NASA EDUCATION PARTNERSHIPS FORUM

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Summary Minutes

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Introduction

On September 12, 2006 the NASA Office of Education hosted the Partnerships Forum. The purpose of the Forum was to:

- Increase knowledge and understanding of the national context of NASA's education legacy of innovation,
- Use NASA's Education Framework ("Pyramid") and strategy to inspire and empower leaders as innovation change agents and advocates,
- Foster understanding of a systems approach to address the three priority education outcomes,
- Clarify the strategy using education panels at each Center,
- Foster participant discussion and capture ideas/common visions of education partnerships as a strategy to achieve NASA education outcomes and support national initiatives to increase student pursuit of STEM career paths, including teaching,
- Identify ongoing education efforts with which NASA might collaborate and leverage its unique people, content and facilities.

This one day event commenced with presentations by thought leaders. These presentations were followed by roundtable group discussions that focused on questions regarding education and partnerships. This document begins by providing a synopsis of the roundtable group discussions. The synopsis is followed by outlines of the thought leaders' presentations. Comprehensive summaries of the group discussions follow the outlines. The document concludes with a summary of the Forum participants' feedback.

For more information on NASA's partnership and collaboration initiatives, visit **www.nasa.gov/education/partnership**.

Synopsis of Group Discussion

What makes a partnership successful?

- Shared values, communication, synergy, and sustainable resources contribute to partnership success. Shared values foster sustainable relationships. Communication using a variety of media is essential to engage stakeholders in addressing community needs. Synergy is achieved through commitment of partners to address community challenges. Resources are sustainable when leveraged with demonstrable return on investment.

What emerging models for education would guide partnerships?

- As a result of growing recognition of the value in partnering to address our nation's educational challenges, partnerships emerge from across a broad spectrum of stakeholders, e.g., universities, governments, businesses, non-profits, families.
- Establishment of Future's Panels, advisory boards, and STEM councils with broad organizational representation facilitates engagement of individuals in addressing community needs.
- Emerging models include integration of experiential-based and informal learning into the educational process. Engage students in interactive problem solving and real-world projects that benefit their community. Recognize that learning is a continual process that continues throughout life.
- Role models are vital to education; programs should foster mentoring across all educational levels, from professionals to grade-school students.

How can we use technology and innovation to embrace partnership goals?

- Technology provides tools to facilitate communication and to help overcome resource limitations by providing broad access to knowledge bases. Technologies and applications can bridge different communities and reach people in remote locations.
- A broad range of technologies can bring information to the classroom and into the hands of students. Technology is a valuable aid for teaching problem solving, critical thinking and enquiry-based learning.
- Technology integrated into education enables a wide variety of options for engaging students. Technology strengthens partnerships through increased utilization of partner resources.

What methodologies would you recommend for establishing partnerships?

- Establish communication channels and seek input from community stakeholders. Actively listen to and understand partner's motivations, needs, and resources. Create a clear definition of common goals and a plan to address needs.

- Create an environment that is receptive to and nurtures technology, innovation, and partnerships. Communicate standard information on an ongoing basis.
- Be inclusive and active in the community. Recognizing shared goals of helping students, faculty, and institutions to succeed will contribute to creating an environment that fosters sharing and excellence.
- Approach obvious and enthusiastic partners and attract others outside existing group.

How can we engage "thought leaders"—those who have established successful partnerships—as resources for NASA?

- Thought leaders come from all walks of life. They may be scholars, experts, or researchers. The may come from industry, government, non-profits, or professional, student, and faculty organizations. They may be outliers or people peripherally aligned with, but not engaged in, addressing partnership goals.
- Invite thought leaders to an initial meeting. Engage thought leaders through specific events, mentoring opportunities, staff exchange agreements, research opportunities, and consulting exchanges.
- Involve thought leaders in the development and implementation of education strategy. Demonstrate commitment to and impact of thought leaders' advice.
- Share thought leaders' ideas, presentations, and resources through newsletters, conferences, panels, etc.

What is your vision for the Future's Panel and the partnership process?

- Future's Panels are established at each NASA center, which spans grassroots organizations and government agencies. A hierarchal structure includes an overarching cross-center panel responsible for communication.
- Panels include participation of core stakeholders, e.g., students, parents, staff, teachers, industry, and government. Panels include kids, emerging scholars, and individuals excluded in the past, who may think beyond traditional paradigms.
- Panels are strong regional coalitions that have common operational constructs and goals. Each panel is unique and dynamic, offering a cumulative value-added effect.
- Panels identify ways in which people can contribute and initiate pilot programs with the local, city, state, national, and international stakeholders. Panels help NASA centers develop beneficial partnerships and identify strategic key stakeholders.

How can partnership help your organization?

- Partnerships can create a shared vision and prioritized list of community needs.

- Partnerships can create environments whereby students, teachers, and institutions help each other. Partnerships can build public and private support based on the cohesive networks established. Partnerships can generate pipelines through which students can be promoted and nurtured from one level to the next.
- Partnerships can broaden their knowledge base, expand their reach to a larger variety of audiences, and promote each other's assets and contributions. Partnerships can provide mechanisms that help institutions share and leverage resources to strengthen education.
- Diversity within partnerships can generate creativity and promote thinking outside the box, resulting in new perspectives, more innovative ideas, sound approaches, and solutions.

Welcome and Introduction of Keynote—Dr. Bernice Alston

Dr. Alston, opening the meeting on behalf of the mission directorates and the 10 education centers, welcomed participants to this planning forum. Dr. Alston recognized the participation of two teams of NetGeneration of Youth (NGY) Cyberjournalists, one team from Medgar Evers College NASA SEMAA (Science, Engineering, Math, Aerospace Academy), Brooklyn, New York and another from Montgomery County Public Schools Blake High School, Silver Spring, Maryland.

In furthering partnerships, the purpose for this meeting is to foster discussion of the legacy of NASA's innovations, its education framework (including the governing structure), and ways to make partnerships work through a systems approach; and to identify education efforts where NASA might collaborate.

Dr. Anngie Johnson introduced Ms. Christyl Johnson.

Celebrating NASA's Legacy of Innovation: Addressing the Global Challenge—Ms. Christyl Johnson

Until 40 years ago, when John F. Kennedy announced that we would go to the Moon, NASA had focused on developing satellite technology. Going to the Moon raised NASA's profile, and then, in 2004, Pres. Bush presented a new vision for NASA: go back to the Moon, then on to Mars and beyond. To do this, NASA will need all of its partners—engineers, technologists, mathematicians, scientists, and mission support people. *Apollo* era engineers have retired, so we must improve the caliber of instruction and cultivate a culture of excellence. The *Columbia* accident analysis pointed out deficits in NASA's policy toward its engineers. Now in its effort to return to engineering excellence, the engineering function has been made independent, putting engineers are on an equal footing with program managers whose role emphasizes meeting deadlines and budget estimates.

