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NASA Nebraska Space Grant 5 Year Proposal

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December 2004

UNO
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Funding Support

*NASA National Space Grant College and Fellowship Program & NASA
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Publication

The UNO Aviation Institute Monograph Series is published at the University of Nebraska at Omaha, 6001 Dodge Street, Omaha, NE 68182.

Published as a not-for-profit service of the Aviation Institute. Funded in part by a grant from the NASA National Space Grant College and Fellowship Program.

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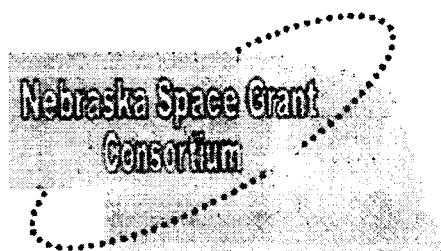
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**NASA Nebraska Space Grant
5 Year Proposal**

Submitted by the Board of Regents,
University of Nebraska at Omaha



**"To inspire the next generation of
explorers... as only NASA can."
- NASA Mission**

A handwritten signature in cursive script, appearing to read "Brent D. Bowen".

**Brent D. Bowen, Director
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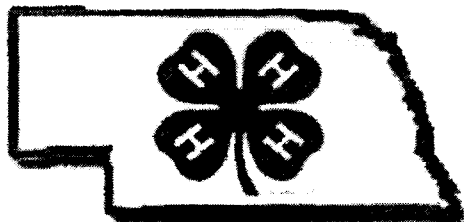
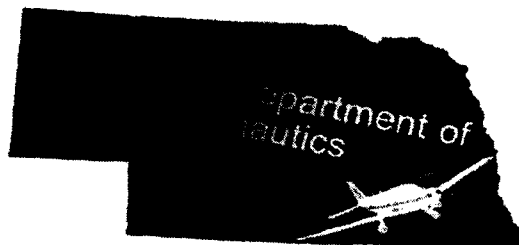
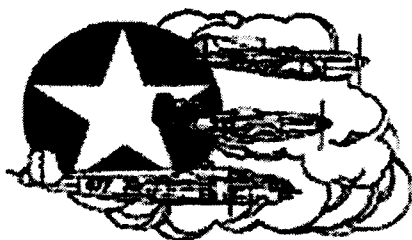


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Executive Summary

When the NASA Nebraska Space Grant Consortium (NSGC) resolved to answer the *FY 2005 National Space Grant College and Fellowship Program -- Proposal and Budget Call*, we made a commitment to align our efforts with NASA's *Vision for Space Exploration*. As NASA transforms, NSGC is also evolving to better adapt to an environment poised to launch a new generation toward space exploration. This proposal documents the NSGC process.

To ensure that NSGC will continue to function optimally in the areas NASA needs most, we examined Nebraska Space Grant's existing strategic plan. NASA's Guiding Documents (*President's Commission, Education Enterprise Strategy, Vision for Space Exploration, and Human Capital Management Plan*) were used as touchstones for each goal, strategy, and outcome. Every outcome was analyzed with SMART Charts to certify specific, measurable, acceptable, realistic, time-oriented metrics. The resultant strategic plan positions NSGC as a hub in Space Grant's national network of U.S. colleges and universities for collaborating with industries and agencies to motivate, recruit and train students in aerospace and science, technology, engineering and math (STEM)-related fields.

Nebraska is the home of a robust combination of Space Grant and Experimental Program to Stimulate Competitive Research (EPSCoR) programs. The exchange of ideas between these complementary programs has created innovative opportunities for teachers, students and researchers. The Technical Advisory Committee (TAC) oversees both programs, supplying an effortless conduit for technology transfer among participants. NSGC builds on this synergism by incorporating EPSCoR's Collaborative Research Teams' outputs into our research fellowship and outreach programs.

NSGC contributes a solid reputation of excellence in aerospace-related research, education, and outreach across Nebraska. In fact, NSGC earned high praise from NASA for the Consortium's excellent performance during its 15-year program evaluation. NASA's program manager for the National Space Grant College and Fellowship Program, Diane DeTroye, congratulated NSGC on its "exceptional achievement and national leadership," specifically applauding the success of Native American community engagement in Nebraska. NSGC received superior scores on all three components of its evaluation, demonstrating the overall impact of the consortium in the state and to NASA. Throughout this document "Success Boxes" exemplify each NSGC goal, highlighting achievements of our NASA-funded programs.

NSGC proposes to build on its acclaimed infrastructure to fulfill the *Vision for Space Exploration's* recommendation to tap the creative talents of our nation. Our strategic planning renovation guides us to transform the hands-on education programs NSGC already offers students and teachers to parallel NASA's future mission needs. This proposal emphasizes NASA ties to strengthen our national and regional network. Our efforts will continue to target under-represented and under-served populations for student research and workforce development projects. The newly-created Manager of Community Engagement will lead a team dedicated to actively seeking new non-academic and industry collaborations, as well as assisting academic affiliates to connect students to NSGC programs and services. A longitudinal tracking system will be implemented to secure long-range evaluation. NSGC will invest in quantitative and qualitative/ethnographic evaluation tools, as well as continue to rely upon the expertise of NASA Center Technical Monitors and Collaborators for feedback during our evaluation process. While NSGC exhibits a proven track record of success with NASA and demonstrated commitment to

the aerospace community, this proposal embodies our steps over the next five years to achieve our nation's dream of returning man to the moon...and beyond.

Past Performance of Workforce Development Augmentation

Training Nebraska's State Workforce

The NASA Nebraska Space Grant Consortium (NSGC) continues to recognize the necessity of increasing the quantity and quality of highly skilled graduates and faculty involved with NASA. Through NASA Workforce Development funds awarded in 2003, NSGC spearheaded customer-focused workforce training and higher education, industry and community partnerships that are significantly impacting the state's workforce in the science, technology, engineering, and mathematics (STEM) competencies. NSGC built upon these accomplishments to meet the steadily increasing demand for STEM skills and to safeguard minority representation in these disciplines. NSGC has aligned its Workforce Development efforts with the guiding documents for NASA's *Vision for Space Exploration*.

A wide range of workforce development activities target NASA's need to establish stronger connections among higher education, industry, and community organizations. Participation in the National Student Satellite Program (NSSP), Community Internship Program, and Nebraska Science and Technology Recruitment Fair extended the pipeline of employees benefiting NASA as well as Nebraska. The diversity component of the proposal catapults from the exceptional reputation NSGC has built by delivering geospatial science experiences to Nebraska's Native Americans. For seven years, NSGC has fostered and sustained partnerships with the two tribal colleges and four reservation-serving school districts in Nebraska to foster aeronautics education and outreach. This program, the Nebraska Native American Outreach Program (NNAOP), has grown to incorporate more than educational institutions and is now a partnership among tribal community leaders, academia, tribal schools, and industry. The content focus has broadened from aeronautics in the school systems to aerospace technology and earth science applications in tribal community decision-making and workforce training on the reservations. To date, participants include faculty and staff at four Nebraska tribal schools, two tribal colleges, approximately 1,000 Native American youth, and over 1,200 community members. This Native American Initiative of the NSGC addresses Nebraska workforce development and serves as a model to others. NSGC proposes to sustain delivery of the training funded by NASA in 2003 to tribal entities through partnerships linking academic programs and industry leaders.

This report is written in parallel with a Nebraska-led multi-consortia proposal entitled *Native Connections*. Together, the proposed programs will continue to bring NSGC's strategic objectives to fruition. Additionally, the University of Nebraska at Omaha (UNO), NSGC's lead institution, has agreed to waive all indirect costs.

Objective I

The first objective addressed in the 2003 Nebraska Aerospace Workforce Development proposal was to support higher education research capabilities and opportunities to attract and prepare increasing numbers of students and faculty to the NASA-related career pipeline. The following outcomes were realized as a result of this funding.

National Student Satellite Program (NSSP)

Guided by the goal of making aerospace history by sending the first student-built satellites to Mars, the NSSP is a national effort to engage Space Grant students in the design,

construction, and flying of a vast array of spacecraft. At the Summer Aerospace Education Workshop held for three weeks in July 2004, Dr. Mike Larson of the UNO Aviation Institute and Dr. Carol Mitchell of the UNO College of Education presented NSSP concepts to twenty-three K-12 math and science teachers. A major portion of this workshop was devoted to the building and launching of Balloon Satellites (BalloonSats), containers constructed to allow several scientific experiments and data collecting devices to be sent to near-space in a helium-filled balloon. The BalloonSats were tracked using the Global Positioning System (GPS) and then recovered with the experiments and data analyzed. The next Aerospace Education Workshop is scheduled for July 11-19, 2005, with plans to expand the BalloonSat program to include more creative scientific experiments and a multi-balloon launch.

Expansion of the Community Internship Program & NASA Center Placements

Several not-for-profit and government organizations in Nebraska already participate in the NSGC Community Internship Program. Established to assist students in obtaining real-world experience, the program has placed interns with organizations such as Mutual of Omaha Corporate Flight Department, the Transportation Security Administration, the Omaha Airport Authority, the Nebraska Department of Aeronautics, the Strategic Air and Space Museum, the Omaha Police Department Air Support Unit, and the University of Nebraska at Omaha (UNO) Aviation Institute Remote Sensing Air Operations. Over the last academic year, 10 students were placed in the internship program. The NSGC supports these students and organizations through small stipends to the interns in exchange for student development activities in the internship program.

These opportunities have not been limited to the Nebraska area. For the past three years, students and faculty have been placed at NASA JPL and Langley for internship opportunities funded solely by the Space Grant program. Gale Paulsen, a graduate student in mechanical engineering from the University of Nebraska-Lincoln (UNL), conducted research for his master's thesis at NASA's Jet Propulsion Laboratory during the summers of 2003 and 2004. His research focuses on the cliff-bot system, which is a system of three individual rovers. By working together as a team, two of the rovers are able to assist the motion of a third rappelling rover along a cliff face. A decentralized control technique is used to control the motion of the three rovers. The objective of this study is to develop a control algorithm that will create a more robust communication method between the rovers in the Cliff-bot system. Gale Paulsen continues his research at UNL.

Native Schools Science Fair

The Native Schools Science Fair showcases hands-on experiences for elementary, middle, and high school students as well as student employment opportunities in the science fields. The annual fair brings together all of Nebraska's Native American Schools including Winnebago, St. Augustine's, Santee, Walthill, and Macy. NSGC has been highly supportive of this effort for past few years. Geospatial Extension Specialist (GES) Karisa Vlasek has served as a judge for the past two years and has recruited other Space Grant personnel as judges. In 2003, NSGC External Relations Coordinator Dr. Mike Larson participated as a judge in the event. In addition, the UNO College of Education sent four student teachers to



serve as judges and to help with the event. Since many of the teachers are involved with the highly successful Family Science Night Program, the fair provides NSGC personnel another opportunity to interact with the teachers and students. NSGC will continue to support the Annual Native Schools Fair by providing judges and support.

Objective II

The second objective was to increase the number and diversity of students, faculty, and researchers from underrepresented groups and underserved communities in NASA-related STEM disciplines. Outcomes from this goal are outlined below.

Geospatial Experiences for Native Americans

The Native American Workforce training focus is closely tied with the Geospatial Extension Specialist (GES) in Nebraska. Karisa Vlasek of the NSGC was hired for this full-time position in August 2002. Due to the state's strategic use of NASA and state funding in the past 12 years there has been considerable capacity in place in Nebraska to intensify geospatial research, education, and outreach efforts. The GES has developed linkages between academic programs and commercial entities to result in both economic and workforce development for Nebraska, with NSGC partnerships with Land Grant; Cooperative Extension; the University of Nebraska-Lincoln (UNL) Center for Advanced Land Management Information Technologies (CALMIT) and remote sensing faculty at Creighton University and the University of Nebraska at Omaha (UNO). The GES contributed to workforce development in Nebraska through the implementation of continuing education credits, training, and workshops in this field.

Native IMAGE (Institute for Managing Applications in Geospatial Extension)

Native IMAGE is housed at Little Priest Tribal College (LPTC) in Winnebago, NE. The center serves Nebraska's tribal communities with geospatial outreach, training, and education. The NSGC Program, with GES Vlasek, has been supporting and directing the activities of the center in partnership with LPTC. The director of the center is Jan Bingen, a computer science faculty member at the college, succeeding Dr. Hank Lehrer (NSGC) who was Director until his retirement in August 2004. Native IMAGE officially began operating in January 2003 and has engaged tribal communities in Nebraska through research, training, and outreach projects. Funding for Native IMAGE sustains support for LPTC's undergraduate research fellows. These students conduct geospatial research by incorporating workshop knowledge to archive data for broad access. LPTC faculty and staff train fellow educators, students and community members with skills acquired at summer training workshops.

Native IMAGE provides educational and economic, customer-focused opportunities for Nebraska's tribes featuring color infrared imagery collected over the Santee Sioux and Winnebago Native American Reservations. Hyperspectral imagery collected on the Winnebago Reservation focuses on 2 bison pastures. After Creighton and UNO collect, analyze and evaluate the data, they transfer it through the Native IMAGE. Native IMAGE delivers the imagery, research data, and results to the Winnebago tribal council,

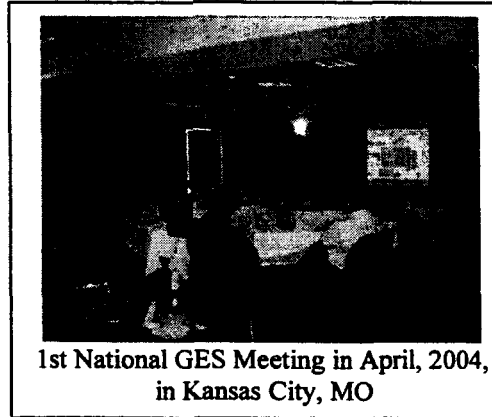


Airborne Remote Sensing mission over the Santee Sioux Reservation using the NE Airborne Remote Sensing Platform from CALMIT

planning department, community, schools, and Little Priest Tribal College. In addition to agricultural implications, this information impacts economic, social and cultural issues.

National Geospatial Extension Program & Nebraska's Involvement

GES Vlasek has been instrumental in organizing two National Geospatial Extension Specialist Meetings in 2004. NSGC sponsored both meetings, the first in April and the other in September 2004. The National Geospatial Extension Program has gained tremendous momentum over the past year, with two National GES Meetings conducted, a national poster created, 4 GES panel presentations given at national meetings, several teleconferences conducted, and collaborative opportunities available via the GES list-serve. Additional collaborations among the state GES' are planned, including a National GES website, regional training opportunities, resource sharing, and numerous national meeting presentations.



1st National GES Meeting in April, 2004, in Kansas City, MO

Nebraska was one of three states to be awarded funding from the United States Department of Agriculture to help support their existing GES Programs. The NativeGEM (Geospatial Extension Model) grant is an expansion of Native American geospatial activities in Nebraska. Workforce funding was and will be critical to the success and continued expansion of the Nebraska GES Program.

Community Development

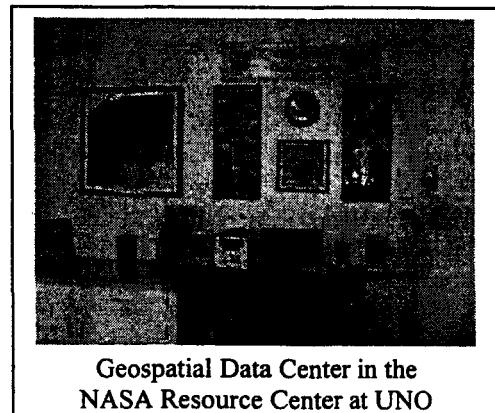
Infusion of geospatial applications into the tribal communities was a major deliverable of this research, disseminated by employing local educational seminars, classes, and workshops. This project's educational goals are to educate the members of the community-at-large as to the use of GIS, GPS, and remote sensing, and to better prepare future users, such as students at community schools, in such technology.

Family Science Program

The highly successful Family Aeronautical Science Program expanded to include geospatial activities in 2003-2004 as the Geospatial Family Science Night Program enters Phase II of the curriculum. Phase I included lessons on basic map reading skills, heading and bearing, latitude and longitude, and the Global Positioning System (GPS). NEGEP is working in close partnership with several reservation teachers on lesson plans for Phase II that will build upon the curriculum from Phase I including GIS and remote sensing concepts and applications. GES Vlasek is on the Nebraska 4-H Geospatial Curriculum Committee, tasked with designing curriculum to be used in 4-H clubs and classrooms. The committee is modeling its curriculum after the Geospatial Family Science Night program developed by NSGC.

Geospatial Curriculum Development

Community colleges are important in the delivery of geospatial data and the training of the future workforce. New data centers at Little Priest Tribal College (LPTC) and Nebraska Indian Community College (NICC) provide computer workstations and GIS/remote sensing software to students, faculty, and community members.



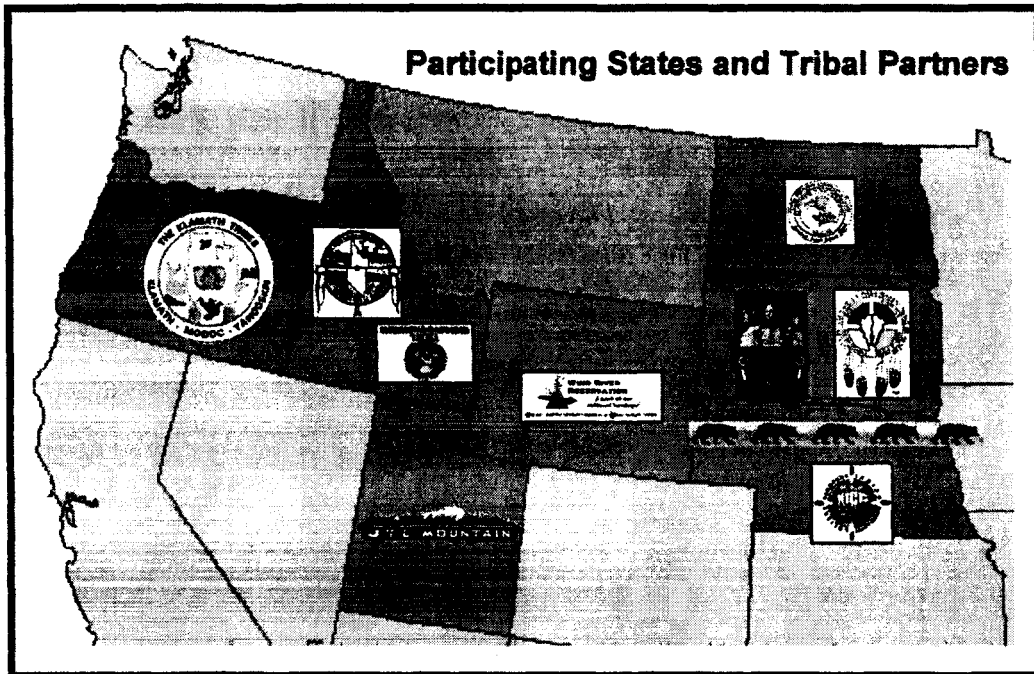
Geospatial Data Center in the NASA Resource Center at UNO

Geospatial Data Centers

Geospatial Data Centers have been established at LTPC in Winnebago, NE, NICC in Santee, NE and in the NASA Resource Center on the campus of UNO. These data centers provide computer workstations and GIS and remote sensing software to students, faculty and community members. Other data centers in development across Nebraska include Northeast Community College in Norfolk and Iowa Western Community College (IWCC) in Council Bluffs, IA. Hardware and geospatial software at these data centers allow users to access technologies such as GIS and remote sensing. Continued funding of the Geospatial Data Centers will bridge the gap and allow users who otherwise would not have access to this type of software the chance to utilize it. GES Vlasek has been conducting training workshops with these communities and they will have the opportunity to expand their knowledge and skills by utilizing the workstations in their communities after the training.

	Initiative	Estimated Numbers	Grade Level	Race of Participants	Gender	Race & Numbers of Faculty Participating
February 2004	Women In Science Career Fair	350	High School	Many Races	All Female	2 Female Caucasians
July 2004	Student Satellite Program	23	Teacher Training & K-12 students	Many Races	Male & Female	3 Male Caucasians
2003-2004	Geospatial Data Centers	75	Higher Education & General Public	Many Races	Male & Female	2 Female Caucasians
2003-2004	Family Science Night Program	300	K-12 students, Teacher Training, Higher Education & General Public	Majority Native Americans, other races	Male & Female	3 Female Caucasians 1 Male Caucasian
April 2004	Geospatial Workshop in Winnebago	13	Higher Education K-12 Teacher Training & General Public	5 Native Americans 11 Caucasians	9 Females 7 Males	3 Female Caucasians 1 Male Caucasian
April 2004	Native Schools Science Fair	350	K-12 students & Teachers	Majority Native Americans, other races	Male & Female	1 Male Caucasian 1 Female Caucasian
August 2004	Geospatial Technology Workshop	5	Higher Education, K-12-Teacher Training & General Public	2 Native Americans 3 Caucasians	3 Male 2 Female	2 Female Caucasians 2 Males (1 Hispanic, 1 Caucasian)
2003-2004	Community Internship Program	10	Higher Education	Caucasians	7 Males 3 Females	1 Male Caucasian

Nebraska's Multi-State Workforce Development "NativeConnections" Program



The NativeConnections' vision is to engage multi-state consortia for Native American higher education groups with tribal lands and develop their expertise in geospatial sciences with particular emphasis on remote sensing. Each participating state established a separate mentoring relationship among its space grant program, remote sensing specialist, and tribal partner(s). NativeConnections built upon the successes of Native IMAGE (Institute for Managing Applications in Geospatial Extension), a Space Grant-funded center and a charter member connection to NativeView, which is a consortium of tribal organizations working to improve geospatial applications on native lands. Native IMAGE provides Nebraska's Winnebago community and Little Priest Tribal College with geospatial data for education and decision-making purposes and serves as a model foundation for this multi-state workforce development program. In addition, the Institute provides training in geographic information systems (GIS) with a particular emphasis in remote sensing science, technology, and applications. Public education for the tribal leadership and community at large has been a key component of Native IMAGE that will be adapted across seven states (ID, NE, OR, ND, SD, UT, WY). Each state will report on its individual outcomes.

