activity is appropriately

focused and does not propose unrealistic outcomes that are clearly beyond project/activity resources (see FAQs [14](#), [28](#), and [29](#)).

- The overall project/activity budget (including in-kind contribution and other funds leveraged from E/PO partners' resources) is cost-effective and provides cited or estimated figures for the fiscal contribution of each partner. Overall project cost, costs of project deliverables, and the relationship of proposed budget to available funds are each realistic and reasonable (see FAQ [18](#) and [28](#)).
- Adequate funds are included for E/PO partners commensurate with their level of involvement in proposed activities (see [FAQ 29](#)).
- Budget details are provided. This includes the amount of individual labor effort, details of travel, supplies, and subcontractor expenses. These must be clearly connected to the described effort.

Program Balance Factors

NASA has a strong interest in attracting and retaining students in STEM disciplines. NASA also has a strong interest and commitment to meeting the needs of underserved and underrepresented groups in STEM. As part of this commitment SMD will use these program balance factors in selecting among EPO proposals of essentially equivalent overall rating based on Intrinsic Merit, Relevance, and Cost Factors noted above.

8. Pipeline: Through the use of NASA Earth and space science, projects/activities/products make a demonstrable contribution to attracting diverse populations to careers in science, technology, engineering, and mathematics (STEM).

Indicators of alignment include:

- The program promotes careers in STEM. Approaches include teacher and student use of NASA data, research experiences for students and teachers, exposure to career options through hands-on participation in STEM enrichment projects/activities.
- The program promotes improvement of STEM skills. Approaches include engaging students in participatory activities, such as hands-on learning, research, the use of innovative technology, peer support groups, and mentoring relationships with professionals and college students; involving teachers in effective and extensive staff development opportunities to improve their content knowledge in STEM areas; increasing teacher participation in STEM enrichment projects/activities; and increasing parent awareness of and involvement in student academic progress in STEM activities to strengthen family support of STEM education.
- The program creates linkages to other STEM educational opportunities. Approaches include utilization of partnerships or having substantive linkage with other federal and NASA education projects and involvement of community groups, corporations, research laboratories, museums, and educational/professional organizations in STEM activities.

- The program/product addresses diverse populations of students. The overall E/PO program reflects an atmosphere of equity, balance, and inclusiveness.
- Members of the target audience are involved in the development and execution of the effort.

9. Diversity: Through the use of NASA Earth and space science, projects/activities/products reach identified targeted groups. They contribute to the involvement, broad understanding, and/or training of underserved and/or underutilized groups in science, technology, engineering, and mathematics (STEM).

Engaging more minorities and women in careers and greater interest in science and engineering has become an increasingly critical need in America (see [FAQ 4](#)). Indicators that the proposed E/PO projects/activities contribute to underserved and/or underutilized groups (see [FAQ 17](#)) may include one or more of the following:

- The program serves individuals from underrepresented groups and ensures accessibility to people with disabilities.
- The program has been or will be developed in consultation with members of the communities it is intended to serve.
- The program promotes opportunities for faculty at minority-serving institutions to engage in research consistent with NASA's requirements. Approaches include utilization of partnerships or having substantive linkage with one or more minority universities such as: Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), Tribal Colleges and Universities (TCUs).
- The program supports closing identified gaps in STEM proficiencies among diverse populations.
- The program provides awareness and understanding through culturally appropriate materials to targeted communities of how NASA's research and innovations affect and improve the quality of life for all citizens.
- Members of the target audience are involved in the development and execution of the effort.

Frequently Asked Questions

SMD E/PO Policies

1. [What is NASA's Science Mission Directorate \(SMD\) commitment to Education and Public Outreach \(E/PO\)?](#)
2. [How does the SMD E/PO program relate to the NASA Education Program?](#)
3. [Why has NASA's Science Mission Directorate \(SMD\) made a major commitment to Education and Public Outreach \(E/PO\)?](#)
4. [Why is SMD placing an emphasis on outreach to underserved and/or underutilized groups?](#)

Science Education and Public Outreach Forums

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13. [Can SMD E/PO funding be used for Public Affairs efforts to reach the media?](#)
14. [What kind of Education or Outreach should I emphasize in my E/PO proposal segment?](#)
15. [What is evaluation and how important is it to include as a funded part of my E/PO program?](#)
16. [Can SMD E/PO funds be used to support efforts directed towards higher education?](#)
17. [What is meant by "underutilized" and "underserved" groups in science and technology?](#)
18. [How can I expand the scope of my E/PO program in order to get the most out of proposed funding?](#)
19. [How can I disseminate products developed by our E/PO program?](#)

E/PO Proposal Preparation and Review

20. [Can E/PO just be delegated or contracted out to somebody else so that the science investigators don't have to worry about it?](#)
21. [What attributes should I look for in an E/PO partner?](#)

22. In the context of an AO that has advanced to the Concept Study Report phase, what specific requirements must be satisfied for the involvement of E/PO partners, (encompassing partnerships between both individuals and organizations)?
23. What specific requirements apply when partnering with a for-profit organization?
24. What attributes should I look for in an E/PO lead?
25. What is the E/PO proposal review process?
26. How will the E/PO segment affect whether or not my proposal is funded?
27. How can I realistically describe a high-quality AO E/PO effort in only a few pages?
28. What format should be used for E/PO budgets?
29. Are there any restrictions on what can be funded in an E/PO budget?
30. For proposals responding to AOs the budget for the E/PO segment is specified as a percentage of the mission cost. Is this a percentage of the full mission cost, including the launch vehicle?
31. Is E/PO funding added on to a proposal or considered part of the research program funding?

Answers to Frequently Asked Questions

FAQs: SMD E/PO Policies

1. What is NASA's Science Mission Directorate (SMD) commitment to Education and Public Outreach (E/PO)?

Historically NASA has placed a premium on training the next generation of scientists via the support of graduates and postgraduates in their usual scientific roles on research proposals. Such support for future scientists is important and ongoing. The SMD E/PO program expands the SMD role in education to meet national needs for improving pre-college science education and enhancing general literacy in science, mathematics and technology. This means supporting the involvement of the science community in partnership with the education community to enhance science, technology, engineering, and mathematics (STEM) education and the public understanding of science. SMD is devoting a substantial level of resources toward its E/PO program. Every NASA Science Mission Directorate (SMD) flight project proposal (AO) is *required* to include a meaningful segment on E/PO (see [FAQ 30](#)).

A national network of organizations (SMD Science Education and Public Outreach Forums) is in place to help investigators and flight projects use the available resources to create and disseminate effective, well coordinated E/PO products and activities (see FAQs [5,6,7](#)). The Forums work in close collaboration with NASA's Office of Education as a part of NASA's overall Education effort.

2. How does the SMD E/PO program relate to the broader NASA Education Program?

There is only one NASA Education program. It is coordinated by the Office of Education. Management of various programs is vested in several organizations including the Office of Education, NASA Directorates (such as the Science Mission Directorate), and the NASA Field Centers.

3. Why has NASA's Science Mission Directorate (SMD) made a major commitment to Education and Public Outreach (E/PO)?

The NASA science research and development community has earned an international reputation for outstanding scientific achievement. Discoveries are abundant as scientists probe into the depths of a familiar night sky or our own home planet. This discovery-rich quality also makes Earth and space science an inspirational context for science education and public outreach (E/PO). The SMD E/PO strategy reflects the conviction that with key partnerships and cleverly leveraged efforts, the Earth and space science community can take greater advantage of its inspirational assets to have a powerful, positive impact on education in America.

Successful science education produces a science literate public who appreciates the nature of science; science literate educators, journalists, artists, politicians and business leaders who can recognize and articulate the value of science in society; and a diverse, high-quality technical work force. It is clearly in the enlightened self-interest of the space science community to bring the power of its inspirational endeavors more deliberately to bear in support of these outcomes.

4. Why is SMD placing an emphasis on outreach to underserved and/or underutilized groups?

Profound changes in the composition of the population of the United States are now taking place. According to projections by the Bureau of the Census:

- By 2030, the total elementary school age population of the United States will be equally divided between non-Hispanic whites and all other racial/ethnic groups combined.
- From 2030 to 2050, Native Americans, Asian/Pacific Islanders, Hispanics, and African Americans will together far outnumber non-Hispanic whites in elementary schools, high schools, and new entrants into college and the workforce.
- By 2050, non-Hispanic whites will decline to 53 percent of the total US population (all ages).

Thus, meeting the future needs of a society based on science and technology will require the involvement of individuals from groups who, at the current time, are not as effectively utilized as they should be in science and technology. In addition, these underserved and/or underutilized groups are significantly more underrepresented in space science than they are in science and technology as a whole. SMD is committed to playing a substantive role in addressing the need for outreach to these underrepresented groups to help ensure the future supply of scientists and engineers, and educate all people about the important role that science and technology plays in their lives (see FAQ [16](#), [17](#)).

FAQs: Using the SMD Science Education and Public Outreach Forums

5. What are the SMD Science E/PO Forums?

Each SMD Science Division has its own Forum: Astrophysics, Earth Science, Heliophysics, and Planetary Science. The four Forums are teams of scientists and educators that work closely with SMD to support and coordinate the activities of the SMD E/PO community. The SMD E/PO community includes the missions, programs, contractors, and grantees funded to conduct E/PO activities using SMD content, expertise, and facilities, as well as those interested in these efforts. The Forums:

- Facilitate communication and collaboration among current and potential SMD-funded E/PO programs and providers
- Identify a range of opportunities and various strategies for scientists and others to participate in SMD E/PO programs
- Support community members in enhancing their skills and knowledge as E/PO practitioners
- Help community members respond to SMD and NASA E/PO requirements
- Identify and leverage partnerships that enhance and broaden program impact
- Analyze the portfolio of SMD E/PO products and activities

- Develop thematic approaches that place E/PO activities in the context of SMD science
- Help SMD place E/PO products and activities into an online one-stop portal
- Integrate Division E/PO activities into SMD- and NASA-wide initiatives

Through these coordinated efforts, SMD is working to increase coherence within its E/PO portfolio and to create more effective, sustainable, and efficient utilization of SMD science discoveries and learning experiences.

If you are interested becoming involved in SMD E/PO and wish to learn more, please contact the lead of the Forum that most closely aligns with the scientific theme of your research or educational program. The Forum Leads are:

Astrophysics

Space Telescope Science Institute
Point of Contact: Denise Smith

E-Mail: dsmith@stsci.org
Phone Number: (410) 338-4434

Earth Science

The Institute for Global Environmental Strategies
Point of Contact: Theresa Schwerin

E-Mail: theresa_schwerin@strategies.org
Phone Number: (703) 312-0825

Heliophysics

University of California, Berkeley
Point of Contact: Laura Peticolas
E-Mail: laura@sunearth.ssl.berkeley.edu
Phone Number: (510) 643-6295

Planetary Science

Lunar & Planetary Institute
Point of Contact: Stephanie Shipp
E-Mail: ship@lpi.usra.edu
Phone Number: (281) 486-2109

6. How can the Forums support my proposal efforts?

The Forums can help you understand the elements in this evaluation guide so that you can create strong programs and competitive proposals. They can offer insights into ways that a project activity can be strengthened, based on an understanding of audience needs, gaps in the SMD E/PO portfolio, best educational practices, and evaluation methodologies. They can make recommendations for contacting similar programs that could serve as models for your efforts, and suggest partners to contact to

discuss synergies. They can also point to resources pertaining to effective evaluation tools and metrics.