In 1983, *A Nation at Risk* said that education was challenged by a rising tide of mediocrity, and that the United Stated had undergone "unilateral education disarmament." Since then, other studies have promoted better education, and most recently, *Rising above the Gathering Storm* reported that, without a focus on education, the United States will lose its place of world leadership.

At the same time, NASA researchers continue to innovate in technologies that have revolutionized people's lives, affecting every field of endeavor—e.g., the "jaws of life" (used to cut people out of wrecked cars), athletic equipment,

wireless telephones, computer barcodes, laser surgery to improve vision, cochlear implants, airplane equipment to stabilizer cabin pressure, and heart surgery devices. In 2005, there were 1735 inventions (5 per day); the return on investment was $7 for each $1 spent. A goal of this meeting is to determine how to continue this tradition of innovation, but with limited resources.

STEM Education Challenge: NASA's Portfolio Approach—Mr. John M. Hairston

"A vision without a plan and perseverance is just a dream." NASA's education development and framework has been approved within the last 8 months. The vision for space exploration is a national—not a NASA—vision to advance U.S. scientific, security, and economic interests through a robust space exploration program. And, education is alive and well, despite pervasive forecasts of gloom; the 2006 NASA Strategic Plan includes education. Its strategic goals are:

1. Fly the shuttle as safely as possible until its retirement.
2. Complete the International Space Station.
3. Develop a balanced, overall program of science, exploration, and aeronautics to focus on exploration.
4. Develop new crew exploration vehicles.
5. Encourage the pursuit of appropriate partnerships with the emerging commercial space sector.
6. Establish a lunar return program having the maximum possible utility for later missions to Mars and other destinations.

Strategic communications include stakeholder outreach and education initiatives, focusing effort on legislative affairs, public affairs, external relations, and education. These efforts must be relevant and consistent, and they are coordinated agency-wide to ensure a consistent NASA message. In this way, the Agency will continue its tradition of investing in the nation's education programs, and of maintaining its commitment to excellence in STEM education.

The Administrator's guidance says education should map to the agency's strategic plan, use a closely defined and coordinated portfolio approach, have clearly defined roles and responsibilities to promote coordination, and have a well-defined evaluation plan. The *NASA Education Strategic Coordination Framework: A Portfolio Approach* constitutes one response to this directive. The framework allows potential partners (e.g., GM) to see their place and how they fit into the overall plan. In the portfolio approach, data are collected to develop the right tools—and, NASA's call for data resulted in a 98% response.

Outcomes are aligned with the 3 education goals—workforce development, strengthening the pipeline, and public benefit—and guided by 3 desired outcomes:

1. Contribute to the development of the STEM (science, technology, engineering, mathematics) workforce in disciplines needed to achieve NASA's strategic goals, though a portfolio of investments.
2. Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.
3. Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission.

A pyramid approach can be used to describe the education portfolio strategic framework, with outcome 3 (informal education) at the bottom, then 2 (elementary and secondary education), and 1 (higher education) at the top. To reach our goals, we must align resources to content, facilities, and people. The changing demographics in the United States make diversity a key issue. Relevance is a very important operating principle—any program must benefit the nation, NASA, and its partners. The bottom line is that NASA needs partnerships to ensure sustainability because NASA cannot do everything by itself.

Applying a Systems Approach to Cultivating, Strengthening, and Sustaining NASA Partnerships—Dr. Bernice Alston & Dr. Ronnie Lowenstein

Dr. Alston: Community-based organizations are very interested, and NASA needs to find the best ways to partner with them; that is today's focus. This group was convened to get input from real partners. Dr. Lowenstein has studied and written about successful partnerships.

Dr. Lowenstein: NASA is soliciting feedback to guide its next steps. We're living in revolutionary times of tumultuous change, in which science and technology has propelled us out of the Industrial Age into a Knowledge Driven Digital Age transforming every aspect of our lives. Many of the changes and the attendant discomforts had been prophesied. For example, in 1970 Alvin Toffler described the 'Future Shock' of 'waves of change coming faster and faster. In 1982 in his national best seller, Megatrends, John Naisbett detailed the dramatic restructuring of American society from an industrial age of production to a post modern age of services and information which he characterized as "living between the parentheses." A few years later, education futurist and historian Harold Shane observed that such rapid change had thrust society past Toffler's

"future shock" and into "hyper-turbulence." More recently, MIT sociologist and cyberspace anthropologist Sherry Turkle noted we are poised between the second and third wave of civilization in the "liminal moment," a time when things are between and betwixt – where old structures have broken down and new ones have not been created.

As we wish to keep up with waves of change, we have to address both the sociology of learning and the cultures of schooling. … We need to establish a more holistic, interrelated system of possibilities. It is clear that as we reflect on the STEM Education Crisis, America must innovate or we will abdicate our competitive edge. .. Today and going forward., we hope to learn from a variety of "thought leaders" who can help us confront our current realities.

A systems thinking approach is being promoted (e.g., by Peter Senge and Rick Stevens), i.e., we must address education issues with a systems approach just as we did when building the Space Shuttle and International Space Station. And the answers we seek must be borne out of the thinking of all of us. A systems approach involves a systematic and ongoing future's-focused communication process, which would provide scalable approaches that empower NASA leadership and foster an ecology of community transformation.

NASA is adapting the Future's Research Methodology (Delphi Research Methodology) to initiate an ongoing Systems Model of Communication with and among the 10 NASA sites. Each Site will invite a Future's Panel to engage in an iterative cycle of reflection, inquiry, and synthesized feedback; each Site will analyze and synthesize the feedback and create a report. On an ongoing basis, NASA Headquarters will aggregate reports and create an *Annual State of the NASA Education Future: Celebrating Partnership*, and other reports. Headquarters will also provide training, guidelines, and technical assistance to ensure consistency among sites. Each site will have a monitor to coordinate inquiries and will create a Partnerships Future's Panel. The constituents of a Panel will include stakeholders, experts, and facilitators who represent not just scientific knowledge, but sensitivity to diversity ---diversity of ideas, culture, geography, and education levels Panels will address the myriad of issues related to initiating, implementing and sustaining robust and effective partnerships. Headquarters will coordinate the data and produce a final report for national and international use. Various publics must be engaged at every stage to ensure that visions and innovations are understood, and political will to support them is cultivated.

Adapting a Delphi Methodology to create a systematic communication process with iterative cycles of inquiry, reflection, synthesis and feedback can foster consensus and coalition-building across our country. The process, using the

NASA systems approach, reinforces the value of NASA's ideas, but also conveys respect for diverse ideas and autonomy of individual Sites. Outlier views may be as productive as the consensus views, so they should be recognized and reflected upon. The final report will be a powerful tool, by which NASA will be recognized as the resource that it is.

Q&A

- Dr. Lowenstein has written several books on the partnership process and worked with organizations to help them establish a systematic process to secure robust, effective and sustainable private public partnerships. A partnership development process can provide innovative programs with a portfolio of resources until the programs are institutionalized.