NativeConnections enabled each state to customize and conduct training programs for delivery to the tribal partner(s) in multiple states. A decentralized management plan ensured the states the flexibility to customize mentoring plans specific to each state and tribal partner's unique needs. The Nebraska Space Grant Consortium (NSGC) led the multi-state partnership, guided by the precepts of the NativeView Charter. Based on the AmericaView concept sponsored by the United States Geological Survey (USGS), NativeView is a consortium of Indian Nations and Indian institutions of higher education that upholds the sacred and traditional role that Indian people have with Mother Earth. Modern geospatial technology is utilized to

coordinate and share geospatial technologies, data, and resources within and between Indian institutions of higher education and Indian nations.

Participating NativeConnections Space Grant Consortia

	Tribal Partner(s)	Designated remote sensing specialist	Space grant program director	Space grant staff point of contact
ID	Sho-Ban Tribe and Duck Valley Indian Reservation	Dr. Nancy Glenn	Dr. Jean Teasdale, Director	Ms. April Christenson, Coordinator
NE	Little Priest Tribal College and Nebraska Indian Community College	Ms. Karisa Vlassek	Dr. Brent Bowen, Director	Ms. Mary Fink, Coordinator
ND	Turtle Mountain Community College	Dr. Brad Rundquist	Dr. Shan de Silva, Director	Ms. Suezette Bieri, Assistant Director
OR	Klamath Tribe	Dr. Peter Wu	Dr. Jack Higginbotham, Director	Ms. Catherine Lanier, Coordinator
SD	Oglala Lakota College Sinte Gleska University	Ms. Mary O'Neill Dr. Edward Duke Mr. Patrick Kozak Dr. Sylvio Mannel	Dr. Sherry Farwell, Director	Mr. Thomas Durkin, Deputy Director
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WY	Wind River EPA	Dr. Ramesh Sivanpillai Dr. Bill Gribb	Dr. Paul Johnson, Director	Dr. Kathleen Harper, Assistant Director

The chart below illustrates that Native Connections met and exceeded all benchmarks proposed in the Phase I.

Key Deliverables: NativeConnections Multi-State Workforce Development

	Tribal Partner(s)	Set goals, indicators, metrics for each state	Needs Assessment Complete	Training Completed and/or In Progress	Evaluate progress, share best practices, prepare for Phase II
ID	Shoshone-Paiute Tribes of the Duck Valley Indian Reservation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NE	Little Priest Tribal College & Nebraska Indian Community College	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ND	Turtle Mountain Community College	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
OR	Klamath Tribe	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SD	Oglala Lakota College & Sinte Gleska University	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

UT	Ute Tribal Education Department	☑	☑	☑	☑
WY	Wind River EPA	☑	☑	☑	☑

Nebraska NativeConnections Outcomes

	Initiative	Estimated Numbers	Grade Level	Race of Participants (Student & Faculty)	Gender	Race & Numbers of Faculty Participating
April 2004	Geospatial Boot Camp	13	Higher Education, K-12 Teacher Training & General Public	5 Native Americans 11 Caucasians	9 Females 7 Males	3 Female Caucasians 1 Male Caucasian
August 2004	Geospatial Technologies Training	5	Higher Education, K-12 Teacher Training & General Public	2 Native Americans 3 Caucasians	3 Males 2 Females	2 Female Caucasians 2 Males (1 Hispanic, 1 Caucasian)
2004	Needs Assessment Meeting in Winnebago	11	Higher Education, General Public, K-12 Teacher Training	6 Native Americans 5 Caucasians	6 Females 5 Males	1 Female Caucasian 2 Males Caucasian
2003	Needs Assessment Meeting in Winnebago	15	Higher Education, General Public, K-12 Teacher Training	Native American & Other Races	Male & Female	1 Female Caucasian 2 Males Caucasian

Synergistic Outcomes Led by Nebraska

Phase I delivered diverse opportunities for information dissemination amongst the consortia. The 2004 Western Region Space Grant Meeting held at the Johnson Space Center (JSC) facilitated poster presentations for all 7 consortia to demonstrate accomplishments of the partnerships between the tribal partners and space grants. A separate briefing was conducted with NASA Technical Monitor Dr. Kamlesh Lulla of JSC. NativeConnections also held a lunch meeting at the conference. Findings were shared in *The Good, Bad, and the Ugly Presentation: Lessons Learned from the NativeConnections Project*. The 2004 National Space Grant Meeting in Pasadena, CA, provided further interaction at the NativeConnections Breakfast Meeting. Two teleconferences were also held. On May 18, 2004, the teleconference topics included discussing the needs assessment, identifying remote sensing specialists for states that had yet to determine them, and creating a NativeConnections website. The



NativeConnections Poster Session during the 2004 Space Grant Western Region Meeting

October 13, 2004, teleconference addressed building next phase of NativeConnections for the 2004 Workforce Call and compiling a report of Phase I accomplishments. Phase I enhanced opportunities for sharing trainers; as a result of this interaction, Nebraska will be helping Oregon. To further facilitate communications amongst the consortia, the NativeConnections website was created (<http://nativeconnections.unomaha.edu>).

NativeConnections serves as an excellent model to other consortia and institutions. The multi-state consortia have taken full advantage of sharing geospatial resources and expertise. In addition, the sharing of best practices and lessons learned have been extremely beneficial to all partners involved. NativeConnection's best practices can be exported to other consortia. The project will continue to leverage Space Grant resources, collaborate with affiliates, utilize the Geospatial Extension Specialist network, participate in the NativeView initiative, and continue to work with local, state, and national partners.

Synergistic Outcomes Led by Nebraska

Initiative/Activity	
March 2004	NativeConnections Meeting at the National Space Grant Meeting
April 2004	NativeConnections website created
May 2004	NativeConnections Teleconference
September 2004	Meeting with NASA JSC Technical Monitor Dr. Kamlesh Lulla
	NativeConnections Poster Presentation
	NativeConnections Presentation at the WRSB Meeting "The Good, the Bad, and the Ugly: Lessons Learned"
October 2004	NativeConnections Breakfast Meeting at the National Space Grant Meeting
October 2004	NativeConnections Teleconference
November 2004	NativeConnections website updated
November 2004	Submission of Phase II of NativeConnections

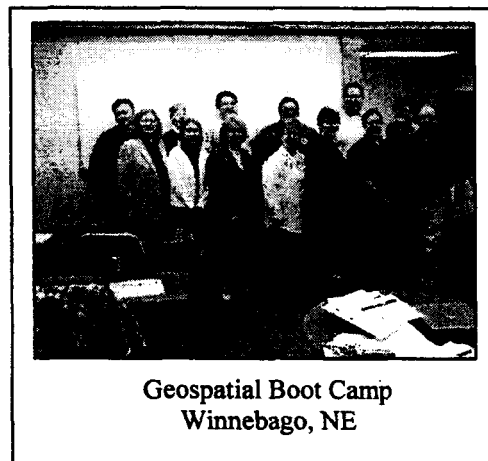
Nebraska NativeConnections Outcomes

Karisa Vlasek, Nebraska's GES began working with NSGC's tribal partners. NSGC already had an established relationship with Little Priest Tribal College (LPTC) and Nebraska Indian Community College (NICC) through the Family Science Night Program and other outreach and scholarship programs. In addition, through the Nebraska Geospatial Extension Program, GES Vlasek has been working with tribal communities in Nebraska since 2002. As part of this effort, in January 2002, Native IMAGE was created on the Winnebago Reservation at

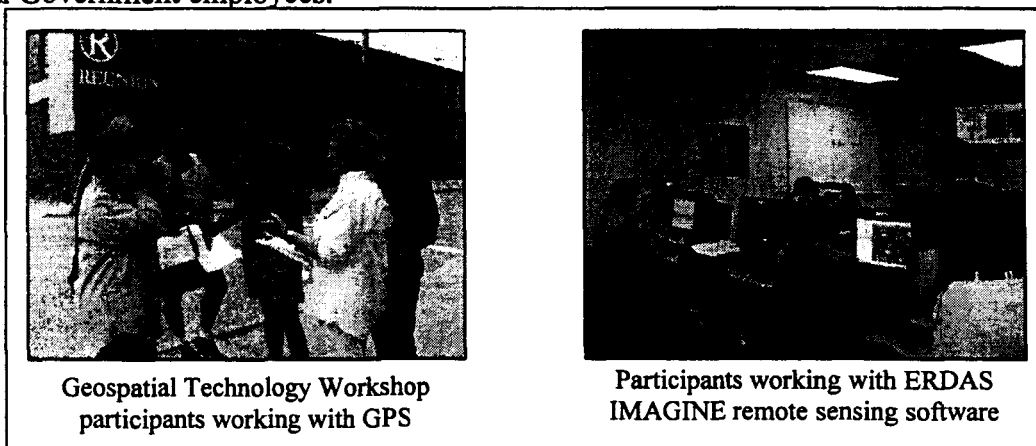
LPTC. Native IMAGE engages in research, outreach, and training with an overarching goal to serve as a conduit through which tribal communities can be exposed to geospatial technologies.

A needs analysis conducted on the Winnebago Reservation identified stakeholders, including the Winnebago Environmental Protection Agency (EPA) Water Quality Specialist, Winnebago GPS/GIS Specialist, Construction Manager, Tribal Planning Department, Land Management Department, faculty from LPTC, and teachers from Winnebago Public Schools. Stakeholders participated in several meetings conducted to outline the needs on the reservation. The greatest need involved locating and mapping many of the reservation resources including roadways, unpaved roads, water resources, animal feed lots, railroads, utilities, pesticides, water wells, and abandoned wells.

Two customized training workshops were held as part of the NativeConnections program. In April 2004, a "Geospatial Boot Camp" was conducted at Little Priest Tribal College. Boot Camp was an introductory workshop to GIS, GPS, and Remote Sensing. The workshop provided the participants with basic knowledge of geospatial activities and was sponsored by NASA Nebraska Space Grant and EPSCoR, CALMIT, and Native IMAGE. Participants included K-12 teachers, Little Priest Tribal College Faculty members (including the President and Academic Dean), Winnebago Tribal Government employees, Winnebago EPA employees, as well as community members.



In August 2004, the Geospatial Technologies Workshop was held in cooperation with CALMIT at the University of Nebraska at Lincoln. The workshop provided hands-on training with GPS receivers, ESRI's ArcGIS 9.0, and remote sensing applications. The workshop was sponsored by NASA Nebraska Space Grant and EPSCoR, USGS Nebraska View, and CALMIT. Participants in this workshop ranged from K-12 teachers, Tribal College Faculty members, to Tribal Government employees.

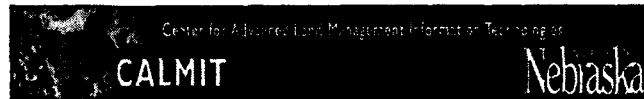
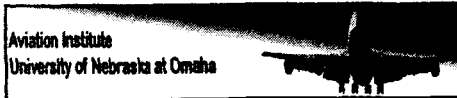


Collaborations

The imagery/data collection and sensors utilized during the two workshops were provided by the University of Nebraska at Lincoln's Center for Advanced Land Management

Information Technologies (CALMIT). The organization has provided specialized knowledge in research, education, and outreach activities. Specifically, CALMIT has provided Nebraska NativeConnections with the technical knowledge for training seminars and workshops in geospatial technologies.

The air operations are provided by the University of Nebraska at Omaha Aviation Institute. The organization has assisted NSGC by providing a pilot in data collection missions and outreach activities.



Conclusion

All of Nebraska's multi-state objectives were met with metrics of success greater than proposed. Each state has reported independent progress while Nebraska reports synergistic relationships and outcomes. These successes have been validated with our NASA Technical Monitor, Dr. Kamlesh Lulla at NASA Johnson Space Center.

5-Year Proposal Goals, Objectives & Outcome Indicators

Strategic Plan Alignment to NASA Goals & Guiding Documents

Nebraska devised a strategic approach for the next five years of Space Grant activities. The consortium examined the state's existing strategic plan goal by goal to align it to NASA's overarching *Vision for Space Exploration* in terms of NASA's guiding documents (*President's Commission, Education Enterprise Strategy, Vision for Space Exploration, and Human Capital Management Plan*). The result is a long-term 5-year plan, carefully honed to target NASA workforce competencies and research needs. The revised strategic plan was approved by the NASA Nebraska Space Grant and EPSCoR Technical Advisory Committee on November 12, 2004. SMART goals and objectives tie to NASA Mission Directorates. A matrix comparing each NSGC objective to the specific guiding NASA documents is included to illustrate this integrated approach. Strategies and Outcome Indicators are documented in the following narrative, and can also be found in an outline format in the 2005-2010 Strategic Plan included as *Appendix D*.

Throughout the process of realigning the strategic plan to NASA's mission, care was taken to keep the elements consistent with the NSGC's stated mission:

Nebraska is a designated upgrade and EPSCoR funded program directed by NASA to develop research infrastructure and enhance the quality of aerospace research and education throughout the state. Results of these endeavors will ultimately support decisions about the destiny of human exploration. The NASA Nebraska Space Grant and EPSCoR Program strives to provide national leadership in applied aspects of aeronautics/aerospace in an effort to protect America's technological competitiveness, economic vitality, and security.

The newly revised 2005-2010 Strategic Plan supplies Nebraska with a roadmap through the end of this first decade of the 21st century. The plan maintains a customer-focus, formulated to meet the needs of Nebraska as well as to fulfill NASA goals and objectives. With strategies customized to further progress in human exploration, science, aeronautics and space endeavors, the plan forms the framework for this 5-year proposal. The plan's outcome indicators will serve as evaluation mechanisms to gauge the NSGC's progress and overall impact. This document is intended to serve as the touchstone in preparing and assessing NSGC's annual reports for NASA with the full concurrence of our affiliate network.

Higher Education & Student Research Fellowship Programs (Goal 1)

Goal Matrix 1.1

Goal 1. – Deliver a scholarship/fellowship program that offers research opportunities to diverse student populations pursuing aerospace course work with a scholarship/fellowship program that offers diversity driven research opportunities at participating academic affiliates throughout Nebraska.				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 1.1 Ensure the fair and equal distribution of funds to all academic affiliates	<ul style="list-style-type: none"> Inspire youth to enter tech fields Support youth & teachers inspired 	<ul style="list-style-type: none"> STEM excellence for America's students & 	<ul style="list-style-type: none"> Higher education capability Student pipeline 	<ul style="list-style-type: none"> Workforce pipeline Flexibility & tools to ensure

through the minimum allotment of scholarship and fellowship funds for every academic affiliate each year.	by the Vision • Decision support infrastructure	teachers	• Student research	highly skilled, diverse & productive workforce
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The NSGC has provided scholarships and fellowships totaling over \$1.5 million dollars to approximately 507 undergraduate and graduate students representing 14 colleges and universities throughout the state since 1991. Nebraska's research fellowship program reflects the diversity of the Consortium's membership by providing funds for each academic affiliate. Each academic affiliate is awarded scholarship and fellowship funds in amounts based on involvement and past performance in the program. Nebraska's Designated Status has enabled doubling of the base amounts where applicable. Additional research scholarship and fellowship awards are made in conjunction with seed research proposals, senior faculty research, and the designated Hartmann fellowships.

Scholarships/Fellowships to NSGC's 14 Affiliates (2004 Awards)

Chadron State College	\$3,000	Nebraska Indian Community College	\$500
College of St. Mary	\$1500	University of Nebraska-Lincoln	\$8,500
Creighton University	\$1,500	University of Nebraska at Kearney	\$1,500
Grace University	\$4,500	University of Nebraska Medical Center	\$7,500
Hastings College	\$1,500	University of Nebraska at Omaha	\$9,750
Little Priest Tribal College	\$2,000	Western Nebraska Community College	\$1,500
Metropolitan Community College	\$2,250	Northeast Community College	\$1,500

Strategies developed to ensure fair and equitable delivery of funds include promoting the program statewide according to the qualifications set by NASA, with **all affiliates receiving information on student fellowship programs at least three months prior to due dates**. A statewide review committee will assure that **awards reflect the diversity of the Consortium's membership and statewide balance**.

Goal Matrix 1.2

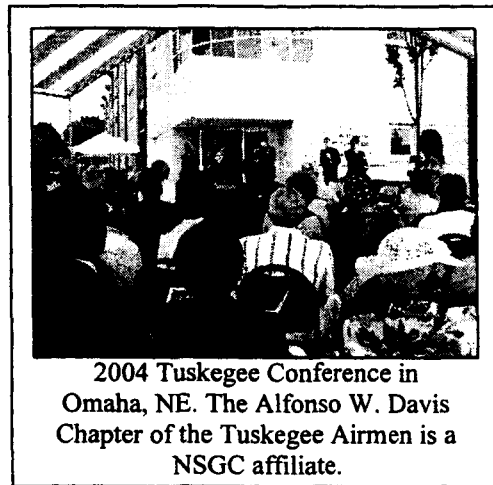
Goal 1. – Deliver a scholarship/fellowship program that offers research opportunities to diverse student populations pursuing aerospace course work with a scholarship/fellowship program that offers diversity driven research opportunities at participating academic affiliates throughout Nebraska.				
<i>Strategic Objectives Alignment with NASA Guiding Documents</i>				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 1.2 Sustain Nebraska's funding for fellowships targeting and recruiting women and	• Target & recruit women & under-represented populations in the STEM	• STEM excellence for America's students & teachers	• Under-represented and under-served populations • Student pipeline • Researcher &	• Education programs matching diverse populations of students with

underrepresented populations in the STEM fields	fields <ul style="list-style-type: none"> • Tangible experiences to prepare students for STEM fields 		institutional support	projected NASA workforce needs <ul style="list-style-type: none"> • Workforce representing diverse leadership
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Recruitment of underrepresented groups has always been a priority for NSGC's scholarship/fellowship programs. In 2004, **62% of the awards went to female students and 19% went to minority students – more than double the state's minority population base of 9.3%**¹. The NSGC Communications Coordinator works with other campus coordinators to customize award announcements for each affiliate. For example, at some affiliates, site visits by the communications coordinator may be deemed to be most effective, while at other affiliates campus coordinator contacts with faculty could be the best approach. For affiliates with larger populations of underrepresented groups (i.e., tribal and women's colleges), the NSGC will promote intensified recruitment techniques, such as personal contacts with science faculty and academic advisors. Intensive marketing techniques including such personal visits, direct faculty contacts, and e-mail will be utilized to encourage women and underrepresented students to apply for funding. Ultimately, **awards to women and minorities will equal or exceed 18% to minorities and 50% to females.**

NSGC specifically targets Nebraska's under-represented Native American population with scholarships tailored to safeguard diversity in the student pipeline. Transfer scholarships will increase opportunities for Nebraska tribal college students to complete four-year degrees in the STEM-related disciplines. **At least one transfer scholarship will be awarded each year to a Nebraska tribal college student to complete a four-year degree program at an NSGC affiliate.**

NSGC African American outreach is also enhanced by the Tuskegee Airmen Internship Program. Omaha's Chapter of the Tuskegee Airman sponsors a local Civil Air Patrol chapter for economically disadvantaged youth and actively sponsors an undergraduate intern. Additional NSGC funding provides needed supplies for the official Alfonza W. Davis Chapter office.



Goal Matrix 1.3

Goal 1. – Deliver a scholarship/fellowship program that offers research opportunities to diverse student populations pursuing aerospace course work with a scholarship/fellowship program that offers diversity driven research opportunities at participating academic affiliates throughout Nebraska.

Strategic Objectives Alignment with NASA Guiding Documents

	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 1.3 Partner student research fellowship awardees to work	<ul style="list-style-type: none"> • Inspire youth to enter tech fields • Find the best outside 	<ul style="list-style-type: none"> • Expand private sector role • Stimulate space industry 	<ul style="list-style-type: none"> • Institutional and systemic support • Professional development 	<ul style="list-style-type: none"> • Knowledge sharing and mentoring to build needed

¹ Minority statistics for the state of Nebraska obtained from the 2001 National Center for Education Statistics.

