



Systemic Change in Advanced Technological Education

External Evaluation Report
National Geospatial Technology Center (GEOTECH)
NSF/ATE DUE#0801893
YEAR 3
January 1, 2010 through December 31, 2010

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Executive Summary

At the February 2010 GeoTech National Visiting Committee meeting, it was recommended that Elaine Craft, an experienced NSF/ATE Mentor, work with the GeoTech leadership team to present information uniformly, revisit, reword, and strategically realign the Center's goals and objectives to better reflect changes that had occurred and knowledge that had been acquired since the grant proposal was first written. To accomplish this task, a working session was held May 17-18, 2010 at Del Mar College, Corpus Christi, Texas. Two guiding documents now in use are products of this effort: the GeoTech Operational Plan 2009-2012 (provided to the NVC by GeoTech) and a new Evaluation Plan/Logic Model (Appended to this report). Following the planning session in May, the GeoTech management team defined many activities to help accomplish the GeoTech Center's five realigned goals, and they worked with the External Evaluator to ensure that activities have associated milestones, measurable objectives, and an assigned responsible staff member, PI/Co-PI, and/or partner to help ensure that tasks are completed as scheduled and that there is accountability. A thorough end-of year review of the work and products of the Center has been completed by the external evaluation team, and there is substantial evidence that significant progress has been made toward achieving the goals of the Center.

2010 ended on a positive note as a new, improved www.GeoTechCenter.org website was launched in early November, ending a two-year struggle to achieve the desired look and functionality to support the work of the Center. Partners are fully engaged in contributing content to the website, contributing to the leadership of the Center, assisting with special projects in their field of expertise, and providing professional development and outreach presentations for GeoTech.

Among the GeoTech Center's 2010 realigned goals, the greatest amount of progress has been made towards achieving Goal 1: National Leadership and Expertise and Goal 2: Skills and Competencies. The GeoTech Center has strategically placed GeoTech at the forefront of geospatial technology education nationally with the very important work that has been completed in collaboration with the Department of Labor (DOL) in developing the Geospatial Technology Competency Model (GTCM), having it nationally recognized and publicized by DOL, and in leveraging this success with aggressive outreach and powerful publicity. In this regard, the Center has clearly exceeded expectations by leveraging critical partnerships and acting quickly and decisively at the right time. In three short years, GeoTech has established itself firmly as the "go to" place for expertise and resources in geospatial technology education, especially for two-year college faculty. GeoTech's contributions have helped to clearly define geospatial technology occupations for technicians that are enhancing both professionalism and program development.

The primary weakness of GeoTech work is in the area of faculty development. While the quality of each event is evident, target audience focus and evaluation need improvement. Overall, however, the GeoTech team has become increasingly focused

over the past year. GeoTech has completed an exceptionally productive year of work with many notable accomplishments.

Highlights associated with each goal will be noted as well as suggestions for strengthening GeoTech's work in several areas.

Introduction and Approach to Evaluation

SCATE Inc., lead by President/CEO Elaine Craft, serves as external evaluator for the GeoTech Center. Assistance with the evaluation is provided by Special Projects Consultant, Dr. Helen Edens. Craft has worked with the GeoTech team on a regular basis throughout the year and periodically participates in team teleconferences. Face-to-face meetings have taken place at Del Mar College as well as at the HI-TEC and Esri Educational Users PI conferences in Corpus Christi, TX, Orlando, Florida, and San Diego, California respectively. The PI and GeoTech Staff have been full partners in data collection and information sharing activities required for evaluating this project. Numerous opportunities to observe project team activities have been provided during the year.

In response to advice from the GeoTech National Visiting Committee received at a meeting held in Denver, Colorado in February, 2010, lead external evaluator for SCATE Inc. and GeoTech PI mentor, Elaine Craft, was asked to facilitate a meeting at Del Mar College May 17-18, 2010 for the purpose of re-visiting GeoTech's original goals and objectives and realigning them as needed to reflect the project team's refined focus and to position the Center to maximize the impact of GeoTech's work with the Department of Labor on the Geospatial Technology Competency Model (GTCM). The realigned goals and measurable objectives are now guiding GeoTech work and helping to ensure consistent language for the many formats and numerous venues where the goals of the Center are disseminated.

The realigned/restated goals and measurable objectives have been developed in a logic model format to emphasize timelines and metrics, guide the Center's work plan, facilitate evaluation of the project, and clarify assignment of responsibilities among PIs, staff, and partners. The SCATE Inc. evaluation plan for GeoTech has been modified in response to this realignment and is provided in Appendix A.