Panel: Introducing "Thought Leaders" (Community, State, and National Levels)—Dr. Ronnie Lowenstein, Ms. Elane Scott, & Dr. Lynda Goff

Dr. Lowenstein: Thought leaders are conceptual innovators who can inspire and support—Dr. Scott and Dr. Goff, for example. They will talk about lessons they have learned in creating robust, sustained partnerships.

Why Are Our Children Falling Behind in Science and Mathematics? What Can NASA Do to Help Reverse the Trend?—Dr. Lynda Goff

Two reports—*Rising above the Gathering Storm,* and *Science and Mathematics Indicator Report, 2006*—show that, as students progress through grades 4 through 12, they become less proficient in math and science. The United States has been ranked #19 in math and #14 in science (Korea ranks #1). And, this despite the fact that we now spend more than half a trillion dollars on education. But the money is not in a focused and efficient way. Meanwhile, all philanthropic contributions to education barely exceed a billion dollars. To achieve a workforce of the future with training in science and math, we need to partner more effectively.

An example of the economic consequences of this problem is Toyota's decision to put an assembly plant in Canada because, despite Canada's higher cost of labor, training the U.S. workforce would be not be cost effective. The banking industry is also concerned because 90% of its employees have only a high school diploma and must be retrained for banking. Public utilities are interested because they must recruit from their state and the employees must reflect the state's diversity (therefore they cannot go elsewhere to find qualified people).

In universities, interest in science and engineering has remained at about 30% of undergraduates for 2 decades, but the total number of degrees has decreased (especially in mathematics, physics, and engineering). E.g., some 70% of the Berkeley engineering students are foreign. In California, 15,000 degrees per year are given in science and math, of which only about 2000 are in math, despite there being some 750,000 math students. Only about 50% of students who begin studying science and math go on to complete their degree in science and math.

We have reached this state of affairs because curricula in many states offer little or no science in the lower grades, e.g., an average of 2 minutes per day in California. Teachers are often poorly prepared to teach science, and there is a nationwide shortage of science and math teachers. To turn things around, we need to encourage more students to pursue a career as a science or math teacher, K–20; and we need to professionalize teaching as has been done for nursing to help attract and retain math and science teachers of the highest quality. This would be done by resolving salary issues, offering advancement opportunities, improving working conditions, and changing societal attitudes toward teachers.

Research universities must take the lead in developing new approaches to preparing professional science and math teachers. In the last 30 years we have uncoupled the discipline of learning about science and math from learning about teaching science and math. In Texas, they experimented with teaching material at the same time as they taught how to teach, and it doubled retention over the "stacked" method. We also need to provide opportunities for teachers to participate, provide financial incentives, and link teacher professional development with teacher preparation programs.

NASA partners with research universities and with K–12 schools. Now, we need to complete the triangle by linking research universities with K–12 schools to improve teacher preparation in math and science.

Integrated Community Stakeholder Development: Using Partnerships to Drive a Systems Approach to Workforce Needs—Dr. Elane Scott, Dr. Maureen McMann, & Dr. Katharyn Bandoni

A doctoral student uncovered the unexpected problem of the STEM workforce issue in 1995. An aerospace reporter brought the story forward and confirming research was conducted in 1998. Substantiating data unveiled at the 2000 AIAA conference resulted in Birth2Work, the name implying that the issue is complex and preparation begins at birth. Clearly, a systems approach is needed.

Technology has driven skill-level migration: employment in the 1970s required many low-skilled people; in the 1990s, mostly semi-skilled; and by 2010, mostly high-skilled. In effect, the need for engineers is increasing as the engineering workforce is declining. We need more qualified technical people, people who are professional, certified, and competency-based. Both long term and short term, this is a skills shortage, not a labor shortage.

Key forces shaping tomorrow's workforce include: the ever-widening gap between population growth and demographic distribution; language proficiency; the number of skilled professionals (especially scientists and engineers) is declining; the increasing demand for better solutions to global societal problems; and the job a person has today will certainly change, so the workforce must be committed to continuous learning. The complexity of the workforce crisis issue means that multiple variables must be addressed simultaneously. Or, as Joseph Lagowski said, *"We are attempting to educate students (hire people) today so that they will be ready to solve future problems that have not yet been identified using technologies not yet invented based on scientific knowledge not yet discovered."*

Many people are trying to help, but these efforts have to be focused, integrated, cohesive organized, sustainable, and effective and have common objectives. Key elements of structure, systems, style, skills, staff, and strategy require alignment around shared values and vision at the center. Shared values and vision revolve around people who, in the 21st century, must be capable of economic self-sufficiency, are actively participating in governance, can communicate effectively and interact with others, and have a passion to learn, unlearn, and relearn while focusing on the future. Our most significant challenge may be to create a "technical workforce culture" in which technical work is seen as a good profession, and people in the field are well respected and supported by government, industry, media, et al. Math and science must be seen as worthy, and teachers and the education system as deserving of respect. Lastly, parents must be involved in all segments of society. We need an engaged citizenry and community-owned process, not a focus on programs and a single answer. Everyone at the leadership level must understand and encourage this process.

Integrated community stakeholder development puts the community at the center, surrounded by 6 sectors—education, government, media, business and industry, not-for-profits, and healthcare. To do this, we need a set of shared values on which to base change. We must establish a common language and acknowledge and celebrate cultural (sector) differences. Stakeholders from all 6 sectors must be involved. We need to move from the current position where we continually look for and adopt successful programs, continually look for funding for numerous small fledgling programs, annually move from one focus to another, and rely on the same community leadership for everything. A better

process is to use data shared among sectors to define and view community; gain input and perspectives from all community sectors; put community, not education, at the center of the focus; take time to study issues and evaluate best practice models; gather, consolidate, and focus resources; make the tough decisions; and establish integrated community stakeholder teams to work together to establish a cohesive foundation on which to do strategic planning and implementation.

A key partnership with the Marshall Space Flight Center serves to illustrate. It's a 5-year partnership (evolving from a 10-year process to get to the Moon), committed to shared values, and with a vision inclusive of all 6 stakeholder sectors.

Birth2Work has processes and tools to assist communities moving from sector-centric to community-centric engaged teams moving forward to address communities' workforce needs. Their tools include a book, *The System: Seeking the Soul of Commerce;* online learning modules; a white paper and Web resources; and consultant services.

This process is not pleasure-driven or power-driven, but meaning-driven—people want to change their world.

Q&A

- A lot of information about other countries is becoming available, and it behooves us to learn from them. E.g., a study of the content of science in books from publishers in United States vs those in Japan shows that we have 10 times more content in science books, but Japan does much better in teaching science.
- At the National Alliance for State Mathematics and Science Coalitions, they have promoted this thinking for over a decade and are delighted that NASA is taking this view. Many others have programs in place.
- Narrowing down stakeholders to specific persons is done through networking and finding out who key leaders in the community are. Leaders (ideally 4 to 6 per sector) will come to the table. Often these people are overcommitted, but they build the notion of who else should come to the table, people who can commit time and energy. These 2 or 3 leaders talk to each and will be able to suggest others. It's a relationship process and will be sustained over time.

