Report of the NASA Explorer Institutes

Focus Groups and Pilot Workshops
September 2004 – March 2005

Planning and Evaluation Meeting
March 14-17, 2005
Acknowledgements

**NASA Explorer Institutes Staff**

Jim Stofan, Director, Informal Education  
Debbie Gallaway*, NEI Program Manager  
Jason Freeman*, Education Program Specialist  
Renee Juhans, NASA Headquarters Public Affairs  
Nora Normandy, NASA Headquarters Public Affairs

**NEI Pilot Workshop Principal Investigators**

Pam Biegert, NASA Kennedy Space Center  
Anita Davis, NASA Goddard Space Flight Center  
Bob Gabrys, NASA Goddard Space Flight Center  
Ivelisse Gilman, NASA Langley Research Center  
David Herring, NASA Goddard Space Flight Center  
Leslie Lowes, NASA Jet Propulsion Lab  
Ruth Paglierani, UC Berkeley Space Sciences Laboratory  
Bill Williams, NASA Langley Research Center

**Planning and Evaluation Meeting Staff**

**Meeting Hosts**
Myles Gordon, American Museum of Natural History  
Gretchen Walker*, American Museum of Natural History

**Lead Facilitators**
Liz Monroe-Cook, Monroe-Cook & Associates  
Jim Sweitzer, Science Communications Consultants

**Facilitators**
Noah Burg, American Museum of Natural History  
Lucia Cape, NASA Marshall Space Flight Center  
Hilarie Davis*, Technologies for Learning  
Mariet Morgan, American Museum of Natural History  
Katie Pruzan, NASA Space Grant  
Kay Tobola, NASA Johnson Space Center  
Ellen Wahl, Liberty Science Center  
Ryan Wyatt, American Museum of Natural History

**Meeting Support**
Tanya Das, American Museum of Natural History  
Nadine Gross, NASA Headquarters  
Kathryn Venzor, American Museum of Natural History

**NEI Focus Group Principal Investigators**

Alexandra Barnett, Chabot Space and Science Center  
Bob Bonadurer, Great Lakes Planetarium Association  
Alice Carron, ArtReach International  
John A. (Tony) Cook, Auburn University  
Laura Danly, American Museum of Natural History  
Karen Elinich, Franklin Institute  
Todd Ensign, EdVenture Group  
Heather Gibbons, Pacific Science Center  
Pam Kennedy, OU Sooner Flight Academy  
Alan Landever, Challenger Center for Space Science Education  
Brad McLain, Space Science Institute

*Report co-authors*
NASA Explorer Institutes: Exploring the Possibilities for Collaboration with the Informal Education Community

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Executive Summary

NASA Explorer Institutes, a new national level program, is intended to provide, "...as only NASA can," engaging experiences, opportunities, materials, and information to members of the informal education community including, but not limited to, representatives of science centers, museums, planetariums, libraries, parks, aquaria, nature centers, botanical gardens, youth groups, and community-based organizations.

In FY04, 17 NEI pilot projects were funded. Over 270 individuals, representing more than 145 informal education organizations, participated in six pilot professional development workshops. These workshops were designed to support informal science educators in using the unique assets of NASA Field Centers. Over 300 experts from the informal education community, representing over 200 institutions, participated in eleven focus groups. These individuals represented a wide range of expertise and were asked to identify strategies and approaches that can be used to effectively implement the NEI goals and objectives.

This report contains summary information and conclusions from the pilot workshops, focus groups, and the NEI Planning and Evaluation Conference which united representatives of the workshops, focus groups, and NASA education. The culmination of these NEI pilot initiatives resulted in the identification of strategies that could be used to increase collaboration between NASA and the informal education community. Based on that information, the Informal Education Division plans to support projects in four categories in FY05.

The four categories of NEI projects that will be considered for funding in FY05 include Professional Development Workshop Opportunities, STEM Teaching Tools and Products, Infrastructure Development Projects, and Partnerships for Sustainability. All NEI projects will be conducted by NASA Field Centers in partnership with members of the informal education community. NASA will continue to support the IEC through funding initiatives sponsored by the Informal Education Division and program support by informal education points of contact at the NASA Field Centers.
NASA Explorer Institutes Purpose

In 2004, the Informal Education Division initiated a new national level project called NASA Explorer Institutes (NEI). NEI provides, "...as only NASA can," engaging experiences, opportunities, materials, and information to members of the informal education community including, but not limited to, representatives of science centers, museums, planetariums, libraries, parks, aquaria, nature centers, botanical gardens, youth groups, and community-based organizations.