The National Geospatial Technology Center (GeoTech) is effectively working to form a collaboration of community and technical colleges, universities, and industry, to increase the capability of the nation's two-year college community and their high school partners to produce a highly skilled geospatial technician workforce. The initial work of the Center through year 3 has focused on raising awareness of this emerging career option, creating an infrastructure and guidance that supports program growth and career pathways, and faculty development. All goals, however, are being addressed at some level and data collection is underway to support evaluation of longer-term goals (e.g., increasing diversity of the geospatial technician workforce).

Realigned Goals and Outcomes Objectives of GeoTech

- **Goal 1 National Leadership and Expertise**

The GeoTech Center will provide cohesive national leadership and expertise for community college geospatial technology educators and education programs and serve as the eyes, ears, voice and the communication link to secondary schools, universities, government and industry. **Objectives:**

- Use of research-based and successful strategies and practices for advanced technological education for the geospatial workforce is demonstrated.
- Membership(s) and participation in academic and professional organizations provide representation and a voice for community and technical college geospatial technology educators and programs.
- Partnerships with geospatial technology-related governmental entities create a conduit for information and influence on behalf of community and technical college geospatial technology educator and programs.
- Value-added resources and services are identified and provided based on feedback from the geospatial technology community of users.

- **Goal 2 Skills and Competencies**

The GeoTech Center assisted the Department of Labor in completing the Geospatial Technology Competency Model (GTCM) and will promote the use of the GTCM by developing and disseminating related workforce skills and competency resources to guide program development for undergraduate geospatial technology education programs. **Objectives:**

- GTCM is developed in collaboration with the Department of Labor.
- A Matrix is created to establish and promote career pathways and guide curriculum development/alignment.

- **Goal 3 Resources**

The GeoTech Center will expand access to exemplary educational resources for undergraduate and secondary schools through an interactive website, resource repository clearinghouse, and regionally distributed technology infrastructure to share software through innovative technology. **Objectives:**

- An exemplary interactive website (goitechcenter.org) is created and maintained as a primary communication tool in support of community and technical college and secondary schools for geospatial technology education.
- New tools, techniques, research outcomes and publications are developed and broadly shared.
- A regionally distributed network of hardware, software, and IT support is established to increase accessibility to geospatial technology education for community and technical colleges and secondary schools nationally.

- **Goal 4 Faculty Development and Outreach**

The GeoTech Center will provide community college and secondary school educators with geospatial technology professional development, help these educators benefit from geospatial technology education faculty development

provided by others, and guide them in evaluating and accessing geospatial technology professional and academic organizations, user groups, and geospatial technology certification options.

- Multi-day faculty development events that increase/update/upgrade geospatial technology knowledge and skills are provided to enable teachers to effectively deliver geospatial technology courses or incorporate geospatial technology into existing courses/programs.
- Geospatial technology awareness activities stimulate career awareness, program/course development and/or inclusion of geospatial technology into existing curricula.
- **Goal 5 Student Engagement and Outreach**

The GeoTech center will encourage and support an increase in the number, diversity and quality of students participating in and completing geospatial technology courses and programs of study in undergraduate and secondary schools.

 - Resources are provided to educators to stimulate geospatial technology awareness, understanding, and career pathways for students.
 - Strategies for broadening participation and increasing enrollment in geospatial technology courses/programs are identified and/or developed.

If the Center meets its intended goals, the following outcomes should be attained.

- Models of exemplary geospatial programs in terms of technology, curriculum, articulation, and workforce education will be identified and broadly shared.
- The next generation of geospatial technology students will include an increased number of under-represented minorities and women.
- The body of knowledge available to students, educators, researchers, and employers in the geospatial technology industry will be expanded.
- The capacity of two-year colleges to educate geospatial technicians will be increased.
- The quantity, quality, and diversity of geospatial technicians enrolling in and completing programs of study will have increased.
- Potential services, collaborations, and funding sources to sustain the work of the Center will have emerged.

Data Collection Methodology

Extensive work was completed in Years 1 and 2 to establish systems of data collection for the evaluation of GeoTech and to assist the Center with other NSF reporting such as the annual report and the annual ATE Survey. The hoped for, on-line data connection system via the Center's website has not yet materialized, therefore a system of spreadsheet data collection is being used along with on-line surveying tools, interviews, etc.