Paul Racette, a NASA fellow in the Office of Education, and Anngie Johnson will lead the following discussion sessions. Each of the 11 tables of 8 has a facilitator and a recorder. Each facilitator introduced him or herself.

Group Discussion Summary

Successful Partnerships

Examples of Successful Partnerships:

1. National Alliance of State Science and Mathematics Coalitions (NASSMC, http://www.nassmc.org/) is an umbrella organization for state and local coalitions of educators, public policy leaders, schools and business united for the improvement of mathematics, science, and technology education NASSMC is a network of state coalitions and serves as the national advocate for the member organizations.

2. Space Grant College and Fellowship Program (http://calspace.ucsd.edu/spacegrant/) leverages federal funding by requiring matching funds from affiliates which may include academia, planetaria, and museums, e.g., Utah Space Grant, work with partners across the state to promote STEM education by working with science advisors and school districts to develop hands-on activities.

3. The Aerospace Academy (http://www.aerospaceacademy.org/) is a preK-20 education-industry-government collaboration developed to address shortages and skill levels of engineers and other high technology practitioners. The Academy was able to develop private industry partners who share expertise and resources including staff and funds to train mathematics and science teachers needed to produce the needed workforce. The partners developed strong collaborations with school districts and universities which allowed them to serve and to raise funds through jointly developed grants and attract students. Connections, sharing of resources and staff were critical to their success.

4. NSF Science and Technology Centers (http://www.nsf.gov/od/oia/programs/stc/) combine research, education and knowledge transfer under a focused theme of national importance. The program enables innovative research and education projects to achieve the research, education, and knowledge-transfer goals shared by the partners. Measures of success include publications,

producing graduates, providing training opportunities, and multidisciplinary, ethnic, and racial diversity.

5. Science, Engineering, Mathematics and Aerospace Academy (SEMAA, http://www.semaa.net) is a national program designed to reach K–12 minority students that are traditionally underrepresented in careers involving science, technology, engineering, and mathematics (STEM) a partnership has 2.3 million dollars matching funds. SEMAA program currently boasts 23 sites in 17 states across the Country. The NASA SEMAA National Office works with its 23 sites to seek grants, corporate donations and in-kind gifts from both internal and external stakeholders to support the costs of program operations.

6. Experimental Program to Stimulate Competitive Research (EPSCoR) is a federal program which operates through 7 federal agencies in 22 states. The program that focuses on developing research bases and improving the quality of science and engineering research conducted at universities and colleges in states that have historically received lesser amounts of federal research and development funding.

7. Academy for Information Technology is a new start up high tech high school in Stamford, Connecticut. The school brought key industry leaders together in one room to identify the outcome they sought; asked them to identify skills needed by their employees. The school was built from the ground-up by community stakeholders. Success is attributed in part to ongoing communication—"The Talking Memo"—created and distributed on a regular basis and the use of formal and informal discussion time during regular meetings. The program includes a partnership with the University of Connecticut, GE Edge Lab, and Norwalk Community College to provide adult education classes in the evenings.

8. Boys and Girls Clubs (http://www.bgca.org/) share a common goal, i.e. to contribute to the success of students. Communication among stakeholders led to collaboration and a deeper level of involvement. Having a facilitator connection, parental involvement, and buy-in are also important. The credibility and respect for the organization also contributes to the program's success.

9. Utah State University Space Dynamics Lab (http://www.sdl.usu.edu/index-flash.adp) is an aerospace research laboratory partnering with Utah State University, Space Grant Consortium, and the community to provide outreach, mentorship, and professional development in the field of science and technology. Their

education outreach program bridges to pre-service teachers, helping them learn math and science in the schools. As part of their research projects, graduate and undergraduate math and engineering students reach out nationally and internationally to schools. Contributing to the program's success, college students convince younger students that advanced education is achievable since they are able to relate to students closer to their peer group.

10. The AERO Institute (http://www.aeroi.org/) is a partnership with NASA Dryden Research Center, California Space Grant Consortium, local industry, and local, state, and federal government. As an example of inter-state partnership, California State Colleges offer collaborative higher education programs through Purdue University's distance learning program.

11. NASA Science and Technology Institute for Minority Institutions (NMSTI-MI, http://www.uncfsp.org/nstiprog.aspx) is a newly established research institute which resides in the NASA Research Park located at the NASA ARC. The institute is founded upon a partnership between NASA ARC, United Negro College Fund Special Programs, and Google. The goal of the institute is to bring together expertise of minority institutions from across the nation providing minority researchers unparalleled access to NASA facilities, scientists and capabilities, as well as the opportunity to collaborate with researchers in the surrounding community of universities and high-tech R&D companies.

12. University of Central Florida Virtual Lab did not reinvent the wheel but drew on existing relationships for seed funding and implementation funding. Program acknowledges that change and longitudinal results may not be quantifiable for several years and the importance of needs assessment and sharing and using data.

13. The KSC Girl Scouts Partnership provides hands-on tutoring in science and technology fields, training for leaders, and use of NASA products to enhance classroom teaching.

14. Health Plus at Medgar Evers College in New York provides a youth program, workshops, conferences, financial assistance, equipment for summer camps, and a long-term commitment.

15. Library of Congress partner with community educators to provide digitized learning opportunities for a Summer Teacher experiences.

Teachers develop a lesson plan that is mounted onto a website for public use.

16. Project ASTRO (http://www.astrosociety.org/education/astro/project_astro.html) is part of the astronomical society of the pacific, a national program aimed at improving the teaching of astronomy and physical science by creating relationships between local educators and professional and amateur astronomers.

17. Urban Advantage (http://urbanadvantage.amnh.org/) is a partnership between several cultural institutions (e.g., Bronx Zoo, American Museum of Natural History, Aquarium, etc.) and the New York City schools. The program provides professional development and access to 7th and 8th graders to complete science investigations. Most of the schools have waivers to meet this requirement for science investigation.

18. JC Penney and 4-H After School Fund is a partnership for improving math and science education in after school programs. The program leverages each other's resources, resulting in greater capacity to tackle problems in a more comprehensive manner. A success story reference can be found at: (http://4h.uwex.edu/afterschool/workteam/documents/04SuccessStory.pdf#search=%22JC%20Penney%204-H%20%22).

19. Brevard Space Week is an informal education institution, which brings 6000 students in Brevard School System in the KSC area to NASA and gives them science experiences, plus professional development workshops based on NASA materials.

20. Brevard Community College, Florida (http://www.brevard.cc.fl.us/) created a dual degree program for high performing high school students in cooperation with the school board and local community college. Success of this program is attributed to partnership within the community.

21. Skywatch program (http://spaceflight.nasa.gov/realdata/sightings/index.html) is staffed by volunteers who meet in a museum.

22. Achievement Counts Campaign (http://www.mbrt.org/achievem.htm) brings scientists and engineers to middle school and high school classrooms. *Be What I Want to Be Magazine* and Web site profiles young persons, obstacles they overcame, what their day is like.