The Forums cannot fund, write, or review proposals, nor can a Forum serve as a proposal team-member (e.g., co-investigator, collaborator, partner, advisory panel member). The integrity of the proposal process is at the heart of SMD's approach to E/PO. The Forums have adopted a set of Operating Principles to ensure that they provide fair and equitable services to the entire SMD E/PO community (see Appendix K). Forums cannot provide letters of support. All proposers are eligible for the services discussed here and in FAQ #7 without a letter of support.

Before consulting a Forum, it is helpful for you to prepare answers to the following questions as a way to focus the discussions.

- What is the name of the solicitation to which you are responding?
- When is the proposal due date?
- Who are the Co-Is and primary contractors (if any) on your proposal and where are they located?
- What is the basic science content of your proposal, and to which SMD Division(s) is it linked: Astrophysics, Earth Science, Heliophysics, or Planetary Science?

In addition to the questions above, the Forum will discuss the following with you:

- What are the science, education, and outreach experiences and interests of your proposal team members?
- Does the target audience “fit” with the experiences and interests of your team? What are the audience needs with respect to your proposal idea? How do you intend to meet those needs?
- Are you aware of any particular partners or networks with whom you want to collaborate (e.g. school districts, university or community college, science museum, planetarium, observatory, minority focused organization, educational TV, SMD networks, National Parks, etc.)?
- How much funding will your proposal devote to education and public outreach?
- Over what time period will E/PO funds be spent?

This set of questions does not constitute an exhaustive list but is intended to stimulate dialogue and the flow of fruitful ideas.

7. How will the Forums support my program efforts if I am selected for funding?

Once selected, you will be invited to join the Forum activities through the Forum with which your project most closely aligns. The Forums provide a variety of opportunities for you to get to know your colleagues and the programs they represent, including monthly online tag-ups that share news pertinent to the community, professional development opportunities, and annual community meetings. All of these activities are intended to help community members collaborate, enhance their professional skills, leverage each other's activities, and extend their reach through partnerships. In addition, Forums can continue to offer insights and advice that can help you to strengthen your program as it develops.

The Forums work with community members to develop thematic educational approaches that place your activities in the context of SMD science, thus increasing the reach, impact, and “shelf-life” of your efforts. They assist in the coordination of SMD’s presence at selected science and education conferences and placement of programs within SMD’s web presence, helping to showcase SMD E/PO programs and products. They will help you respond to SMD and NASA E/PO requirements, such as reporting through the Office of Education Performance Measurement system, the NASA education product review, and sharing of E/PO highlights with SMD.

All selected E/PO programs are strongly encouraged to become contributing members of the SMD E/PO community. Doing so will enhance your E/PO efforts and those of other community members and will help SMD to maintain a coordinated, high impact, sustained, national E/PO program.

FAQs: E/PO Content of Proposal Segments

8. At what level does my E/PO program have to be linked with SMD?

SMD E/PO projects must be connected to SMD science and technology. SMD desires that SMD project science be represented in the E/PO project to greatest extent practical. However, the details of a particular research area may too focused and/or too complex to be valuable for general use in K-14 education or public outreach. A knowledgeable assessment of the needs of the audience, such as age-appropriateness, and/or the unique interests or special needs of the particular targeted audience should determine the focus of product or activity design. A public outreach product like an educational TV program might include more specific information about a particular flight project than would an educational product like a middle school Educator Guide. Educational products and services should make use of flight projects or research topics in a different way — more as a motivational *context* for learning fundamental standards-based content in Earth and space science, physical science, mathematics, and technology (see [FAQ 10](#)). A more detailed discussion of the distinction between “education” and “public outreach” is made in answer to [FAQ 11](#).

If there is an associated SMD research project or mission, the proposed E/PO activities must have an intellectual linkage with the objectives of the research effort. The E/PO project must stay within the same science area (Astrophysics, Heliophysics, Planetary, Earth Science), as the research. (*A project that only has linkage at the level of Earth Science or astronomy is inappropriately broad.*)

9. How do I demonstrate a Customer Needs Focus?

NASA education and public outreach activities are undertaken to benefit the agency and the target audience. It is necessary to establish that both NASA and the target audience(s) have an interest and need for the products and opportunities that would be made available through the E/PO activities. Interest and need by NASA may be established by reference to appropriate portions of the NASA strategic plan or similar SMD documents. The interest and needs of the target audience are established by published documents, surveys, interviews, letters of interest, etc. from members of the target audience. For example, the NASA Explorers Institute program report

documents the output of focus groups related to informal education needs. This report is at

http://education.nasa.gov/divisions/informal/overview/F_pathfinder_explorer_institute.html

10. What are Education Standards and what does it mean for an educational activity or product to align with them?

This FAQ focuses on the National Academy of Science's National Research Council science education standards. There are also educational standards in science, technology, mathematics, and geography that have been developed by a variety of scientific and educational organizations. Prospective proposers and their partners should also be aware of these other disciplinary standards that may be pertinent to their proposed E/PO activities (see [Appendix D](#)).

The National Academy of Science's National Research Council published the National Science Education Standards (NSES) in 1995. This document is based on a nationwide collaboration of educators and scientists and is an important ingredient in modern science education reform efforts. It offers a coherent vision of what it means to be scientifically literate and how best to achieve such literacy.

The NSES content standards describe what all students – regardless of background or circumstance -- should understand and be able to do at different grade levels from kindergarten through high school. The content standards are differentiated by grade level (K-4, 5-8, and 9-12) in concert with the best research on what is developmentally appropriate for students at various ages. The content standards are organized under the following headings: Unifying Concepts and Processes in Science, Science as Inquiry, Physical Science, Life Science, Earth and Space Science, Science and Technology, Science in Personal and Social Perspective, and History and Nature of Science. The way science works and evolves is at least as heavily emphasized as the actual facts and specific ideas in science, and thus scientists can offer perspective on this as well as content knowledge. For Earth and space scientists, a good place to begin gaining familiarity is with the content standards in Unifying Concepts and Processes and in Earth and Space Science (see [Appendix E](#) for links to Standards).

A common misconception is that Standards involve content only, as if they were solely a list of facts students should know in science. It is *essential to recognize* that alignment with Standards involves much more than curricular content. There are also standards that articulate best practices in how to teach and assess student learning, how to train and professionally develop teachers, and how school districts and states can support implementation of exemplary curricular materials in an ongoing manner. Thus, aligning an educational product or activity with the *national science education standards* is a challenging prospect that is often underestimated. This points to the value of and need for effective partnering with institutions and/or personnel in the field of education who have studied the Standards carefully and who are knowledgeable and experienced in developing and implementing standards-based instructional materials and practices. Almost any scientific research project can be intellectually linked to the fundamental science concepts and processes articulated in the Standards, but *linking is not the same as aligning.*

A commonly proposed element of an E/PO program is a curriculum or educator guide. An educator guide that is aligned with Standards has several important attributes: 1) the lesson's content is suitably fundamental and age-appropriate, 2) best instructional practices are built into the lessons, and 3) adequate teacher training is available to support the implementation of the Guide's lessons. These attributes are discussed further below.

The focus of a standards-based lesson or educational experience is on a fundamental concept rather than on details associated with a mission or research project. However, missions and research projects may be used as real-world, inspirational *contexts* for teaching fundamental concepts, say about gravity, or energy, or how scientific inquiry is done. For example, NASA's Cassini mission focuses on the study of the Saturn system. There are no science education standards that say students should learn all about the research conducted by the Cassini mission. However, there *are* Earth and space science education standards that call for the study of the Solar System in general, and the planets in particular. Standards also say students should learn about Systems, Order, and Organization, about Science as a Human Endeavor, and about the relationship between technology and scientific discovery. Cassini's exploration of the Saturn system can provide a motivational context for such standards-based learning.

Another aspect of alignment with Standards is age-appropriateness. It is not realistic to propose producing a standards-based lesson or educator guide that serves *all* grade levels *unless* special consideration is given to how the needs and expected cognitive capabilities of students at different grade levels would be addressed. A standards-based lesson will readily fit into or enhance the existing curriculum of a school devoted to science education reform.

A standards-based lesson also offers the educator/user a sound approach to instruction based on the best available research about how students learn and what teaching practices facilitate that learning. This often involves the use of what is commonly called "hands-on" activities, but this in itself is insufficient to make the lesson pedagogically sound. Sound, standards-based lessons are very similar in structure to the way scientists do science: 1) they raise a fundamental question of interest; 2) they identify what they already know or think they know about the question; 3) they plan and implement an experiment ("hands-on activity") to address the question; 4) they examine what they learned from the experiment and reflect on how it relates to what they thought they knew; and 5) others test them out on what they have learned.

Educator guides are best disseminated in conjunction with educator workshops that include appropriately tailored background on the pertinent science and instructional practices, as well as direct hands-on experience with the standards-based lessons of the guide. Workshops aligned with standards model standards-based instruction and explicitly address both science and best teaching practices. Scientists can be effective contributors in workshop settings, both because of their depth of understanding of basic science and their experience in applying this knowledge to inspirational, real-world explorations.

11. **What is the difference between "Informal Education" and "Public Outreach"?**

Both informal education and public outreach are essential elements in engaging and

inspiring the public and each plays a critical role in increasing their understanding of NASA. The following is intended to define informal education's role and distinguish it from public outreach.

The First Criteria is the Intent

In trying to distinguish whether something is informal education or public outreach the first consideration is – what is the primary intent or goal of the activity?

Education:

The **intent** is to increase learning, to educate students, educators and the general public on specific science, technology, engineering or math (STEM) content areas, and to expand the nation's future STEM workforce.

Outreach:

The **intent** is to raise awareness of, or interest in, NASA, its goals, missions and/or programs, and to develop an appreciation for and exposure to science, technology, research and exploration.

Additional Criteria

However having an informal educational 'intent' is not a sufficient condition to be informal education. In order to qualify as 'Informal Education', as opposed to 'Public Outreach', a project has to additionally meet at least two of the following criteria:

1. **Supplemental Materials/Handouts:** Standards based education materials are used to supplement and enrich the experience, visual, or activity.
2. **Staffing:** Staff/facilitators, trained or qualified in STEM/education fields, actively work with participants to further enhance their understanding and increase the educational value of the experience, visual, or activity.
3. **Content:** Educational standards and/or learning objectives play a key role in developing content and/or design and explore topics in-depth

The overlap between Education and Public Outreach [see [Appendix B](#) for E/PO Venn diagram] is sometimes overlooked, but it is a significant area of endeavor called "Informal Education". Informal education engages students, educators, and the general public in settings away from the classroom (e.g. school field trips to science centers). Informal education products combine educational substance with the excitement of successful public outreach, but without the pressure of examinations and assessment. Opportunities for informal education usually require a person to travel to a place outside the home like a nature center, museum, or planetarium – a place that can be revisited. Informal education includes things like museum exhibits, science center programs, and planetarium shows. It also can include educational activities carried out by community organizations such as scouts, girls and boys clubs, 4H, and other youth groups. The intention of Informal Education is both to provide a learning opportunity and to motivate further learning and life-long interest.

Depending on their design, many products and services, such as Web sites, videos, and CD-ROMS, may be structured as informal education, or tailored more toward formal education or toward public outreach. For example, a CD-ROM might contain an interactive, standards-based curriculum for use in the classroom (formal education), or it might be an archive of captioned images for use on home computers (public outreach), or it might serve an interactive kiosk in a science museum exhibit (informal education). A website may also be cast across the E/PO spectrum. A Web site can be used to deliver a standards-based distance learning course (Formal Education), or to provide the public with a description of the latest images from another planet (Public Outreach).

Note that there are other classes of Public Affairs or Public Relations products and services that do not generally fall into the domain of E/PO as defined above (see [FAQ 14](#)). While such activities are important avenues for reaching the public, they are outside the scope of the SMD E/PO program.