The initial list of data elements developed by the SCATE Inc. evaluation team in collaboration with the GeoTech team is driving uniform longitudinal data collection

across the partnership. The only modification made to the data collection template in 2010 was to add graduates/program completers. The data collection spreadsheet is distributed to all Core and affiliate college partners. Semi-annual data collection dates have been established that remain unchanged from year to year to enable colleges to work with institutional research personnel to capture and report data in a timely fashion. Data for spring semester is due by October 31 each year, and data for summer and fall semesters is due by March 31 each year. To ensure student confidentiality, no individual student identifiers are required. Partners submit data directly to the GeoTech Center where the data is consolidated into a single spreadsheet with individual college data provided as verification. This combined data file is then forwarded to the evaluators. Data collected for fall 2008 and spring 2009 enabled the evaluator to establish baselines. Fall 2009 and spring 2010 data have been added to inform the Year 3 evaluation (data for fall 2010 is not due until March 31, 2011). The GeoTech staff is diligent in working with partners to gather the essential data related to students, academic programs, and partnerships across the partnership. Participation in this process has been steadily improving.

Capturing uniform data for professional development activities and outreach presentations, however, continues to be a challenge. In addition to numbers of people participating in these activities, it is important to capture demographic data and to evaluate participant response to the activity. In summer 2009, various drafts and approaches were developed and considered by evaluators with input from project PIs. Ultimately, two “uniform” registration/survey tools were completed: one for “presentations” and one for “workshops.” The data collection tool for presentations is designed for awareness-level events where participants may not pre-register, the event is relatively short, and specific follow-up with participants is not anticipated. The other data collection tool was designed for the type of event that is referred to as a workshop. Workshops are events where participants register (thus providing a better opportunity to capture demographic information), training/education (vs. “awareness”) is involved, and follow-up with participants is possible. Even though these evaluation/data collection tools were available, they have not been uniformly used by all partner and affiliate institutional representatives who have provided presentations or workshops on behalf of, or in partnership with, the GeoTech Center.

Unfortunately, it has been consistently difficult to determine when faculty development events are occurring. No master calendar of GeoTech professional development events or GeoTech co-sponsored events was available to enable GeoTech staff or evaluators to proactively contact providers in advance of events to increase utilization of the uniform data forms. Co-sponsored events present special challenges since other organizations may be driving the organization and evaluation of an event. Not all events were reported or evaluated. Evaluation surveys that were collected for specific faculty development events reflect inconsistency in survey tools used, event descriptions, etc. Evaluation findings from events over the past year, therefore, are event-specific, may not be aggregated in any meaningful way, and are of limited use to the overall Center evaluation.

With the realigned goals and measurable objectives, new data needs have surfaced. The first step in broadening data collection was to develop an expanded protocol for interviewing the Center Director and to provide the GeoTech Center staff with a list of data/information needs. In year 4, additional tools may need to be developed to capture essential data and information related to the 2010 realigned goals/objectives.

All of these data sources and strategies have contributed to the analyses, observations, conclusions and recommendations in this report.

Assessment of Progress towards Achievement of Goals and Objectives

Center Management and Processes

While not listed as a project goal, a well-run ATE Center is critical to the success of stated goals and objectives and thus is of interest in conducting an evaluation of the GeoTech Center. As with any endeavor of this magnitude, it is essential that procedures to get the work done and adapt to change continue to evolve. There is evidence that the GeoTech leadership is continuously modifying and improving the way the Center is managed. The PI meets weekly with the GeoTech Staff at Del Mar College, monthly with the Co-PI/partnership team, and periodically with evaluators and advisors, effectively using technology in doing so. The PI is an excellent communicator, sending messages, news items, and other information out to his team almost daily. One strategy that continues to be helpful in managing the GeoTech Center is conducting meetings via teleconference and then archiving teleconference meetings for access after the “live” meeting by those who were unable to attend. The PI’s efforts to work with individuals or sub-groups within the partnership is proving more effective than trying to manage all aspects of GeoTech as a committee of the whole.

Progress continues in focusing Center efforts very clearly on work that needs to be done at the current point in time in the life of the Center. Saying “no” and scaling back in some areas continues to be a challenge, but the GeoTech PI and leadership team are proving that they are capable of evaluating and prioritizing opportunities. All seem to understand that resources are finite and must be focused to best advantage in accomplishing the Center’s vision. The PI frequently reaches out to advisors when evaluating new opportunities. Exercising this type of project discipline will need to continue as more people across the country (and beyond) learn about and want to partner with the GeoTech Center in a variety of ways. The team will constantly need to keep asking: What and how much can you do for whom and when?