23. Start to Finish Books (http://www.donjohnston.co.uk/catalog/stfd.htm) is a literacy program with library spanning range of topics to promote literacy among students. Topics include science concepts, such as the rings of Saturn, Mars rovers, and the Cassini mission.

24. *Wired Magazine* (www.wired.com) and NASA's Space Operations Mission Directorate have partnered in co-sponsoring a contest for students about "NASA's greatest fan." NASA will give the winners tickets to attend a launch; *Wired Magazine* will pay for hotel and airfare.

25. FMA Live (http://www.fmalive.com) is a stage show that uses actors, music, and video to teach Newton's Laws of Force and Motions.

26. Learning for Life (http://www.learning-for-life.org/) offers programs designed to support schools and community-based organizations in their efforts to prepare youth to successfully handle the complexities of contemporary society and to enhance their self-confidence, motivation, and self-esteem.

27. Society of Women Engineers (http://www.swe.org) is a not-for-profit educational and service organization which empowers women to succeed, advance and be recognized for their life-changing contributions and achievements as engineers and leaders.

28. First Robotics Competition (http://www.usfirst.org/robotics/) is an international event that attracts participants from Brazil, Canada, Ecuador, Israel, Mexico, the United Kingdom, and almost every U.S. state. Colleges, universities, corporations, businesses, and individuals provide scholarships to competitors in the event. The competitions are high-tech spectator sporting events that provide focused brainstorming, real-world teamwork, dedicated mentoring, project timelines, and deadlines.

Reasons Why Partnerships Are Successful

Shared values, communication, synergy, and sustainable resources contribute to partnership success.

1. Shared values

- Foster sustainable partnerships.
- Provide a greater understanding of the issues and a basis for partnerships which derive mutual benefits through addressing common concerns.

- Are basis for leveraging people's good. Institutional commitment is obtained through weaving common threads of passion and personal commitment of institutional leaders.
- Create a compatible culture among partnership organizations even though differences in paradigms may exist.

2. Communication

- Of shared values within a community provides broader opportunity to engage community to address its problems.
- Of needs and goals leads to long-term commitment for addressing problems within a community.
- Using a variety of media effectively conveys the shared values as well as the services and resources offered by the partnership.
- Between leaders and stakeholders is essential to addressing the challenges associated with STEM education.

3. Synergy

- Results in achieving more by working together than what could be achieved through individual efforts.
- Is achieved through community involvement of its partners in contributing to the partnership their own unique capacity within their ability.
- Engages as partners the community of small and large businesses, educational institutions, non-profit organizations, and governments at the local, state and federal levels.
- Provides flexibility to address local needs of targeted audiences with targeted content through a clear understanding of shared values.
- Is fostered through leadership that is committed to collaboration with the community's stake holders.

4. Sustainable resources

- Are well leveraged, widely distributed and serve to achieve mutually beneficial outcomes. Partnerships serve to maintain sustainable resources by leveraging shared resources and solutions that address common needs.
- Are maintained by demonstrating dollar for dollar return on the investment through data and analysis.

What Are Emerging Models for Education that Would Guide Partnerships?

1. Partnership development

Types of partnerships

- University-industry-business partnerships.
- Partnerships with for-profit and not-for-profit companies.

- Partnerships based on multidisciplinary approaches.
- Based on business model which provides accountability and means for evaluation.
- Involvement of gaming and technology industries to develop educational applications.
- Partnering with international countries to gain an understanding of basis learning style, e.g., U.S. universities partnering with international countries.
- A university consortium to provide transferable curriculum for promoting graduate and undergraduate mentorship and scholarship toward advanced degree in a shared national STEM education program.
- NASA University Research Centers provide meaningful collaborations with other institutions.

Reasons for partnering

- Growing recognition of 'need' for partnering rather than going it alone.
- Partnerships provide critical community services for school system.
- Different partners contribute different resources.
- Partnerships attract resources to address community needs.
- Partnerships open doors and create opportunities.

2. Community engagement

Ways to foster community engagement

- Establish STEM Council like a local community arts council or sports league—a group of concerned, committed individuals advocating STEM activities.
- Engage advisory boards, councils, clusters.
- Involve local and state governments.
- Engage learners and practitioners with common interests.
- Entice students with community learning and volunteer services, i.e. use community service as a learning experience.
- Engage the family as an integral member of community.
- Engage corporations as entrepreneur partners in education investment.
- Solicit requirements of key stakeholders that share common vision for workforce development.
- Seek alliances that engage students and parents.
- Recruit scientists and engineers to teach expert subject matter.
- Engage international partners through communication and relationship building.

Benefits of community engagement

- Broadens participation in addressing community problems.

- Increased opportunities for pre-service and in-service teacher training, preparation and teacher professional development.
- Strengthens community through relationship building.
- Increased curriculum for special needs children by extended school year, day programs and summer school.
- Parental involvement is vital to successes.
- Broader consensus of community needs.
- Increased opportunity to obtain "certification" in subject matter of importance to community.

3. Approaches to learning

Experiential based and informal learning

- Develop contests which are engaging, challenging, and competitive and include built-in recognition, e.g. STEM based competitions involving students, teachers, mentors, academia, NASA centers, and industry.
- Provide students with hands-on, minds-on activities.
- The Net Generation of Youth—get the adults to get to where the kids already are.
- Engage parents in learning outside of the classroom (such as going to the zoo to support a school lesson).
- Create collaborative learning environments with active participation of parents; collaborations of assets and skills under umbrella groups made-up of community, for-profit, nonprofit, city, local and government; active communications through video and digital conferences.
- Provide internships with real-world experience and give students ownership in addressing relevant problems.

Subject matter

- Emphasize "targeted" skills based on students' interests and needs.
- Emphasize developing communication, social, professional, and life skills.
- Offer project-based (which integrates classroom curriculum) with after-school activities using technologies for e-mentoring and documenting progress through multimedia.
- Engage students in projects that touch the community, e.g., health projects, environmental projects.
- Use virtual learning environments for inquiry-based, interactive problem solving with real-world relevance.

Theory and Methodologies

- Take advantage of standards-based approach to education as opposed to focusing on pre-conceived notions.

- Use outcomes-based approaches to design learning experiences based on what you want your learners to be able to do, i.e. backwards-design.
- Allow learner-centered approach to feed into outcome-based designs Learner-centered education continues to need improvement. Organizations like NASA should strive to find commonalities between what audiences need to learn and what they want to teach.
- Teaching subject matter in a manner that is of interest to the student, e.g., through music, sports, etc.
- Accommodate multiple-intelligence learning. Identifying learning styles and designing accordingly.
- Incorporate experiential-based learning methodologies for instruction and to conduct activities. "Hands-on" methods make learning exciting and fun.
- Expedite content/curricula development to adjust to dynamic needs of the community.
- Emphasize life-long and free-choice learning. Free-choice learning is another way of describing informal education.
- Lifelong learning must be cultivated across the board, it's a cultural shift that must take place: students, parents, schools, organizations, and colleges.
- Lifelong is K–gray; we must convey that to the kids that learning and education never ends; learning occurs 24 hours a day, 7 days a week.