12. What is the difference between “Connection to Other NASA E/PO Activities”, “Pipeline” and “Diversity”?

Projects that address the *Pipeline* factor are primarily concerned using NASA Earth and space science as a means of increasing the number of students in general, who develop high proficiency in those skills suitable to successful pursuit of STEM careers. This could include programs focused on retention of students in STEM subject areas and/or efforts to increase the students in STEM subject areas.

Approaches include:

- Teacher and student use of NASA data, research experiences for students and teachers, exposure to career options through hands-on participation in STEM enrichment projects/activities.
- Engaging students in participatory activities, such as hands-on learning, research, the use of innovative technology, peer support groups, and mentoring relationships with professionals and college students; involving teachers in effective and extensive staff development opportunities to improve their content knowledge in STEM areas; increasing teacher participation in STEM enrichment projects/activities; and increasing parent awareness of and involvement in student academic progress in STEM activities to strengthen family support of STEM education.
- Utilization of partnerships and/or having substantive linkage with national or state education programs or involvement of community groups, corporations, research laboratories, museums, and educational/professional organizations in STEM activities.

The *Connection to Other NASA E/PO Activities* subfactor of *Intrinsic Merit* is directed at the means of either attracting participants to the project and/or informing project participants about other NASA education and outreach opportunities. The objective is to assist participants in connecting to other NASA projects – providing “continuity” of experience in the “*education pipeline*”.

Projects that focus on *Diversity* are primarily concerned with using NASA Earth and space science as a means of engaging of individuals from groups that are underutilized and/or underserved in science and technology (see [FAQ 17](#)).

“Pipeline and Diversity” are areas of special interest to the SMD E/PO program. Projects should identify how they support these areas and may wish to focus project elements on them.

13. Can SMD E/PO funding be used for Public Affairs or Public Relations?

In general, no. Public Affairs or Public Relations (PR) products and activities are important to public awareness, but they are not appropriate for funding by the SMD E/PO program. PR products may include press conferences, press releases, video clips, mission-related brochures, posters, lithographs, and toys. Some of these products can be tailored or modified for E/PO uses. For example, a poster or toy could be packaged with an educational guide or insert that takes advantage of the interest and learning opportunity stimulated by the poster image or the playful appeal of the toy. A video clip and text from a press release might be adapted for use in a teacher guide or workshop. Such tailoring or development of educational products to accompany PR products is potentially fundable with SMD E/PO funds, but it should not dominate an E/PO proposal. In particular, SMD resources for E/PO should not be used for "give-away" souvenirs like coffee mugs, lapel pins, patches, T-shirts, mouse pads, and other items of limited educational value.

14. What kind of Education or Public Outreach should I emphasize in my E/PO proposal?

There is no single answer to this question as there are a wide spectrum of acceptable E/PO products and activities (see FAQs [11,13](#)), some of which may be of greater value for a particular locale or region. There may also be geographically convenient partnership opportunities—such as with a nearby science museum or planetarium that can serve to motivate particular types of E/PO activities. The SMD E/PO effort recognizes that various audiences have different needs, and that impact manifests itself differently within each group of users.

The answer to the question also depends strongly on the amount of funding being proposed for E/PO. Because of the modest financial scope of NRA projects/activities, an educationally sound, well-posed and focused effort that will be clearly effective in reaching its intended target audience is preferable to an unrealistically broad effort. On the other hand, E/PO projects/activities associated with AOs have a much larger financial scope and thus are expected to have a breadth and depth commensurate with these greater resources. These larger projects/activities should have a more balanced portfolio of activities and intended audiences with state, regional, or national scope. This general guidance is not meant to discourage the development of a novel E/PO idea that is more focused on a particular activity or target audience so long as the scope of the idea clearly merits the proposed funding.

There are two primary sources for information on SMD sponsored programs and products. The first is the 2006 NASA Education Portfolio Data Call Report [<http://www.strategies.org/Portfolio/FinalReport.html>]. The second source is the SMD EPO report [<http://ossim.hq.nasa.gov/ossepo/index.html>].

Abstracts of previously selected SMD E/PO projects/activities can be found by selecting a year at

http://research.hq.nasa.gov/code_s/archive.cfm

15. What is evaluation and how important is it to include as a funded part of my E/PO program?

Evaluation¹ of E/PO efforts is essential, particularly for larger scale projects/activities. The general goal of all E/PO efforts is to accomplish something (e.g., teach, inform, excite, etc.). While it is possible to accomplish something without realizing it, it is also possible to believe falsely that there have been accomplishments in the absence of validating evidence. It is thus necessary to investigate how well the outcomes of E/PO efforts actually match with their intended effectiveness and impact. Just as scientific claims must be testable and tested before they are accepted, so must claims about E/PO accomplishments be substantiated with evaluation.

Evaluation should be geared to the scale and type of a proposed E/PO effort. Smaller E/PO projects/activities, such as those responding to an NRA, might use simple, informal, or very specific evaluation methods like pre- and post-tests, questionnaires, or a focus group. It is useful to follow standard methods or consult an individual trained in research and evaluation methods when designing an evaluation procedure, even when the evaluation is to be done informally by the proposer(s).

Larger E/PO projects/activities, such as those responding to an AO, should integrate a more formal, comprehensive, and structured approach to evaluation. Missions typically devote 5-10% of the E/PO budget for evaluation and usually hire an independent professional evaluator to conduct a more substantial assessment and to produce a more formal and objective report on the program as a whole as well as on its component E/PO activities. Missions are also encouraged to seek out evaluators who are familiar with the unique SMD Education and Public Outreach objectives and requirements.

There are generally three stages of evaluation. "Front End" evaluation, done very early in the planning stages, can help determine where there is need, interest, or potential confusion regarding an envisioned E/PO product or activity and its intended audience. "Formative" evaluation improves the E/PO effort while it is being developed: field-testing is a good example of formative evaluation. "Summative" evaluation looks at the results of an effort: how effective it was, whether it met the stated intentions, whether it had other unanticipated effects, and so on. Summative evaluation tends to be the most formal and is often done to publish the lessons learned so they can be used for future projects. Methods of evaluation include focus groups, surveys, observations, follow-up interviews, pre- and post-testing, and many other techniques.

16. How can SMD E/PO funds be used to support efforts directed towards higher education?

SMD has education and research opportunities for faculty, researchers, and post-postdoctoral fellows, and students through many competitive solicitations such as Research Opportunities in Space and Earth Science (ROSES), NASA Earth and Space

¹ The Space Telescope Science Institute provides an excellent primer on evaluation that is relevant to NASA SMD E/PO programs. The URL is: <http://ideas.stsci.edu/Evaluation.shtml>

Science Fellowships (NESSF), and flight mission Announcements of Opportunities. Historically SMD has placed a premium on training the next generation of scientists via the support of graduates and postgraduates in their usual scientific roles on research proposals. Science and engineering undergraduates have also become increasingly involved in SMD mission operations and scientific research. SMD support for future scientists and engineers is important and ongoing.

SMD solicitations may identify additional opportunities and areas of interest in higher education. The list below offers some of the ways SMD E/PO funds could be used if specified in the solicitation. This list is not meant to be comprehensive, but to convey the spirit of the SMD E/PO interest in higher education:

- Collaboration between Earth and space science departments and schools of education to enhance the science literacy of students preparing to become K-12 teachers
- Employing a graduate student in education to work on the design and development of educational products and materials or the evaluation of an E/PO activity
- Enhancing introductory undergraduate courses in Earth or space science for non-science majors at community colleges as well as 4-year colleges and universities (see [FAQ 3](#))
- Workshops on how to do successful classroom outreach for science and engineering graduates and undergraduates involved in SMD research and development efforts
- Developing and/or enhance courses for science majors in SMD research fields
- Collaborations with minority institutions to develop undergraduate coursework and/or experiential opportunities that promote increased minority interest and participation in science and engineering (see [FAQs 4,17](#))
- Development and/or enhancement of research opportunities for undergraduates in SMD research areas, such as “Student Collaborations” for development of ground and/or flight software/experiments and data analysis in connection with SMD missions

Individual solicitations will indicate if graduate and undergraduate students and post-docs can be supported by the SMD E/PO funds.

17. What is meant by "underutilized" and "underserved" groups in science and technology?

The terms "underutilized" and "underserved" have special meaning in this context. In Equal Opportunity organizations, the operative phrase is "underrepresented in science and engineering" which is currently defined as individuals of Hispanic, African American, Pacific Islander, and Native American origins. In particular, all federal agencies, including NASA, have legislative and White House mandates to increase their support to minority universities. Such universities include Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), Tribal Colleges and Universities (TCUs), and other institutions certified by the Department of Education as having more than 50% combined minority undergraduate enrollment.

A complete list of all accredited minority institutions is available from the Department of Education at <http://www.ed.gov/about/offices/list/ocr/edlite-minorityinst.html> (also see [Appendix G](#)).

The terms "underutilized" and "underserved" encompass "underrepresented," but also include more. Use of the term "underutilized" recognizes that there are groups of people who have the talent and ability to participate in the SMD program and thus should be involved, but for one reason or another, they are not now involved. Such groups obviously include minorities but also include women and the physically challenged.

Use of the term "underserved" recognizes that there are people in areas where goods or services are in short supply. For example, this term is usually applied to individuals in small towns, rural communities, or in economically depressed areas where key services are frequently not available. The usage of "underserved" in this context is also intended to include groups with which NASA has not historically had a significant relationship, such as students at community colleges.

18. How can I expand the scope of my E/PO program in order to get the most out of proposed funding?

This is an important aspect of the [SMD E/PO Evaluation Factors](#) (see [EF 3](#)) and addressing it is a central consideration in the overall approach SMD has taken towards E/PO. The SMD-supported Earth and space science community is quite small (approximately 10,000 to 20,000 including aerospace contractors). The education community is enormous by comparison. In 2004, there were over 54 million precollege students with over 3.5 million teachers in about 125,000 schools nationwide. To have a significant national impact, SMD must leverage its E/PO resources carefully to get the most out of every dollar invested. The products and activities must be highly valued and worthy of broad dissemination and use in the education and outreach communities.

There are many strategies for enhancing the value or cost-effectiveness of an E/PO program including the creative use of existing Earth and space science community resources (see [FAQ 19](#)) in support of E/PO (e.g., scientists and engineers, observatories, mission operations facilities, computers, science imagery and other data). Some general strategies to expand the scope of an E/PO program or activity are listed with examples below:

- Having a substantive impact beyond the direct beneficiaries (e.g. having a "waterfall effect" where a program trains master educators who in turn train other K-12 teachers, or where scientists partner with an education graduate student who will in turn teach future teachers)
- Capitalizing on dissemination techniques and infrastructures that can reach relatively large audiences (e.g. science museums, planetariums, radio, television, Internet, traveling exhibits – see [FAQ 21](#)).
- Making the case that the design of a proposed product or activity qualifies for replication or broad dissemination by organizations and programs with established and reputable means for doing so (e.g., an Educator Guide qualifies

for dissemination in the Web-based [Eisenhower Clearing House](#) of educator resources or is suitable for distribution via NASA's national network of Educational Resource Centers; an educator workshop qualifies to be presented at the [National Science Teachers Association](#) convention)

- Drawing on (or leveraging) resources beyond those directly requested (e.g. E/PO partners provide cost sharing, in-kind contributions, or existing capability and infrastructure that would be cost ineffective to recreate from scratch)

19. How can I disseminate products developed by our E/PO program?

All NASA-sponsored grantees are invited to submit their Earth and space science education products and resources for review and broader dissemination. All products developed or funded by NASA's SMD are eligible to enter the review process. This review does not take the place of formative evaluation of education materials and it is expected that products have been reviewed for scientific accuracy and educational value, as well as field-tested by teachers and/or students as appropriate.