The wise guidance of a strong NVC, excellent leadership; energetic, capable, dedicated PIs/partners; teamwork; and, effectively distributed responsibility continue to be central to the on-going success of the GeoTech Center. Another factor is the national environment where, even during an economic slow-down, geospatial technology is becoming more essential and more mainstream across multiple disciplines and innumerable applications. Opportunity continues to knock at the GeoTech door, and it is becoming increasingly clear that GeoTech was formed at exactly the right time to

seize the opportunity and maximize the impact on two-year college geospatial education.

Data and Assessment of Accomplishment of Objectives

It is not the role of this evaluation report to reiterate the activities completed by the Center over the past year (this information will be provided by GeoTech) but rather to denote specific evidence that shows progress, or lack thereof, towards the goals of the Center.

- **Goal 1 National Leadership and Expertise**

The GeoTech Center will provide cohesive national leadership and expertise for community college geospatial technology educators and education programs and serve as the eyes, ears, voice and the communication link to secondary schools, universities, government and industry. **Objectives:**

- Use of research-based and successful strategies and practices for advanced technological education for the geospatial workforce is demonstrated.
- Membership(s) and participation in academic and professional organizations provide representation and a voice for community and technical college geospatial technology educators and programs.
- Partnerships with geospatial technology-related governmental entities create a conduit for information and influence on behalf of community and technical college geospatial technology educator and programs.
- Value-added resources and services are identified and provided based on feedback from the geospatial technology community of users.

→GeoTech is making a name for itself with publications (e.g., three articles in the Special GIS Education Issue of the *Journal of the Urban and Regional Information Systems Association (URISA)*, vol. 22, No. 2, 2010) and presentations (e.g., multiple presentations/exhibits at the 2010 Esri Educational User's Conference, Dr. David DiBiase keynote at GeoED 2010) as well as through its collaboration with the Department of Labor to define geospatial technology occupations for technicians which has generated positive press and stimulated interest in presentations on the Geospatial Technology Competency Model (GTCM).

→Among the 11-member GeoTech leadership/partnership team, there are 28 memberships in geospatial professional organizations, only four of these are paid by GeoTech. This represents a high level of professionalism among this group and provides many opportunities for these GeoTech leaders to function as the "eyes, ears, voice, and communication link" for the two-year college geospatial technology community.

→Chris Semerjian and Ann Johnson serve as GeoTech representatives to UCGIS. In 2010, four GeoTech articles or blogs specifically address UCGIS.

→In 2010, PI Phil Davis has had contact with five governmental entities that provided opportunities to share information about the work of GeoTech: US

Department of Labor, USGS EROS Center, NASA Outreach, Department of Education (served as grant reviewer), NOAA/NWS (via Del Mar College internship program).

→The GeoTech annual survey (conducted in October 2009 and October 2010) is getting good response and is providing feedback from the field.

- **Goal 2 Skills and Competencies**

The GeoTech Center assisted the Department of Labor in completing the Geospatial Technology Competency Model (GTCM) and will promote the use of the GTCM by developing and disseminating related workforce skills and competency resources to guide program development for undergraduate geospatial technology education programs. **Objectives:**

- GTCM is developed in collaboration with the Department of Labor.
- A Matrix is created to establish and promote career pathways and guide curriculum development/alignment.

→The GTCM has been developed and is being disseminated.

→Co-PIs/partners are pilot-testing the process of program alignment to inform the development of tools to assist others.

→Informational and training sessions on the GTCM and program alignment have begun.

- **Goal 3 Resources**

The GeoTech Center will expand access to exemplary educational resources for undergraduate and secondary schools through an interactive website, resource repository clearinghouse, and regionally distributed technology infrastructure to share software through innovative technology. **Objectives:**

- An exemplary interactive website (goitechcenter.org) is created and maintained as a primary communication tool in support of community and technical college and secondary schools for geospatial technology education.
- New tools, techniques, research outcomes and publications are developed and broadly shared.
- A regionally distributed network of hardware, software, and IT support is established to increase accessibility to geospatial technology education for community and technical colleges and secondary schools nationally.

→A new version of www.GeoTechCenter.org was launched in November 2010. Based on the evaluator's review of the site, it has the desired look and excellent initial functional capability, with improvements ongoing. Traffic on the site increased measurably after the new version was launched. For example, page views fluctuated between 380 and 1509 from January-October 2010 and then jumped to 2250 the week of November 8-14, fluctuating between 1299-2283 through the end of December 2010. Visitors reached a new high of 485 the week of December 13-19. Google Statistics for the new site will be monitored going forward to assess spread and depth of usage over time. Visitors, visits, page views, pages/visit, % of new visits, and geographic spread and growth of use by region will be noted to help evaluate usage of this resource.