Networked learning environments

- Use network for distance learning and on-line collaboration.
- Leverage gaming with NASA science content.
- Utilize on-line, on-demand resources such as Wikipedia and Google.
- Utilize technologies such as iPods, text messaging as part of learning communities.
- Balance accessibility to technology. Beware of the potential for technology-based learning to increase the divide between the "haves and have nots."

4. Mentoring and role models

- Recruit and support professional mentors from academia, governments, and industry.
- Partner scientists/engineers to mentor pre-service and in-service teachers.
- Encourage, enable and expand parental involvement in education. For example, increase parental involvement in programs such as SEMAA, (Science, Engineering, Communication, Mathematics Enhancement Program) SECME, and NASA Explorer Schools.

- Foster mentoring across peer groups, e.g. adult-to-students, student-to-student, and peer-to-peer mentoring. Enable high-school students to work with K–8 students as part of in-school and after-school programs.
- Implement programs that support more than just the learner but includes families and caregivers, recognizing the benefits of engaging a larger group.

5. Examples and models

- NASA Education Pyramid: Inspire, Engage, Educate and Employ.
- SRI and Midwest Continental Regional Education Lab (MCREL) focus on the integration of technology and needs-assessment tools into education.
- NASA lets Virginia Department of Education know about K–8 elements in NASA, from which content can be drawn (gap analysis).
- Recognize that it is really valuable to mix communities in practice, (Society of Women Engineers/ITEA is an example).
- You have to have "Engagement Capacity Continuity" for children to succeed in STEM education; one reference book is by Eric Jolly (http://www.smm.org/ecc/).
- Systems maps help identify important features for each community.
- Integration of formal and informal STEM community with national groups to leverage individual and organizational expertise.

How Can We Use Technology and Innovation to Embrace Partnership Goals?

1. Features and benefits of technology

- Technology is a "tool," not the "answer." Technology must be horizontal, and provide infrastructure and support for a wide range of issues.
- Technology, if used properly, should be "invisible."
- Technology "flattens the world."
- Technology can exacerbate the separation between the "haves and the have nots": If technology is unavailable at home, students must have access at school.
- Technology enables just-in-time, 24/7, and on-demand information.
- Teachers must understand technology well enough to engage students.
- Technology brings more stakeholders to the table; enables partnership collaboration through open source.
- Technology enables replication of best practices; facilitates information exchange and analysis and provides access to knowledge bases.
- Technology allows access to real data from scientists available providing students providing opportunities for simulations and role plays.
- Technology helps respond to problems associate with teacher shortages.

- Technology enables distant learning which can help overcome resource limitations.

2. Applications and types of technologies

- Distance-learning and on-line capabilities to reach larger, remote, and limited populations.
- Use technology to evaluate outcomes.
- Use technology to share documents and develop standard templates.
- Use technology for communication and planning, e.g. webcasts and networked meetings.
- Bridging different communities, e.g. astronauts talking with teachers.
- Virtual interactive experiences, e.g. video-games, Disney World.
- Internet-based instruction for students, teachers, fieldtrips, tutoring, research, etc.
- Develop a community centered workforce with measurable goals.
- Multi-level networks, which bring experts to the classroom, e.g., Digital Learning Network.
- Gaming and simulation software, which can train, recruit, test, and market with team building experiences and competitions.
- Blackboard, planetary photo journal, digital library.
- Web-based collaborative development.
- GPS—geography and social studies.
- Communication
    - E-mail
    - Blogging
    - Voice-over technologies
    - Video conferencing
    - Web-inars
    - Broadcasting and Podcasting

3. Approaches

- NASSMC has structure in place that involves all stakeholders and coalitions which provide geographic diversity.
- Project-based learning with data accessed through partnerships, e.g., in science education and astronomy, access to data is being used increasingly for research-based, authentic learning experiences.
- Partnership with industry to provide knowledge base and resources to schools so that they can get wired and have better forms of communication.
- Summer institute training of teachers, parents, school leaders, and industry by stakeholders and for stakeholders with common goals.

- Prepare teachers to be engaged and feel comfortable with the new technology so that may in turn engage students and make students feel comfortable.
- Provide teachers with the necessary time and resources to achieve partnership goals.
- Provide continuity to both students and teachers.
- Schools and programs engage new partners with knowledge of technology.
- Include plans to ensure that ethical standards are applied to prevent abuse and misuse.
- Establish safe Internet environments for students, parents and teachers.
- Expand NASA Explorer Schools' capabilities to all schools and use NES to "train the trainers."
- Extent "the research arm" through senior technology projects which allow students virtually (distance learning) or physically to complete a course at university consortium institutions.
- Use technology for teaching process, problem solving, critical thinking, and enquiry-based learning.
- Concurrently develop resources for classroom as well as professional development.
- Strengthen partnerships with linkages to each other's Web sites and resources.

What Methodologies Would You Recommend for Establishing Partnerships?

1. Tangible actions

- Create clear definition of the partnership and identify what you want and what you're looking for in the partnership; define "common" goals and areas of need.
- Write a plan to accomplish goals, and identify where and what help is needed and approaches to resolve issues and problems.
- Establish communication channels, e.g., blog, chat room, Web site, newsletter for "thought leaders" to keep them engaged and plugged in. Use portals to share information, new ideas and resources to promote success, and advertising media to target marketing.
- Solicit suggestions for partnerships from NASA staff members and panels which have already done studies; provide examples of model partnerships, show results; identify existing programs and their leaders.
- Explore non-traditional science and math industries and share best practices methodologies and processes.
- Bring resources to the table.
- Identify barriers to achieving outcomes.

2. **Methods for fostering partnerships**

Communicate

- Build effective communications internal and external to partnership; provide standard information on an ongoing basis for partners to distribute.
- Actively listen to and understand partner's motivations, needs, and resources.
- Communicate what we want the coalitions to make through pre-existing funded NASA programs.
- Share information in a variety of ways, e.g., portals, web casts, and traditional reports can promote success. "Wikipedia" is an example of how shared trust and responsibility can lead to leveling the playing field; utilize communication that does not require funding.
- Utilize NASA image to leverage cultural change making STEM "cool."

Practice

- Employ methodologies based on common or shared strategies using proven and workable best practices gained as a result of contest or competition.
- Utilize information such as needs assessment and gap analysis already gathered by various coalitions.
- Align plan with self-interests that benefit of each partner and utilize needs assessment tools and evaluation strategies (quantitative and qualitative).
- Tap into existing organizations instead of creating new ones; be prepared to accept plans, ideas, strategies that are "not invented here." Identify return on investment, i.e. "What's in it for me?"
- Provide competitive solicitation opportunities; use specific and direct funding elements during the process. NASA assets should be mapped and partner resources leveraged for the partnership to grow and survive beyond the pilot period.
- Be inclusive and active in communities and promote community empowerment in terms of STEM.
- Leverage Space Grant resources in every state. Engage NASA Space Grant Consortium at the state school board level to assist in developing a consistent set of National Education Standards for at least science and engineering. These Space Grant consortia will need to engage themselves with National Science Teachers Association, National Council of Teachers of Mathematics, NSF, and other federal and local education partners.