Earth and Space Science products should be submitted to <http://www.strategies.org/nasareviews>

Dissemination routes include utilization of the SMD Space Science Support Network, and other NASA resources such as the NASA Space Grant Consortia, NASA CORE, and NASA Aerospace Education Specialists. In addition materials may be posted online at the NASA Education portal Web site or the SMD education Web site.

The Space Science Education Resource Directory (<http://teachspacescience.stsci.edu/>) is another a convenient way for you to make your educational product available for use in classrooms, science museums, planetariums and other settings. The directory allows prospective users to do a quick search by Grade, Subject or Topic.

FAQs: E/PO Proposal Preparation and Review

20. Can E/PO just be delegated or contracted out to somebody else so that the science investigators don't have to worry about it?

No. The deliberate intention of the SMD E/PO strategy is to increase the degree to which the SMD-funded Earth and space science community is active and effective in support of public outreach and education. While some scientists have had significant experience in E/PO, many have not, and thus it has proven an effective strategy to form partnerships with organizations or individuals in the E/PO communities who can identify efficient ways for scientists to play valuable roles.

While a proposal team may select an E/PO partner institution or qualified E/PO Co-Investigator to lead the implementation of an E/PO program, it is expected that one or more science team members will be directly involved in overseeing and carrying out the proposed E/PO program. The essential idea is that attention to E/PO becomes an integral part of the Earth and space science community's professional activities. It may

be useful for SMD investigators to participate in workshops that offer training for scientists on E/PO.

There are a variety of roles that can be played by Earth and space scientists besides the most easily imagined one of public or classroom presenter. (See [Appendix C](#) for a chart depicting a sampling of roles scientists can play in support of education and public outreach). The key is to combine roles that fit the interests and abilities of participating scientists with partners who can provide further expertise in E/PO and opportunities for enhancing the scope of the proposed activities (see FAQs [18](#), [21](#)).

21. What attributes should I look for in an E/PO partner?

Desirable qualities to look for may include:

- substantial experience in managing the development of Earth/space science-related E/PO products and activities
- significant experience in presenting SMD science effectively to a large and diverse public audience
- a history of positive professional association with both the science and education communities
- credible expertise relevant to the assigned E/PO program element (e.g., a curriculum guide would require an E/PO partner who is intimately familiar with what it means to align with science education standards [see [FAQ 10](#)])
- openness and ability to engage scientists in meaningful and efficient ways in E/PO efforts (see [FAQ 20](#))
- geographical or institutional desirability in terms of access to proposal scientists and/or to underserved or underrepresented populations
- willingness to contribute the use of existing infrastructures, capabilities, or programs that could be leveraged for dissemination or evaluation of E/PO products and events (e.g., museum and planetarium programs, an ongoing series of educator workshops, a distance learning infrastructure, a national network of outlets for educational resources, or a radio/television/Internet broadcast capability)
- willingness to provide matching funds or in-kind contributions.

22. In the context of an AO that has advanced to the Concept Study Report phase, what specific requirements must be satisfied for the involvement of E/PO partners, (encompassing partnerships between both individuals and organizations)?

An E/PO Partner is defined as individual or organization who plays a necessary role in the proposed Education and Public Outreach Program and whose services are either funded by NASA or are contributed by his/her employer. If funded by NASA, costs must be accounted for in the NASA SMD Cost. If contributed, the costs must be accounted for in the Total Mission Cost and an endorsement letter from the proposed E/PO partner's home institution with full legal authority to approve the terms of the partnership must be provided with the proposal or Concept Study Report in the case of an AO. In addition, the role of each E/PO partner must be adequately described in the

proposal or concept study report to demonstrate the nature of the partner contribution and the associated costs. Note that the identification of an unjustified number of E/PO partner(s), partner(s) without a clearly defined role or contribution, or partner(s) without adequate legal authorization to participate may result in downgrading of an investigation and/or the offer of only a partial selection by NASA.

23. What specific requirements apply when partnering with a for-profit organization?

NASA policies prohibit offering a grant, contract or subcontract for the sole purpose of generating a potentially marketable (retail/for profit) educational end product such as a book, video, CD-ROM, slide set, poster, computer software, or web-based activity/resource. Funds can be awarded for an educational activity that might incorporate the use and assessment of a developed product. Example: A proposed program may involve the development of an educational product, but this product would be part of a larger activity and would be distributed either for free or at cost, and be subject to all SMD E/PO Evaluation Factors.

In addition, it is strongly encouraged that any E/PO co-investigator or partner/individual with a salaried position in a for-profit company sign a non-disclosure agreement to avoid potential conflicts of interest directly related to the intellectual property rights of other E/PO team members and partnering institutions. If an individual or company is unwilling to comply with this request, it is usually not advisable to proceed with the proposed partnership.

24. What attributes should I look for in an E/PO lead?

Personnel leading E/PO projects should be suited to the scope and content of the proposed program and qualified by education, training, and experience to manage such projects/activities. E/PO mission leads are key personnel and their selection should be made with as much rigor as science team members. [Appendix H](#) provides a sample position description and qualifications actually used by a mission to select an E/PO lead. The E/PO lead plays a similar role to that of the mission system engineer – they ensure that all the E/PO pieces come together for a successful E/PO effort for the mission.

25. What is the E/PO proposal review process?

The process of handling E/PO proposal segments follows the known best and fair practices for proposal review in current use throughout SMD. (See the *Guidebook for Proposers Responding to NASA Research Announcements*, [Appendix C](#), which is available at <http://www.hq.nasa.gov/office/procurement/nraguidebook/>)

Appropriately qualified scientific, education, and outreach personnel evaluate E/PO proposal segments using the [SMD E/PO Evaluation Factors](#). Proposers should consult individual AOs and NRAs for further specific requirements and information.

To ensure quality and consistency in the review process, experience to date has demonstrated that review panels for E/PO proposals must include both educators and scientists. The substance of these reviews is conveyed to proposers as part of their usual debriefings (see [FAQ 26](#)).

In order to avoid “Conflict of Interest” during the review process, it is essential that all key personnel including the E/PO lead for AOs are identified and names and addresses of all current institutions of employment be provided.

A sample Review Form is provided in [Appendix G](#).

Student Collaborations are a part of the E/PO effort of missions and are evaluated according to the evaluation factors specified in the AO. For example the SMEX 2007 AO specified that “Student Collaborations will be evaluated for overall merit. Overall merit of an SC is a combination of 1) the science/engineering merit of the proposed SC investigation; 2) implementation merit of the SC based on technical, management, and cost feasibility of the SC, including cost risk, as expressed in terms of specific major and minor strengths and weaknesses; and 3) and educational merit of the SC. The SC educational merit will be evaluated in four education merit areas: 1) quality, scope, realism and appropriateness, 2) continuity, 3) evaluation, and 4) diversity. These areas are discussed in detail in the *Explanatory Guide to the NASA Science Mission Directorate Educational Merit Evaluation Factors for Student Collaborations in the Explorer Program Library*.”

26. How will the E/PO segment affect whether or not my proposal is funded?

E/PO projects are a required component for AOs. The SMD Selecting Official takes into account proposed E/PO tasks and their review ratings when deciding on final selections and in particular when discriminating between research proposals having otherwise comparable merits. In the case of AOs, E/PO can play a significant role in discriminating among closely competing proposals. However, for mission proposals (e.g. Discovery, MIDEX) or major instrument proposals, other factors beyond both science and E/PO —such as risk, cost, and programmatic considerations also play a major role in the selection process.

27. How can I realistically describe a high-quality AO E/PO effort in only a few pages?

Admittedly, a few pages is a very small space to devote to describing how a proposed flight project will spend hundreds of thousands or even millions of dollars on E/PO in a manner that meets all [SMD E/PO Evaluation Factors](#) (EF). There is not room to provide a great deal of programmatic or budgetary detail in a flight project proposal. However, proposers can use the space allotted very effectively to provide key information to reviewers. Listed below is one possible strategy for making efficient use of space in providing this key information:

- A brief opening statement of how the proposed program will help achieve the goals of the SMD E/PO strategy and implementation plans
- A clear and succinct statement of program goals and objectives (see [EF 1](#))
- A paragraph to indicate the proposal team's commitment to E/PO, including a brief description of which science team member will have overall E/PO oversight, how scientists' will be involved with E/PO partners, and how E/PO implementation will be managed and coordinated (see [EF 3](#), and [FAQ 20](#))

- Substantiation of capability and commitment of E/PO partners via support letters that may be attached at the end of the proposal (see [EF 3](#))
- A collection of brief paragraphs (1-2 pages) introducing the basic "Who, What, When, Where, Why, and How," for each E/PO activity or product that will serve to fulfill program goals and objectives (see [EF 1](#) and FAQs [11](#), [13](#), [14](#)). The descriptions for each E/PO activity should emphasize:
 - a. what audience and educational needs are being addressed and why this is important (see for example [EF 5](#), [8](#), [9](#) and [FAQ 4](#), [17](#));
 - b. the substantive involvement of appropriate and demonstrably capable partners (with reference to any support letters, see [EF 3](#), [5](#), and [FAQ 21](#));
 - c. how the E/PO activity aligns with science education standards (if relevant, see [EF 6](#), [FAQ 9](#)); and
 - d. how the E/PO activity will expand its scope (see [EF 3](#), and [FAQ 18](#)).
- A table to summarize E/PO activities, including partners/leads, estimated costs and timing (0.5 –1 page). Table headings could include "E/PO Activity or Product", "E/PO Partner/Lead", "Estimated Cost", and "Schedule" (see [EF 1,3](#) and [FAQ 28](#))
- A short section to describe what approaches will be used to evaluate E/PO activities and the overall E/PO program (see [FAQ 16](#), [EF 4](#)).
- A paragraph to mention general dissemination strategies and to summarize the expected impact of the proposed E/PO program (see [EF 1](#) and [EC 3](#)).

28. What format should be used for E/PO budgets?

The E/PO proposal must reflect the entire cost of the E/PO effort including cost sharing and in-kind contributions. The budget should indicate the amount (if any) of cost sharing and in-kind contributions.

Cost Sharing includes items such as waiver or reduction of overhead expenses, personnel costs, and/or other direct charges.

In-kind contributions includes the value of services rendered, goods donated, facilities provided.

For AOs it is important to refer to the specific Announcement for guidelines on budget formatting. In general, AO proposers should integrate the E/PO budget into the *Budget Summary* of the parent proposal. Proposers may find it useful to provide a summary table in the text of the E/PO segment that lists "ball-park" costs for each E/PO product or activity (citing clearly any cost sharing or in-kind contributions). This table offers reviewers a useful way of assessing whether the proposed E/PO program and the proposed budget are a realistic and cost-effective match.

29. Are there any restrictions on what can be funded in an E/PO budget?

All costs must be allowable under Federal Regulations. Promotional items, awards, and other "give-aways" are generally not allowable but the proposer may include them

as cost-sharing or in-kind contributions. Beyond that there are some recommended guidelines in keeping with the spirit and purpose of the SMD E/PO funding:

Salaries and Wages: Salaries and wages must be connected to the E/PO effort and justified. Adequate funds should be included for E/PO partners commensurate with their level of involvement in proposed activities.

Equipment: It is not the intent of the E/PO program to purchase equipment for general use in schools, museums, planetariums, or other institutions. There must be a detailed justification for any equipment, including how it will be incorporated as an essential component into a large-scaled educational activity. Any requests for equipment must also be accompanied with certification that it will be used strictly for educational purposes both during the program and once the program is completed. Hardware such as computers, telescopes, and so on should be ancillary to the E/PO activities being proposed rather than the primary use of funding. Requested items must be essential to the successful of the project. In any event, no more than 50% of the total budget (including cost sharing and in-kind contributions) may be used for this purpose.