→The GeoTech website is quickly becoming a key dissemination tool for publications and communications. Whereas the PI initially provided most of the content for blogs, etc., other team members are now contributing and the depth and quality of postings is steadily improving. Editorial guidelines and a selection process for additions to the resource library have not yet been provided on the website to solicit quality contributions from the broader geospatial education community. A system for archiving older and/or less popular publications is also planned but has not yet been developed.

→Pilot testing of two remote access systems continues: remote access via cloud computing in Kentucky and remote desktop access to on-campus computers in Georgia. To date, both systems appear to work well. The advantages and disadvantages of both systems continue to be investigated and are being documented to inform potential adopters. The GeoTech Synergy project is focused on taking the remote access strategy from pilot tests to scale to increase accessibility to geospatial technology across a broad range of educational settings. GeoTech hosted a webinar on the topic of remote access in May. In addition, to inform potential users, presentations (some with video) have been provided on the topic of remote desktop access.

→GeoTech PIs and partners are contributing to the body of knowledge in GIS through presentations (~100 events), publications (12 documented in 2010), books/book chapters (1 chapter published and 1 book in press), webinars (13 in 2010, 10 with evaluation data), and blogs (28 entries in 2010).

Goal 4 Faculty Development and Outreach

The GeoTech Center will provide community college and secondary school educators with geospatial technology professional development, help these educators benefit from geospatial technology education faculty development provided by others, and guide them in evaluating and accessing geospatial technology professional and academic organizations, user groups, and geospatial technology certification options.

- Multi-day faculty development events that increase/update/upgrade geospatial technology knowledge and skills are provided to enable teachers to effectively deliver geospatial technology courses or incorporate geospatial technology into existing courses/programs.
- Geospatial technology awareness activities stimulate career awareness, program/course development and/or inclusion of geospatial technology into existing curricula.

→A variety of faculty development events have been provided over the past year ranging from “awareness” presentations at conferences to multi-day skills/knowledge-building workshops. All GeoTech partners have participated by hosting events and/or delivering instruction. In addition, GeoTech hosted 13 webinars on a variety of topics.

→While events over the past year have been somewhat more targeted than in past years, participants still range from middle school children to incumbent workers. From the information that is available for professional development events offered (or co-sponsored) by GeoTech in the 2009-2010 grant year, it is

not obvious that the goal of faculty development for GeoTech is two-year college geospatial technology instructors (as recommended by the NVC). For example, evaluation data for four events are available on the GeoTech website. One event is listed as having been offered for high school instructors, but only two participants reported having secondary education credentials and six participants were less than 18 years old. Another event was listed as targeting K-12 instructors: of 19 participants, eight were community college faculty, three were "other," and eight were high school teachers. Of two fall 2010 events hosted in Kentucky for which evaluation data was provided, one clearly targeted incumbent workers. Different evaluation forms were used for each event, and one collected no demographic data on participants. These examples illustrate that there is still considerable work to do in targeting professional development and in collecting consistent evaluation data on events that can be collated and used to assess broader impacts. The evaluation data, on a per-event basis, appear to indicate that the event was well done and well received. Any plans for follow-up with participants to determine longer term affects of the training are unclear.

→Evaluation is included at the conclusion of every webinar. Thirteen webinars were provided in 2010 (evaluation data are available for 10 webinars). The number of participants completing the end-of-event survey ranged from 2-19 (the total number of webinar participants/event is unknown at this time, but the GeoTech team has been disappointed with low response rates on the end-of-event evaluation survey indicating much higher participation than evaluation survey completion rates reveal). Those participants who have completed evaluation surveys indicate that they are likely to participate in future webinars (50-100%). Further investigation of feedback received, participation and evaluation response rates, and the survey form itself will be scheduled by the evaluator in 2011 to provide formative feedback to the GeoTech team for 2011 webinar and evaluation planning.

→GeoTech team members provided information at approximately 100 events during 2010, reaching between 4200-4300 audience participants. Table 1 below outlines presentations and participants by semester as reported by partners.

Table 1: Geospatial Presentations and Participants

Number of Geospatial Presentations									
Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Totals
47	47	41	61						
Number of Geospatial Event Participants									
Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Totals
1838	6537	3113	3901						

→The number of presentations was up from spring 2009 to spring 2010 while the number of event participants went down.