The goal of NEI is to encourage and support projects that:

- Improve the public’s understanding and appreciation of science, technology, engineering, and mathematics (STEM) disciplines to enhance their scientific and technological literacy, mathematical competence, problem solving skills, and the desire to learn;
- Establish linkages that promote new relationships between providers of informal and formal education resulting in improved and creative STEM education in all learning environments;
- Excite youth, particularly those who are underrepresented and underserved, about STEM disciplines;
- Expand STEM informal education programs and activities to communities/locations that have been traditionally underserved by such opportunities;
- Stimulate parents and others to support their children’s learning endeavors in formal and informal settings and to become informed proponents for high-quality, universally available STEM education in the home and elsewhere;
- Encourage and implement innovative strategies that support the development of a socially responsible and informed public who can make responsible decisions about STEM policy issues affecting their everyday lives.

The objective of the NASA Explorer Institutes is to enhance the capabilities of the informal education community to inspire the next generation of explorers by providing access to NASA staff, research, technology, information, and/or facilities and by:

- Engaging the informal education community in discussions about how to involve the public in shaping and experiencing NASA-related missions;
- Identifying NASA-related instructional content, resources, and information, in collaboration with the informal education community, that will enhance informal education program goals and objectives;
- Providing NASA-related professional development opportunities for members of the informal education community across the nation;
- Facilitating the formation of collaborative partnerships between informal and formal education communities.

In the first year, a comprehensive planning process was developed to inform the direction of NEI by working with the informal education community (IEC) to identify shared goals, needs, strengths and strategies.
Pilot Year Process

The 2004-2005 NEI Project was conducted in three phases. In phase one, NASA Field Centers competed internally for the opportunity to design and host pilot professional development workshops for informal science educators. In phase two, informal education institutions applied to host focus groups on the needs of particular informal science education sectors, geographical regions, or target audiences. In phase three, representatives from both the pilot workshops and the focus groups convened at a conference to collaborate, clarify, synthesize, prioritize and elaborate on the ideas developed in their individual projects.

Pilot Professional Development Workshops and Focus Groups

NASA funded pilot professional development workshops to support informal science educators using the unique assets of NASA Field Centers. NASA education and mission staff were invited to develop workshops in conjunction with an informal education partner. In several cases, the workshops were a product of multiple centers, mission offices, and/or informal education organizations.

<table>
<thead>
<tr>
<th>Workshop Title</th>
<th>Host NASA Center(s)</th>
<th>Partner Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth Explorer Institute</td>
<td>Goddard Space Flight Center</td>
<td>Maryland Science Center</td>
</tr>
<tr>
<td>From Earth to Sky</td>
<td>Ames Research Center and Goddard Space Flight Center</td>
<td>National Park Service</td>
</tr>
<tr>
<td>Girl Scouts USA NASA Experiences</td>
<td>Jet Propulsion Laboratory</td>
<td>GSUSA</td>
</tr>
<tr>
<td>An Innovative Collaboration Involving NASA’s Office of Biological and Physical Research, NASA Langley, and North Carolina 4-H</td>
<td>Langley Research Center</td>
<td>North Carolina 4-H</td>
</tr>
<tr>
<td>NASA Informal Education Partners for Excellence</td>
<td>Langley Research Center</td>
<td>Virginia Air and Space Center</td>
</tr>
<tr>
<td>Workshop for Informal Education Specialists (Return to Flight)</td>
<td>Kennedy Space Center</td>
<td>KSC Visitors Center; NASA Marshall, Johnson, Stennis</td>
</tr>
</tbody>
</table>

NEI Focus Groups assembled experts from the IEC. These experts were asked to identify strategies and approaches that can be used to effectively implement the NEI goals and objectives. Each focus group examined a different strategy to enhance the capabilities of the informal education community to inspire the next generation of explorers through access to NASA staff, research, technology, information, and/or facilities. Focus groups covered a wide range of topics, and many of the groups crossed multiple disciplines. However, to help with synthesis, some broad categories are used here to describe the groups:
### NEI Focus Groups – January/February 2005