Travel: Travel for investigators is acceptable if it is for the purpose of disseminating information about the E/PO activities, or for the purpose of attending an E/PO training or workshop for scientists. In the case of AOs, travel money for investigators may be used to support participation in E/PO planning and/or implementation of E/PO activities.

Travel for investigators is acceptable if it is for the purpose of E/PO planning, implementation of E/PO activities, or disseminating information about the activities, or attending E/PO training for scientists. Participation in annual NASA SMD E/PO meetings for awardees is expected. Meeting details will be provided upon award. Foreign travel must be essential to the execution of the effort and is inappropriate as the means of disseminating Project Activity results.

Meals and Coffee Breaks: When certain meals are an integral and necessary part of a conference (e.g., working meals where business is transacted), grant funds may be used for such meals. Grant funds may also be used for furnishing a reasonable amount of hot beverages or soft drinks to conference participants and attendees during periodic coffee breaks.

Indirect Costs: SMD requests (but does not require) that the institutional overhead for an E/PO budget be reduced or waived by the submitting organization, since such activities in many cases will be of direct value to local educational and/or public science institutions and the budget available for this SMD E/PO program is extremely restricted.

Reserves: E/PO for a mission can be a large and complex undertaking. There are many things that may impact the cost of delivering the proposed E/PO effort. Proposers should include sufficient reserves at the outset of the project to enable them to adapt to programmatic needs just as the mission is required to include reserves.

30. For proposals responding to AOs the budget for the E/PO segment is specified as a percentage of the mission cost. Is this a percentage of the full mission cost, including the launch vehicle?

The operational policy is that the E/PO budget is percentage of the mission cost, NOT including the launch vehicle. So E/PO funding should be percentage of the total mission cost for spacecraft, operations, and science. The percentage is based on the fixed year dollar basis specified in the AO.

31. Is E/PO funding added on to a research proposal budget or considered part of the research program funding?

For AOs the E/PO budget is considered integral to the overall mission cost (see [FAQ 30](#)).

APPENDIX A Key NASA Links

NASA Strategy and E/PO Implementation Documents

- (1) NASA Office of Education Strategy
<http://education.nasa.gov/about/strategy/index.html>
- (2) 2006 NASA Strategic Plan
http://www.nasa.gov/pdf/142302main_2006_NASA_Strategic_Plan.pdf

NASA Information

- (1) NASA Science Mission Directorate
<http://nasascience.nasa.gov/>
- (2) NASA Office of Education
<http://www.nasa.gov/offices/education/about/index.html>

Resources for Researchers and Educators

- (1) SMD E/PO information for researchers
<http://nasascience.nasa.gov/researchers/education-public-outreach>
- (2) Overviews of SMD Missions and their E/PO projects
<http://nasascience.nasa.gov/missions>
- (3) Earth Science Education Catalog
<http://nasascience.nasa.gov/educators/earth-science-education-catalog>
- (4) NASA Space Science Education Resource Directory
The Education Resource Directory provides Internet access to top-quality educational resources produced by NASA's Space Science Education and Public Outreach programs
<http://teachspacescience.stsci.edu>
- (5) NASA Reviewed Collection
The NASA Science Reviewed Collection provides educators and students with a direct line of access to quality products reviewed through the NASA product review. The resources have been rigorously reviewed by an independent peer review of teachers, curriculum and design specialists, teacher trainers, and Earth system scientists. The review of the learning resources is based on their scientific accuracy, educational value, documentation, ease of use, their power to engage or motivate students, their robustness/sustainability as a digital resource, and ability to foster mastery of significant understandings or skills. Resources in the collection support the NASA Science Mission Directorate: Earth and Space Science education missions.
<http://www.dlese.org/dds/histogram.do?group=subject&key=eserev>

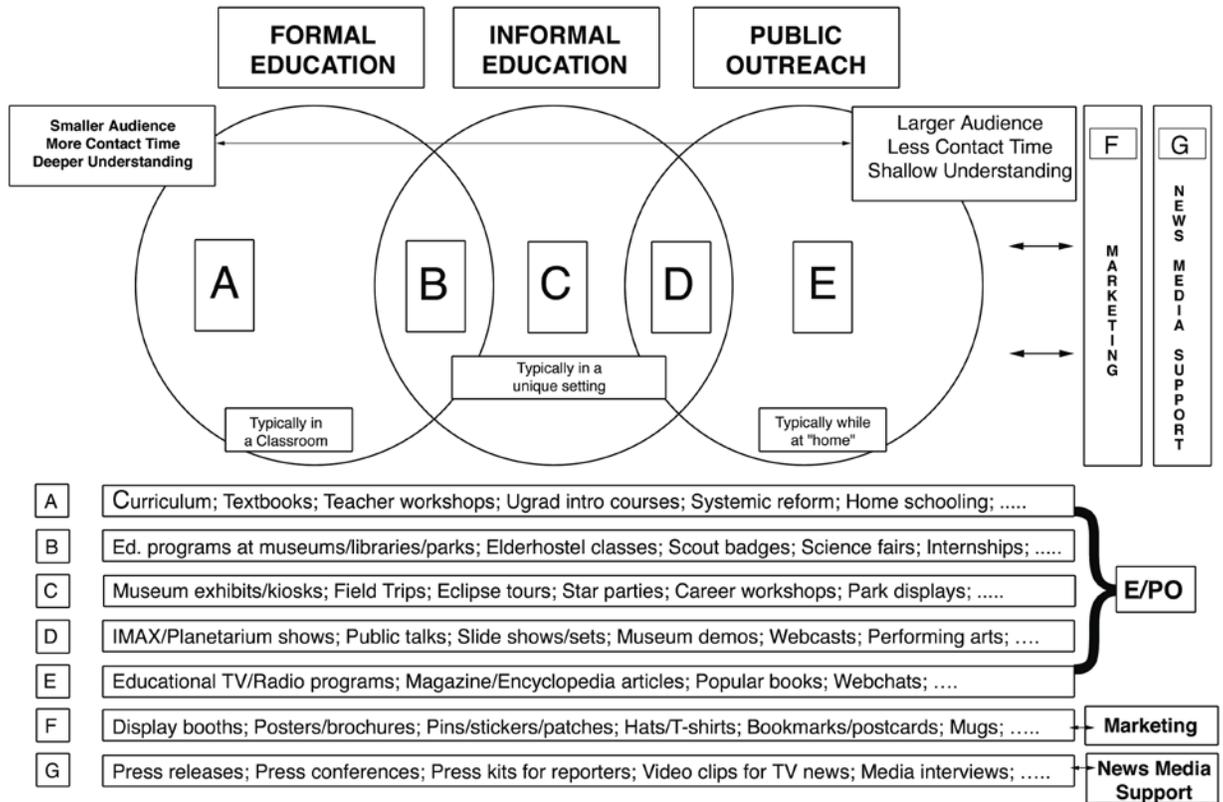
- (6) Educators' Resources for Earth and Space Science: Teacher's guides, education programs, and learning resources
<http://nasascience.nasa.gov/educators>
- (7) Space Science Is for Everyone: Creating and Using Accessible Resources in Educational Settings
 The brochure is offered as a tool for science, technology, engineering and mathematics educators who are working with students with disabilities. Some activity descriptions are supplemented with case study examples addressing a particular disability. In addition, contributing educator-authors have provided a variety of lessons learned from formal education (Pre-K through 12th-grade), home school education, and informal or "free-choice" education learning venues, such as science centers, museums and planetariums.
http://www.nasa.gov/pdf/259240main_Space_Science_Is_for_Everyone.pdf
- (8) Recasting Content in a New Light: A Guide for Adapting Formal Education Materials for Informal Settings
 Recasting Content in a New Light: A Guide for Adapting Formal Education Materials for Informal Settings is a field-tested "how-to" guide for adapting formal education materials to meet the unique needs of the informal education community.
https://nasascience.nasa.gov/educators/space-science-education-resource-directory-sserd/RecastingContent_508.pdf
- (9) NASA Science Mission Directorate Education and Public Outreach Annual Reports (last report done was in 2005)
<http://ossim.hq.nasa.gov/ossepo/>
- (10) *Voyages in Education and Public Outreach*: A NASA Space Science Newsletter
Voyages served as a vehicle for sharing the NASA Space Science's latest events and accomplishments in Education and Public Outreach. Past issues (2001-2005) are available here.
<http://nasascience.nasa.gov/researchers/education-public-outreach/voyages-in-education-and-public-outreach>
- (11) Abstracts of SMD proposals selected for Education and Public Outreach Opportunities in Earth and Space Science (2006-2009)
 NASA lists the titles and abstracts of all proposals and associated Principal Investigators that were selected for funding in response to these opportunities on the NSPIRES Web site, which is located at: <http://nspires.nasaprs.com/>. At this site, click on the link to "Selected Proposals" then select the year, such as "2008", to view the posting of the Education & Public Outreach for Earth & Space Science Program proposals selected.
- (12) Resources for Scientists in Education and Public Outreach
 These resources include several papers and presentations by authors who have significant experience at the interface between the realms of scientific research and K-12 education and public outreach (E/PO). The resources fall into six categories: 1. Making the Case for Scientist Involvement in Education and Public Outreach 2. The Roles of Scientists in Education and Public Outreach 3. Guidance for E/PO Program and Proposal Planning 4. Guidance for E/PO Product Development 5. Professional Development Opportunities for Scientists and E/PO Leaders in Education 6. Access to the E/PO Community
http://www.space-science.org/education/extra/resources_scientists_cd/

- (13) Roles Matrix for Scientists in Education and Public Outreach
http://www.spacescience.org/education/extra/resources_scientists_cd/Source/Roles.pdf
The Roles Matrix is designed to raise awareness about the great diversity of education and public outreach roles scientists can play. The Matrix offers a framework that describes the different levels of involvement in a variety of activities that contribute to improving science education in both formal and informal settings.
- (14) Space Science Media Needs of Science Center Professionals
<http://cse.ssl.berkeley.edu/spacescience.pdf>
The Sun-Earth Connection Education Forum interviewed twenty-nine science center professionals to explore ways to better meet their media needs. (“Media” refers to images, animations, simulations, and videos, etc.) Key recommendations are discussed.
- (15) NASA Education Resources in Other Languages
<http://flbrain.org/NASALanguageMaterials1.htm>
A comprehensive list of over 50 NASA programs and resources in Spanish and many other languages.
- (16) Trends in International Mathematics and Science Study (TIMSS)
<http://nces.ed.gov/TIMSS/>
TIMSS responds to the need for reliable and timely data on the mathematics and science achievement of our students compared to that of students in other countries. The TIMSS provides trend data on students' mathematics and science achievement from an international perspective.