<p>with the best in the aerospace industry, offering meaningful, hands-on experience in the scientific and technical disciplines necessary for space commerce and exploration</p>	<p>expertise</p> <ul style="list-style-type: none"> • Integrate STEM initiatives with those of interested stakeholders • Provide hands-on experience in tech disciplines • Shared vision of skills needed to train future scientists & engineers • Industry leaders proactive with education incentives 	<ul style="list-style-type: none"> • Industry engages public in understanding vitality of space exploration 	<ul style="list-style-type: none"> • Customer focus • Partnerships with private sector • Student pipeline 	<p>competencies</p> <ul style="list-style-type: none"> • Integrated, strategic training builds needed competencies • Enhanced mission success through use of diverse talents/abilities of workforce
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As students prepare themselves for employment after graduation, they need the tools and opportunities to distinguish their achievements from other applicants. It is the responsibility of NSGC to provide them with these opportunities and experiences. Over the years NSGC has made provisions for these external learning initiatives through funded NASA Center Fellowships, internships, and research grants. These opportunities have been delivered when funds and interest have been available.

As part of the new vision, we plan to **develop a statewide Internship / Externship program**. This program would place qualified students into a three - six month program with NASA Centers, NASA Academies, federal, state, or local government entities, non-profit organizations, or industry affiliates. This program will provide students with a non-classroom experience that will expose them to elements and surroundings that can only be found in this type of environment. With this added exposure and experience, students will be better prepared for the start of their career path and have the foundation to make an immediate impact with the organization or business. Students would assist in areas of need for the organization and help acclimate themselves to the workforce environment. Funds from the NASA Nebraska Space Grant would be used to pay for the student's participation in the program. Outcomes from the initiative would be **placement of at least five interns with local businesses and non-profit organizations** annually.

- | |
|---|
| <p>Potential Providers for Internship/Externships</p> <p>NASA Centers
 NASA Headquarters
 NASA Academies
 Federal Aviation Administration
 Department of Transportation
 Department of Agriculture
 Transportation Security Administration
 Nebraska Department of Aeronautics
 Nebraska Department of Roads
 Nebraska Agriculture Department
 Nebraska Business Aviation Association
 Omaha Airport Authority</p> |
|---|

The NSGC will direct specific efforts at **recruiting graduates of NASA pre-college programs and Center-initiated undergraduate and graduate programs** (e.g., NASA Academy, SSEP, GSRP, USRP, SHARP, Stargazer) to the Space Grant scholarship/fellowship program. At least one such award will be budgeted each year.

Additional emphasis will be placed on the development of additional research scholarship

and fellowship opportunities during the summer and academic year. These will include placements with NASA Nebraska EPSCoR Collaborative Research Team (CRT) faculty, the National Student Satellite Program, NASA Academy (Dryden, Goddard, and Ames), Undergraduate Student Research Program (USRP), and the Graduate Student Research Program (GSRP). **At least 12 students will participate in CRT activities annually.**

NSGC's Designated Status helped us relocate a Jet Propulsion Laboratory (JPL) Geospatial Data Server from JPL to Nebraska where it will be made available for national use. By offering research fellowships that support this endeavor, our geospatial research centers, and other specific NSGC initiatives, we can make direct use of NASA content and facilities to involve students in NASA science. At least three of these fellowships will be offered each year.

The Hartmann Undergraduate Research Fellowships are awarded annually to competitively selected students who exhibit intellectual breadth with a strong academic record, pursue a career in a space-related area, and demonstrate interest in attending graduate school. Awardees participate in space-related undergraduate research experiences in a laboratory or with a professor. All awardees assume a mentorship role for a first-year engineering student from an underrepresented group and provide a report on this activity each semester. University of Nebraska-Lincoln Professor Wieslaw Szydlowski will continue to coordinate the Hartmann Fellowship Program. At least one fellowship will be awarded, through a competitive application process, to participate in engineering research through this program. Underrepresented students will be encouraged to apply.

Matrix 1.4

Goal 1. – Deliver a scholarship/fellowship program that offers research opportunities to diverse student populations pursuing aerospace course work with a scholarship/fellowship program that offers diversity driven research opportunities at participating academic affiliates throughout Nebraska.				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 1.4 Provide educational support/enhancement mechanisms to student researchers, integrating education efforts with those of other interested stakeholders to improve STEM education for our future workforce.	<ul style="list-style-type: none"> • Provide tangible experiences that prepare students for future in STEM fields • Support youth & teachers inspired by the Vision 	<ul style="list-style-type: none"> • Promoting enabling science to initiate enabled science • Using private sector resources • Provide for better integration of existing STEM initiatives across governments, industries & professional organizations • Technology transfer 	<ul style="list-style-type: none"> • Seamless pipeline of STEM education programming • Sustaining partnerships with NASA Centers • e-learning opportunities • Customer focus 	<ul style="list-style-type: none"> • Knowledge sharing and mentoring to build needed competencies • Capture knowledge & lessons learned in a more effective, systematic way • Effective process to develop leaders for future • Education programs matching diverse populations of students with projected NASA workforce needs

Another means to support youth and teachers inspired by the *Vision for Space Exploration* is to enhance educational opportunities by integrating education efforts with those of other interested stakeholders. Mechanisms designed to boost the research fellowship and internship programs include faculty mentoring, distance education, student research presentations and enhanced technology.

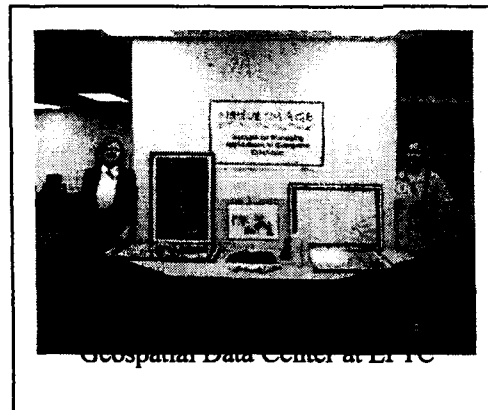
The NSGC scholarship/fellowship program incorporates mentoring of students by faculty at their academic institution. Students receiving scholarships or fellowships will be assigned a faculty member with which he/she will have monthly conferences to discuss academic progress and/or problems, current and future research interests, and career development. For students receiving fellowships or scholarships to participate in research with a collaborative research team (CRT), the NSGC will designate a CRT faculty researcher to serve as the student's mentor. NSGC will also designate a Nebraska faculty mentor for each student receiving an NSGC scholarship or fellowship. In this role, the faculty mentor will assist the student in making contacts with NASA-funded researchers (in-state and at Centers) and maintain ongoing e-mail contact with the student before, during, and after their NASA fellowship. In all of these scenarios, faculty mentors will assist fellowship recipients in preparing their presentations for the annual Nebraska Academy of Sciences Conference (Space Grant Section). A faculty mentor will be assigned to 100% of student researchers.

To give more depth to their experiences, students completing research fellowships will continue to be required to present results each year at the annual Nebraska Space Grant research conference, Aeronautics and Space Science Section, held in conjunction with the Nebraska Academy of Sciences each April. The Nebraska Academy of Sciences (NAS) is a multi-disciplinary conference with a focus on research-oriented science and technology. The Aeronautics and Space Science Section, now the largest component of NAS, was established by the NSGC as an outlet for researchers, both students and faculty to share their results. All NASA Nebraska research outcomes are presented. Many faculty mentors cultivate and enhance research relationships with their students through this program. Student researchers gain valuable presentation experience for future outreach and promotion of NSGC initiatives. It will be required for all students funded through NSGC to present results each year either at the annual Nebraska Space Grant research conference or another outreach experience.

In an effort to substantially enhance the educational experience of NASA Nebraska Space Grant Fellows and Scholars, the NASA Student Resource Center will be relocated and augmented to better suit the learning and development needs of our students. The vision for this expansion to the resource center is to house educational materials and provide for a working space for students to conduct group meetings, work on educational material like research and homework, and be a place for students to utilize computers and other technology aids. The resource center will be equipped with 5 computers, a printer, internet access, televisions that will monitor the NASA Television Network, and other research and educational materials.

NSGC's Nebraska Geospatial Extension Program (NEGEP) is developing and placing geospatial data centers throughout Nebraska. The first data center was placed within Native IMAGE, where students, faculty, and Winnebago community members now have access to two computer workstations equipped with GIS and remote sensing software. Other data centers are in development at Metropolitan Community College, Nebraska Indian Community College, Midplains Community College, and Northeast Community College. These data centers will consist of hardware and geospatial software that will allow users to access various geospatial technologies. Through the addition of three new community college academic affiliates (each

with multiple delivery sites) funded through the Designated Status Upgrade award, the NSGC will establish these labs for public use. These facilities will provide data utilization sites in support of the surrounding communities. Training and supervision will be provided by Nebraska's Geospatial Specialist. A pool of four community colleges will be invited to compete for this unique opportunity to become three of a total of eight possible delivery sites around the state.



Through the NASA Space Grant Resource Center, Geospatial Data Centers, UNO Flight Lab/FAA Testing Center and Laptop Loan Program, student researchers are promised technical support for their endeavours. These resources and others allow for technology transfer, as well as tangible experiences preparing students for future careers in the STEM disciplines.

Goal 1 SMART Chart

Goal 1 Metrics	Specific	Measurable	Acceptable	Realistic	Time Frame
All affiliates receive information on student fellowship programs at least 3 months before due dates	<input checked="" type="checkbox"/>	100% of affiliates	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Awards reflect the diversity of the Consortium's membership and statewide balance	<input checked="" type="checkbox"/>	At least 40% female (national target 9.3% minority state target)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Increases of 100% to base awards for each affiliate will be provisioned	<input checked="" type="checkbox"/>	100% of affiliates	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Awards to women & minorities equal or exceed 20% to minorities and 50% to females	<input checked="" type="checkbox"/>	20% to minorities; 50% to females	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least one transfer scholarship will be awarded each year to Nebraska tribal college student to complete a 4-year degree program at a NSGC affiliate	<input checked="" type="checkbox"/>	1 transfer scholarship	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
A minimum of 5 interns placed each year	<input checked="" type="checkbox"/>	5 interns	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least one award will be given each year to graduates of NASA pre-college programs and Center-initiated graduate and undergraduate programs	<input checked="" type="checkbox"/>	1 scholarship	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least 12 students will participate in CRT activities annually	<input checked="" type="checkbox"/>	12 students	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least 3 fellowships offered each year to support NSGC initiatives	<input checked="" type="checkbox"/>	3 research fellowships	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least one Hartmann fellowship awarded annually	<input checked="" type="checkbox"/>	1 Hartmann fellowship	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)

100% of student researchers will be assigned a faculty mentor	✓	100% student researchers	✓	✓	Long-term (Years 1-5)
At least one distance course related to aerospace science is developed each year	✓	1 new distance course	✓	✓	Long-term (Years 1-5)
100% of all student researchers funded through NSGC will present results each year	✓	100% funded student researchers	✓	✓	Long-term (Years 1-5)
Student researchers have access to enhanced technology in support of their academic efforts	✓	100% of students	✓	✓	Long-term (Years 1-5)
Scholarship expanded to high school seniors and affiliates	✓	SG recruiter implemented	✓	✓	Long-term (Years 1-5)
Space Grant Recruiter promotes scholarships for high school students, attends college fairs, and visits schools	✓	At least 20 schools visited per year	✓	✓	Long-term (Years 1-5)

Aerospace Research (Goal 2)

Since its inception, the NSGC has promoted, fostered, and supported the development of research throughout the state. Research endeavors are consistent with NASA aims, driven by collaborative relationships between Nebraska and NASA researchers, nationally competitive in terms of quality and impact, and offer near- and long-term potential to contribute to the state's economic growth. To achieve these aims, the NSGC has developed and implemented deliberate strategies designed to engage promising faculty in NASA-driven research activity.

Aerospace Research Matrix 2.1

Goal 2. – Raise the aggregate quality and quantity of Nebraska's aerospace/aeronautics research endeavors to the highest level of national competitiveness, exploring and refining concepts that will help America return to the moon and ultimately travel to Mars and beyond.				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 2.1 Place priority in the Nebraska research program on research in the aerospace area, as well as research with direct application to the state of Nebraska.	<ul style="list-style-type: none"> Find the best outside expertise Discovery-driven Achieve new exploration goals Help America return to moon & beyond 	<ul style="list-style-type: none"> Protect US technological leadership, economic vitality & security Set space exploration vision as a national priority Scientific knowledge enabling science exploration vision 	<ul style="list-style-type: none"> Customer focus Education technology R & D Researcher & institutional support Enhancing higher education capability in STEM disciplines 	<ul style="list-style-type: none"> Ensuring a source of competencies needed to assure future mission successes Training & development programs that build competencies Capture knowledge & lessons learned Develop leaders for the future

Nebraska utilized its Designated Status Upgrade funding increase to modify and intensify its research priorities and related activities. In response to a recommendation by NASA, NSGC is placing greater emphasis on aerospace research and other research with direct application to Nebraska. Aerospace research is one of Nebraska's "success stories." The state's universities

and colleges have developed long-term research and education affiliations with NASA, the FAA, and industry. Since 1946, Nebraska has hosted the U.S. Strategic Command (formerly the Strategic Air Command) and the 6th Space Squadron of the U.S. Air Force. Aerospace science is the basis of the major research activities for AERIAL, the Nebraska EPSCoR 2000 initiative, as well as other major projects receiving funding from NSF, DEPSCoR, USDA, NIH, and the Nebraska Research Initiative, in addition to private funding.

The priority that Nebraska places on research in the aerospace technology area, as well as research with direct application to the state of Nebraska, reflects the *President's Commission on Implementation of United States Space Exploration Policy* directive to set space exploration as a national priority. By infusing this priority into every decision regarding research, NSGC positions Nebraska as a leader in the STEM disciplines, ensuring a source of competencies needed to assure future NASA mission successes. NSGC funding will dedicate researcher and institutional support for aeronautics development, as called for in the *Education Enterprise Strategy*.

Matrix 2.2

Goal 2. – Raise the aggregate quality and quantity of Nebraska's aerospace/aeronautics research endeavors to the highest level of national competitiveness, exploring and refining concepts that will help America return to the moon and ultimately travel to Mars and beyond.				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 2.2 Ensure the fair and equal distribution of seed funds throughout the state.	<ul style="list-style-type: none"> Decision support infrastructure Integrate STEM initiatives with those of interested stakeholders Target & recruit women & under-represented populations in the STEM fields Tangible experiences to prepare students for STEM fields 	<ul style="list-style-type: none"> STEM excellence for America's students & teachers Stimulate space industry 	<ul style="list-style-type: none"> Student research Sustaining partnerships with private sector and informal education 	<ul style="list-style-type: none"> Education programs matching diverse populations of students with projected NASA workforce needs Workforce representing diverse leadership Flexibility & tools to ensure highly skilled, diverse & productive workforce

The annual statewide call for proposals encourages all affiliates to participate, ensuring the fair and equal distribution of seed research funds throughout the state. A statewide call for proposals for aeronautics-related seed research funding will be released annually. The next proposal deadline will be February 28, 2005.

Seed Funding Successes

Since 1991, NSGC has distributed approximately \$750,000 among its affiliate faculty.

Goal is set for 75% of all affiliates to have at least one submission for each competition each year.

The statewide peer review selection process for seed grant proposals will place special emphasis on statewide balance. This will ensure the highest level of statewide participation, balance, and benefit sharing. Awards will reflect the diversity of the consortium’s membership, paving the way for a workforce representing diverse leadership.

Initially, NSGC awards small amounts of seed funding (on average, less than \$15,000) to researchers from academic affiliates throughout the state to encourage the development of new research or NASA collaborations. Priority is given to projects which establish research collaborations with NASA scientists or NASA Centers. Following the achievement of their stated objectives, these researchers are eligible for additional Space Grant funding. Since 1991, Nebraska has distributed approximately \$750,000 among its participating faculty. Approximately half of all seed grant recipients have subsequently received NASA EPSCoR or other forms of NASA funding.

NSGC will award seed grants of a sufficient amount to support new research endeavors throughout the state. Mirroring Goal 2.1, the seed research program will give priority to research in aeronautics over research in other areas. At least 80% of all seed research funded by NSGC will be in the aerospace area, while 50% will have direct applications for the state of Nebraska. Goal is set to award 2-3 seed grants per year at approximately \$18,000 each.

Matrix 2.3

Goal 2. – Raise the aggregate quality and quantity of Nebraska's aerospace/aeronautics research endeavors to the highest level of national competitiveness, exploring and refining concepts that will help America return to the moon and ultimately travel to Mars and beyond.				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 2.3 Stimulate, motivate, and support the development of faculty.	<ul style="list-style-type: none"> Proactive use of education incentives Motivate & train teachers 	<ul style="list-style-type: none"> STEM excellence for America's students & teachers Increased priority on teacher training 	<ul style="list-style-type: none"> Faculty competitiveness Preservice education Teacher/faculty support Researcher & institutional support Professional development 	<ul style="list-style-type: none"> Develop academic skills NASA relies on for STEM competencies Ensure education programs matching NASA workforce needs

The statewide peer review selection process for seed grant proposals will also place special emphasis on the development of junior faculty, relying on an innovative, graduated approach to developing and “growing” new research activity by junior faculty throughout the state. The NSGC’s practice of incremental seed funding programs has stimulated promising research activities of talented junior faculty members throughout the state and has led directly to the acquisition of additional research funding. Through numerous travel grants, fellowships at NASA research centers, and frequent communication, Nebraska has advanced productive collaborations between its researchers and NASA personnel. These efforts have resulted in a proliferation of synergistic research activity that continues to benefit NASA's *Vision for Space Exploration*, as well as the State of Nebraska. Specifically, these initiatives have directly or

Seed Funding Successes

Travel grants and fellowships at NASA research centers have contributed directly or indirectly to 55 new or expanded collaborations with NASA and more than 507 undergraduate, graduate and doctoral assistantships.

indirectly resulted in 55 new or expanded collaborations with NASA; more than 507 undergraduate, graduate, and doctoral assistantships; and the development of several research-industrial collaborations in Nebraska, including the launch of several new in-state industrial efforts, such as the manufacturing of ellipsometers and a new airborne remote sensing business venture.

Consistent with the call of the *President's Commission* for an increased priority on teacher training, junior faculty proposing seed research projects that include mentoring from senior faculty mentors will be given priority. At least 80% of all seed research funded by NSGC will incorporate a mentoring relationship. Seed research recipients will be required to pursue publication of research outcomes in refereed academic publications, with at least one publication resulting from each funded project. Productive collaborations between Nebraska researchers and NASA personnel will be supported in the seed research program, leading to cooperative scientific inquiry that contributes to NASA's strategic research and technology priorities. All funded seed researchers will make contact with at least one NASA researcher during their funding period, with at least half of funded researchers establishing collaborative relationships with NASA researchers. Junior faculty will present their seed research findings at the annual Space Grant statewide conference in conjunction with the Nebraska Academy of Sciences. All funded seed researchers will annually submit abstracts for verbal/poster presentation. To ensure programs meeting NASA's needs, NASA representatives, University Affairs Officers, administrators and researchers will be invited to Nebraska to conduct research symposia, course lectures and general public talks. Goal is set for at least one NASA officer will present at academic events in Nebraska each year.

Matrix 2.4

Goal 2. – Raise the aggregate quality and quantity of Nebraska's aerospace/aeronautics research endeavors to the highest level of national competitiveness, exploring and refining concepts that will help America return to the moon and ultimately travel to Mars and beyond.				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 2.4 Encourage the development of relationships between faculty and researchers at NASA Centers.	<ul style="list-style-type: none"> Find the best outside expertise Proactive use of education incentives Support teachers inspired by the Vision Stimulate STEM excellence in teachers 	<ul style="list-style-type: none"> Provide for better integration of existing STEM initiatives across governments, industries & professional organizations Technology transfer 	<ul style="list-style-type: none"> Sustaining partnerships with NASA Centers Customer focus Making direct use of NASA content, people & facilities to involve educators in NASA science 	<ul style="list-style-type: none"> Ensure training and development to build needed competencies Enhance mission success through knowledge sharing

Faculty development is fostered through travel grants, allowing them to visit NASA Centers and establish collaborations with NASA researchers. This effort leads to cooperative scientific inquiry that contributes to NASA's

Seed Funding Successes

Appendix B
illustrates NASA Center visits by Nebraska Space Grant and EPSCoR personnel from 1999 to present

strategic research and technology priorities. Connections are further strengthened through faculty participating in summer internship placements at NASA Centers. NSGC will ensure that at least one faculty member will be placed at or will visit a NASA Center. Travel grants are earmarked for faculty to establish/strengthen ties with NASA Center researchers. Approximately 5 travel grants will be awarded per year. Researchers awarded grants to visit NASA Centers are required to meet with the Center UAO to better coordinate the state Space Grant activities with the Centers. As faculty meet NASA UAOs face-to-face to describe their NSGC collaborations, the number of UAO collaborations will increase. As collaborative relationships develop, Nebraska provides seed funding for the initiation of research. This approach has proven effective for Nebraska, particularly for its aerospace, aeronautics, and geospatial endeavors. *Appendix B* illustrates NASA Center visits by Nebraska Space Grant and EPSCoR personnel from 1999 to present.