<table>
<thead>
<tr>
<th>Topic</th>
<th>Host Institution</th>
<th>Products for Public Audiences (Exhibitions, media, etc.)</th>
<th>Programs for Public Audiences (one-time events, courses, camps)</th>
<th>Professional Development (Including all support for formal education)</th>
<th>Community-based programs for youth and families.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bringing NASA into Focus: Improving Effective Use of NASA Resources within the Informal Science Education Community</td>
<td>Pacific Science Center</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Digital Planetaria: Building Bridges Between Institutions, Universities, Programmers, and NASA</td>
<td>Chabot Space and Science Center</td>
<td>X</td>
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<td>X</td>
<td></td>
</tr>
<tr>
<td>Encouraging American Indians to Study Aerospace</td>
<td>ArtReach</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Exploring Common Resources and Needs with NASA Field Centers and Education Offices</td>
<td>Challenger Center for Space Science Education</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Extending NASA Education Resources through 4-H</td>
<td>Auburn University</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Internet2 and Informal Science: Connecting K-6 with NASA</td>
<td>Franklin Institute</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>NASA Listens to the Four Corners</td>
<td>Space Science Institute</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>New Frontiers: Focusing on the Future of NASA</td>
<td>OU Sooner Flight Academy</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Seeing the Universe: Visualizing Space for Informal Science Education</td>
<td>American Museum of Natural History</td>
<td></td>
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<td>X</td>
<td></td>
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<tr>
<td>Stellar Strategies to Understand the Universe</td>
<td>Great Lakes Planetarium Association</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The Integration of NASA NEI Programs and Resources into After School and Professional Development Programs Offered by Informal Science Education Institutions in the Eastern Region</td>
<td>The EdVenture Group</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Each focus group and workshop reported on the needs of the IEC, identified relevant NASA assets and effective mechanisms to access and leverage resources, and made recommendations for next steps. These reports were analyzed by NEI staff for goals, strategies, needs and strengths.
**NEI Planning and Evaluation Conference**

The NEI Planning and Evaluation Conference, held in March 2005, brought together representatives of the focus groups and pilot workshops with NASA education representatives. The conference was designed to facilitate the sharing and synthesis of ideas generated and lessons learned in the eleven focus groups and six pilot workshops.

Conference participants were initially divided into groups to discuss ideas and needs. Focus group and pilot workshop representatives were organized into four groups: products, programs, professional development, and community-based organizations (see table above for groupings). Other NASA education representatives met in their own groups (customer focus and content). Each discussion group described the intersection of their goals with NASA Explorer Institutes, then discussed and reported on common themes/issues, unique themes, short-term needs and long-term needs, organizing information under these categories:

1) Things NASA should know about working with our group
2) Factors involved in effectively serving our audiences
3) NASA assets relevant for our group
4) Mechanisms for the relationship between NASA & our group
5) Professional development for our group

Output from the subgroups was analyzed by the Informal Education Division staff and the conference facilitation team. Emerging themes, concerns, and program ideas were identified. Program ideas emerging in the first session drove the remaining sessions, as each idea was first elaborated by self-selected groups of conference participants, and refined by the original conference subgroups.

Each group working on the development of a program idea completed the following sentence stems:

1) Our big idea is …
2) Intended outcomes for this program, product, service are …
3) This program, product, service would serve …
4) This program, product, service would make use of these NASA resources …
5) Mechanisms needed to support this idea are …
6) This program reaches NEI goals by …

Refinement of ideas focused on implementation, feasibility, sustainability and evaluation strategies for each idea.

The results of the three day meeting were captured and analyzed for shared goals, strategies, needs and strengths. Pilot workshop and focus group reports were then analyzed for key themes and strategies in relationship to the themes that emerged from the conference to ensure that nothing was overlooked.

The NEI staff combined the results of the meeting with analysis of the final reports from each pilot workshop and focus group. The results of all of these efforts provided the framework for the FY05 NEI funding opportunity.
NASA Explorer Institute Pilot Year Process

11 Focus Groups and 6 Pilot Workshops
(552 Attendees from 314 Institutions)

National Conference
(representatives from 11 focus groups and 6 pilot workshops, 86 participants from 28 non-NASA institutions)

Report on Shared Goals, Effective Strategies, Future Directions

NASA Explorer Institute Design
Supporting Collaboration between NASA and the Informal Education Community

NASA’s Informal Education Division is designed to serve as a bridge between the large, diverse, and unique communities that exist both within NASA and throughout informal education. The pilot year of the NEI project identified the shared goals, strategies, needs, and strengths of NASA and the informal science education community that will serve as the foundation for future collaborations and partnerships.

Shared Goals:

- Promote public science learning: Both NASA and informal institutions seek to educate the public about science, particularly current scientific research.

- Reach underserved audiences (minorities, women, people with disabilities).

- Connect formal and informal education opportunities.

- Broaden participation in STEM pipeline: Both groups seek to inspire and support young people in the pursuit of STEM careers.