→GeoTech stipends stimulated and/or helped support 15 outreach presentations by TG3 participants in 2009-2010.

→GeoTech events are being publicized via the faculty development website for the ATE Program, www.TeachingTechnicians.org.

Goal 5 Student Engagement and Outreach

The GeoTech center will encourage and support an increase in the number, diversity and quality of students participating in and completing geospatial technology courses and programs of study in undergraduate and secondary schools.

- Resources are provided to educators to stimulate geospatial technology awareness, understanding, and career pathways for students.
- Strategies for broadening participation and increasing enrollment in geospatial technology courses/programs are identified and/or developed.

→Role models are being identified to encourage consideration of geospatial technology careers. A video featuring Sian Proctor is an example. GeoTech is also distributing a career piece developed by Arizona State University. Other role models have been identified who can be featured in outreach materials, e.g. Charlene Walker (African American), and Luis Bluiz (Hispanic).

→Resources are being shared to support involvement in GIS day.

→There is increasing anecdotal evidence that new geospatial technology courses and programs are being started and expanded with the assistance of the GeoTech Center and GeoTech Center partners. One way this is being stimulated is that faculty members are being assisted in developing grant proposals to help initiate and grow geospatial technology programs at their colleges and schools.

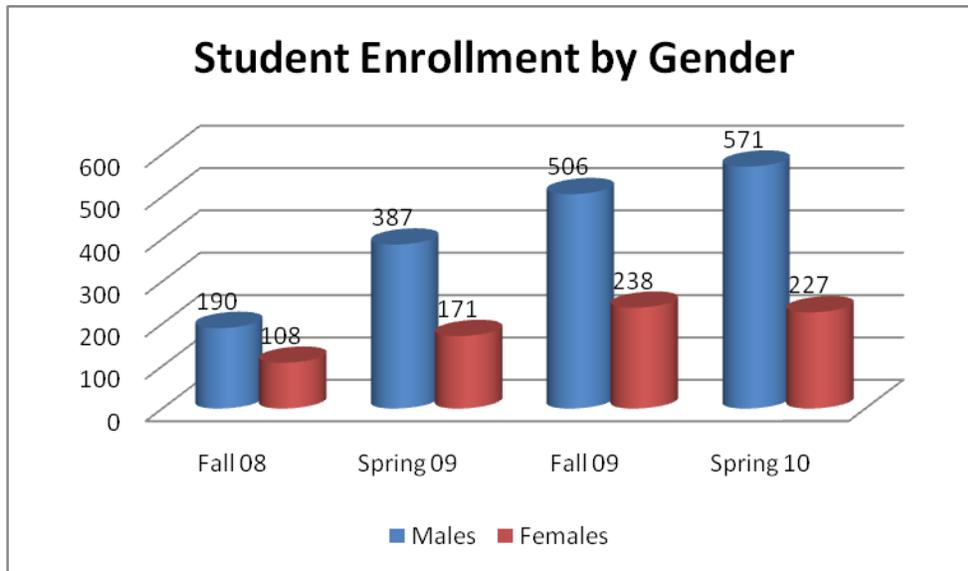
→While enrollment numbers across the partnership are still relatively small, there were notable increases in fall-to-fall and spring-to-spring comparisons: 72% increase from fall 2008 (25) to Fall 2009 (43); 20% increase from spring 2009 (41) to spring 2010 (49).

→Certificate program graduates are up from 35 in spring 2009 to 62 in spring 2010, a 10% increase.

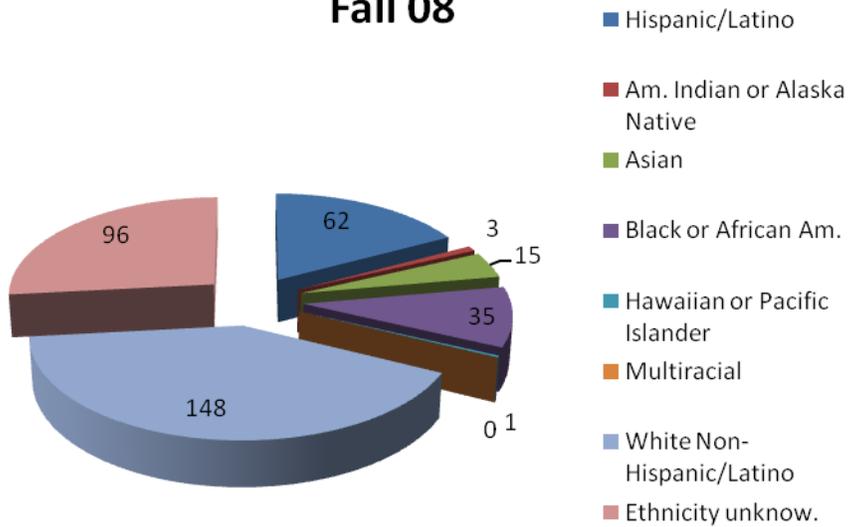
→Associate Degree graduates more than doubled: 9 in spring 2009 to 22 in spring 2010, a 214% increase.