Matrix 2.5

Goal 2. – Raise the aggregate quality and quantity of Nebraska's aerospace/aeronautics research endeavors to the highest level of national competitiveness, exploring and refining concepts that will help America return to the moon and ultimately travel to Mars and beyond.				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 2.5 Identify and obtain additional sources of funding for aeronautics/aerospace research.	<ul style="list-style-type: none"> • Exploring & refining concepts that will help America return to the moon & beyond • Develop infrastructures to support decisions about human exploration • Integrate education efforts with those of interested stakeholders 	<ul style="list-style-type: none"> • Protect US technological leadership, economic vitality & security • Set space exploration vision as a national priority • Stimulate space industry • Use national and international resources 	<ul style="list-style-type: none"> • Customer focus • Achieve high leverage and/or sustainability through appropriate partnerships 	<ul style="list-style-type: none"> • Workforce pipeline • Flexibility & tools to ensure highly skilled, diverse & productive workforce

The overall goal of the seed research program is to grow research that contributes to the economic development of the state beyond Space Grant funding. Nebraska personnel assist in the identification of sources to continue the research after Space Grant funding ends, including industry outlets and the University of Nebraska Technology Park. As NSGC facilitates seed researcher ties with industry, the number of new industry contacts will increase by three or more. The collaborative relationship with the University of Nebraska Technology Park will generate shared communications and successful placement of interns. At least one new industry initiative will be launched through the Technology Park and UNO Technology Development Center.

Many Nebraska researchers have also utilized the outcomes of initial NSGC seed funding to acquire additional grant funds through non-NASA sources, including private funding, the National Science Foundation (NSF), the National Institutes of Health (NIH), DEPSCoR, and the

Nebraska Research Initiative. All three Collaborative Research Teams (CRT), comprised of statewide researchers and funded by Nebraska's NASA EPSCoR 2000 (AERIAL) grant, initially received seed research money through NSGC. For example, the CRT led by Dr. Don Rundquist originated with a small seed grant in 1998. This funding led to a larger award through a NASA Preparation Grant in 1999, and ultimately designation as a NASA EPSCoR CRT in the AERIAL initiative in 2000. NSGC will provide support to researchers in identifying and applying for other sources of funding for ongoing research in Nebraska, striving to increase the number of non-NASA applications submitted and/or funded by at least two.

The seed research program exemplifies the mandate of the *Education Enterprise Strategy* to achieve high sustainability through appropriate partnerships. Sustainability is further assured by requiring seed research recipients to leverage seed funding. A minimum of 1 to 1 match will consistently be met.

Goal 2 SMART Chart

Goal 2 Metrics	Specific	Measurable	Acceptable	Realistic	Time Frame
75% of all affiliates have at least one submission for each seed research proposal competition each year	<input checked="" type="checkbox"/>	75% of affiliates	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Awards will reflect the diversity of the consortium's membership and statewide balance	<input checked="" type="checkbox"/>	40% female (national target) 9.3% minority (state target)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least 80% of all seed research funded by NSGC will be in the aeronautics area	<input checked="" type="checkbox"/>	80% of all NSGC seed research	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
50% of all seed research funded by NSGC will have direct application to the state of Nebraska	<input checked="" type="checkbox"/>	50% of all NSGC seed research	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
2-3 seed grants awarded per year at approximately \$18,000 each	<input checked="" type="checkbox"/>	2-3 seed grants	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least 80% of all seed research funded by NSGC will incorporate a mentoring relationship	<input checked="" type="checkbox"/>	80% of all NSGC seed research	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least one publication will result from each funded project	<input checked="" type="checkbox"/>	100% of all NSGC seed research	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
All funded seed researchers will make contact with at least one NASA researcher during funding period	<input checked="" type="checkbox"/>	100% of all NSGC seed researchers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least half of funded researchers will establish a collaborative relationship with a NASA researcher	<input checked="" type="checkbox"/>	At least 50% of all NSGC seed researchers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
All funded seed researchers will annually submit abstracts for verbal/poster presentation	<input checked="" type="checkbox"/>	100% of all NSGC seed researchers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)

At least one NASA officer travels to Nebraska each year to present at academic events	<input checked="" type="checkbox"/>	At least 1 NASA officer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least one junior faculty member will be placed at or will visit a NASA Center	<input checked="" type="checkbox"/>	At least 1 junior faculty member	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Approximately 5 travel grants awarded per year	<input checked="" type="checkbox"/>	5 travel grants	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
An increase in the number of UAO collaborations, as documented in travel reports	<input checked="" type="checkbox"/>	At least 2 UAO collaborations each year	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Increase by 2 or more the number of non-NASA applications sent/funded	<input checked="" type="checkbox"/>	2 non-NASA applications	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Requirement of minimum 1:1 match met consistently	<input checked="" type="checkbox"/>	1:1 match	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Successful placement of interns at Technology Park	<input checked="" type="checkbox"/>	At least 3 interns	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Development of at least one industry initiative through the UNL Technology Park and the UNO Technology Development Center	<input checked="" type="checkbox"/>	1 new industry initiative	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)

Workforce Development (Goal 3)

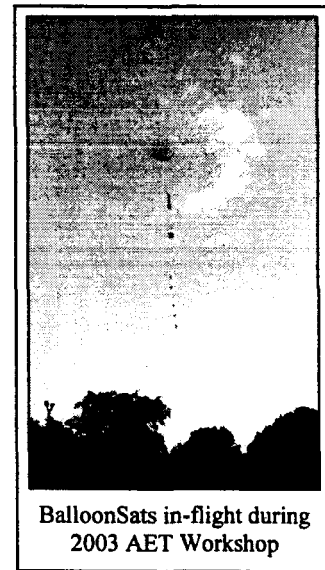
Nebraska workforce development issues are addressed in great detail in the recently submitted Nebraska and Nebraska Multi-state Workforce Development proposals. Space Grant funding extends the reach of these initiatives, consistent with the *Human Capital Management Plan's* focus on the development of a future workforce for NASA and its related industries. Nebraska recognizes that its workforce will need to possess the skills, knowledge, and motivation necessary to advance the long-term goals of NASA. Increased efforts in this area include participation in the National Student Satellite Program through collaborative efforts with the Iowa Space Grant; aerospace career exploration activities, such as Aviation Career Education (ACE) Academy; internship opportunities that promote aerospace-related careers; and joint efforts with NASA Center personnel such as Mike Freeman (Kennedy) and Linda Rodgers (JPL) to arrange for placement of Nebraska graduates at NASA.

Matrix 3.1

Goal 3. – Contribute to the state's aeronautics and aerospace workforce development pipeline by motivating talented Nebraska youth, and in particular those from underrepresented populations, to pursue post-secondary and graduate-level education and careers in aerospace science and industry.				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 3.1 Inspire K-16 youth to enter tech fields through high visibility programming rich in STEM content	<ul style="list-style-type: none"> Inspire youth to enter tech fields Find the best outside expertise Engage the public Integrate STEM initiatives with 	<ul style="list-style-type: none"> Expand private sector role Stimulate space industry Engage public in understanding vitality of space exploration 	<ul style="list-style-type: none"> Student participation Institutional and systemic support Customer focus Partnerships with private sector Student pipeline 	<ul style="list-style-type: none"> Knowledge sharing and mentoring to build needed competencies Integrated, strategic training builds needed competencies

	those of interested stakeholders <ul style="list-style-type: none"> • Provide hands-on experience in tech disciplines • Shared vision of skills needed to train future scientists & engineers • Industry leaders proactive with education incentives 			<ul style="list-style-type: none"> • Enhanced mission success through use of diverse talents/abilities of workforce
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Nebraska has incorporated the innovative National Student Satellite Program (NSSP) as an initiative to increase public exposure to NASA opportunities. Through the NSSP, students design, build, fly, and operate a broad range of spacecraft. Students arrive with different levels of skill, knowledge, and experience. Missions of growing complexity provide opportunities to acquire baseline skills and experience, a strategy dubbed by NASA as “crawl, walk, run, fly”. NSGC pursues this program’s goal to make aerospace history by sending the first student-built satellites to Mars. NSGC will sponsor a Nebraska team of researchers to attend the student satellite workshops and ensure that Nebraska students participate in the *Crawl, Walk, Run, Fly Student Satellite Program*. In addition to encouraging students to excel in STEM coursework during in their high school career, this activity features the added value of strengthening the NSGC collaboration with the Iowa Space Grant Consortium.



BalloonSats in-flight during 2003 AET Workshop

A wide variety of career exploration and outreach programs increase the visibility and broaden the range of STEM-related career exploration activities, including NASA and industry internships. For example, NSG collaborates with the Nebraska Department of Aeronautics to produce the Aviation Career Exploration (ACE) Academy, which introduces high school students to aviation- and aerospace-related career opportunities. During this annual five-day summer session, approximately 30 students participate in classroom presentations and field trips to visit aviation-related organizations and activities, both civil and military. Students from underrepresented groups, such as Nebraska’s Native American communities, are encouraged to participate. Funding for at least four aerospace career exploration activities annually, including one related to geospatial science, would expand the range of career exploration programs available for youth.

Matrix 3.2

Goal 3. – Contribute to the state's aeronautics and aerospace workforce development pipeline by motivating talented Nebraska youth, and in particular those from underrepresented populations, to pursue post-secondary and graduate-level education and careers in aerospace science and industry.

Strategic Objectives Alignment with NASA Guiding Documents

<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
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<p>Objective 3.2 Enhance higher education capability in STEM disciplines by offering student support through scholarship and fellowship opportunities that encourage the application of underrepresented students (e.g. at all women's, tribal, community and rural colleges)</p>	<ul style="list-style-type: none"> • Target & recruit women & under-represented populations in the STEM fields • Tangible experiences to prepare students for STEM fields • Integrate STEM initiatives with those of interested stakeholders 	<ul style="list-style-type: none"> • STEM excellence for America's students & teachers 	<ul style="list-style-type: none"> • Sustaining partnerships with NASA Centers • Customer focus • Making direct use of NASA content, people & facilities to involve educators in NASA science • Attracting diverse populations to pipeline 	<ul style="list-style-type: none"> • Education programs matching diverse populations of students with projected NASA workforce needs • Workforce representing diverse leadership
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NSGC will offer student support through scholarship and internship opportunities which encourage the application of underrepresented students. NSGC is utilizing its Designated Status Upgrade funding to develop more direct connections with NASA in the placement of Nebraska graduates with NASA, placing Nebraska students at the Jet Propulsion Lab by working with our workforce contact, Dr. Linda Rodgers of the JPL University Programs Office. To extend these ties, each time a visit is made to a NASA Center, personal contact will be made with Personnel Officers and University Affairs Officers. At least three internship placements are slated to be developed with NASA, the UNL Technology Park, and/or private aerospace industry.

Matrix 3.3

Goal 3. – Contribute to the state's aeronautics and aerospace workforce development pipeline by motivating talented Nebraska youth, and in particular those from underrepresented populations, to pursue post-secondary and graduate-level education and careers in aerospace science and industry.				
<i>Strategic Objectives Alignment with NASA Guiding Documents</i>				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
<p>Objective 3.3 Expand Nebraska Space Grant involvement in activities of Geospatial Extension</p>	<ul style="list-style-type: none"> • Tangible experiences to prepare students for STEM fields • Integrate STEM initiatives with those of interested stakeholders 	<ul style="list-style-type: none"> • Provide for better integration of existing STEM initiatives across governments, industries & professional organizations • Technology transfer 	<ul style="list-style-type: none"> • Customer focus • Attracting diverse populations to pipeline • Researchers & institutional support • e-learning opportunities 	<ul style="list-style-type: none"> • Integrated, strategic training builds needed competencies • Enhanced mission success through use of diverse talents/abilities of workforce

Nebraska's Geospatial Extension Specialist (GES) ideally positions NSGC to inspire students' interests in the geospatial science competencies needed by NASA's future workforce. By increasing participation in geospatial related workshops with other geospatial specialists, Nebraska's GES will integrate the perspectives of other invested stakeholders on STEM initiatives. The GES will attend national geospatial workshops, collaborate with other Geospatial Extension Specialists, and explore additional geospatial grant opportunities.



2nd National GES Meeting in September, 2004, in Kansas City, MO, in conjunction with ASPRS Fall Meeting

Goal 3 SMART Chart

Goal 3 Metrics	Specific	Measurable	Acceptable	Realistic	Time Frame
Sponsor a Nebraska team of researchers to attend student satellite workshops	<input checked="" type="checkbox"/>	1 research team	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Nebraska students participate in the Crawl, Walk, Run, Fly Student Satellite Program	<input checked="" type="checkbox"/>	1 team of students	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Fund at least 4 aerospace career exploration activities annually, including one related to geospatial science	<input checked="" type="checkbox"/>	4 aerospace career exploration activities	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Develop at least 3 internship placements with NASA, the UNL Technology Park, and/or private aerospace industry	<input checked="" type="checkbox"/>	3 internships	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Visit with Personnel Officers and University Affairs Officers each time a visit is made to a NASA Center	<input checked="" type="checkbox"/>	At least 2 visits	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Attend national geospatial workshops	<input checked="" type="checkbox"/>	At least 2 per year	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Collaborate with other geospatial extension specialists	<input checked="" type="checkbox"/>	At least 2 collaborations per year	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Explore additional geospatial grant opportunities	<input checked="" type="checkbox"/>	At least 3 grants applied for per year	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)

Geospatial Research (Goal 4)

In response to NASA's need to disseminate geospatial information and technologies to potential users, Nebraska paved the way for new applications with customer-focused research, outreach and public service activities. Since hiring Geospatial Extension Specialist (GES)

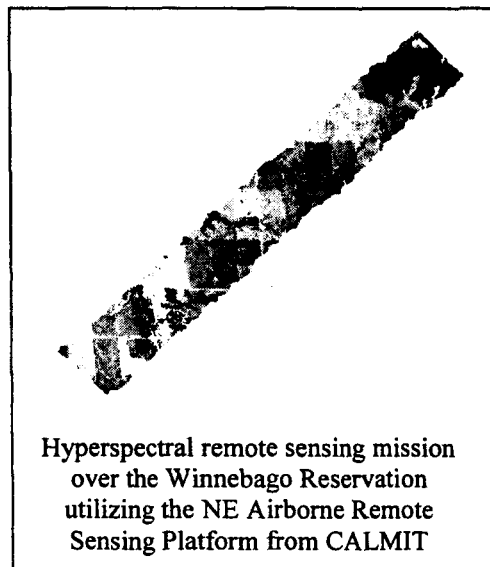
Karisa Vlasek in 2002, NSGC has been effectively applying remote sensing research to the needs of Nebraska citizens. Collaborations with Cooperative Extension allow for applied research, technology transfer, and education/demonstration projects targeting rural and urban users that want to employ remote sensing data to improve the quality of life in the state. GES Vlasek is developing linkages between academic programs and commercial entities to result in economic development for Nebraska. She is also reviewing and fostering academic research programs for those best fit for commercialization. NSGC's GES contributes to workforce development in Nebraska through the implementation of continuing education credits, training, and workshops.

Matrix 4.1

Goal 4. – Expand customer-focused research, outreach, and public service activities in the emerging area of geospatial science to enhance NASA's ability to meet its future human capital needs				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 4.1 Increase participation by underrepresented and underserved communities with the development of a geospatial research in partnership with community members and educators at Nebraska's tribal colleges and rural communities	<ul style="list-style-type: none"> • Target & recruit women & under-represented populations in the STEM fields • Tangible experiences to prepare students for STEM fields • Improve prosperity and quality of life 	<ul style="list-style-type: none"> • Engage public in understanding vitality of space exploration • Technology transfer 	<ul style="list-style-type: none"> • Customer focus • Attracting diverse populations to pipeline • Achieve sustainability through appropriate partnerships 	<ul style="list-style-type: none"> • Integrated, strategic training builds needed competencies • Enhanced mission success through use of diverse talents/abilities of workforce

The infusion of geospatial applications into the tribal communities is a major deliverable of Nebraska's Workforce Development activities. Remote sensing and geographic information systems offer reservations relevant applications for tribal issues including bison tracking and habitat management, land planning, and introduction of geospatial technologies to students in K-12 and tribal colleges.

An airborne remote sensing platform was utilized to conduct overflights of tribal lands to collect necessary data. Color infrared imagery was collected over the Santee Sioux and Winnebago Indian Reservations. The Center for Advanced Land Management Information Technologies (CALMIT) took advantage of these flights to calibrate their color-infrared mounted camera. The imagery has been used for many purposes, including educating the Winnebago Tribal Council on geospatial technologies, educational purposes by Santee and Winnebago teachers, and by the Winnebago Extension Agent in youth outreach activities.



Hyperspectral imagery was also conducted on the Winnebago Reservation. A particular area of interest includes two bison pastures. This project utilized the Piper Saratoga and the Airborne Imaging Spectrometer (AISA) from CALMIT. Creighton and UNO conducted the data analysis. Imagery, research data, and results were transferred through Native IMAGE to the Winnebago tribal council, community, schools, and LPTC. In addition to agricultural implications, this information will impact economic, social, and cultural issues.

NSGC proposes to continue to support the development of relevant research by Dr. Don Rundquist of CALMIT and his colleagues focusing on airborne remote sensing research for customer-focused agricultural and commercialization applications. Resultant airborne remote sensing data will be disseminated to spur public interest and understanding of environmental changes. NSGC will also apply Dr. Rundquist's airborne research platform to precision agriculture and heritage bison herd tracking on the Santee and Winnebago reservations. Ultimately the geospatial data will be utilized directly by the tribal leaders.

Geospatial data is now being utilized by tribal leaders in Nebraska and accessed by students at Geospatial Data Centers located at community and tribal Land Grant colleges.

Geospatial data centers are currently operating at Little Priest Tribal College, Nebraska Indian Community College and the University of Nebraska at Omaha. Plans are underway to instate data centers in the near future at Metropolitan Community College and Northeast



Family Science Night held April, 2004, preparing seltzer rockets for launching.

Community College, NSGC's most recently added academic affiliate. NSGC funding will permit the establishment of three geospatial centers to increase participation by under-represented and underserved communities in geospatial research, as well as strengthen tribal community collaborations.

NSGC also proposes to work with Nebraska's Tribal-serving Public Schools and Nebraska Tribal College faculty to introduce geospatial research in activities designed to inspire students to study and pursue STEM-related careers. The foundation is already in place, as the Nebraska Geospatial Extension Program personnel collaborated with Nebraska's reservation teachers to create lesson plans utilizing geospatial elements including mapping, GPS, and GIS into the Family Science curriculum. The first stage of curriculum implementation and the inaugural Family Geoscience Night occurred on November 11, 2003. A goal is set for at least one faculty member to incorporate geospatial science into his/her curriculum.

Matrix 4.2

Goal 4. – Expand customer-focused research, outreach, and public service activities in the emerging area of geospatial science to enhance NASA's ability to meet its future human capital needs				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>

<p>Objective 4.2 Develop supporting materials using the NSGC's existing technology infrastructure to expand the number of Geospatial-related educational outreach and research programs rich in STEM content</p>	<ul style="list-style-type: none"> • Find the best outside expertise • Proactive use of education incentives • Decision support infrastructure 	<ul style="list-style-type: none"> • Promoting enabling science to initiate enabled science • Provide for better integration of existing STEM initiatives across governments, industries & professional organizations • Technology transfer • Engage public in understanding vitality of space exploration 	<ul style="list-style-type: none"> • e-learning opportunities • Making direct use of NASA content, people & facilities to involve educators in NASA science 	<ul style="list-style-type: none"> • Flexibility & tools to ensure highly skilled, diverse & productive workforce • Capture knowledge and lesson learned in an effective, systematic way • Integrated strategic training & development program builds needed Agency leadership competencies
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The NSGC currently operates a comprehensive NASA information dissemination campaign through its website and its network of affiliates and researchers. Maintained by the NSGC's Manager of Technology-based Educational Systems, the NSGC website (<http://nasa.unomaha.edu>) includes direct links to NASA, its Mission Directorates and Centers, and the Space Grant College and Fellowship program, as well as other sites of interest related to aerospace, science, and aeronautics.

This existing technology infrastructure will be maximized to promote NASA's geospatial outcomes, providing e-learning opportunities as called for by the *Education Enterprise Strategy*. The geospatial webpage will be updated on a quarterly basis. Traditional communication mechanisms will continue to be employed to ensure reaching the broadest possible array of students, educators, and community leaders.

Outreach and research will also be promoted through grants dedicated to geospatial science-related topics. A minimum of two geospatial science mini-grants will be awarded each year for educational outreach or workforce development projects. In addition, two or more seed grants will be awarded for geospatial-related research each year. One travel grant will also be awarded each year for the development of geospatial collaborations. Fellowships will provide another tool integrate geospatial science training and development. Two research fellowships will be earmarked for geospatial science topics each year.

GES Vlasek collaborates with Cooperative Extension to allow for applied research, technology transfer, and education/demonstration projects to be implemented which best meet the needs identified in Nebraska. These demonstration projects target rural and urban users that want to employ remote sensing data to improve the quality of life in the state. NSGC proposes to continue collaborations with other geospatial extension specialists throughout the country through the National Geospatial Extension Program. These informal education partnerships will cultivate knowledge sharing and develop additional research and outreach activities in Nebraska, as well as throughout the nation.

Sustainability is a vital concern for Nebraska's geospatial initiatives. To this end, NSGC will expand its resource pool by encouraging grant applications by affiliate researchers to non-NASA sources. At least one grant application will be made by NSGC researchers for funding of geospatial research/outreach to non-Space Grant sources.