- Involve families: Informal institutions serve families and seek to engage entire families in cross-generational activities.

Strategies for Reaching Shared Goals:

- Build an infrastructure for accessing, developing, funding, supporting, sustaining programs in informal education community that utilize NASA resources.

- Provide STEM content and teaching tools to informal institutions and work together to develop curriculum and programs.

- Provide professional development opportunities based on the varying needs of different segments of the informal science communities – the professional development needs of science center staff are different from those of afterschool leaders.

The representatives of the informal education institutions and NASA each identified their needs and strengths to facilitate future collaboration. These themes emerged:

What Informal Institutions would like NASA to know:

- **Content**: The informal education community’s expertise is content delivery. Informal education needs NASA content. Work with us to design products and programs for the public.

- **Sustainability**: Informal education institutions need long-term commitments to be able to plan, deliver and sustain programs.
- **Leverage Funding**: Budget and staff shortages often impact program sustainability. Resources are limited, and there are competing content agendas. Informal education institutions need to be able to leverage partnerships with NASA to bring in additional funding.

- **Advanced Planning**: Long lead times are needed. Calendars are set and event planning happens months in advance. Curriculum takes time to adapt and/or develop. Institutions need long lead times to take full advantage of current science missions/events.

- **Variety**: Informal education institutions are as varied as the audiences they serve. There is variation in capacities and needs.

What NASA would like informal education institutions to know:

- **Limited Budgets**: Budget and staff time are limited. NASA education budgets can be tied to specific missions, projects, etc., that operate on specific time frames and need to cover related content. NASA’s strategic plan and budget are variable and subject to government oversight.

- **Larger NASA Mission**: Education is one piece of NASA’s overall agenda. The Agency has other missions to carry out in addition to its education missions. These missions receive the bulk of the resources and the bulk of the staff effort.

- **Advanced Planning**: As a federal agency, answerable to Congress and taxpayers, change and motion is sometimes slow, yet, at other times, sudden. Working with NASA requires long lead times and patience. NASA staff members should concentrate on managing partnerships but may not know the needs of a particular institution. Collaboration requires active participation on both sides.

- **Exploration Vision**: The new exploration initiative is a central focus: NASA’s next educational challenge is to consider how to integrate the exploration focus into NASA’s educational mission.
The synthesis across focus groups and pilot workshops reveals a strong set of shared goals, a clear strategic direction, and a strong match between IEC needs for content and NASA as a content provider. Challenges facing collaboration include maximizing limited budgets for program sustainability and coordinating the long lead times needed by both NASA and the IEC. The next section includes specific solutions proposed to address the needs and strengths of the two groups.
Future Directions

The recommendations that NASA received from the pilot workshops, focus groups, and the evaluation and planning conference are presented in three areas: Infrastructure, or mechanisms for collaboration; STEM content, needs and resources; and, Professional Development.

Infrastructure

An overarching theme emerging from this collaborative planning process was the opportunity for NASA and the informal education community to learn from each other. The informal education community has an extensive grassroots reach into their target communities. They are experienced in recruiting and engaging members of their communities over time in a variety of activities. They are used to adapting and dovetailing with formal educational programs. NASA has rich and deep resources, name recognition and public events that interest people. NASA and the informal education community share the goals of increasing everyone’s science literacy, particularly families and the underserved.
Infrastructure recommendations for NASA action:

- Creating ways to make NASA resources easily accessible to the informal education institutions (through Field Centers and a web portal).
- Supporting the adaptation and dissemination of materials for informal education (host and maintain a best practices database, co-develop instructional materials with informal institutions).
- Using NASA tools such as NASA TV to provide content for informal education.
- Seeing informal education institutions as partners in educating the public about current events in the media.

Infrastructure recommendations for IEC action:

- Providing advisors to NASA on informal education constituents and delivery.
- Becoming involved with scientists for education and public outreach (E/PO).
- Creating and managing traveling exhibits on timely topics through the Museum Alliance Network.
- Creating and maintaining a STEM Ambassador program with certification in NASA content and resources.

Possible Infrastructure Strategies/Solutions

Several general categories of infrastructure and solutions for providing that infrastructure emerged from the discussions. Recommendations from the focus groups and pilot workshops included:

*Portal for Resources and Partnerships*

NASA should provide an online environment that allows easy posting and searching of resources, matchmaking tools which promote partnerships, and access which encourages informal education institutions to use NASA resources. Such information should be searchable by theme, content, age, audience, or tool.