Table 2: Student Enrollment (2008-2012)

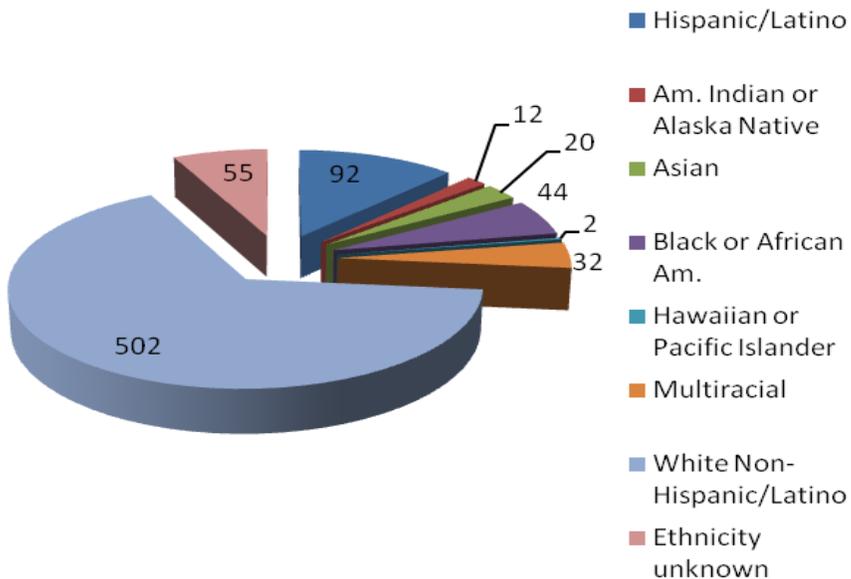
Data	Fall '08	Spg '09	Fall '09	Spg '10	Fall '10	Spg '11	Fall '11	Spg '12	Fall '12	Totals
Total enrollment	360	612	786	798						
Males	190	387	506	571						
Females	108	171	238	227						
Hispanic/Latino	62	66	92	64						
Am. Indian or Alaska Native	3	12	12	14						
Asian	15	21	20	23						
Black or African American	35	31	44	56						
Hawaiian or Pacific Islander	1	1	2	0						
Multiracial	0	21	32	8						
White Non-Hispanic/Latino	148	380	502	546						
Ethnicity unkn.	96	60	55	87						