Matrix 4.3

Goal 4. – Expand customer-focused research, outreach, and public service activities in the emerging area of geospatial science to enhance NASA’s ability to meet its future human capital needs				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President’s Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 4.3 Respond to the widespread demand for access to “precision technologies” with the development of a customer-focused “extension presence” in the Geospatial area	<ul style="list-style-type: none"> • Integrate STEM initiatives with those of interested stakeholders • Provide hands-on experience in tech disciplines • Find the best outside expertise • Shared vision of skills needed to train future scientists & engineers • Proactive use of education incentives 	<ul style="list-style-type: none"> • Promoting enabling science to initiate enabled science • Technology transfer • Engage public in understanding vitality of space exploration 	<ul style="list-style-type: none"> • Creating sustainable partnerships with private sector and informal education • Customer-focus • Attracting diverse populations to pipeline 	<ul style="list-style-type: none"> • Knowledge sharing to build needed competencies • Capture knowledge & lessons learned in a more effective, systematic way • Effective process to develop leaders for future • Education programs matching diverse populations of students with projected NASA workforce needs

By integrating the Geospatial Extension Specialist into the NSGC team, Nebraska is positioned to respond to the widespread demand for access to “precision technologies”. A customer-focus guides NSGC to deliver expertise and culturally-sensitive training to users, customizing geospatial technology programming to address Nebraska’s environmental and social challenges. Our National Science Foundation co-funded Airborne Remote Sensing Facility is uniquely applicable to ensure reaching this goal.

While many geospatial efforts are being funded by the NASA workforce development grant, NSGC will provide for a portion of the operating costs of Nebraska’s geospatial programs. This includes incentives that support geospatial-related workforce development in Nebraska. Continuing education credits, training and workshops will match the diverse populations of students with projected NASA workforce needs. Educational incentives will be awarded proactively, with a minimum of two mini-grants funded each year for geospatial science-related educational outreach or workforce development.

Nebraska’s extension presence in the geospatial arena will draw on the resources of the nation’s best geospatial information science experts. New sustainable partnerships with private sector and information education will be solicited, promoting a shared vision of the skills needed to train future scientists and engineers. To foster these relationships, funding will enable NSGC affiliate members and/or staff to attend national geospatial workshops.

Goal 4 SMART Chart

Goal 4 Metrics	Specific	Measurable	Acceptable	Realistic	Time Frame
Dissemination of collected airborne remote sensing data to spur public interest and understanding of environmental changes	<input checked="" type="checkbox"/>	At least 2 presentations	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Geospatial data utilized by tribal leaders	<input checked="" type="checkbox"/>	At least 1 tribal government	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Maintain and upgrade geospatial centers to support research activities	<input checked="" type="checkbox"/>	4 geospatial centers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least one faculty member incorporates geospatial science in his/her curriculum	<input checked="" type="checkbox"/>	1 Nebraska Tribal Public School faculty member	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (end of Year 3)
Geospatial webpage updated on a quarterly basis on NSGC website	<input checked="" type="checkbox"/>	1 website	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Short-term (quarterly)
A minimum of 2 mini-grants for geospatial science-related educational outreach or workforce development funded each year	<input checked="" type="checkbox"/>	2 geospatial mini-grants	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Continue collaborations with other geospatial extension specialists throughout the country to develop additional research/outreach activities in the state	<input checked="" type="checkbox"/>	14 geospatial extension specialists	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
A minimum of 2 seed grants awarded for geospatial-related research each year	<input checked="" type="checkbox"/>	2 geospatial seed grants	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least 1 travel grant awarded for the development of geospatial-related collaborations	<input checked="" type="checkbox"/>	1 travel grant	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
A minimum of 2 research fellowships related to geospatial science awarded each year	<input checked="" type="checkbox"/>	2 research fellowships	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least 1 grant application made by NSGC researchers for funding for geospatial research/outreach to non-Space Grant sources	<input checked="" type="checkbox"/>	1 grant application	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
A minimum of 2 mini-grants for geospatial science-related educational outreach or workforce development funded each year	<input checked="" type="checkbox"/>	2 mini-grants	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Attendance at national geospatial workshops by NSGC affiliate members and/or staff	<input checked="" type="checkbox"/>	At least 2 workshops	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Develop Geospatial CRT for NASA Nebraska EPSCoR	<input checked="" type="checkbox"/>	1 CRT	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (end of Year 2)

Public Service Activities (Goal 5)

Public service in the Nebraska Strategic Plan encompasses general public, pre-college, and higher education activities. These activities are linked by the statewide emphasis on teacher training programs and workshops that focus on STEM education. Nebraska supports systematic improvement of STEM education in the state through the partnerships established with the College of Education at the University of Nebraska at Omaha. These leading faculty members

work with NASA in the Earth Systems Science Education Alliance, incorporating NASA-developed technology into teaching tools for on-line delivery. Collaborations with non-academic affiliates will continue to foster rural and general public outreach through informal education channels. Priority will also be given to working with the NASA Explorer School located in Pender, Nebraska.

Matrix 5.1

Goal 5. – Encourage and nurture a strong science, mathematics, and technology education base from elementary through university levels, with an emphasis on teacher training and delivery to underrepresented groups at the collegiate level				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 5.1 Increase priority on training programs for current and future teachers focusing on science, mathematics, and technology education.	<ul style="list-style-type: none"> • Target & recruit women & under-represented populations in the STEM fields • Motivate & train teachers • Support youth & teachers inspired by the Vision 	<ul style="list-style-type: none"> • Increased priority on teacher training • STEM excellence for America's students & teachers 	<ul style="list-style-type: none"> • Teacher, educator & faculty support • Faculty competitiveness • Making direct use of NASA content, people & facilities to involve educators in NASA science • Attracting diverse populations to pipeline 	<ul style="list-style-type: none"> • Workforce representing diverse leadership

As called for by the *President's Commission*, NSGC initiatives have historically focused on teacher education and will continue to grant priority to provide or support teacher training programs focusing on science, mathematics, and technology education on a statewide basis. To promote on a statewide basis NSGC teacher training opportunities to support youth and teachers inspired by the *Vision for Space Exploration*, registration fees and other stipends will be annually awarded to teachers who participate in training activities.

Nebraska will continue to offer mini-grant funds that support teacher training, including curriculum support and academic preparation, and expanded sponsorship of Native American students and teachers to attend NASA workshops such as the NAU/NASA Stargazer Program. Each year at least two students and one teacher from Nebraska's Native American school districts will participate in the Stargazer Program. At least four mini-grants will be awarded for teacher training each year, including at least two for teachers from Native American tribal colleges and school districts. The synergistic benefits of NSGC's targeting teachers of under-represented populations for training in the STEM-fields will produce more under-represented populations inspired to pursue careers in the STEM fields with the skills that NASA needs most.

To ensure statewide balance and access to NSGC funds in this regard, each NSGC affiliate will nominate one reviewer to evaluate curriculum development and



Space Shuttle Simulation Laboratory housed at the University

mini-grant proposals. As with all NSGC activities, their faculties will be eligible for mini-grants, and they will be encouraged to seek applicants from their communities and regions to apply for education mini-grants. Fair and equitable distribution of funds will be ensured through an annual statewide review committee that 100% of all academic affiliates will be invited to participate in the review sessions.

NSGC has directed resources and effort to teacher education in space science through support of the University of Nebraska at Omaha's Department of Teacher Education. The outcome of this collaboration, the establishment of a Space Shuttle Simulation Laboratory, exemplifies the *Education Enterprise Strategy's* call to make direct use of NASA content to involve educators in NASA science. This facility is an extensive teaching, research, and service facility that uses real NASA data, websites, and software. Each year, more than 100 teachers and 1,000 students from 20 school districts routinely utilize the facility for curriculum workshops and hands-on student activities. A goal is set to increase the number of educational outreach missions of the space shuttle simulator to 150 annually.

NSGC will increase elementary and secondary education participation by offering or co-sponsoring a variety of workshops to increase teacher education and training through resources such as the Aerospace Education Workshop, the UNO College of Education's Space Shuttle Simulator, the NASA Consortium for the Application of Space Data to Education (CASDE), geospatial extension, the Center for Advanced Land Management Information Technologies, and the EarthKAM Program. At least two teacher workshops will be offered each year.

Matrix 5.2

Goal 5. – Encourage and nurture a strong science, mathematics, and technology education base from elementary through university levels, with an emphasis on teacher training and delivery to underrepresented groups at the collegiate level				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 5.2 Promote rural and general public aeronautics/aerospace outreach through informal education channels.	<ul style="list-style-type: none"> • Inspire youth to enter tech fields • Integrate STEM initiatives with those of interested stakeholders • Shared vision of skills needed to train future scientists & engineers 	<ul style="list-style-type: none"> • Engage public in understanding vitality of space exploration • Expand private sector role 	<ul style="list-style-type: none"> • Supporting informal education & public outreach efforts • Student participation • Family support • Attracting diverse populations to pipeline • Creating sustainable partnerships with private sector and informal education • Customer focus 	<ul style="list-style-type: none"> • Education programs matching diverse populations of students with projected NASA workforce needs

Mini-grants will provide one tool to promote aeronautics/aerospace outreach to the rural and general public through informal education channels. Information education-oriented organizations (i.e, the Strategic Air and Space Museum, Edgerton ExplorIt Center) will be invited to apply for mini-grants to support education efforts. At least five mini-grants will be awarded to technology-oriented organizations for information science activities annually, with at least two projects focusing on underrepresented populations.

NSGC will also increase its efforts related to informal STEM education with increased participation by under-represented students in informal science activities through sponsoring additional students at the Aviation Career Education (ACE) Academy and through intensified support of the Family Science Program at Nebraska's tribal schools. At the ACE Academy, at least two under-represented Nebraska students will participate in a week-long camp which features the many aviation and aerospace career opportunities for students. This annual, week-long summer day camp familiarizes junior and senior high school students with aviation careers and encourages students to excel in STEM coursework while in their high school career. Topics include weather, history, careers, the Federal Aviation Administration, navigation, and safety. Each student has the opportunity to take the controls of a small aircraft while on a Discovery Flight. The Family Science Program involves Native American families working together on hands-on activities during evening meetings at school. An extension of the NNAOP, Family Science involves Native American families in the real-world applications of science and scientific research in an informal, fun setting. This program strives to inspire Native American youth from Nebraska to pursue academic excellence and professional careers in the aeronautics and aerospace fields by involving their families more deeply in their education. The purpose of this program is not to make parents into scientists or their child's primary teacher, but rather to provide an opportunity for families to work together in simple scientific inquiry, demonstrating that science is a fundamental component of everyday lives. In line with the *Education Enterprise Strategy*, both student and family support are integral parts of this program. A goal is set for at least 100 Native American youth to participate in the Family Science Program each year.

Nebraska has operated an annual Native American Aeronautics Day in South Sioux City since 1997. To date, over 1,000 Native American fifth graders have attended this event, which is designed to motivate them to stay in school and succeed in math and science, as well as inspire them to pursue education and careers in aerospace science, aeronautics, or aviation. Native American students from across Nebraska are exposed to careers in both military and general aviation while introducing them to many interesting aircraft and aircraft-related aspects of aviation. In September 2003, Native American NASA astronaut John Herrington visited Wayne State College for the Native American Aeronautics Day. NSGC faculty and staff served as role models and motivational speakers, offering hands-



Family Science: Teachers, Students, and Parents



Native American NASA Astronaut John Herrington at the 2003 Native American Aeronautics Day

on aviation and aerospace activities emphasizing skills in mathematics, science, and technology. All participating students and teachers at the event received a copy of the NSGC-supported DataSlate CD-Rom. A goal is set for at least 100 Native American youth to participate each year.

Matrix 5.3

Goal 5. – Encourage and nurture a strong science, mathematics, and technology education base from elementary through university levels, with an emphasis on teacher training and delivery to underrepresented groups at the collegiate level				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 5.3 Support and promote NASA's Education Pathfinder Initiatives through the Explorer School Program to inspire the next generation of explorers.	<ul style="list-style-type: none"> • Inspire youth to enter tech fields • Support youth & teachers inspired by the Vision 	<ul style="list-style-type: none"> • Promoting enabling science to initiate enabled science • STEM excellence for America's students & teachers • Provide for better integration of existing STEM initiatives across governments, industries & professional organizations 	<ul style="list-style-type: none"> • Making direct use of NASA content, people & facilities to involve educators in NASA science • Institutional & systemic support • Student participation • Increasing elementary & secondary education participation in NASA programs 	<ul style="list-style-type: none"> • Better performance through a more knowledgeable, more highly skilled workforce • Develop academic skills NASA relies on for STEM competencies

This proposal features support for NASA's Education Pathfinder Initiatives through the Explorer School Program. NSGC will work closely with Pender Public School, who was selected in 2003, to participate as an inaugural NASA Explorer School. Several NSGC personnel have already met with Pender personnel and JSC's Ota Lutz. Future activities are being planned with the school to promote STEM opportunities. To build a partnership with the Explorer School in Nebraska, NSGC will provide teacher support for at least two teachers during the KC-135 reduced gravity missions. Ms. Jane Swartz and Ms. CoraLynn Malmberg, teachers at Pender Public School, completed training and conducted experiments about the KC-135A "Vomit Comet" April 15-21, 2004, at Ellington Field near NASA's Johnson Space Center. The teachers designed and built experiments for a microgravity environment and flew them aboard NASA's KC-135A aircraft, alternating steep climbs and divers to experience the best opportunity at weightlessness available on earth. Experiments conducted by Ms Swartz and Ms. Malmberg included testing the effects of reduced gravity on balloons containing air, helium and argon.



Ms. CoraLynn Malmberg (right) teacher at Pender Public Schools, holds on tight during a microgravity experiment aboard the KC-135

Goal 5 SMART Chart

Goal 5 Metrics	Specific	Measurable	Acceptable	Realistic	Time Frame
Registration fees and other stipends will be annually awarded to teachers who participate in training activities	<input checked="" type="checkbox"/>	At least 5 teachers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
100% of all academic affiliates will be invited to participate in review sessions	<input checked="" type="checkbox"/>	100% of academic affiliates	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Offer at least 2 teacher workshops each year to increase teacher education and training	<input checked="" type="checkbox"/>	2 teacher workshops	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Increase the number of educational outreach missions of the space shuttle simulator from 75 to 150 annually	<input checked="" type="checkbox"/>	150 educational outreach missions	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least 4 mini-grants awarded for teacher training each year, including at least 2 for teachers from Native American tribal colleges and school districts	<input checked="" type="checkbox"/>	4 teacher training mini-grants (2 to Native American districts)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least 2 students and 1 teacher from Nebraska's Native American school districts to annually participate in the Stargazer program	<input checked="" type="checkbox"/>	2 students + 1 teacher from Native American districts	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least 5 mini-grants awarded to technology-oriented organizations for informal science activities annually, with at least 2 projects focusing on underrepresented populations	<input checked="" type="checkbox"/>	5 mini-grants (2 focusing on under-represented populations)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Sponsorship of at least 2 underrepresented students annually	<input checked="" type="checkbox"/>	2 under-represented students	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least 100 Native American youth participate each year in NASA Aeronautics Day for Native American students	<input checked="" type="checkbox"/>	100 Native American youth	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
At least 50 families participate in the Family Science Program each year	<input checked="" type="checkbox"/>	50 Native American families	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Provide teacher support for at least 2 teachers during the KC-135 reduced gravity missions	<input checked="" type="checkbox"/>	2 Explorer School teachers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Offer to provide at least 2 Space Grant personnel as resources to NASA Explorer Schools	<input checked="" type="checkbox"/>	2 Space Grant personnel	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Annually (as long as NE has an Explorer school)

Community Youth Outreach Extension: Explorers, ACE Camp, 4-H, Girl Scouts, Family Science, Boy Scouts, Aim For the Stars, Explorer School, Summer camps at Strategic Air and Space Museum
Add new affiliates



Consider expanding by 1 program each year



Long term (end of Year 5)



Add 5 new non-academic affiliates



Long term (end of Year 5)

Technology Transfer (Goal 6)

Transfer and effective implementation for NASA-funded research endeavors to Nebraska industry is a vital piece of the NSGC program. The crux of this goal relies upon ongoing program participation by key industrial and state leaders. The NSGC and all three NASA Nebraska EPSCoR initiatives have placed the highest priority on the development and support of research activities that have near and long-term potential for private industry and economic development in Nebraska. This approach complements the goals and objectives found in the all of the guiding documents provided by NASA and is also consistent with those of Nebraska EPSCoR, the Nebraska State Policy for Science and Technology, and the Nebraska State Department of Economic Development's Strategic Plan.

Matrix 6.1

Goal 6. – Support technology transfer and effective implementation strategies for NASA-funded research endeavors to Nebraska industry through ongoing program participation by key industrial and state leaders, generating economic benefit to the state through the creation of additional tech jobs				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 6.1 Develop new research/industry collaborations in aeronautics with the best outside expertise in aerospace.	<ul style="list-style-type: none"> Find the best outside expertise Integrate STEM initiatives with those of interested stakeholders 	<ul style="list-style-type: none"> Technology transfer Expand private sector role Stimulate space industry Engage public in understanding vitality of space exploration 	<ul style="list-style-type: none"> Supporting informal education & public outreach efforts Customer focus Partnerships with private sector Partners participate in evaluation plan Attracting diverse populations to pipeline 	<ul style="list-style-type: none"> Integrated, strategic training builds needed competencies Enhanced mission success through use of diverse talents/abilities of workforce

The development of the Manager of Community Engagement position will advance collaboration between the NSGC and community and industry partners. Nebraska is poised as a site for aggressive economic development, supplying the pipeline for the aerospace workforce, in part due to its proximity to nearby Offutt Air Force Base, the home of the U.S. Strategic Command whose 2002 merger brought the U.S. Space Command to Offutt. NSGC develops and facilitates industry and technology transfer links in Nebraska. Nebraska staff work

Innovation:

Manager for Community Engagement

Leads a team focused on connecting students at academic affiliates to NSGC programs and services, while actively seeking new non-academic and industry collaborations

alongside NASA-funded researchers to develop plans and contacts for technology transfer and industrial development. In collaboration with the Nebraska Business Development Center (NBDC), the NSGC is helping to foster small business ventures and adapt the technology transfer of research and products to the community. As part of this process the Small Business Innovative Research (SBIR) Grant process will be encouraged to engage the researchers into advancing their research and ideas into fruition. The Manger of Community Engagement will be used to help facilitate these activities and assist in making the technology transfer component a more viable option for our researchers. Workshops and seminars in SBIR will be hosted to help facilitate and establish collaborations for researchers and potential end users. Additionally, the establishment of the University of Nebraska Technology Park in Lincoln has furthered efforts in this area. Collaborations have also been established with the College of Information, Science and Technology and the new business incubator in Omaha. Theses three centers will be the main focal point for the distribution of technology transfer and fostering of innovative research and adaptation.

To intensify technology transfer efforts, NSGC has set a short-term goal (one year) to compile a list of Nebraska aerospace industry members for dissemination to all seed research applicants via the NSGC website. A relationship has been established between NSGC and the UNO College of Information Science and Technology (IS&T), which operates an incubator for new information science and technology businesses. To strengthen this relationship, the lead administrator from IS&T will continue to serve on the NSGC Technical Advisory Committee.

Matrix 6.2

Goal 6. – Support technology transfer and effective implementation strategies for of NASA-funded research endeavors to Nebraska industry through ongoing program participation by key industrial and state leaders, generating economic benefit to the state through the creation of additional tech jobs				
<i>Strategic Objectives Alignment with NASA Guiding Documents</i>				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 6.2 Ensure partnership sustainability by expanding existing research collaborations with industry	<ul style="list-style-type: none"> • Exploring & refining concepts that will help America return to the moon & beyond • Develop infrastructures to support decisions about human exploration • Integrate STEM initiatives with those of interested stakeholders 	<ul style="list-style-type: none"> • Using private sector resources • Provide for better integration of existing STEM initiatives across governments, industries & professional organizations • Technology transfer 	<ul style="list-style-type: none"> • Achieve high leverage and/or sustainability through appropriate partnerships • Supporting informal education & public outreach efforts • Customer focus • Partnerships with private sector • Partners participate in evaluation plan 	<ul style="list-style-type: none"> • Knowledge sharing to build needed competencies • Capture knowledge & lessons learned in a more effective, systematic way • Effective process to develop leaders for future • Education programs matching diverse populations of students with projected NASA workforce needs

NSGC is also expanding existing research collaborations with industry by working with researchers who have established key contacts with industry. For instance, NSGC is

strengthening its relationship with the University of Nebraska Technology Park through the placement of an intern who will be mentored by faculty and industry personnel at the facility. NSGC also strives to stimulate the private sector through the creation of additional tech jobs. To this end, at least one aerospace-related business venture will be incubated at the Scott Technology Transfer and Incubator Center by May 2010. The Scott Technology Center is part of a dynamic partnership between the University of Nebraska at Omaha's College of Information Science and Technology, the University of Nebraska-Lincoln's College of Engineering and Technology, and area business and industry.

Goal 6 SMART Chart

Goal 6 Metrics	Specific	Measurable	Acceptable	Realistic	Time Frame
A listing of aerospace industry members will be compiled and disseminated via the NSGC website by the end of the first year of funding	<input checked="" type="checkbox"/>	At least 20 members listed	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Short-term (end of Year 1)
Lead administrator from IS&T will continue to serve on Technical Advisory Committee	<input checked="" type="checkbox"/>	1 IS&T lead administrator	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Quarterly meetings
At least 2 collaborations with researchers and industry will be launched by 2005	<input checked="" type="checkbox"/>	2 industry-researcher collaborations	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Short-term
At least one aerospace-related business venture will be incubated at the Scott Technology Center by May 2010	<input checked="" type="checkbox"/>	1 aerospace-related business venture	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (May 2010)

Disseminating Materials and Findings (Goal 7)

Nebraska's goal to increase accessibility and availability of engaging content based on NASA's discoveries and exploration reiterates the NSGC's commitment to support the outreach goals of NASA through the statewide dissemination of NASA educational products, promulgation of NASA's research and mission outcomes, and promotion of NASA-based fellowship opportunities. Through these activities, the NSGC also facilitates the goals and objectives of NASA's *Education Enterprise Strategy*.