*National-level Partnership and Sponsorship*

Ongoing programs primarily sponsored by informal education institutions can enter partnerships to use the NASA name, content, and expertise, as well as funding. Existing afterschool science clubs and space-related programming hosted by informal institutions could connect directly with NASA-provided materials and STEM advisor support. Program developers at informal institutions can use the NASA support to integrate NASA content. A more direct connection between such programs and NASA would promote a continuous NASA presence for informal education customers.

*Role in Current Public Events*

Informal education institutions seek involvement in timely events (celestial events, launches) as part of the NASA’s public outreach. Informal institutions can serve as local hosts for NASA mission events, feeding NASA content into their existing infrastructure of family nights, exploration clubs, after school programs, and support for schools/formal education institutions. The establishment of such a network would require a centralized point of contact that alerts informal institutions of upcoming events with sufficient lead
time to work into their event planning cycle, and a consistent format for NASA supplied content/resources.

**Dissemination Partners**

Science-Rich Institutions (museums, planetaria, Challenger Centers) could become “NASA-certified” partners and provide programs, professional development, creation or adaptation of curriculum and serve as hubs for informal education activities.

**STEM Content**

NASA has science content, facilities, and professionals to offer. The IEC has expertise in content delivery. Facilitating collaboration between NASA and IEC partners requires an understanding of what content is available and which formats will best support eventual delivery of that content. This is not a simple determination to make.

**One-NASA Resource for Informal Education**

Informal educators throughout the NEI project urged NASA to present “one NASA” to their community. Informal educators want a single point of contact to help find upcoming events, available resources, and lessons learned by others who have delivered the same content. In the above infrastructure section, an Internet portal was highly recommended. Other recommendations included use of specific individuals or physical locations to provide this single stop for NASA content.

**Content Adapted to Unique IEC Programming**

However, one point of contact does not translate into ‘one size fits all.’ IEC institutions vary widely in STEM expertise. Institutions may have certified teachers, high school student instructors, retired scientists, or parent/community leaders as facilitators of activities. Informal educators are hungry for rich content in multiple forms, such as visualization tools, images, live broadcasts, interactive video-conferencing and web interfacing. They want access and know-how to bring these resources to their constituents, support formal education, and represent NASA in the field. Informal educators are used to adapting materials from different sources as well as creating content for their audiences. IEC programs often serve different ages and abilities, as well as different cultures and interests. They want to partner with NASA to adapt and develop materials for informal setting such as afterschool programs, evening events, family nights, special presentations and projects.

**“Hub and Spoke” Dissemination Networks**

NASA/IEC collaboration might best be served by taking advantage of the diversity of capacity and knowledge within the IEC community. A “hub and spoke” relationship could be created with the larger, science-rich organizations as the hubs for NASA products and professional development. These hubs then provide support for smaller, less resource-rich informal education groups. Community-based organizations with knowledge of specific communities, could work with the hubs to create spokes tailored to their community’s needs. This strategy would create a dissemination network organized
by region. This would encourage collaboration to build the IEC capacity to offer NASA content.

**STEM Activity Kits**

It was also suggested that core STEM content could be identified and packaged in activity kits or traveling exhibits. Development of such kits and training on use could be done through science-rich institutions such as planetaria and museums. This would provide a new, unique context for NASA missions and events.

NASA’s mission has the power to inspire. As one of, if not the, premier science organization in the world, NASA inspires people to achieve what they thought they could not. NASA and informal educators can work together to tell the stories of those who work for NASA and those for whom NASA has been an inspiration. Informal educators suggested that, by partnering with NASA, they can offer life-changing events. They can focus STEM content on local, as well as, global issues of significance and make NASA content relevant to people’s immediate lives and their dreams. They can use NASA resources to feed the pipeline for STEM careers.
**Professional Development**

Professional development can promote collaboration by building the capacity of collaborators, facilitating communication, and providing a mechanism for continuity, both among informal education institutions and between the IEC and NASA.

**NASA-sponsored professional development workshops**

NASA can provide life-changing content and experiences. To make these experiences available and accessible to as many people as possible, NASA must make its unique content available to local users. Two strategies were identified for promoting the professional development of informal educators. These strategies can leverage the efforts of both NASA and the IEC and take advantage of existing networks in both communities.

NASA can increase the capacity of local organizations by establishing a network of trainers. To develop and nurture content expertise within the informal community partner’s infrastructure and culture, NASA could host regional training on relevant topics open to the IEC. Some groups even suggested that NASA train and certify STEM Ambassadors, creating a web of trainers and education providers.