Archives

- (1) History of OSS E/PO Program
http://nasascience.nasa.gov/researchers/education-public-outreach/strategy/Cospar_Manuscript.pdf
- (2) "Partners in Education: A Strategy for Integrating Education and Public Outreach into NASA's Space Science Programs"
<http://spacescience.nasa.gov/admin/pubs/edu/educov.htm>
- (3) "Implementing the Office of Space Education & Public Outreach Strategy"
http://spacescience.nasa.gov/admin/pubs/edu/imp_plan.htm
- (4) “Implementing the Office of Space Science Education/Public Outreach Strategy: A Critical Evaluation at the Six-Year Mark”
http://nasascience.nasa.gov/educators/program-evaluation/OSS_EPO_Task_Force_Report.pdf
- (5) NASA Space Science E/PO Summative Evaluation Report (2007), Lesley University
http://nasascience.nasa.gov/educators/program-evaluation/NASA_2007_Summative_report.pdf
- (6) Earth Science Outreach and Communication Plan 2005
<http://nasascience.nasa.gov/about-us/science-strategy/past-strategy-documents/OutreachPlan.pdf>

APPENDIX B: Education and Public Outreach Venn Diagram*



A two page white paper entitled, "A Framework for Planning Education and Public Outreach Programs Associated with Scientific Research Programs" (C.A. Morrow, 2000) offers a more complete description of this diagram. It is available online from http://www.space-science.org/education/extra/resources_scientists_cd/Source/Venn.pdf

**APPENDIX C:
A Sample of Roles For Scientists, Technologists, Engineers, And Mathematicians In Education
and Public Outreach (E/PO)(adapted from C. A. Morrow, 2000)**

		Nature of E/PO Involvement		
		ADVOCATE	RESOURCE	PARTNER
E n t r y P o i n t	K-12 STUDENTS	<ul style="list-style-type: none"> Participate in PTA 	<ul style="list-style-type: none"> Judge a science/technology fair Answer student E-mail Give tour of a research facility 	<ul style="list-style-type: none"> Mentor a student Tutor a student
	IN-SERVICE K-12 TEACHERS	<ul style="list-style-type: none"> Speak out in support of appropriate professional development opportunities for teachers. 	<ul style="list-style-type: none"> Answer teacher email Present in teacher workshop 	<ul style="list-style-type: none"> Work with a teacher to implement curriculum. Hire a teacher intern.
	INTRO UNDERGRADUATE SCIENCE TEACHING	<ul style="list-style-type: none"> Speak out in a faculty meeting in favor of attention to educational research that supports the reform of undergraduate STEM teaching. Support the teaching profession in your classroom. 	<ul style="list-style-type: none"> Teach a segment of a STEM or STEM methods course for preservice teachers. 	<ul style="list-style-type: none"> Teach an intro science course that applies innovative inquiry-based methods Develop a STEM course or curriculum in your department for teachers-to-be.
	SCHOOLS OF EDUCATION (Science Courses for Preservice Teachers, Graduate Students, Faculty Members)	<ul style="list-style-type: none"> Speak out in your department or organization in favor of closer ties with Colleges of Education Support the teaching profession in your classroom 	<ul style="list-style-type: none"> Teach a segment of a STEM course or science methods course for preservice teachers. Collaborate with education faculty to improve courses on teaching science 	<ul style="list-style-type: none"> Hire a graduate in education as evaluator of an education project Work with an Education professor to develop a new “STEM methods” course for teachers-to-be.
	SYSTEMIC CHANGE (District, State, National)	<ul style="list-style-type: none"> Speak out at professional meetings about the importance and value of involvement in systemic change. 	<ul style="list-style-type: none"> Review STEM standards for accuracy. 	<ul style="list-style-type: none"> Collaborate on writing or adapting STEM standards.
	EDUCATION MATERIALS DEV. (NSRC, EDC, Lawrence Hall)	<ul style="list-style-type: none"> Speak out at a school board meeting for adopting exemplary educational materials. 	<ul style="list-style-type: none"> Review STEM educational materials for science accuracy. 	<ul style="list-style-type: none"> Collaborate to create exemplary STEM education materials.
	INFORMAL EDUCATION (e.g., Science Centers, Scouts, After-school Programs, Planetaria, Elderhostels, Amateur Astronomy Groups)	<ul style="list-style-type: none"> Participate on the board of a science center or planetarium. 	<ul style="list-style-type: none"> Review scripts for science exhibit or planetarium show. Serve as a science advisor for an exhibit or program. 	<ul style="list-style-type: none"> Create content for a museum science exhibit or planetarium show. Serve as science coordinator for a scout troop
	PUBLIC OUTREACH (e.g., NPR, PBS, popular magazines/ books/ encyclopedias, lectures, public Web sites)	<ul style="list-style-type: none"> Advocate that quality science and technology news be covered by your local newspapers and television stations 	<ul style="list-style-type: none"> Give a public lecture Review an article or Web site on science for accuracy and currency 	<ul style="list-style-type: none"> Collaborate in the production of a PBS television show Write an article for a popular science magazine

APPENDIX D:

Links to Science, Math and Technology Education Standards

Academic content standards describe what every student should know and be able to do in the core academic content areas (e.g., mathematics, science, geography). Content standards should apply equally to students of all races and ethnicities, from all linguistic and cultural backgrounds, both with and without special learning needs.

Science Standards

NRC National Science Education Standards

<http://www.nap.edu/books/0309053269/html/index.html>

Describes the science standards created by the National Research Council.

AAAS Project 2061 Benchmarks

<http://project2061.aas.org/tools/>

Describes the science standards created by the American Association for the Advancement of Science.

Science Literacy Maps

<http://strandmaps.nsd1.org>

A tool for teachers and students to find resources that relate to specific science and math concepts. The maps illustrate connections between concepts as well as how concepts build upon one another across grade levels. Clicking on a concept within the maps will show National Science Digital Library resources relevant to the concept, as well as information about related AAAS Project 2061 Benchmarks and National Science Education Standards.

Mathematics Standards

<http://standards.nctm.org/>

Describes the mathematics standards created by the National Council of Teachers of Mathematics.

Technology Standards

<http://cnets.iste.org/>

Describes the technology standards created by the International Society for Technology in Education.

State Standards

<http://www.academicbenchmarks.com/search/>

APPENDIX E: Links to Organizations Serving Underserved/Underutilized Populations

NASA Minority University Research and Education Programs

http://www.nasa.gov/audience/foreducators/postsecondary/features/F_MUREP.html

American Indian Higher Education Consortium (AIHEC)

<http://www.aihec.org/>

American Indian Science and Engineering Society (AISES)

<http://www.aises.org>

National Organization for the Professional Advancement of Black Chemists and
Chemical Engineers (NOBCChE)

<http://www.nobcche.org>

National Society of Hispanic Physicists (NSHP)

<http://www.hispanicphysicists.org/>

National Society of Black Physicists (NSBP)

<http://www.nsbp.org>

Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)

<http://www.sacnas.org>

Coalition to Diversify Computing (CDC)

<http://www.cdc-computing.org/>

National Federation of the Blind (NFB)

<http://www.nfb.org/nfb/Default.asp>

Association for Women in Science

<http://www.awis.org/>

APPENDIX F: Sample E/PO Program Evaluation Form

NASA SCIENCE MISSION DIRECTORATE EDUCATION AND PUBLIC OUTREACH PROGRAM

E/PO Program Evaluation Form

Proposal Number:	PI Name:	Version:
Proposal Title:		
Submitting Organization/Institution:		

Brief Summary of Proposed Project:

FACTORS:	EXCELLENT	VERY GOOD	GOOD	FAIR	POOR
1. Intrinsic Merit - Quality, Scope, Realism, and Appropriateness - Connections to Other NASA E/PO Activities - Partnership Leverage/Sustainability - Evaluation					
2. Relevance to NASA - Customer Needs Focus - Content					
3. Cost - Resource Utilization					

PROGRAM BALANCE FACTORS:	EXCELLENT	VERY GOOD	GOOD	FAIR	POOR	NOT ADDRESSED
4. Program Balance Factors - Pipeline - Diversity						

Strengths:

Weaknesses:

Overall Comments:

**APPENDIX G:
Sample Budget Summary for Proposed E/PO Activity**

	Year 1	Year 2	Year 3	Cum
A. Direct Labor - Key Personnel				
B. Direct Labor - Other Personnel				
Total Number Other Personnel				
Total Direct Labor Costs (A+B)				
C. Direct Costs - Equipment				
D. Direct Costs - Travel				
Domestic Travel				
Foreign Travel				
E. Direct Costs - Participant/Trainee Support Costs				
Tuition/Fees/Health Insurance				
Stipends				
Travel				
Subsistence				
Other				
Number of Participants/Trainees 0				
F. Other Direct Costs				
Materials and Supplies				
Publication Costs				
Consultant Services				
ADP/Computer Services				
Subawards/Consortium/Contractual Costs				

Equipment or Facility Rental/User Fees				
Alterations and Renovations				
Other				
G. Total Direct Costs (A+B+C+D+E+F)				
H. Indirect Costs				
I. Total Direct and Indirect Costs (G+H)				
J. Fee				
K. Total Cost (I+J)				
Total Cumulative Budget				

APPENDIX H: Mission E/PO Lead Sample Position Description

The E/PO manager will be responsible for the overall planning, management and coordination of all formal and informal education activities.

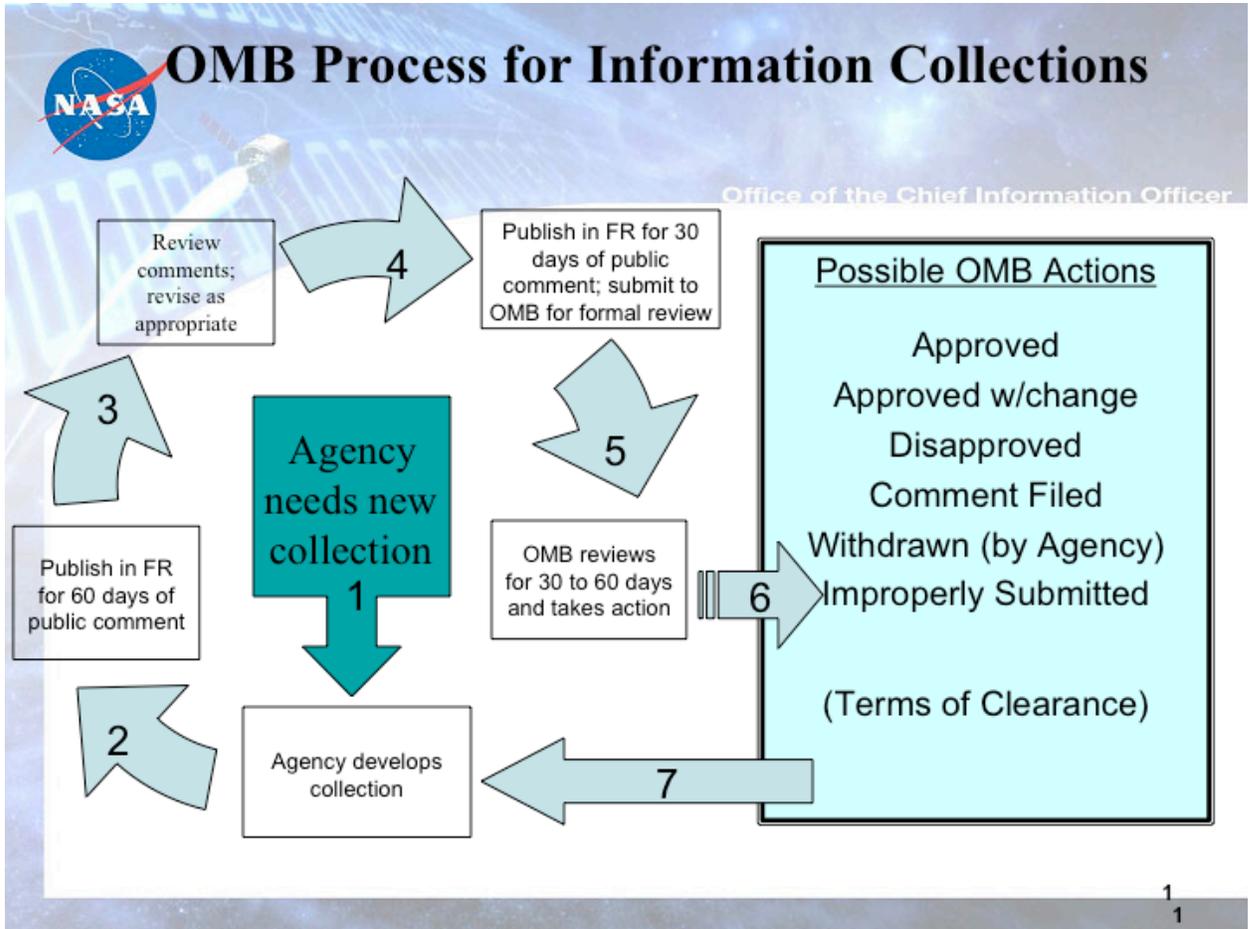
Position duties and requirements:

1. In collaboration with the science and technology team members design and develop a suite of formal education materials/products and resources aligned with the Mission science objectives. (15%)
2. Alignment and coordination of formal and informal education activities. Develop and coordinate a series of informal education activities, products and events aligned with key Mission milestones. (15%)
3. Assume overall responsibility for the management and reporting of the Mission E/PO budget expenditures and assume all NASA HQ reporting requirements. Develop an end-to end schedule of activities, events and deliverables appropriately aligned with the Mission E/PO budget. (10%)
4. Insure all partner institutions/organizations, and co-investigators (museums, universities, and all other sub-contracting organizations) are compliant with NASA Guidelines and have formal institutional authorization for participation. Insure adherence to SMD E/PO policies and guidelines as they pertain to various partner/collaborative organizations as well as all other general legal requirements for federally funded research activities. (5%)
5. Function as representative for the Mission E/PO Program at appropriate professional society meetings and various NASA education events. (5%)
6. Responsible for insuring all educational products developed for the Mission E/PO program (including curricular materials, and all on-line activities and products) align with Mission science objectives as well as appropriate national education standards, are independently evaluated and are made available to the education community in accordance with NASA SMD policies and requirements. (15%)
7. Coordinate participation of Mission Scientific and technical team members for various Mission Public Events. (15%)
8. Participate in other programs, and activities such as workshops, events, and Public Presentations as required. Various other duties relevant to Mission E/PO effort as required. (20%)

Educational Requirements, Skills and Experience:

1. Understanding of SMD Education and Public Outreach and the current Exploration Programmatic goals.
2. Terminal degree in relevant area of scientific expertise or in science, mathematics, or technology education with a minimum of five years of relevant experience leading large, preferably national scale education programs that focus on content relevant to NASA Science Mission Directorate content areas. A minimum of 10 years of relevant experience in a Formal Science/Mathematic/Technological Education setting with increasing duties that demonstrate successful progression into a leadership/managerial role may be considered in lieu of a terminal degree.
3. Candidates without terminal degree in science/math/technology must demonstrate experience and understanding of relevant science, math, and technical content areas and ability to communicate and work effectively with scientific and technical staff.
4. Candidates without significant K-12 educational expertise must demonstrate experience and ability to interact effectively with formal/informal education community and address current National Science, Mathematics and Technology Education requirements.
5. Significant experience working effectively with underserved communities and awareness of the unique educational needs of these communities.
6. Excellent oral and written communication skills and formal presentation skills. Ability to work effectively as a team member and diverse national audiences with a wide range experience, interests and abilities.
7. Flexibility and ability to adapt and function effectively in a fast-paced working environment.

APPENDIX I: OMB Approval Process for Data Collection Instruments



APPENDIX J:
Office of Education Program Management (OEPM) System Data
Collection Instruments

STUDENT END OF EVENT (SHORT ACTIVITY)
PRE-LONG ENGAGEMENT STUDENT SURVEY
POST-LONG ENGAGEMENT STUDENT SURVEY

EDUCATOR END OF EVENT SURVEY
EDUCATOR 120 DAY FOLLOW UP SURVEY

INFORMAL EDUCATION OBSERVER SURVEY
INFORMAL PROFESSIONAL DEVELOPMENT SURVEY
INFORMAL PROFESSIONAL DEVELOPMENT PARTICIPANT 120 DAY
FOLLOW UP SURVEY

STUDENT END OF EVENT (SHORT ACTIVITY)

PART 1: Participant Information

1. Name of school or institution:
2. State or Territory:
3. Grade Level
 - 4
 - 5
 - 6
 - 7
 - 8
 - 9
 - 10
 - 11
 - 12

PART 2: NASA Activities and Learning

4. What type of activity did you participate in today? Check all that apply.
 - Visit from a NASA educator, scientist, or engineer
 - Visit from a NASA astronaut
 - Seminar/lecture by a NASA or aerospace professional
 - Participate in a launch event
 - Video downlink from International Space Station or Space Shuttle
 - Ham radio call to an astronaut
 - Classroom lesson about NASA
 - Library lesson about NASA
 - NASA TV-based activity
 - NASA computer-based activity
 - Visit to a NASA Center
 - Visit to a museum, science center, or planetarium
 - Competition
 - Career fair
 - After school or club activity
 - Webcast
 - Videoconference
 - Other

Check only one response for the following four questions.

5. I learned something new about NASA as a result of my participation today.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

6. I enjoy learning when I use NASA materials.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

7. I think NASA does important and exciting work.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

8. As a result of this experience, I am more interested in a career at NASA or in science, technology, engineering, or mathematics.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

9. As a result of my participation today, I will: Check all that apply.

- Visit the NASA website (www.nasa.gov)
- Talk to my family about NASA
- Ask my teacher about space
- Ask my teacher to do more NASA activities
- Read a book about space
- Consider doing a science fair project
- Visit a museum, science center, or planetarium
- Watch television shows that have a science, technology or engineering theme
- Do more activities about science, technology, engineering or mathematics

10. I am interested in doing more NASA activities, including: Check all that apply.

- Visit from a NASA educator, scientist, or engineer
- Visit from a NASA astronaut
- Seminar/lecture by a NASA or aerospace professional
- Participate in a launch event
- Video downlink from International Space Station or Space Shuttle
- Ham radio call to an astronaut
- Classroom lesson about NASA
- Library lesson about NASA
- NASA TV-based activity
- NASA computer-based activity
- Visit to a NASA Center
- Visit to a museum, science center, or planetarium
- Competition
- Career fair
- After school or club activity
- Webcast
- Videoconference
- Other

PART 3: Participant Demographic Data (OPTIONAL) – Please Provide

11. What is your Gender? Check one.

- Male
- Female
- Do Not Wish to Report

12. What is your Ethnicity? Check one.

- Hispanic or Latino
- Not Hispanic or Latino
- Do Not Wish to Report

13. What is your Race? Check all that apply.

- American Indian or Alaska Native
- Native Hawaiian or other Pacific Islander
- Asian
- White
- Black or African American
- Do Not Wish to Report

14. Disability Status? Check all that apply.

- Hearing Impairment
- Visual Impairment
- Mobility/Orthopedic Impairment
- None
- Do Not Wish to Report
- Other, Please Specify:

PRE-LONG ENGAGEMENT STUDENT SURVEY

Part 1: Participant Identification

- **School Name** _____

- **Street Address**
 - **City** _____
 - **State** _____

Circle Grade Level

4 5 6 7 8 9 10 11 12

Part 2: Student Experience, Attitudes And Expectations

Q1: Which other NASA programs or events have you previously participated?

Check all that apply.

- INSPIRE
- SEMAA
- NASA Explorer School
- Co-op or other internship at a NASA Center
- NASA days or guest speakers at my school
- NASA activities in my classroom
- NASA career information days/events
- Using NASA website
- Watching NASA TV
- Viewing a, launch, downlink, ham radio call, webcasts, podcasts
- Visiting a NASA Center
- Other
- I have not previously participated in NASA related activities

Q2: What do you hope to gain from this experience? Check all that apply:

- Learn more science skills
- Learn more science content
- Learn what it is like to work for NASA
- Learn what it is like to work in Science, Technology, Engineering or Mathematics (STEM) careers

- Build on other NASA experiences that I have had
- Build experience and background for a future NASA career or STEM career
- Other

Please indicate how much you agree with the following statements

Q3: I am interested in NASA.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q4: I am interested in Science.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q5: I am interested in Technology.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q6: I am interested in Engineering.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q7: I am interested in Mathematics.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q8: I know a lot about NASA.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q9: I am good at Science.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q10: I am good at Technology.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q11: I am good at Engineering.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q12: I am good at Mathematics.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q13: I am interested in careers at NASA.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q14: I am interested in careers in Science.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q15: I am interested in careers in Technology.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q16: I am interested in careers in Engineering.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q17: I am interested in careers in Mathematics.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q18: My family is interested in my science, technology, or mathematics coursework.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q19: I participate in NASA, science or math clubs after school.

- Yes
- No
- My school does not offer after school science or math clubs, but I would participate if I could.
- My school does not offer after school science or math clubs, and I am not interested.

PART 3: Participant Demographic Data (OPTIONAL) – Please Provide

Q20: What is your Gender? Check one.

- Male
- Female
- Do Not Wish to Report

Q21: What is your Ethnicity? Check one.

- Hispanic or Latino
- Not Hispanic or Latino
- Do Not Wish to Report

Q22: What is your Race? Check all that apply.

- American Indian or Alaska Native
- Native Hawaiian or other Pacific Islander
- Asian
- White
- Black or African American
- Do Not Wish to Report

Q23: Disability Status? Check all that apply.

- Hearing Impairment
- Visual Impairment
- Mobility/Orthopedic Impairment
- None
- Do Not Wish to Report
- Other, Please Specify:

POST-LONG ENGAGEMENT STUDENT SURVEY

Part 1: Participant Identification

- School Name _____
- Street Address _____
- City _____
- State _____

Check Your Grade Level

- K 1 2 3 4 5 6 7 8 9 10 11 12

Part 2: Student experiences, attitudes, and expectations

Please indicate how much you agree with the following statements

Q1: Participation in the program was a good investment of my time.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q2: My personal learning objectives were met.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q3: I have a better understanding of NASA's mission.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q4: This experience **inspired** me to learn more about science, technology, engineering or mathematics?

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q5: I prefer learning with NASA resources.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q6: I enjoy learning with NASA resources. I enjoy learning when I use NASA materials.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q7: I want to take more courses in science, technology, engineering or mathematics after learning with NASA.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q8: I am interested in NASA.

- Strongly Disagree
- Disagree
- Neutral

- Agree
- Strongly Agree

Q9: I am interested in Science.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q10: I am interested in Technology.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q11: I am interested in Engineering.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q12: I am interested in Mathematics.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q13: I know a lot about NASA.

- Strongly Disagree
- Disagree

- Neutral
- Agree
- Strongly Agree

Q14: I am good at Science.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q15: I am good at Technology.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q16: I am good at Engineering.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q17: I am good at Mathematics.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q18: I am interested in careers at NASA.

- Strongly Disagree

- Disagree
- Neutral
- Agree
- Strongly Agree

Q19: I am interested in careers in Science.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q20: I am interested in careers in Technology.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q21: I am interested in careers in Engineering.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q22: I am interested in careers in Mathematics.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Family Involvement and After-School Linkage

Q23: My family is interested in my science, technology, or mathematics coursework.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Q24: I participate in NASA, science or math clubs after school.

- Yes
- No
- My school does not offer after school science or math clubs, but I would participate if I could.
- My school does not offer after school science or math clubs, and I am not interested.