Matrix 7.1

Goal 7. – Increase accessibility and availability of engaging content based on NASA's discoveries and exploration by making content and funding opportunities available for Nebraska participants				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 7.1 Operate a comprehensive information	<ul style="list-style-type: none"> Integrate STEM initiatives with those of interested 	<ul style="list-style-type: none"> Engage public in understanding vitality of space exploration 	<ul style="list-style-type: none"> Supporting informal education & public outreach 	<ul style="list-style-type: none"> Capture knowledge & lessons learned in an effective,

dissemination campaign through NSGC's website, publications, programs, and its network of affiliates and researchers	stakeholders <ul style="list-style-type: none"> • Exploring & refining concepts that will help America return to the moon & beyond • Provide clear recognition of America's leadership 	<ul style="list-style-type: none"> • Provide for better integration of existing STEM initiatives across governments, industries & professional organizations • Technology transfer • Expand private sector role 	efforts <ul style="list-style-type: none"> • E-learning opportunities • Customer focus • Learning tools & material • Education technology R & D • Digital learning/content services 	systematic way <ul style="list-style-type: none"> • Ensure training & development programs build needed competencies • More effective incorporation of knowledge sharing
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NSGC currently operates a comprehensive NASA information dissemination campaign through its website (<http://nasa.unomaha.edu>) and its network of affiliates and researchers. Facilitated by NSGC's Manager of Technology-based Educational Systems, the Nebraska website includes direct links to NASA, its Enterprises and Centers, and the Space Grant College and Fellowship program, as well as other sites of interest related to aerospace, science, and aeronautics. The NSGC website serves as an information clearinghouse for consortium-related information. As a component of the University of Nebraska at Omaha Aviation Institute's website, the site has been independently evaluated and listed in *200 Best Aviation Websites and 100 More Worth Bookmarking*, published by McGraw-Hill. This comprehensive site, which is an integral component of our statewide communication network, has been examined for compliance with federal government standards for website accessibility.

Website Success

Aviation Institute's website
<http://www.unomaha.edu/~unoai/>
 is listed in McGraw-Hill's *200 Best Aviation Websites and 100 More Worth Bookmarking*.

NSGC proposes to continue to utilize the capabilities and facilities of their Manager of Technology-based Educational Systems to coordinate information dissemination, by developing e-mail links for all known Nebraska-based NASA alumni on the NSGC website. The website contains extensive information about NSGC and NASA funding opportunities, current and past research activity, educational programs, fellowship and scholarship opportunities, and other events. An active electronic distribution list notifies affiliates of upcoming research, fellowship/scholarship activities, and special events. Funding enables the Manager of Technology-based Educational Systems to keep the distribution list operational to keep affiliates abreast of timely events and opportunities. Nebraska also uses standard mail to notify affiliates, student organizations, school districts, and other entities of upcoming funding opportunities or events.

Matrix 7.2

Goal 7. – Increase accessibility and availability of engaging content based on NASA's discoveries and exploration by making content and funding opportunities available for Nebraska participants				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 7.2 Maintain a high level of outreach activities to inspire	<ul style="list-style-type: none"> • Inspire youth to enter tech fields • Support youth & teachers inspired 	<ul style="list-style-type: none"> • Technology transfer • Engage public in understanding of 	<ul style="list-style-type: none"> • Customer focus • Education technology R & D 	<ul style="list-style-type: none"> • Knowledge sharing to build needed competencies

both public interest and educational purposes	by the Vision <ul style="list-style-type: none"> Integrate STEM initiatives with those of interested stakeholders 	vitality of space exploration <ul style="list-style-type: none"> Provide for better integration of existing STEM initiatives across governments, industries & professional organizations 	<ul style="list-style-type: none"> Learning tools & materials Supporting informal education & public outreach efforts Teacher, educator & faculty support Family support 	<ul style="list-style-type: none"> Capture knowledge & lessons learned in a more effective, systematic way Effective process to develop leaders for future Education programs matching diverse populations of students with projected NASA workforce needs
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A key Nebraska strategy requires all funded researchers to incorporate a public outreach component in their research that highlights NASA connections and related promotional materials. Outlets identified by NSGC include the State EPSCoR Report and the Nebraska Academy of Sciences, along with other local presentations and other media.

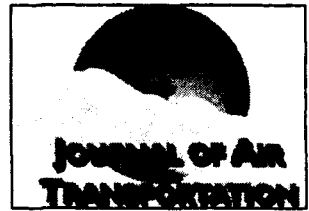
Nebraska researchers work with the NSGC staff to develop educational materials, including educational CDs, which are distributed to educators. Nebraska has incorporated NASA curricula into the classroom, including Blanche Meeson's (GSFC) geospatial educational materials. The Family Science Night program, for example, incorporates outcomes from NSGC-funded projects to develop ties to NASA researchers and to utilize these collaborations to strengthen the public outreach components of their research activities.

NSGC researchers will be required to work with the Manager of Technology-based Educational Systems to develop STEM-content educational materials. Applications for e-learning will be explored and promoted, along with the development of a NASA Academy and summer program opportunities web page on the NSGC website.

Matrix 7.3

Goal 7. – Increase accessibility and availability of engaging content based on NASA’s discoveries and exploration by making content and funding opportunities available for Nebraska participants				
<i>Strategic Objectives Alignment with NASA Guiding Documents</i>				
	<i>Vision for Space Exploration</i>	<i>President’s Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 7.3 Build upon and intensify NSGC efforts to increase awareness of Nebraska’s NASA connections and facilitate public access of NASA outreach and educational resources	<ul style="list-style-type: none"> Working with the best in the aerospace industry Integrate STEM initiatives with those of interested stakeholders 	<ul style="list-style-type: none"> Engage public in understanding of vitality of space exploration Provide for better integration of existing STEM initiatives across governments, industries & professional organizations Use national & international resources 	<ul style="list-style-type: none"> Learning tools & materials Increase accessibility to content based on NASA discoveries Making direct use of NASA content, people & facilities to involve educators in NASA science 	<ul style="list-style-type: none"> Knowledge sharing and mentoring to build needed competencies Flexibility & tools to ensure highly skilled, diverse & productive workforce

NSGC is intensifying its efforts to increase awareness of Nebraska's NASA connections and facilitate public access of NASA outreach and educational resources. Additional markets for information dissemination, including formal and informal education outlets, will be identified for mailed and web-based materials throughout the state. To increase statewide recruiting efforts and awareness of summer apprenticeship and research programs at NASA, such as the Summer High School Apprenticeship Research Program (SHARP), USRP, Graduate Student Research Program (GSRP), and NASA Academy, Nebraska will publicize placement opportunities on the NSGC website and provide participant scholarships. Funding for two Nebraska students to attend the NASA Academy/USRP/GSRP will be allocated each year. NSGC is working with Ms. Kathy Waldo of NASA Dryden Flight Research Center to reinstate the Dryden Aeronautics Academy on behalf of the Aerospace Technology Enterprise Working Group.



The *Journal of Air Transportation (JAT)* provides the global community immediate key resource information in all areas of air transportation. As an international and interdisciplinary journal, the *JAT* provides a forum for peer-reviewed articles in all areas of aviation and space transportation research, policy, theory, case study, practice, and issues. Production costs related to the *JAT* will be co-funded by NSGC.

Library resources will continue to be supported through Space Grant funding. Aeronautics/aerospace materials are housed at the University of Nebraska at Omaha, but are made widely available through the inter-library loan program. Additional library materials related to aerospace and NASA will be purchased to augment that state's collection.

Goal 7 SMART Chart

Goal 7 Metrics	Specific	Measurable	Acceptable	Realistic	Time Frame
All known Nebraska-based NASA alumni will have e-mail links on the NSGC website	<input checked="" type="checkbox"/>	At least 50 alumni added	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Short term (end of Year 1)
Distribution list operational to update affiliates on upcoming events and opportunities	<input checked="" type="checkbox"/>	100% of affiliates	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
All funded researchers contribute research highlighting NASA connections to outreach resources such as State EPSCoR Report, Nebraska Academy of Sciences, other local presentations and other media	<input checked="" type="checkbox"/>	100% funded researchers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Development of NASA Academy and summer program opportunities web page on NSGC website	<input checked="" type="checkbox"/>	1 website	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Short term (end of Year 1)
Research outcomes from NSGC research incorporated into the Family Science Night program	<input checked="" type="checkbox"/>	100% NSGC researchers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long term (end of Year 2)
Increased statewide recruiting efforts and awareness of summer apprenticeship and research programs at NASA	<input checked="" type="checkbox"/>	Hire a SG Scholarship recruiter	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long term (end of Year 2)
Funding for 2 Nebraska students to the NASA Academy/USRP/GSRP allocated each year	<input checked="" type="checkbox"/>	2 Nebraska students	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)

Purchase additional library materials related to aerospace and NASA-related library materials	<input checked="" type="checkbox"/>	Purchase at least \$1,500 worth of materials	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)
Journal of Air Transportation	<input checked="" type="checkbox"/>	Increase dissemination by 25%	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Long-term (Years 1-5)

Evaluation (Goal 8)

NSGC recently updated its strategic plan. This planning incorporated the views of all affiliates and their future needs. Nebraska is well positioned through this planning activity to maintain its ranking as a Designated Upgrade State. Nebraska's 15-year evaluation from NASA cited "exceptional achievement and national leadership," specifically applauding the successes of Native American community engagement in Nebraska. NSGC received superior scores on all three components of its evaluation. The Program Performance and Results required each Space Grant to demonstrate the overall impact of the consortium in the state and to NASA. Network Participating and Responsiveness graded states on several elements, including participation in national NASA initiatives, leadership, and collaboration. Finally, the Affiliate Survey allowed each of Nebraska's 13 consortium members to assess the Space Grant's progress, program emphasis, and impact in Nebraska. NSGC is committed to achieving excellence in aerospace-related research, education, and outreach across Nebraska.

Goal Matrix 8.1 Goal 8. – Implement an evaluation plan to document outcomes and demonstrate progress toward achieving objectives				
Strategic Objectives Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 8.1 Develop a process to engage in longitudinal tracking of Space Grant and EPSCoR funded students.	<ul style="list-style-type: none"> Develop infrastructures to support decisions about human exploration 	<ul style="list-style-type: none"> Provide for better integration of existing STEM initiatives across governments, industries & professional organizations 	<ul style="list-style-type: none"> Customer focus Demonstrate progress toward achieving objectives Document outcomes 	<ul style="list-style-type: none"> Flexibility & tools to ensure highly skilled, diverse & productive workforce Ensuring a source of competencies needed to assure future mission successes

A longitudinal student tracking process is under development to measure long-term impacts of the Space Grant program. Collaboration with Arizona Space Grant Consortium is proposed to adapt their multi-pronged approach to Nebraska's needs. Past student contact information will be correlated from NSGC archives, affiliate databases, and faculty and industry mentors and input into a database. Careful consideration will be given to the specific data NSGC will gather to demonstrate Space Grant activities' impact, and a corresponding internet tracking form will be built. A system for transforming the data into functional summary statistics will be devised. Resultant statistical information will be utilized in NASA reports. Potential long-term

enhancements include incorporating the alumni tracking form and select data onto an alumni page on the NSGC website.

Goal Matrix 8.2

Goal 8. – Implement an evaluation plan to document outcomes and demonstrate progress toward achieving objectives				
Strategic Objectives: Alignment with NASA Guiding Documents				
	<i>Vision for Space Exploration</i>	<i>President's Commission</i>	<i>Education Enterprise Strategy</i>	<i>Human Capital Management Plan</i>
Objective 8.2 Execute quality improvement controls for all funded programs	<ul style="list-style-type: none"> Integrate STEM initiatives with those of interested stakeholders Exploring & refining concepts that will help America return to the moon & beyond 	<ul style="list-style-type: none"> Provide for better integration of existing STEM initiatives across governments, industries & professional organizations Technology transfer Protect US technological leadership, economic vitality & security 	<ul style="list-style-type: none"> Customer focus Achieve high leverage and/or sustainability through appropriate partnerships Partnerships with private sector Partners participate in evaluation plan Demonstrate progress toward achieving objectives Document outcomes 	<ul style="list-style-type: none"> Capture knowledge & lessons learned in an effective, systematic way More effective incorporation of knowledge sharing Flexibility & tools to ensure highly skilled, diverse & productive workforce Ensuring a source of competencies needed to assure future mission successes

Technical Advisory Committee members are called upon to ensure continuous quality improvement of all funded programs. This committee holds scheduled meetings semi-annually and calls upon its members to participate in additional reviews periodically throughout the year. These reviews include periodic reporting forms from funded researchers and students.

Goal 8 SMART Chart

Goal 8 Metrics	Specific	Measurable	Acceptable	Realistic	Time Frame
Past student contact information correlated and input into database	<input checked="" type="checkbox"/>	Data base created with at least 50 students inputted	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Short term (end of Year 1)
Data transformed into functional summary statistics	<input checked="" type="checkbox"/>	Statistics run on all numbers inputted into database	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Short term (end of Year 1)
NASA reports incorporate longitudinal tracking data	<input checked="" type="checkbox"/>	Incorporate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Short term

		into SG reports for Year 13 and beyond		(end of Year 1)
Alumni-tracking form incorporated into NSGC website alumni page	<input checked="" type="checkbox"/>	Internet based alumni form created with estimated 50 students participating	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Short term (end of Year 1)
Technical Advisory Board Members provide input in the evaluation process at least twice a year	<input checked="" type="checkbox"/>	TAC meeting semiannually	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Long-term (Years 1-5)

Management & Evaluation

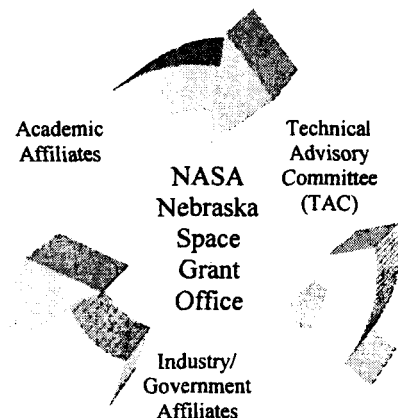
The comprehensive objective of the Nebraska Space Grant Consortium (NSGC) is to effectively manage the Space Grant and related EPSCoR program in Nebraska, ensuring the equal participation of academic affiliates and the promotion of opportunities throughout the state. To this end, the NSGC will utilize its long established management approach — a structure that has a proven track record of success with NASA and a demonstrated commitment to aerospace research and education. This organizational framework is well suited to manage the interrelated and egalitarian nature of the NSGC's goals and programmatic objectives (as guided by NASA), the varied interests of its affiliates and stakeholders, and the statewide emphasis of its mission. The following components will demonstrate an inclusive and fair plan to effectively distribute, report, and evaluate our statewide consortium.

Affiliate Members

The NSGC is committed to the full participation of each of the consortium's 14 academic affiliate members: Chadron State College, College of Saint Mary, Creighton University, Grace University, Hastings College, Little Priest Tribal College, Metropolitan Community College, Nebraska Indian Community College, the University of Nebraska at Lincoln, the University of Nebraska at Kearney, the University of Nebraska at Omaha, the University of Nebraska Medical Center, Western Nebraska Community College, and Northeast Community College. Each institution has identified an NSGC campus coordinator who serves as the institutional contact and conduit for NSGC activities. The coordinators are responsible for disseminating requests for research/travel grant proposals and scholarship/ fellowship applications at their respective institutions and for encouraging applications from qualified faculty and students. NSGC holds an annual statewide competition for all research, educational outreach, and scholarship/fellowship funds which is open to all member institutions. All academic affiliates have equal opportunity to compete in NSGC competitions and participate in grant proposal reviews. The review committee, composed of representatives (usually the campus coordinator) from each academic affiliate, reviews and recommends proposals to our advisory committee for approval. We have stated goals of three or more applications from each affiliate and three or more reviewers to score each application. To bring further participation opportunities to our non-academic affiliates inclusive of government, industry, not-for-profits, and the general public-at-large, the NSGC has implemented new procedures and renewed focus for this critical area of our continuing development. Since the onset of our Space Grant program in Nebraska, the aerospace industry has flourished and enjoyed rapid growth. We wish to allow greater opportunities for collaboration and leverage over the next five years of this performance period. A strong and engaged Space Grant network will ensure our success.

Technical Advisory Committee

The NSGC conceptualized the Nebraska Space Grant Consortium's NASA Nebraska Technical Advisory Committee (TAC) to serve in an oversight capacity and ensure the broadest possible level of statewide participation, balance, and benefit sharing. The TAC is a successful collaboration between a variety of academic, government,



non-profit, and industry affiliates. In this role, the TAC meets semiannually and is directly involved in guiding NSGC funding and initiatives as well as policy setting. Approximately 30 members attend and actively participate in the TAC meetings. This committee is composed of both men and women, many of whom represent underserved groups of Nebraska citizens. Specifically, the TAC is composed of the campus coordinators from each academic affiliate, Land Grant representatives, individuals from industrial affiliates and government, and the NSGC management team and lead institution administrators. (A listing of individual TAC members appears in the appendices.) The statewide network represented by TAC has prospered and become more engaged over the years. The NSGC Director is responsible for the implementation of policies developed by the committee and ensures that these policies are carried out on each campus by contacting the campus coordinators and placing specific policy provisions within annual subcontracts.

TAC meetings are held in various locations throughout Nebraska to accommodate affiliates from all parts of the state. Despite considerable travel distance (sometimes greater than 400 miles) and unpredictable weather conditions, participation at TAC meetings remains high. Each semiannual TAC meeting allows participants to provide input on a variety of NSGC issues. Such issues include, but are not limited to, the NSGC competitive scholarship, fellowship, internship process, recruitment techniques, collaborative research team progress, technology transfer, and overall program evaluation. It has been discovered that involving the NSGC's Native American participants in the decision-making process is highly effective. Taking the TAC meeting to venues on or near the reservation communities has been well received.

The NSGC is committed to engaging this representative and diverse advisory group in each critical area of program administration. It was this group that helped developed the strategic vision that was crucial to Nebraska's recent upgrade to Designated Status. That achievement was only possible through the constant and decade long involvement of the TAC preceding that accomplishment. In continuation of this best practice, the TAC was engaged during the Fall semester of 2004 to revise our strategic plan in responsiveness to NASA guiding documents. Thus the elements represented in this proposal were directly derived through this comprehensive and collaborative process.

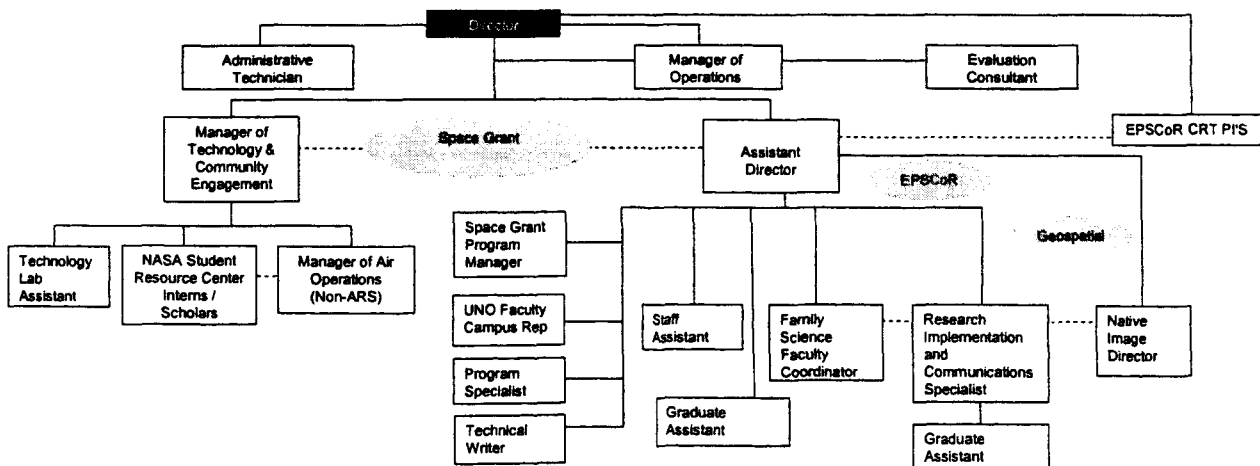
Management and Program Personnel Structure

The NSGC is administratively housed in the University of Nebraska at Omaha Aviation Institute's Division of Aeronautics and Transportation Policy and Research. It is managed by the same administrative team that currently oversees Nebraska's NASA EPSCoR programs. Monthly meetings are convened and attended by the NSGC Director, Assistant Director, Managers and Program Specialists to address current issues facing the NSGC programs. This ensures that the NSGC administrative team maintains its cohesiveness and responsiveness to issues such as program operation, marketing, recruitment, research, community engagement and educational outreach. Dr. Brent Bowen serves as Director of both the NSGC and the Aviation Institute. As director, he is responsible for long-term planning, overall program direction and management, review of activities and progress of each collaborative research project, and coordination with key NASA personnel, and the NASA Nebraska Technical Advisory Committee. Dr. Bowen is well qualified in his role as the NSGC Director and serves on several national committees, including Chair of a National Space Grant organization and Chair of the Space Grant Nominating Committee. Dr. Bowen recently completed ten years of service as the NASA Space Grant Program's Aeronautics working group. The University of Nebraska Foundation's Distinguished Professor in Aviation, Dr. Bowen has served as the Director of the

Aviation Institute at the University of Nebraska at Omaha (UNO) since 1992 and NSGC Director since 1993 (year 2 of our NSGC program).