Another strategy for leveraging professional development is the “train-the-trainers” model. Different segments of the IEC have established professional development networks and their own communities of trainers. By working with these established networks, NASA can benefit from IEC organizations’ ability to adapt programs to their own backyard. Creating a strong infrastructure will support significantly more local programming, as implemented by local educators, than could be supported by NASA alone.

To further encourage connections between NASA and the IEC, NASA could invite an “informal educator in residence” to develop curriculum. There could also be a staff exchange program where informal educators work at NASA and vice versa.

**Replicating best practices**

NASA projects with informal education should be designed for sustainability and replication. By establishing a common infrastructure, best practices and programs can be shared throughout the informal community, reducing duplication of effort, maximizing the impact of each program, and providing continuity in NASA-sponsored programming.

Suggestions for promoting continuity across programs included:

- Creating standards for informal educational materials, a NASA “seal of approval,” or a credential for dissemination sites for NASA content.
- Building expertise and recognition within partner organizations for unique capacities that can then be shared through training or provided as services.
- Establishing several common levels of technology and format for the dissemination of data, visualizations, and other mission information.

Replication of best practices can be promoted through training and documentation. NASA should support efforts to teach core STEM content which then supports all other educational
opportunities. Using the NASA portal or a similar infrastructure to document best practices as they evolve and making them available for replication will ensure continuous improvement. Commitment to NASA programs may be built through coordinated and standardized training (perhaps through science-rich institutions) and by sharing what is learned widely.

**NASA materials and resources tailored to informal education settings**

NASA has a number of existing structures and products that could be expanded or tailored serve the IEC. NASA could offer reciprocal training between NASA content providers and informal educators around existing NASA education programs. This may lead to cooperative development or adaptation of products and methodology for informal education. Standard evaluation protocols should be developed and used to refine programs, document results and develop models and principles for implementation. Existing distance learning capabilities can be better used to connect people to provide mentoring opportunities. NASA should promote informal educators’ use of Educational Resource Centers and development or adaptation of materials for the IEC.
Communication
Communication is a critical piece of the structure needed to support informal education. Networking, sharing, and training will succeed if supported by an effective communication infrastructure. Several groups recommended methods for NASA to build its capacity to communicate with the IEC:

- Create a cadre of NASA representatives, at local, regional, and national levels, who are tied into NASA and their informal science/youth development communities.
- Create that portal for information retrieval, posting, partnering and co-creating programs.
- Create a search engine on the web that increases access to relevant and reliable science information.
- Support communication and collaboration between different members of the IEC (museums, community-based orgs, etc.). Methods of connection include conference calls, informational meetings, and conferences. All of these should encourage “dreaming up new initiatives together.”
- Support communication technologies, such as blogs and bulletin boards, to connect various segments of the IEC.
- Share working models for collaboration. Have partners that are working well together feed information and program models for effective collaboration back to both the IEC and NASA.
**Conclusion**

The analysis reveals several critical factors for success in this partnership as perceived by the two communities:

**Continuity** → stable structures, clear communication, and a commitment to build relationships and resources over time;

**Access** → to each other and to each other’s resources and expertise;

**Usability** → resources that are or can be adapted, professional development designed for informal educators with diverse backgrounds, and a range of technology requirements;

**Affiliation** → both organizations can further their goals and benefit from an active partnership.

Based on the input from over 552 individual FY04 NEI participants, representing at least 314 institutions, the next steps of the NEI project have been developed in conjunction with the writing of this report. The four categories of NEI projects that will be considered for funding in FY05 include Professional Development Workshop Opportunities, STEM Teaching Tools and Products, Infrastructure Development Projects, and Partnerships for Sustainability. All NEI projects will be conducted by NASA Field Centers in partnership with members of the informal education community. NASA will continue to support the IEC through funding initiatives sponsored by the Informal Education Division and program support by informal education points of contact at the NASA Field Centers.
A Vision for NASA/IEC Collaboration

NASA and the IEC are connected through portals (searchable, downloadable, plug and play, uploadable), blogs, video conferencing, and lifelong learning portfolios for audiences, participation in collaborative projects.

NASA and the IEC provide meaningful, life changing events. We create possibilities in the minds of those we serve – our neighbors, friends and colleagues.

NASA and the IEC listen to each other - Collaborating develop products and programs so they are responsive to communities needs, with reciprocal training opportunities –combining NASA content with IEC practical everyday experience of content delivery to a variety of audiences.

NASA collaborates with the IEC to make resources available - on our desktops – through broker/facilitator networks – at several levels of technology – through regional on and off site training - NASA TV.