Foster community

- Create an environment that is receptive to and nurtures technology, innovation, and partnerships, e.g., by means of collaborative communication.
- Recognize shared goals of helping students, faculty, and institutions to succeed will contribution to creating an environment that foster sharing and excellence.
- Develop deeper understanding of partners and a culture in which people want to help each other to succeed.
- Create an environment that promotes a level playing field through which everyone benefits.
- Engage community, partners, and parents in the processes through a wide distribution of assets and /or learning curriculums.
- Develop synergy within all partnership activities; allow partnership room and time to evolve.
- Develop more coordination among states to strengthen coalitions. Community feeds into a state network, which feeds into the Future's Panel. Have a Future's Panel for each state that reports to a specific NASA center.

- Inspire teachers the way Explorer Schools programs or Northup Grumman does with its partnership programs.

3. Engaging partners

- Start networking, engage support of existing partnerships to attract partners outside of group, approach obvious and enthusiastic partners.
- Find strategic people in those areas/spheres that share objectives with NASA.
- Communicate information about NASA's existing partnerships and related activities.
- Ask businesses that may want to partner with NASA.
- Produce educational projects, keeping in mind the outcomes of NASA.
- Attract non-traditional technology developers to participate in the process.
- Use NASA events to attract leaders, professional societies. Ask for help from the partners when needed.
- Identify potential partners' shared interests and values.
- Use professional and personal contacts.
- Seek strategic alliances with corporate partners not just aerospace contractors.
- Identify partnership champions, i.e. "people."

How Can We Engage "Thought Leaders" Who Have Established Successful Partnerships as Resources for NASA?

1. Who are thought leaders?

- Scholars, experts, and researchers.
- Individuals considered to be outliers, e.g., individuals aware of groups with inequities including individuals working on social injustice and socioeconomic communities.
- Individuals with marketing knowledge; media leaders.
- Individuals with knowledge of emerging technology in gaming, such as Electronic Arts for Serious Games Summit.
- Individuals from for-profit organizations.
- People who are aligned peripherally but are not yet engaged.
- People from different areas including private industries, other government agencies, non-profits, and professional student and faculty organizations.
- Individuals who are proficient at inspiring, engaging, educating, and employing in their field.

2. Methods for engaging thought leaders

- Embed language in grants that encourage the participation of thought leaders; provide incentives.
- Demonstrate commitment and impact of thought leader's advice. Must be a clear "return on their investment."
- Identify thought leaders and their accomplishments and bring them in and find out more, i.e. initial engagement.
- Identify what NASA wants from the thought leaders; develop credentials to be considered a "thought leader."
- Engage thought leaders at multiple-scales, i.e. national, state, and local.
- Involve thought leaders in the development and implementation of education strategy; empower thought leaders to make an impact; create an environment that fosters a win/win conditions for and among thought leaders.
- Access to NASA's people, resources, and facilities, and distribution channels; ask not what the community can do for NASA but what NASA can do for the community.
- NASA needs to validate and value its partners and establish to long-term commitments to a few long-term goals.

3. Actions for engaging thought leaders

- Use technology that facilitates communication and identifies partners.
- Use newsletters, conferences, panels, strategic planning sessions, etc. Engage thought leaders through NASA–specific events, mentoring opportunities, staff exchange agreements, research opportunities, or consulting exchanges to infuse ideas into the process.
- Share thought leaders' resources, e.g., their presentations or publications. Get thought leaders to conduct on-line educational forums that promote an exchange of ideas.
- Create more opportunities for face-to-face meetings.
- Establish connections with new groups of people and events.
- Recognize and acknowledge contribution of thought leaders.
- Offer intergovernmental (e.g., IPA) or NASA Professional Development opportunities.

What Is Your Vision for the Future's Panel and the Partnership Process?

1. Establishing Future's Panels

- Establish Future's Panel at each center and at NASA headquarters.
- Establish hierarchical structure of Panel spanning from the grass roots to the upper level of society and the government.
- Establish an over-aching cross-center panel for communication.
- Provide organizing structure for otherwise externally fragmented groups.

2. Future's Panel membership

- Involve diverse groups of people from all walks of life—ethnic, racial, geographic, socioeconomic.
- Include kids, students, emerging scholars, and young people who may think beyond the traditional paradigms.
- Engage individuals who in the past have been excluded.
- Recruit participation from the community levels comprising core stakeholders (students, parents, staff, teachers, industry, and government—local, county, and city).
- Include strategic planners and futurists, a broad cross section of thought leaders.
- Expect panel membership to be dynamic and subject to turn over.
- Include corporate participation in panel meetings.
- Include Space Grant and EPSCOR representation in all panels.
- Keep core group small to maintain knowledge and commitment.

3. Characteristics of Future's Panels

- Must be replicable to multiple stakeholders, established and structured to reap benefits, and locally responsive.
- Have a common operational construct and are accountable.
- Prioritize actions and take one step at a time, rather than trying to do it all at once.
- Build on ideas and partnerships by frequent communication, e.g., through quarterly or monthly videoconferences.
- NASA Headquarters must retain a managerial role of the Future's Panel to create coherence and oversight across agencies.
- Panels are strong regional coalitions that can be replicated nationally and on a national scale by NASA HQ.
- Partnerships form a "web" not a connection with NASA.
- Each panel is unique and dynamic.
- Cumulative effect of panel's work is value added.
- Panels promote trust.

4. Function of Future's Panels

- Create a vision; define and communicate goals and outcomes.
- Create a database that allows us to ascertain where we are now.
- Start with a good mix of issues, topics, ideas, and people.
- Research and understand the wants and needs of the communities, e.g., the NASA Explorer Institute.
- Identify ways in which people can contribute, e.g., by conducting a gap analysis.

- Initiate pilot programs with the local, city, state, national, and international stakeholders.
- Obtain information from students and their peers on methodologies they use.
- Help the NASA centers develop the beneficial partnerships and identify strategic key stakeholders.
- Pull together common interest groups (speakers, educators, community outreach) and foster and mentor collaborative opportunities.
- Communicate community needs between the Future's Panel and NASA; NASA provides content resources to their region and communities.
- Provide details on the NASA Framework and information on how we conduct evaluations to avoid a duplication of effort.
- Provide opportunities for visionaries not implementers.
- NASA centers oversee "regional" distribution of the Space Grant consortium resources.
- Avoid having to constantly educate and inform rather than being productive.

How Can Partnership Help Your Organization?

1. Creating networks

- Support the universities' goals to provide "complete" education for students.
- Provide opportunities for hands-on applications.
- Foster professional collaborations.
- Provide a source for adjunct professors.
- Identify stakeholders to engage in the future, e.g., at the Summit.
- Build public and private support based on the cohesive networks established as a result of partnerships.
- Create environments whereby students and institutions help each other.