As represented in the included organization chart, the NSGC management team has expanded and grown through additional NASA funding (Space Grant upgrade, NASA EPSCoR) and by means of program leverage. Karisa Vlasek, our state's Geospatial Extension Specialist, was recently appointed as interim program coordinator. It is anticipated that Ms. Vlasek will assume the position of Assistant Director prior to the start of our next period of award and assume the responsibilities of coordinating all NSGC programs. Michaela Schaaf, who has been an active part of our Space Grant program since year one, will hold a .10FTE support line as Manager of Operations for the NSGC. Ms. Schaaf's responsibilities will include periodic service as acting director, strategic planner, evaluator, and advisor to the NSGC. Ms. Mary Fink, our NSGC Program Coordinator for the last 5 year period, will assume a part-time role of program specialist with the responsibilities of coordinating scholarship programs, communications, proposal support and program reporting. Scott Vlasek, Manager of Technology, will continue to oversee development and ongoing maintenance of the NSGC website and the creation of information technology and software supporting the public information and outreach aims of NSGC. Mr. Vlasek has been assigned additional responsibility to serve as Manager of Community Engagement. A recently revised position of Research Implementation Specialist for the NSGC and EPSCoR programs works with NSGC seed researchers and others in reporting research outcomes and helping position them for future leveraged funding opportunities among other duties. Karisa Vlasek will continue to serve as NSGC Geospatial Extension Specialist to further the continuing development of Geospatial-related research and public service. Ms. Vlasek will have the support of our emerging tribal center of excellence, the Native Institute for Managing Applications in Geospatial Extension (IMAGE) at Little Priest Tribal College. Both the Research Implementation Specialist and a graduate assistant will assist Ms. Vlasek in providing the geospatial components of our program.

All of the above personnel report directly to Dr. Bowen. Standard monthly meetings among NSGC staff include review of seed, travel, and mini-grant funding program progress and reports; review of progress toward achieving NSGC goals and objectives; and discussion of emerging issues, budget review, and planning. Special effort is directed at the integration of NSGC efforts with the NASA Nebraska EPSCoR AERIAL initiative.



New NSGC Area of Emphasis in Community Engagement

The NSGC has instituted a new functional role of Manager for Community Engagement. Scott Vlasek will assume these new areas of program enhancement to complement his leadership in community service via Technology. Through this new role, we will actively seek new non-academic affiliates and industry collaborations. Details of these new responsibilities are embedded throughout the proposal. To assist Mr. Vlasek, the Manager of Air Operations (a leveraged position), will provide about .25FTE investment. Additionally, the existing position of Technology Lab Assistant will provision direct support to this initiative. Together, this team will work to fully realize our stated vision for a NASA Student Resource Center to provide outreach, mentoring, and tutoring services to NASA Student Fellows, Scholars, Interns and others through a dedicated and well appointed facility at the campus of the lead institution. In fair and proactive response to our statewide mission, this team will assist our academic affiliates and other regional institutions to connect students to our programs and services for the overall betterment of collegiate aerospace education through effective recruitment and retention strategies.

Quality Assurance and Program Evaluation

The NSGC management team has developed an effective data management system in the implementation of its NASA-funded projects. Throughout the year, the management team gathers data regarding the NSGC strategic plan's outcome indicators, reports from funded researchers and students, and other data consistent with Consortium Management Information System (CMIS) requirements. All program evaluations and reports are reviewed by Dr. Bowen and the NSGC/the TAC. Feedback from the TAC is incorporated into the NSGC strategic plan and future activities. Dr. Bowen will continue to submit regular CMIS and annual NSGC reports on or before stated deadlines. Additionally, periodic briefings are given to NASA University Affairs Officers at those Centers with which Nebraska has established relationships. Annual evaluation protocols of the lead institution and academic affiliates will also provide additional quality assurance. Goal 8 describes the NSGC plan for adopting longitudinal student tracking practices which will be incorporated in this process. Whenever appropriate, direct feedback from NASA Center Technical Monitors and Collaborators is included in our evaluation process. Dr. Bowen takes extraordinary measures to include University administrators in our ongoing evaluation processes.

Recognizing the increasing emphasis of evaluation on specific program elements, the NSGC has initiated plans to enhance this area of our program. We will continue to rely on our TAC to provide our consortium with valuable evaluations and assessment of our programs, services, and activities. This will provide a proven and responsive mechanism for evaluation implementation and continuous improvement. Outcomes from TAC meetings allow the NSGC to continually strive for educational and research excellence consistent with NASA guiding documents while providing balance with unique state-based needs. Periodically, in addition to our TAC meetings (which include our Native American tribal college and public school leaders), the NSGC engages the Native American community in the NSGC Native American Outreach Program's periodic assessment process in the form of a focus-group style summit meeting. Through the summit of tribal community leaders, Nebraska's Native American programs are assessed, revised, and improved to best fit the evolving needs of this unique community. As a new element to be added for this next five year period, the NSGC proposes to invest in the application of increased evaluation tool applications, both quantitative and qualitative/ethnographic in design, to be applied to each of our program emphasis areas.

Targeted and specific evaluation, conducted in parallel to our established evaluation and planning techniques at the TAC level, will provide a strong foundation that will propel ongoing and future NSGC success.

Resources, Location, and Accessibility of the Space Grant Office

Throughout its entire history, the NSGC has successfully waived all indirect charges for maximum benefit of the program. This representation of financial investment allows all NASA funds to be applied directly to the support of the initiatives outlined herein. Furthermore, this practice provides further leveraged support through the requirement of this practice in each of our subcontract relationships. NSGC facilities consist of three dedicated office suite areas in two buildings at the lead institution, the University of Nebraska at Omaha. The main office houses the NSGC program management and support staff in addition to the NSGC implementation team, which consists of the NSGC Research Implementation Specialist and one student assistant. The NSGC Director and Manager of Operations work in adjacent offices that are provided by the UNO Aviation Institute. Both the Manager of Technology and Community Engagement and the Manager of Air Operations are located adjacent to the NASA Student Resource Center, along with supporting research and technology assistants. Each of the above-stated offices are located in the University's main science and engineering buildings, which are centrally located on campus. All of this office space is located in buildings with adjacent parking that are all fully accessible to those with disabilities. Developed through state funds with a nominal amount of enhancement from Space Grant, the Space Grant Community Resource Center at the University of Nebraska at Omaha is a vital resource for students and faculty. The Center provides an advanced learning environment for the University and community at large.

Conclusion

Over the years, the NSGC has built a solid infrastructure for aerospace research and education. During the twelfth year of funding from the National Space Grant College and Fellowship Program, NSGC successfully delivered additional programs resulting from two successful proposals that doubled consortium funding. As one of three capability enhancement states selected for designated status, and one of 45 states selected for workforce development funding in 2003, Nebraska offers strategies to strengthen the national education base for the STEM disciplines at all levels. NSGC proposes to put the mechanisms already in place to their best and highest use, to exceed the high expectations set by NASA's favorable evaluation. NSGC believes that the best way to surpass this mark is to follow NASA's *Vision for Space Exploration...* and shoot for the stars.

The tools to help America return to the moon and beyond are at our fingertips. With 25% of the budget devoted to scholarships, NSGC assures the student pipeline will swell with diverse candidates pursuing higher education in the STEM fields. By making aerospace seed research funding available statewide, driven by collaborative relationships between Nebraska and NASA researchers, nationally competitive in terms of quality and impact, NSGC offers near- and long-term potential to contribute to the state's economic growth.

Nebraska recognizes that its workforce will need to possess the skills, knowledge, and motivation necessary to advance the long-term goals of NASA. To this end, NSGC spearheads a customer-focused workforce training directive, carefully designed to meet NASA's steadily increasing demand for STEM skills and to safeguard minority representation in these disciplines. Educational incentives are maximized to strengthen connections among higher education, industry and community organizations, to ultimately extend the pipeline of employees benefiting NASA as well as Nebraska. The Manager of Community Engagement leads a team focused on connecting students at our academic affiliates to NSGC programs and services, while actively seeking new non-academic and industry collaborations.

This proposal's diversity component is warranted by the exceptional reputation NSGC has built by delivering geospatial science experiences to Nebraska's Native Americans over the past seven years, introducing aeronautics education and outreach to Nebraska's two tribal colleges and four reservation school districts. As NASA's need for geospatial information and specialists grows, NSGC paves the way for new applications with customer-focused research, outreach and public service activities. Collaborations with Cooperative Extension allow for applied research, technology transfer, and education/demonstration projects targeting rural and urban users that want to use remote sensing data to improve the quality of life in the state.

Public service activities feature general public, pre-college, and higher education activities, emphasizing teacher training programs and workshops that focus on STEM education. Informal education channels provide effective information outlets. Priority is given to NASA's Education Pathfinder Initiatives through support for Nebraska's Explorer School.

Key industrial and state leaders are positioned for effective implementation and technology transfer of NASA-funded research endeavors to Nebraska industry. Infrastructure is already in place for statewide dissemination of NASA educational products, research and mission outcomes, as well as promotion of NASA-based fellowship opportunities. The existing NSGC/NASA Nebraska EPSCoR management structure personifies a proven track record of success with NASA and demonstrated commitment to aerospace. With such tools at our

disposal, NSGC is primed to take a vanguard role in training the leaders who will make the decisions ultimately determining the destiny of human space exploration.

Appendix

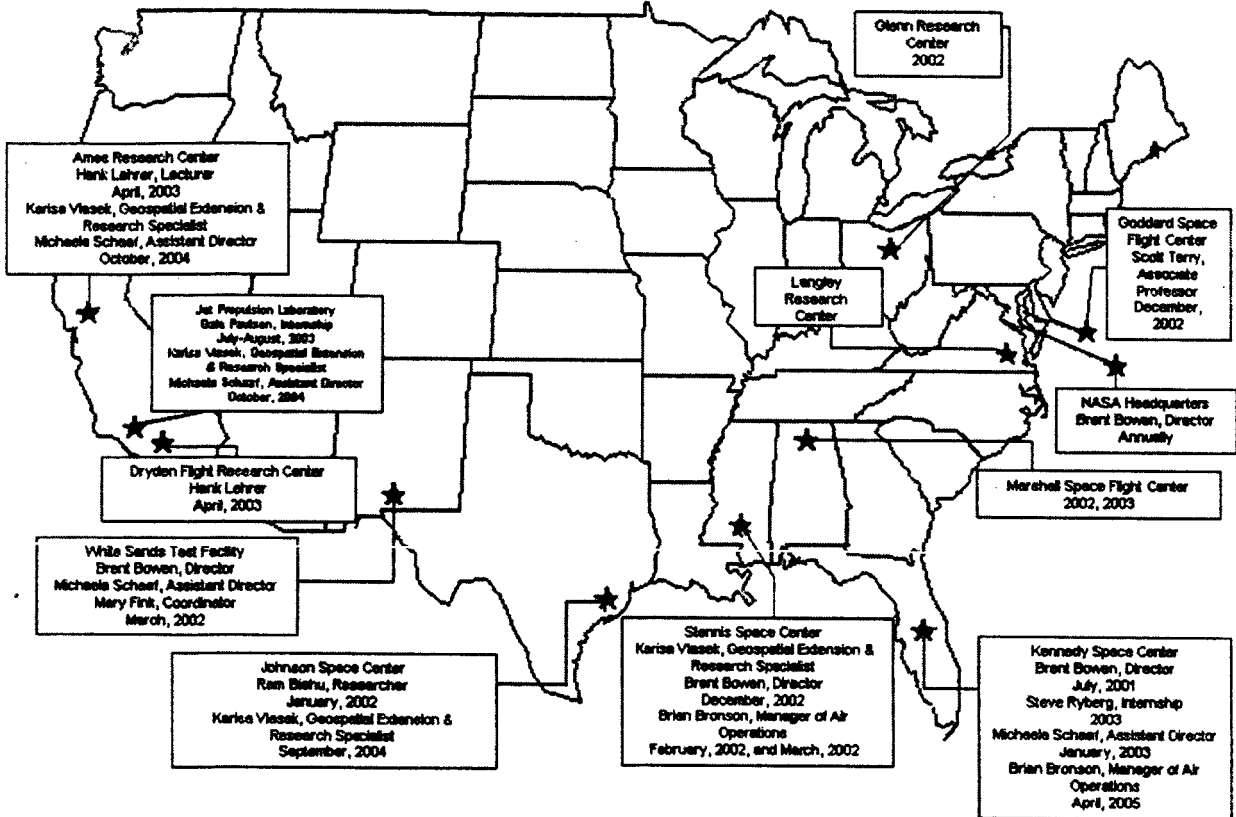
Appendix A: Listing of Proposal Acronyms

AERIAL	Aeronautics Education, Research, and Industry Alliance
ACE	Aviation Career Education
AISA	Airborne Imaging Spectrometer
ASPRS	American Society for Photogrammetry and Remote Sensing
CALMIT	Center for Advanced Land Management Information Technologies
CASDE	Consortium for the Application of Space Data to Education
CMIS	Consortium Management Information System
CRT	Collaborative Research Teams
DEPSCoR	Department of Defense Experimental Program to Stimulate Competitive Research
EPA	Environmental Protection Agency
EPSCoR	Experimental Program to Stimulate Competitive Research
FAA	Federal Aviation Administration
GES	Geospatial Extension Specialist
GIS	Geographic Information Systems
GPS	Global Positioning System
GSFC	Goddard Space Flight Center
GSRP	Graduate Study Research Program
ISGC	Iowa Space Grant Consortium
IS&T	Information Science and Technology
IWCC	Iowa Western Community College
JAT	Journal of Air Transportation
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
LPTC	Little Priest Tribal College
NAS	Nebraska Academy of Science
NASA	National Aeronautics and Space Administration
NativeGEM	Geospatial Extension Model
Native IMAGE	Institute for Managing Applications in Geospatial Extension
NAU	Northern Arizona University
NBDC	Nebraska Business Development Center
NEGEP	Nebraska Geospatial Extension Program
NICC	Nebraska Indian Community College
NIH	National Institutes of Health
NNAOP	Nebraska Native American Outreach Program
NSF	National Science Foundation
NSGC	Nebraska Space Grant Consortium
NSSP	National Student Satellite Program
SBIR	Small Business Innovative Research
SHARP	Summer High School Apprenticeship Research Program
SMART	Specific, measurable, acceptable, realistic, timebound
SSEP	Solar Systems Educators Program
STEM	Science, Technology, Engineering, and Math
USDA	United States Department of Agriculture

USGS	United States Geological Survey
USRP	Undergraduate Study Research Program
UAO	University Affairs Officer
UNL	University of Nebraska at Lincoln
UNO	University of Nebraska at Omaha
TAC	Technical Advisory Committee

Appendix B: NASA Center Visits By Nebraska Space Grant & EPSCoR Personnel 1999-Present

**NASA Field Center Visits Space Grant and EPSCoR
Personnel and Researchers
2001 to Present**



Appendix C: NASA Nebraska Space Grant Technical Advisory Committee Members

- Mrs. Susan Alford, Grace University
- Ms. Shelly Avery, Nebraska Indian Community College
- Dr. Royce Ballinger, University of Nebraska – Lincoln
- Ms. Diane Bartels, Nebraska Aviation Council
- Dr. Otto Bauer, Professor (ret)
- Ms. Jan Bingen, Little Priest Tribal College
- Dr. Brent Bowen, NASA NE Space Grant & EPSCoR
- Dr. Thomas Bragg, University of Nebraska – Omaha
- Mr. Ed Brogie, Nebraska Academy of Sciences
- Dr. Larry Carstenson, University of Nebraska – Kearney
- Dr. Fred Choobineh, University of Nebraska – Lincoln
- Dr. John Christensen, University of Nebraska – Omaha
- Dr. James Dugan, Hastings College
- Dr. Samy Elias, Nebraska Research Initiative
- Dr. John Farr, University of Nebraska – Omaha
- Dr. Lynne Farr, University of Nebraska Medical Center
- Dr. Shane Farritor, University of Nebraska – Lincoln
- Mrs. Mary Fink, NASA NE Space Grant & EPSCoR
- Dr. E. Terence Foster, University of Nebraska – Omaha
- Mr. James Freeman, University of Nebraska – Omaha
- Dr. George Gogos, University of Nebraska – Lincoln
- Dr. Neal Grandgenett, University of Nebraska – Omaha
- Mr. Scott Hazelrigg, Strategic Air & Space Museum
- Ms. Wanda Henke, Santee Schools
- Ms. Diane Hofer, Olsson Associates
- Mr. James Joyce, Western Nebraska Community College
- Mr. Dave Kipling, Great Plains Girl Scouts
- Lt. Col. Charles Lane, Civil Air Patrol - 99th Pursuit Squadron
- Mr. Louis LaRose, Little Priest Tribal College
- Dr. Mike Larson, University of Nebraska - Omaha
- Mr. Tommie Lee, 3M
- Dr. Hank Lehrer, University of Nebraska - Omaha
- Brig. Gen. Roger Lempke, Nebraska National Guard
- Ms. Kathleen Lodi, Nebraska 4-H Youth Development
- Mr. Stuart MacTaggart, Nebraska Department. of Aeronautics
- Dr. Jay Noren, University of Nebraska - Lincoln
- Dr. Richard Pennington, College of St. Mary
- Dr. Louis Pol, University of Nebraska - Omaha
- Dr. Natalie Rasmussen, University of Nebraska Medical Center
- Ms. Barb Rebrovich, Metropolitan Community College
- Dr. Betty Red Leaf, Little Priest Tribal College

- Dr. BJ Reed, University of Nebraska - Omaha
- Mr. Mark Rentschler
- Mr. Robert Rose, Tuskegee Airmen, Inc.
- Mr. Jack Ruff, Nebraska Dept. of Economic Development
- Dr. Donald Rundquist, Center for Adv. Land Mgmt. Info. Technologies
- Dr. John Schalles, Creighton University
- Ms. Bonnie Schulz, Northeast Community College
- Dr. Russ Smith, University of Nebraska - Omaha
- Dr. Scott Tarry, University of Nebraska - Omaha
- Mrs. Amy Tegeder, NASA NE Space Grant & EPSCoR
- Dr. Lois Veath, Chadron State College
- Mr. Scott Vlasek, NASA NE Space Grant & EPSCoR
- Ms. Karisa Vlasek, NASA NE Space Grant & EPSCoR
- Mr. Al Wendstrand, Nebraska Dept. of Economic Development
- Ms. Sara Woods, University of Nebraska - Omaha

Recent TAC Meetings

2004

November 12, 2004	Mahoney State Park	Ashland, NE
April 16, 2004	Nebraska Wesleyan University	Lincoln, NE

2003

November 21, 2003	University of Nebraska	Omaha, NE
April 25, 2003	Nebraska Wesleyan University	Lincoln, NE

2002

December 3, 2002	Nebraska Technology Park	Lincoln, NE
April 26, 2002	Nebraska Wesleyan University	Lincoln, NE

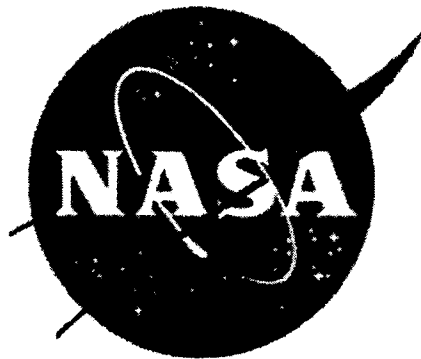
2001

December 7, 2001	Marina Inn	South Sioux City, NE
April 2001	Nebraska Wesleyan University	Lincoln, NE

2000

December 2000	Strategic Air Command Museum	Ashland, NE
April 2000	Nebraska Wesleyan University	Lincoln, NE

Appendix D: 2005-2010 Strategic Plan



2005-2010 Strategic Plan

For the NASA Nebraska Space Grant Consortium and NASA Nebraska EPSCoR Program

Updated November 11, 2004

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NASA Nebraska Space Grant and EPSCoR Program

Mission

Nebraska is a designated upgrade and EPSCoR funded program directed by NASA to develop research infrastructure and enhance the quality of aerospace research and education throughout the state. Results of these endeavors will ultimately support decisions about the destiny of human exploration. The NASA Nebraska Space Grant and EPSCoR Program strives to provide national leadership in applied aspects of aeronautics/aerospace in an effort to protect America's technological competitiveness, economic vitality, and security.

Vision

To enhance the quality of life for Nebraskans by inspiring current and future generations through the continuous development of a seamless pipeline of public outreach, research, fellowship and scholarship opportunities, and public service related to NASA's missions and priorities.

Values

The NASA Nebraska Space Grant & EPSCoR Programs are committed to promoting and achieving excellence in the areas of student and faculty research, revitalizing STEM education, and expanding outreach projects to reflect and capture Nebraska's rich diversity. The Native American Initiative guides outreach, to extend opportunities to underserved and underrepresented tribal communities and other members of rural Nebraska.