The IEC supports clear understanding of core STEM content. Its members are connected to NASA mentors, and have clear communication channels with NASA personnel.

NASA and the IEC many ways to involve our communities – common programs, information our communities can use, local data and projects that make a difference

NASA and IEC combine efforts to reach common goals – promoting science literacy and broadening participation in STEM – through networks of certified ambassadors and products that have the NASA seal of approval.

NASA and the IEC know what works – we do ongoing evaluation as part of a larger systematic effort with common research questions, protocols and instruments

We are the pipeline – we know the audiences – we have the delivery systems- we inspire and support young people seeking to become a part of the STEM workforce.
Appendix

### NEI Pilot Workshops: Participating Institutions

<table>
<thead>
<tr>
<th>Institution</th>
<th>Location/State</th>
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<tbody>
<tr>
<td>21st Century Community Learning Center</td>
<td>Oklahoma</td>
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<tr>
<td>Adler Planetarium &amp; Astronomy Museum</td>
<td>Illinois</td>
</tr>
<tr>
<td>Adventure Science Center</td>
<td>South Carolina</td>
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<td>AIM Clubs</td>
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<td>Strategic Air &amp; Space Museum</td>
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<td>Support Our Students</td>
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<tr>
<td>Wyalusing and Nelson Dewey State Park</td>
<td>North Carolina</td>
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</table>

*Note: The list is not exhaustive and may include additional institutions not specified in the provided text.*
NEI Focus Groups: Participating Institutions

- 4-H Youth Focus Group
  - Academy of Natural Sciences
  - Adler Planetarium & Astronomy Museum
  - Adventure Science Ctr.
  - Alabama Cooperative Extension System
  - American Association for the Advancement of Science
  - American Museum of Natural History
  - Ardmore Avenue Elementary School
  - Arizona Science Ctr.
  - ArtReach
  - Avampato Discovery Museum
  - AVANCE
  - Bowling Green State University
  - Boys and Girls Club of Indianapolis
  - Breakaway Interactive
  - Brevard County Extension
  - Brownsburg Challenger Learning Ctr.
  - Buehler Challenger & Science Ctr.
  - Cabaret Chocolates
  - Capital Area Intermediate Unit
  - Carbon Lehig IU #21
  - Carnegie Science Ctr.
  - Ctr. for Early Childhood Professional Development
  - Ctr. of Excellence for Remote & Medically Under-Served Areas
  - Chabot Space & Science Ctr.
  - Challenger Ctr. for Space Science Education
  - Challenger Ctr. Hawaii
  - Challenger Learning Ctr. at Kirby Smith Middle School
  - Challenger Learning Ctr. at University of Tennessee
  - Challenger Learning Ctr. at Wheeling Jesuit University
  - Challenger Learning Ctr. for Science and Technology
  - Challenger Learning Ctr. of Colorado Springs
  - Challenger Learning Ctr. of Dayton
  - Challenger Learning Ctr. of Indianapolis
  - Challenger Learning Ctr. of Kentucky
  - Challenger Learning Ctr. of Lucas County
  - Challenger Learning Ctr. of Maine
  - Challenger Learning Ctr. of Northwest Indiana
  - Challenger Learning Ctr. of San Antonio
  - Challenger Learning Ctr. of Tallahassee
  - Challenger Learning Ctr., St. Louis
  - Challenger Learning Ctr., Coca-Cola Space Science Ctr.
  - Challenger Learning Ctr., Columbia, SC