2. Actions by partnerships

- Identify existing free or low costs tools.
- Provide organizations with new or leveraged financial, human, and material resources.
- Provide mechanisms that help institutions share and leverage resources to strengthen education.
- Keep partners abreast of new ideas and provide access to new and emerging capabilities.
- Develop access to facilities, content, and people currently unavailable.
- Provide "hands on" opportunities for real hardware development and student experiments.
- Develop leaders and individual skills of future employees.
- Expand potential market for resource distribution through advertising and marketing.
- Provide a secure on-line environment with access to blogging, news, media, and events.
- Provide tax payers' perspective of issues in education,

3. Strategic initiatives

- Focus on all 3 NASA education outcomes,
- Create and share vision with stakeholders; prioritize a "shared vision."
- Consider relevance to the American Competitiveness Initiative.
- Acquire congressional buy-in, public affairs buy-in, etc.
- Use NASA centers' core strengths (e.g., LaRC is pre-service) to reach and engage industries.
- Develop organizations' and partners' credibility, e.g., through reward systems that enables and benefits partnerships.

- Broaden partners knowledge base; expand reach to larger variety of audiences and content; promote each other's assets and contributions.
- Employ successful models and individuals outside NASA realm to promote inventive thinking and problem solving.
- Provide evaluation of fresh and innovating strategies and ideas that build on NASA's overall mission and goals; ensure that programs are relevant, sound, and effective; vigorous evaluation provides a basis for sustaining, expanding, or terminating initiatives.
- Generate pipelines through which students can be promoted and nurtured from one level to the next using partnerships among educational institutions from K–12, community colleges, undergraduate, graduate, and post-graduate programs.

4. Characteristics of partnerships

- Future's panels are comprised of people, not programs.
- Future's panels at the NASA centers will be different, but share in the engagement of all spheres, e.g., the 3 outcomes.
- At the center, Future's Panels are considered the "community," not NASA.
- Synergy among partners results in more effective use of resources, leveraged resources, added value, and mutual benefit.
- Leveraged resources/expertise provides focus for initiatives and catalyst for systemic impact.
- Partners share responsibility and ownership in goals and outcomes, and thus increase the impact of resources while avoiding duplication of efforts.
- Diversity within partnerships generates creativity and promotes thinking outside the box, resulting in new perspectives, more innovative ideas, sound approaches, and solutions. Two heads are better than one and the whole is better than the parts.

Adjourned 4:10

Partnership Forum Evaluation – A

I Wish That	Number of Participants Recommending				Category
	1-2 Hits	3-5 Hits	6-15 Hits	>15 hits	
There was representation from Industry.					P
This model will be developed and shared with other Federal agencies.					P
There was more space in the room. Much too crowded.					L
I had the attendees list.					P
Clarity on "Systems Thinking."					P
More youth participated.					P
NASA will conduct more of these informative gathering, possibly ongoing.					P
More open invitation. How others (states, territories, agencies, industry, might be involved.					P
Co-operative agreement with partners.					P
Panels had a better view of outcomes. There were OUTCOMES from the conference.					P
Group Sessions were better defined and stated. Session 3 Questions were complex.					P
There was a discussion of diversity.					P
There was more input from non-NASA partners.					P
Names Tags were correct; too many people's names were spelled incorrectly,					A
I were invited back to Jan 17 Summit.					A
Participants rotated tables for each new Session.					P
We had included a brief introduction of attendees and					P

an explanation of their connection to NASA.					
NASA will keep the timely structure.					P
More structure for the Summit.					P
Information was more readily available to universities and small colleges.					P
Enthusiasm and drive is not lost.					P
There was more open-ended question.					P
There was a way to coordinate all STEM initiatives across all Federal government. (Too many programs covering same topic.)					P
Time to engage partners prior to the event (6 months in advance)					P
There was an Electronic Forum to continue discussions.					P
The working-level employees from Federal agencies had attended.					P
The room was more conducive to reporting out.					L
NASA would use NASSMC as the vehicle to form partnerships in conjunction with NASA centers.					P
Other government partners were represented on the panel.					P
NASA had provided advanced agenda, questions, and reading list.					A
Hear about next steps soon.					P
NASA will follow-up with working with partners to accomplish goals					P
Expand support for successful programs					P

More time spent discussing communications, collaborations, building best practices.					P
It will become clear how the reporting required in the presentations will replace metrics.					P
Build on existing and emerging partnerships.					P
Clarify Futures Panel.					P
There was a dinner for networking.					P/L
Take one problem/concern and work it until it is no longer a concern.					P

Partnership Forum Evaluation – B

I Appreciated	Number of Participants Recommending				Category
	1-2 Hits	3-5 Hits	6-15 Hits	>15 Hits	
Diversity of the Group and ideas. Meting attendees—great thinkers.				▨	P
New Partnership Opportunities. Networking. Lists				▨	P
Exploring a model for partnership that might prove out as a "National Model."		▨			P
Openness and sharing information on successful partnerships.				▨	P
Hearing from NASA in dialogue on the future.		▨			P
Meeting attendees.	▨				P
Comfortable environment.		▨			L
Timeliness.		▨			A
Free lunch.	▨				A
Thought Leaders (speakers) setting the stage for group work.			▨		P
Small group discussions.				▨	P
Registration process.	▨				A
Organization of Sessions and overall facilitation			▨		P
Student photographers/recorders.	▨				P
Facilitators and Recorders			▨		P
John Hairston's Remarks	▨				P
Vision and Outcomes	▨				P
Our facilitator, Andrew Hubbard	▨				P
The fact that NASA understands they need to have partners.		▨			P
Opportunity to Participate					
The fact that NASA listened and recorded ideas.					

Partnership Forum Evaluation—C

1 SEEMA is not the only NASA partner worth mentioning in a forum such as this. Not sure that the stated purpose of this forum was met. I hope the work will be ongoing.

2 New corporate opportunities with emerging technologies (IPOD< WIKI, NKIA, etc. Google, Yahoo, Myspace.

3 I think that the Future's panel is a very good idea that I look forward to seeing implemented at the national and local levels.

4 Congratulations! One of the Best experiences—NOT BORING.

5 Should national organizations be included at the national level with goal of grass roots impact.

6 Too much academic "system" talk. Partnerships are not as complexed as it was made out to be.

7 I view NASA as over stretched. Question whether NASA will be able to deliver.

8 NASA Center Education contact and capability should be evaluated before center assumes a part of any plan.

9 Great Job!

10 Why didn't you use NASSMC, a NASA program chartered to manage education stakeholder workshops, to manage this workshop?

11 Congratulations on a highly successful meeting.

12 I think everything was on point.

13 Once Future Panels are established with key stakeholders, host an interactive, hands-on session for team building (space camp, challenges, etc.).

14 More youth.

15 This was a great opportunity for expanding partnerships and enveloping relationships.