Goals and Strategies

Higher Education Research Fellowship Program

- Goal 1: To deliver a scholarship/fellowship program that offers research opportunities to diverse student populations pursuing aerospace course work with a scholarship/fellowship program that offers diversity driven research opportunities at participating academic affiliates throughout Nebraska.**
 - Objective 1.1** Ensure the fair and equal distribution of funds to all academic affiliates through the minimum allotment of scholarship and fellowship funds for every academic affiliate each year.
 - Strategy 1.1.1:** Promote the program statewide per the qualifications set by NASA.
Outcome Indicator: All affiliates receive information on student fellowship programs at least three months before due dates.
 - Strategy 1.1.2:** Utilize a statewide review committee to ensure equal distribution.
Outcome Indicator: Awards reflect the diversity of the Consortium's membership and statewide balance.
 - Strategy 1.1.3:** Sustain base awards available to each affiliate.
Outcome Indicator: Increases of 100% to base awards for each affiliate will be provisioned.
 - Objective 1.2** Sustain Nebraska's funding for fellowships targeting and recruiting women and underrepresented populations in the STEM fields.
 - Strategy 1.2.1:** Utilize intensive marketing techniques (personal visits, direct faculty contacts, e-mail) to encourage women and underrepresented students to apply for funding.
Outcome Indicator: Awards to women and minorities equal or exceed 20% to minorities and 50% to females.
 - Strategy 1.2.2:** Increase transfer scholarship program to enhance opportunities for Nebraska tribal college students to complete 4-year degrees in STEM-related disciplines.
Outcome Indicator: At least one transfer scholarship will be awarded each year to Nebraska tribal college student to complete a four-year degree program at a NSGC affiliate.
 - Objective 1.3** Partner student research fellowships awardees to work with the best in the aerospace industry, offering meaningful, hands-on experience in the scientific and technical disciplines necessary for space commerce and exploration.

- Strategy 1.3.1: Offer internships with local businesses and non-profit organizations.
Outcome Indicator: A minimum of 5 interns placed each year.
- Strategy 1.3.2: Recruit graduates of NASA pre-college programs and Center-initiated graduate and undergraduate programs (e.g. NASA Academy, SSEP, GSRP, USRP, SHARP, Stargazer, NSIP) to the Space Grant scholarship program.
Outcome Indicator: At least one award will be given each year.
- Strategy 1.3.3: Support student research opportunities via NASA EPSCoR Collaborative Research Teams (CRTs).
Outcome Indicator: At least 12 students will participate in CRT activities annually.
- Strategy 1.3.4: Offer research fellowships that support NSGC initiatives (JPL server, Geospatial research centers, etc.)
Outcome Indicator: At least three fellowships offered each year.
- Strategy 1.3.5: Offer Hartmann fellowships to qualified students (per NASA).
Outcome Indicator: at least one fellowship awarded annually.
- Objective 1.4 Provide educational support/enhancement mechanisms to student researchers, integrating education efforts with those of other interested stakeholders to improve STEM education for our future workforce.
 - Strategy 1.4.1: Utilize faculty mentors for student researchers.
Outcome Indicator: 100% of student researchers will be assigned a faculty member.
 - Strategy 1.4.2: Provide opportunities for students via distance education channels (e.g. support of course offerings from the UNO College of Education).
Outcome Indicator: At least one distance course related to aerospace science is developed each year.
 - Strategy 1.4.3: Require student researchers to present results at annual Nebraska Space Grant research conference or other outreach experience to relay their research outcomes.
Outcome Indicator: 100% of all student researchers funded through NASA Nebraska Space Grant will present results each year.
 - Strategy 1.4.4: Provide education technology enhancement via the UNO Flight Lab/FAA Testing Center, Laptop Loan Program, NASA Space Grant Resource Center, Geospatial Data Centers, etc.
Outcome Indicator: Student researchers have access to enhanced technology in support of their academic efforts.

Aerospace Research

- Goal 2:** To raise the aggregate quality and quantity of Nebraska's aerospace/aeronautics research endeavors to the highest level of national competitiveness, exploring and refining concepts that will help America return to the moon and ultimately travel to Mars and beyond.
 - Objective 2.1 Place priority in the Nebraska research program on research in the aerospace area, as well as research with direct application to the state of Nebraska.
 - Objective 2.2 Ensure the fair and equal distribution of seed funds throughout the state.
 - Strategy 2.2.1: Release an annual statewide call for proposals for aeronautics-related seed research funding that encourages all affiliates to participate.
Outcome Indicator: 75% of all affiliates have at least one submission for each competition each year.
 - Strategy 2.2.2: Utilize a statewide peer review selection process that places special emphasis on statewide balance.

- Outcome Indicator: Awards will reflect the diversity of the consortium's membership and statewide balance.*
- Strategy 2.2.3: Award seed grants of a sufficient amount to support new research endeavors throughout the state.
- Strategy 2.2.4: Give applications for seed research in aeronautics with priority over research in other areas.
Outcome Indicator: At least 80% of all seed research funded by NASA Nebraska Space Grant will be in the aeronautics area; 50% will have direct application to state of Nebraska.
Outcome Indicator: Two to three seed grants per year at approximately \$18,000 each.
- Objective 2.3: Stimulate, motivate, and support the development of junior faculty.
- Strategy 2.3.1: Give priority to seed research projects by junior faculty that includes mentoring from senior faculty members.
Outcome Indicator: At least 80% of all seed research funded by NASA Nebraska Space Grant will incorporate a mentoring relationship.
- Strategy 2.3.2: Require seed research recipients to pursue publication of research outcomes in refereed academic publications.
Outcome Indicator: At least one publication will result from each funded project.
- Strategy 2.3.3: Stimulate and support productive collaborations between Nebraska researchers and NASA personnel, leading to cooperative scientific inquiry that contributes to NASA's strategic research and technology priorities.
Outcome Indicator: All funded seed researchers will make contact with at least one NASA researcher during funding period; at least half of funded researchers will establish collaborative relationship.
- Strategy 2.3.4: Require seed research recipients to present findings at annual Space Grant statewide conference in conjunction with the Nebraska Academy of Sciences.
Outcome Indicator: All funded seed researchers will annually submit abstracts for verbal/poster presentation.
- Strategy 2.3.5: Invite NASA representatives, (University Affairs Officers (UAOs), administrators, and researchers to Nebraska to conduct research symposia, course lectures, and general public talks.
Outcome Indicator: At least one NASA officer travels to Nebraska each year to present at academic events.
- Objective 2.4: Encourage the development of relationships between faculty and researchers at NASA Centers.
- Strategy 2.4.1: Assist in the placement of summer internships placements for junior faculty at NASA Centers.
Outcome Indicator: At least one junior faculty member will be placed at or will visit a NASA Center.
- Strategy 2.4.2: Offer travel grants to junior faculty to establish/strengthen ties with NASA Center researchers.
Outcome Indicator: Approximately 5 travel grants awarded per year.
- Strategy 2.4.3: Require researchers to meet with UAOs when visiting NASA Centers to describe their Space Grant & EPSCoR collaborations at the Center.
Outcome Indicator: An increase in the number of UAO collaborations, as documented in travel reports.
- Objective 2.5: Identify and obtain additional sources of funding for aeronautics/aerospace research.

- Strategy 2.5.1: NASA Nebraska Space Grant and EPSCoR will provide support to researchers in identifying and applying for other sources of funding for ongoing research in Nebraska.
Outcome Indicator: Increase by two or more the number of non-NASA applications sent/funded.
- Strategy 2.5.2: Require seed research recipients to leverage seed funding.
Outcome Indicator: Requirement of minimum 1:1 match met consistently.
- Strategy 2.5.3: NASA Nebraska Space Grant and EPSCoR will facilitate seed researcher ties with industry.
Outcome Indicator: Increase by three or more the number of new industry contacts.
- Strategy 2.5.4: Develop collaborative relationship with the University of Nebraska Technology Park to include internships, shared communications, etc.
Outcome Indicator: Successful placement of interns at Technology Park.
- Strategy 2.5.5: Launch new industry initiatives through collaboration with Technology Park.
Outcome Indicator: Development of at least one industry initiative through the UNL Technology Park and the UNO Technology Development Center.

Workforce Development

Goal 3: To contribute to the state's aeronautics and aerospace workforce development pipeline by motivating talented Nebraska youth, and in particular those from underrepresented populations, to pursue post-secondary and graduate-level education and careers in aerospace science and industry.

- Objective 3.1 Inspire K-16 youth to enter tech fields through high visibility programming rich in STEM content.
 - Strategy 3.1.1: Participate in the National Student Satellite Program (NSSP).
Outcome Indicators: Sponsor a Nebraska team of researchers to attend student satellite workshops; Nebraska students participate in the Crawl, Walk, Run, Fly Student Satellite Program.
 - Strategy 3.1.2: Provide support for aerospace career exploration activities.
Outcome Indicator: Fund at least four aerospace career exploration activities annually, including one related to Geospatial science.
 - Strategy 3.1.3: Provide internship opportunities that promote aerospace related careers.
Outcome Indicator: Develop at least three internship placements with NASA, the UNL Technology Park, and/or private aerospace industry.
- Objective 3.2 Enhance higher education capability in STEM disciplines by offering student support through scholarship and fellowship opportunities that encourage the application of underrepresented students (e.g. at all women's, tribal, community and rural colleges).
 - Strategy 3.2.1: Work with NASA Center personnel officers to arrange for placement of Nebraska graduates at NASA.
Outcome Indicator: Visit with Personnel Officers and University Affairs Officers each time a visit is made to a NASA Center.
- Objective 3.3. Expand Nebraska Space Grant involvement in activities of Geospatial Extension.
 - Strategy 3.3.1: Increase participation in Geospatial related workshops and with other Geospatial specialists.

Outcome Indicator: Attend national Geospatial workshops, collaborate with other Geospatial Extension Specialists, and explore additional Geospatial grant opportunities.

Geospatial Science Research

Goal 4: To expand customer-focused research, outreach, and public service activities in the emerging area of geospatial science to enhance NASA's ability to meet its future human capital needs.

Objective 4.1 Increase participation by underrepresented and underserved communities with the development of a geospatial research in partnership with community members and educators at Nebraska's tribal colleges and rural communities.

Strategy 4.1.1: Continue to support the development of relevant research by Dr. Don Rundquist and his colleagues focusing on airborne remote sensing for customer-focused agricultural research and commercialization applications.

Outcome Indicator: Dissemination of collected airborne remote sensing data to spur public interest and understanding of environmental changes.

Strategy 4.1.2: Utilize Dr. Rundquist's airborne research platform to track herds and for use in precision agriculture on the Winnebago and Santee Reservations.

Outcome Indicator: Geospatial data utilized by tribal leaders by Year 12.

Strategy 4.1.3: Develop Geospatial data centers with tribal colleges to support research activities.

Outcome Indicator: Establish three Geospatial centers to support research activities.

Strategy 4.1.4: Introduce NSGC Geospatial research to Nebraska Tribal Public Schools and Nebraska Tribal College faculty with activities to encourage interest in studying and pursuing STEM-related careers.

Outcome Indicator: At least one faculty member incorporates Geospatial science in his/her curriculum.

Objective 4.2 Develop supporting materials using the NSGC's existing technology infrastructure to expand the number of Geospatial-related educational outreach and research programs rich in STEM content.

Strategy 4.2.1: Promote NASA's Geospatial outcomes via web-based and traditional communication mechanisms to the broadest possible array of students, educators, and community leaders.

Outcome Indicator: Geospatial web page updated on a quarterly basis on NSGC website.

Strategy 4.2.2: Offer mini-grants for Geospatial science-related educational outreach.

Outcome Indicator: A minimum of two mini-grants for Geospatial science-related educational outreach or workforce development funded each year.

Strategy 4.2.3: Collaborate with the National Geospatial Extension Program.

Outcome Indicator: Continue collaborations with other Geospatial Extension Specialists throughout the country to develop additional research/outreach activities in the state.

Strategy 4.2.4: Award seed grants for Geospatial related research.

Outcome Indicator: A minimum of two seed grants awarded for Geospatial-related research each year.

Strategy 4.2.5: Award travel grants to support Geospatial collaborations.

Outcome Indicator: At least one travel grant awarded for the development of Geospatial-related collaborations.

- Strategy 4.2.6: Earmark fellowships related to Geospatial science.
Outcome Indicator: A minimum of two research fellowships related to Geospatial science awarded each year.
- Strategy 4.2.7: Encourage grant applications by NSGC affiliate researchers to non-NASA sources.
Outcome Indicator: At least one grant application made by NSGC researchers for funding for Geospatial research/outreach to non-Space Grant sources.
- Objective 4.3 Respond to the widespread demand for access to “precision technologies” with the development of a customer-focused “extension presence” in the Geospatial area.
- Strategy 4.3.1: Integrate a Geospatial personnel component into the NSGC team.
Outcome Indicator: Hire a Geospatial Extension Specialist.
- Strategy 4.3.2: Provide incentives that support Geospatial-related workforce development in Nebraska. i.e., continuing education credits, training, and workshops in this field.
Outcome Indicator: A minimum of two mini-grants for Geospatial science-related educational outreach or workforce development funded each year.
- Strategy 4.3.3: Develop new sustainable partnerships related to Geospatial research.
Outcome Indicator: Attendance at national Geospatial workshops by NSGC affiliate members and/or staff.

Public Service Activities

Goal 5: To encourage and nurture a strong science, mathematics, and technology education base from elementary through university levels, with an emphasis on teacher training and delivery to underrepresented groups at the collegiate level.

- Objective 5.1 Increase priority on training programs for current and future teachers focusing on science, mathematics, and technology education.
- Strategy 5.1.1: Promote on a statewide basis Nebraska Space Grant teacher training opportunities to support youth and teachers inspired by NASA’s vision for Space Exploration.
Outcome Indicator: Registration fees and other stipends will be annually awarded to teachers who participate in training activities.
- Strategy 5.1.2: Ensure the fair and equal distribution of funds through annual statewide review committee.
Outcome Indicator: 100% of all academic affiliates will be invited to participate in review sessions.
- Strategy 5.1.3: Increase elementary and secondary education participation in NASA programs. *Outcome Indicator: Offer a variety of workshops to increase teacher education and training (e.g., the Aerospace Education Workshop, relationship with the UNO College of Education, Space Shuttle Simulator Maverick, the NASA Consortium for the Application of Space Data to Education (CASDE), Geospatial extension, the Center for Advanced Land Management Information Technologies (CALMIT), and the EarthKAM Program.*
At least two teacher workshops offered each year; an increase in the number of educational outreach missions of the space shuttle simulator, from 75 to 150 annually.
- Strategy 5.1.4: Offer mini-grant funds to support teacher training, including curriculum support and academic preparation.

- Outcome Indicator: At least four mini-grants awarded for teacher training each year, including at least two for teachers from Native American tribal colleges and school districts.*
- Strategy 5.1.5: Sponsor Native American schoolteachers to attend the Stargazer Program.
Outcome Indicator: At least two students and one teacher from Nebraska's Native American school districts to annually participate in the Stargazer program.
- Objective 5.2 Promote rural and general public aeronautics/aerospace outreach through informal education channels.
- Strategy 5.2.1: Offer mini-grants to informal education-oriented organizations, i.e., the Strategic Air Command Museum, Edgerton Explorer Center) to support education efforts.
Outcome Indicator: At least five mini-grants awarded to technology-oriented organizations for informal science activities annually, with at least two projects focusing on underrepresented populations.
- Strategy 5.2.2: Sponsor underrepresented students to attend STEM-related programs such as the ACE Academy.
Outcome Indicator: Sponsorship of at least two underrepresented students annually.
- Strategy 5.2.3: Sponsor annual NASA Aeronautics Day for Native American students at the Sioux City, Iowa, Gateway Airport.
Outcome Indicator: At least 100 Native American youth participate each year.
- Strategy 5.2.4: Sponsor Family Science Program at Nebraska's tribal schools.
Outcome Indicator: At least 50 families participate in the Family Science Program each year.
- Objective 5.3 Support and promote NASA's Education Pathfinder Initiatives through the Explorer School Program to inspire the next generation of explorers.
- Strategy 5.3.1: Collaborate and partner with Explorer School(s) in Nebraska.
Outcome Indicator: Provide teacher support for at least 2 teachers during the KC-135 reduced gravity missions.
- Strategy 5.3.2: Support and collaborate with the NASA Aerospace Education Program Specialist during visits to NASA Nebraska Explorer School(s).
Outcome Indicator: Offer to provide at least 2 Space Grant personnel as resources to the school(s).

Technology Transfer

Goal 6: To support technology transfer and effective implementation strategies for of NASA-funded research endeavors to Nebraska industry through ongoing program participation by key industrial and state leaders, generating economic benefit to the state through the creation of additional tech jobs.

- Objective 6.1 Develop new research/industry collaborations in aeronautics with the best outside expertise in aerospace.
- Strategy 6.1.1: Compile and disseminate listing of key aerospace related industry in Nebraska through the Aerospace States Association (ASA).
Outcome Indicator: A listing will be compiled and disseminated via the NASA Nebraska Space Grant website by end of the first year of upgrade funding.
- Strategy 6.1.2: Establish a relationship between NASA Nebraska Space Grant Consortium and the UNO College of Information Science and Technology (IS&T).

Outcome Indicator: Lead administrator from IS&T will continue to serve on Technical Advisory Committee.

- Objective 6.2. Ensure partnership sustainability by expanding existing research collaborations with industry.
- Strategy 6.2.1: Collaborate with Nebraska researchers who have established key contacts with industry.
Outcome Indicator: At least two collaborations with researchers and industry will be launched by May 2003.
- Strategy 6.2.2: Stimulate the private sector through the creation of additional tech jobs.
Outcome Indicator: At least one aerospace-related business venture will be incubated at the Scott Technology Center by May 2010.

Disseminating Materials and Funding

Goal 7: Increase accessibility and availability of engaging content based on NASA's discoveries and exploration by making content and funding opportunities available for Nebraska participants.

- Objective 7.1 Operate a comprehensive information dissemination campaign through NSGC's website, publications, programs, and its network of affiliates and researchers.
- Strategy 7.1.1: Utilize the capabilities and facilities of the NSGC Manager of Technology-based Educational Systems to coordinate this dissemination.
Outcome Indicator: All known Nebraska-based NASA alumni will have e-mail links on the NSGC website.
- Strategy 7.1.2: Maintain an active electronic distribution list, which notifies affiliates of upcoming research, fellowship/scholarship activities, and special events.
Outcome Indicator: distribution list operational and updates affiliates on upcoming events and opportunities.
- Objective 7.2 Maintain a high level of outreach activities to inspire both public interest and educational purposes.
- Strategy 7.2.1: Require all funded researchers to contribute materials for a public outreach component in their research that highlights NASA connections and related promotional materials.
Outcome indicator: State EPSCoR Report, Nebraska Academy of Sciences, other local presentations, and other media.
- Strategy 7.2.2: Require NSGC researchers to work with the NSGC's Manager of Technology-based Educational Systems to develop STEM-content educational materials, including, in some cases, educational CDs, which can be disseminated to educators.
Outcome Indicator: The development of NASA Academy and summer program opportunities web page on NSGC website.
- Strategy 7.2.3: Incorporate NSGC research content into the Family Science Night program to develop ties to NASA researchers and to utilize these collaborations to strengthen the public outreach components of their research activities.
Outcome Indicator: Research outcomes from NSGC research are incorporated into the Family Science Night Program.
- Objective 7.3 Build upon and intensify NSGC efforts to increase awareness of Nebraska's NASA connections and facilitate public access of NASA outreach and educational resources.

- Strategy 7.3.1: Identify additional markets for information dissemination, including formal and informal education outlets, for mailed and web-based materials throughout state.
Outcome Indicator: Increased statewide recruiting efforts and awareness of summer apprenticeship and research programs at NASA.
- Strategy 7.3.2: Build a NASA program alumni database and speakers bureau, publicize placement opportunities on the NSGC website, and provide participant scholarships.
Outcome Indicator: Funding for two Nebraska students to the NASA Academy/USRP/GSRP will be allocated each year.
- Strategy 7.3.3: Augment the state's collection of aerospace and NASA related library materials.
Outcome Indicator: Purchase additional library materials related to aerospace and NASA-related library materials.

Evaluation

Goal 8:

- Objective 8.1 Develop a process to engage in longitudinal tracking of Space Grant and EPSCoR funded students.
Strategy 8.1.1: Strategy 8.1.1: Collaborate with Arizona Space Grant Consortium to adapt their approach to Nebraska's needs.
Outcome Indicator: NASA reports will include statistical tracking data derived from longitudinal tracking
- Objective 8.2 Execute quality improvement controls for all funded programs
Strategy 8.2.1 Technical Advisory Board Members provide input in the evaluation process at least twice a year
Outcome Indicator: Researchers and students report to Technical Advisory Board at least twice each year

Appendix E: Acknowledgements

The NASA Nebraska Space Grant Consortium would like to acknowledge the following people for their contributions to the 5 Year Proposal and Budget:

Valerie Russell

Karisa Vlasek

Brent Bowen

Sara Woods

Cindy Webb

Michaela Schaaf

Amy Tegeder

Scott Vlasek

Melissa Wurdeman

Sarah Lucas