- Challenger Learning Ctr.
  - George Observatory Bra
  - Kalama Zoo Valley Museum
  - Louisiana Art & Science Museum
  - Texas City at Union Station
  - Chandra Science Ctr.
  - Christa Corrigan McAuliffe Challenger Learning Ctr.
  - Cinemathex, Inc.
  - Cisilunar, Aerospace, Inc.
  - Clark Planetarium
  - COSI
  - Dana Berry Skyworks Digital
  - Delaware Co. Intermediate Unit
  - Delaware North Parks & Resorts
  - Denver Museum of Nature & Science
  - Department of 4-H Youth Development, NCSU
  - Don Davis Space Art
  - Drefuss Planetarium
  - Edinboro Univ. of Pennsylvania
  - Evans & Sutherland
  - Evansville Vanderburgh School Corp
  - Exploration Place
  - Family Charter School
  - Fernbank Science Ctr.
  - Franklin Institute
  - Georgia Southern University
  - Girl Scouts - Totem Council
  - Girls Incorporated of St. Louis
  - Glendale School District
  - Great Lakes Planetarium Association
  - Harvard-Smithsonian Ctr. for Astrophysics
  - Hilton Pond Ctr.
  - Hook's Discovery & Learning Center
  - Houston Museum of Natural Science
  - Imagemove/Space.com
  - Installation Management Agency Southwest Region
  - Int’l Council of Air Shows
  - Int’l Museum of Art & Science
  - Iowa State University Extension
  - J.R. Fuggett Middle School
  - Kansas Cosmosphere and Space Ctr.
  - Kansas State Univ., Dept. of 4-H Youth Development
  - Kingman Museum
  - Kirkpatrick Planetarium,
- Owipsuem Science Museum
- Last Frontier Council, Boy Scouts of America
- Loch Ness Productions
- LodeStar
- Louisiana Art and Science Museum
- Louisiana Dept. of Education
- Louisiana State University
- Lower Hudson Valley Challenger Learning Ctr.
- Maas Digital LLC
- MAEA Interactive Science Programs
- MAGPI / Univ. of Pennsylvania
- ManyOne Networks
- Maryland Cooperative Extension Service
- Maryland Science Ctr.
- Maxis
- Merced County Extension
- Mid-Atlantic Planetarium Society
- MIT/NOVA
- Monroe-Cook & Associates
- Mountain Plains Library Assoc.
- NASA Ames Research Ctr.
- NASA Glenn Research Ctr.
- NASA Goddard Space Flight Ctr.
- NASA Headquarters
- NASA IVF Facility
- NASA Jet Propulsion Laboratory
- NASA Johnson Space Ctr.
- NASA Langley Research Ctr.
- NASA Mid-Atlantic Region Space Science Broker
- NASA Specialized Ctr. of Research and Training
- National Association for Interpretation
- National Business Aviation Association
- National Ctr. for Supercomputing Applications
- National Optical Astronomy Observatory
- National Park Service
- National Park Service, Oklahoma City National Memorial
- National Radio Astronomy
- New Jersey Cooperative Extension Service
- New York Hall of Science
- Nierman Challenger Learning Ctr., Reuben H. Fleet Science Ctr.
- North Carolina 4-H
- North Carolina Space Grant
- North Museum of Natural History & Science
- NSSTCAMSTEC
- Office of Catholic Education of the Archdiocese of Philadelphia
- Office of Information and Technology
- Oklahoma Aeronautics Commission
- Oklahoma Cooperative Extension Service
- Oklahoma Technology Council
- Orlando Science Ctr.
- OSU Cooperative Extension Service
- OU Sooner Flight Academy
- Pacific Science Ctr.
- Paragon Tech
- Pegasus Productions
- Penn Video Network
- Pinney Ridge Kids
- PIXAR Animation Studios
- Polyhedron Learning Media
- Purdue University
- Quarks to Clusters
- Reuben H. Fleet Science Ctr.
- Riken Research Institute
- Robeson Planetarium & Science Ctr.
- School’s Out Washington
- Science Central in Fort Wayne, IN
- Science City @ Union Station
- Kansas City Science Communications Consultants
- Science Museum of Minnesota
- ScienceWorks Hands-On Museum
- Secret Level
- SETI Institute
- Shaker Heights High School
- Sharpe Planetarium
- Shedd Aquarium
- Sky-Skan
- Space Science Institute
- Space Science Network
- Space Telescope Science Institute
- Spiitz, Inc.
- Spitzer Science Ctr.
- St. Louis Science Ctr.
- Starlight Productions, LLC
- State 4-H Office, Ohio
- Suffolk County Community College
- Texas 4-H and Youth Development
- The Elumenati, LLC
- Twin Cities Public Television
- Twist University of California
- University of Chicago
- Univ. of Colorado Museum of Natural History
- Univ. of Illinois, Dept. of Aerospace Engineering
- University of Oklahoma
- University of Oklahoma – Senior Adult Services
- Univ. of Oklahoma National Resources Ctr. for Youth Services
- Univ. of Oklahoma, American Indian Institute
- Univ. of Oklahoma, National Ctr. for Disability Services
- University of Toledo
- University of Washington
- Utah State 4-H Office
- Virginia Cooperative Extension Service
- Visual Bandwidth
- Westlake Schools Planetarium
- Whatter Ctr. for Science & the Arts
- WLSC SMART Ctr.
- WV Dept of Agriculture, Plant Industries

Office of the Chief Education Officer
Informal Education Division
NASA HQ
300 E Street, SW
Washington, DC 20546
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