Interest in NASA Student Opportunities

Q25: Which future NASA experiences interest you? Check all that apply

- High school internship/work at a NASA Center
- High school classroom activities
- High school on-line/distance learning classes
- College internship/work at a NASA Center
- College research experience
- Other
- I am not interested in future NASA experiences

EDUCATOR END OF EVENT SURVEY

PART 1. Participant Identification

1. Name of school or institution: _____

2. City: _____

3. State or Territory: _____

4. Zip code (5 digits): _____

5. Type of institution (check all that apply)

Public

Parochial

Private

Charter

Rural

Suburban

Urban

Other type of institution. Please specify. _____

6. Your email address will be used only to automatically generate an email invitation to complete an anonymous 120 day follow up survey. No permanent record of contact information for participants in this activity/event is retained by NASA.

Email Address: _____

I do not wish to provide this information

PART 2. Participant Characteristics

7. What is (are) are the grade(s) of students that you teach? Check all that apply.

K 1 2 3 4 5 6 7 8 9 10 11 12

8. What is (are) the subject matter(s) that you teach? Check all that apply.

Art/Music

Drama

English/Language Arts

Foreign Language

Guidance

Health

Media Specialist/Library

Mathematics

Physical Fitness

Science

Social Studies

- Technology
- Other. Please specify. _____

PART 3. Participant Feedback

To what extent do you agree with the following statements?

Educator Attitudes

9. This NASA experience has inspired me to bring NASA content into my classroom.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

10. I can immediately apply what I learned from this NASA experience to my teaching about science, technology, engineering or mathematics (STEM).

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

11. I will be more effective in teaching STEM concepts introduced in this NASA experience.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

12. Based on my NASA experience, I will make changes to my teaching activities.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

13. Which activities do you plan to change or add to your teaching practices? Check all that apply.

- Use printed materials presented at my NASA experience
- Use subject matter covered at my NASA experience

- Use technology resources introduced at my NASA experience
- Use web resources presented at my NASA experience
- Use teaching techniques presented at my NASA experience
- Other. Please specify. _____

Using NASA Materials in the Classroom

14. The NASA materials used in this experience align well with what I teach.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

15. These resources will be effective in increasing my students' interest in STEM topics.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

16. This NASA experience provided ideas for encouraging student exploration, discussion and participation.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Family Involvement

17. I received activities, ideas, or resources that could be used to involve families in their children's STEM education.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree
- Not Applicable

18. I plan to use the family ideas suggested.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree
- Not Applicable

19. I think the resources suggested will be effective with families.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree
- Not Applicable

EDUCATOR END OF EVENT SURVEY

To what extent do you agree with the following statements?

1. After participating in a NASA program, I am confident in my ability to apply the knowledge and/or skills learned.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

2. I received NASA curricular materials or publications.

- Yes
- No

If yes, please respond to all questions in the remainder of the survey. If no, please skip to Question #7.

3. The training I received was valuable.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree
- Not Applicable

4. I have used these materials in my classroom.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

5. I am sharing these materials with other teachers, formally or informally.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

6. The number of students I reached when using these materials was: ____

7. Based on my NASA experience, I have changed my teaching activities.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

8. Which activities did you change or add to your teaching practice? Check all that apply.

- Used printed materials presented at my NASA experience
- Used subject matter covered at my NASA experience
- Used technology resources introduced at my NASA experience
- Used web resources presented at my NASA experience
- Used teaching techniques presented at my NASA experience
- Other. Please specify. ____

9. What barriers, if any, have prevented you from using or integrating NASA materials in your classroom?

- Lack of opportunity to use the skills/knowledge
- Systems and processes within the school will not support the use of skills/knowledge
- Lack of computer and/or technological resources
- Not enough time to integrate the material into the curriculum
- Lack of alignment between NASA content and local and/or state standards
- Other. Please specify. _____

10. Based on your experiences, please provide any recommendations for improving NASA educational materials or training. 500 character limit.

Informal Education Observer Survey

- 1) Number of Persons in Group Surveyed: _____
- 2) Description of Group Members: (Note to Volunteer: Indicate number of persons for each category checked; also include age of each child in the group who participated in the program/activities).

Check if applicable	# in Category Checked	Ages Participating Children
<input type="checkbox"/> Adult female	_____	
<input type="checkbox"/> Adult male	_____	
<input type="checkbox"/> Female child	_____	_____
<input type="checkbox"/> Male child	_____	_____

- Ethnicity:**
- Hispanic or Latino
- Not-Hispanic or not-Latino
- Do not wish to provide

- Race** (select one or more):
- American Indian or Alaska Native
- Native Hawaiian or other Pacific Islander
- Asian
- White
- Black or African American
- Do not wish to provide

Survey on NASA’s Informal Education Activities

- 1) What brought you here? [Text box – 2000 characters]

2) In general, did you find the NASA programs/activities that you attended: (Check one for each item)

	Not at All	A Little	Some	A Lot
a) Fun?	_____	_____	_____	_____
b) Interactive/hands-on?	_____	_____	_____	_____
c) Interesting?	_____	_____	_____	_____
d) Helped you understand the work that NASA employees do?	_____	_____	_____	_____
e) Gave you a better understanding of the skills needed to work at NASA?	_____	_____	_____	_____
f) Affecting your interest in science?	_____	_____	_____	_____
g) Affecting your understanding of science?	_____	_____	_____	_____

3) What did you like best about the NASA program/activities that you participated in today? – [Text Box]--

4) Do you have any thoughts on how NASA’s program/activities can be improved? If yes, please share your thoughts. [Text Box]

5) How many NASA activities have you attended? Are you a: (check one)

- first time attendee attended once before attended 2 or more times in the past

6) (Adult Respondents Only) Overall, how satisfied are you with the educational content of the NASA program activities that you attended today? Are you:

- Very dissatisfied Somewhat satisfied
 Somewhat dissatisfied Very satisfied

Which NASA activities did you attend or take part in today? [Text Box – 500 characters]

What would make you come back to NASA events and activities? [Text box – 1000 characters]

Informal Professional Development Survey

PART 1. Participant Identification

1. Professional Affiliation (say "N/A" if non-affiliated): _____
2. City: _____
3. State or Territory: _____
4. Zip code (5 digits): _____
5. Your email address will be used only to automatically generate an email invitation to complete an anonymous 120 day follow up survey. No permanent record of contact information for participants in this activity/event is retained by NASA.
 - Email Address: _____
 - I do not wish to provide this information

PART 2. Participant Characteristics

6. What age-range of learners do you serve? Check all that apply.
 - 0-4
 - 5-12
 - 13-18
 - 19-22
 - 23 - older

7. What are the primary subject matter area(s) for your programming? Check all that apply.
 - Art/Music
 - Drama
 - English/Language Arts
 - Foreign Language
 - Guidance
 - Health
 - Media Specialist/Library
 - Mathematics
 - Physical Fitness
 - Science
 - Social Studies
 - Technology
 - Other. Please specify. _____

PART 3. Participant Feedback

To what extent do you agree with the following statements?

Participant Attitudes

8. This NASA experience has inspired me to bring NASA content into my program.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

9. I can immediately apply what I learned from this NASA experience to my own program about science, technology, engineering or mathematics (STEM).

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

10. I am better equipped to deliver this NASA-related STEM content to my audiences.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

11. Based on my NASA experience, I will make changes to my program activities.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

12. Which activities do you plan to change or add to your program? Check all that apply.

- Use printed materials presented at my NASA experience
- Use subject matter covered at my NASA experience
- Use technology resources introduced at my NASA experience
- Use web resources presented at my NASA experience
- Use teaching for delivery presented at my NASA experience
- Use learning resources (e.g. hands on activities).
- Other. Please specify. _____

Using NASA Materials in my Program

13. What future information, communication, or support from NASA would aid in your incorporation of the information presented in this NASA experience? [Text box]

14. The NASA materials used in this experience align well with what I share with my audiences.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

15. These resources will be effective in increasing my learners' interest in STEM topics.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

16. This NASA experience provided ideas for encouraging learner exploration, discussion and participation.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

Family Involvement

17. I received activities, ideas, or resources that could be used to involve families in their children's STEM education.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree
- Not Applicable

18. I plan to use the family ideas suggested.

- Strongly Disagree
- Disagree
- Neutral
- Agree

- Strongly Agree
- Not Applicable

19. I think the resources suggested will be effective with families.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree
- Not Applicable

PART 4: Participant Demographic Data (OPTIONAL) – Please Provide

20. What is your Gender? Check one.

- Male
- Female
- Do Not Wish to Report

21. What is your Ethnicity? Check one.

- Hispanic or Latino
- Not Hispanic or Latino
- Do Not Wish to Report

22. What is your Race? Check one or more.

- American Indian or Alaska Native
- Native Hawaiian or other Pacific Islander
- Asian
- White
- Black or African American
- Do Not Wish to Report

23. Disability Status? Check one or more.

- Hearing Impairment
- Visual Impairment
- Mobility/Orthopedic Impairment
- None
- Do Not Wish to Report
- Other, Please Specify: _____

Informal Professional Development Participant 120 Day Follow Up Survey

To what extent do you agree with the following statements?

1. After participating in a NASA program, I am confident in my ability to apply the knowledge and/or skills learned.

Strongly Disagree

Disagree

Neutral

Agree

Strongly Agree

2. The training I received was valuable.

Strongly Disagree

Disagree

Neutral

Agree

Strongly Agree

3. Based on my NASA experience, I have changed the educational activities at my organization.

Strongly Disagree

Disagree

Neutral

Agree

Strongly Agree

4. Which activities did you change or add at your organization? Check all that apply.

Used printed materials presented at my NASA experience

Used subject matter covered at my NASA experience

Used technology resources introduced at my NASA experience

- Used web resources presented at my NASA experience
- Used educational techniques presented at my NASA experience
- Use learning resources (e.g. hands on activities)
- Other. Please specify. _____

5. I received NASA curricular materials or publications.

- Yes
- No

If yes, please respond to all questions in the remainder of the survey. If no, please skip to Question #9.

6. I have used these materials in my organization.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

7. I am sharing these materials with others in my organization, formally or informally.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

8. The number of persons I reached when using these materials was...: _____

9. Based on my NASA experience, I have changed the educational activities at my organization.

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

10. What barriers, if any, have prevented you from using or integrating NASA content or materials in your education activities at your organization?

- Lack of opportunity to use the skills/knowledge
- Systems and processes within your organization will not support the use of skills/knowledge
- Lack of computer and/or technological resources
- Not enough time to integrate the material into educational activities.
- Resources do not meet our needs (Please explain). _____

- Need further information, interaction, or training from NASA. _____
- Other. Please specify.

11. Based on your experiences, please provide any recommendations for improving NASA learning materials and professional development experiences. 500 character limit

**APPENDIX K:
Operating Principles of the Science Education and Public
Outreach Forums
(29 January 2010)**

1. The Science Education and Public Outreach Forums (Forums) will provide fair and equitable services to all customers of the NASA Science Mission Directorate (SMD) Forums. Such services include advice on Education and Public Outreach (E/PO) project design and implementation and proposal preparation, and information on partnership and networking opportunities with a wide variety of E/PO institutions and programs within and outside of NASA.
2. Forums will not write or review all or part of SMD AO or NRA proposals. In all cases, the responsibility for formulating the E/PO program and preparing a proposal is that of the proposer.
3. Forums will treat E/PO proposals prepared by customers who respond to SMD AOs and NRAs as proprietary information.
4. Forums are, in some cases, embedded in larger host organizations that have ongoing E/PO programs. To ensure fair and equitable services, Forum team members and their host organizations will follow existing best and fair business practices and good faith measures used by NASA and the Earth and space science research community regarding pre-proposal information dissemination, proposal creation, peer review, and proposal selection.
5. Forums will provide information to customers about options for partnerships that feature competing possibilities and capabilities other than those of their host organization.
6. Forum team members will not participate in the review of E/PO proposals for which they have directly rendered services, or in which they or their host institutions are listed as partners.