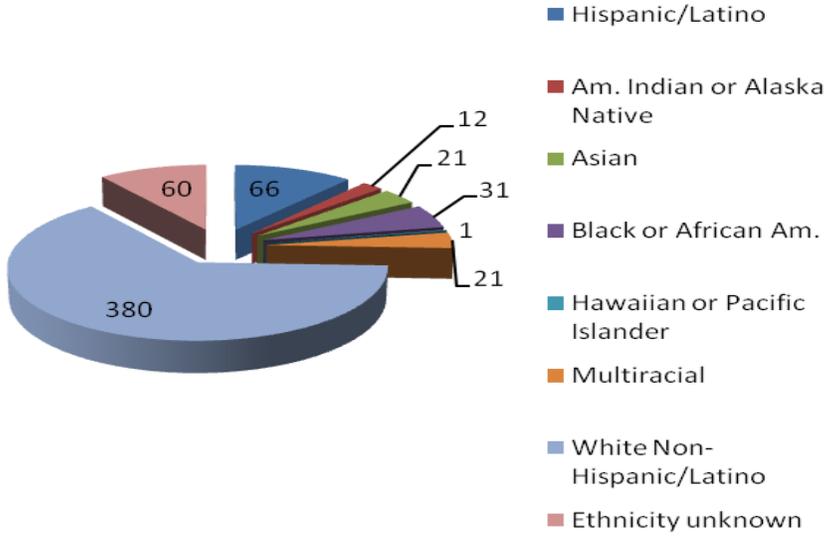
Student Race/Ethnicity Fall 08



Student Race/Ethnicity Fall 09



Student Race/Ethnicity Spring 09



Student Race/Ethnicity Spring 2010

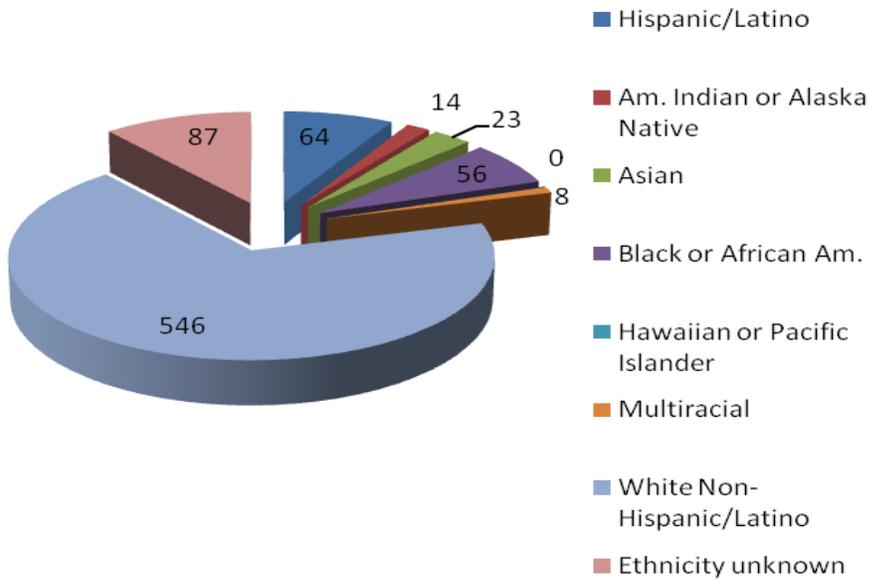


Table 3

Number of GIS courses offered by all partner institutions									
Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	
25	41	43	49						
Number of Certificate Programs									
Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	
14	35	27	62						
Number of Associate Degree Programs									
Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	
5	9	10	22						
Annual Additions to # of high school to 2-year college Articulation Agreements									
2007-8 baseline	2008-2009	2009-2010	2010-2011	2011-2012					
5	1	1							
Annual Additions to # of 2-year college to 4-year college Articulation Agreements									
2007-8 baseline	2008-2009	2009-2010	2010-2011	2011-2012					
9	6	0							
Annual Additions to # of high school to 2-year college Articulation Agreements for concurrent matriculation									
2007-8 baseline	2008-2009	2009-2010	2010-2011	2011-2012					
7	3	0							
Annual Additions to # of 2-year college and 4-year college Articulation Agreements for concurrent matriculation									
2007-8 baseline	2008-2009	2009-2010	2010-2011	2011-2012					
0	1	0							
Number of Geospatial Mentoring Activities/Contacts									
Fall 2008	Spring 2009	Fall 2009	Spring 2010	Fall 2010	Spring 2011	Fall 2011	Spring 2012	Fall 2012	Totals
293	255	372	276						

Sustainability

Although no longer articulated as one of the five major goals of GeoTech, sustainability is a goal of all ATE Centers and will become an increasingly important component of the work of the GeoTech Center as it matures.

Table 4: Industry Support for Geospatial Technology Programs/Geotech (2008-2012)

Data	Fall '08	Spg '09	Fall '09	Spg '10	Fall '10	Spg '11	Fall '11	Spg '12	Fall '12	Totals
Donated Money Total \$ Value	0	\$3,900	\$890	\$5,700						
Donated Equipment or Software Total \$ Value	\$900	\$2,975	\$14,243	\$9,000						
Total Donated Time/#Hours	63	111	282	128						
Total paid Interns	0	5	10	12						
Total non-paid interns	0	16	7	16						
Data	Fall '08	Spg '09	Fall '09	Spg '10	Fall '10	Spg '11	Fall '11	Spg '12	Fall '12	Totals
# serving as advisors	15	23	55	25						
# recruiting activities with industry help	5	14	37	16						

Summary and Findings

If the Center meets its intended goals, the following outcomes should be attained.

- Models of exemplary geospatial programs in terms of technology, curriculum, articulation, and workforce education will be identified and broadly shared.
- The next generation of geospatial technology students will include an increased number of under-represented minorities and women.
- The body of knowledge available to students, educators, researchers, and employers in the geospatial technology industry will be expanded.
- The capacity of two-year colleges to educate geospatial technicians will be increased.
- The quantity, quality, and diversity of geospatial technicians enrolling in and completing programs of study will have increased.

- Potential services, collaborations, and funding sources to sustain the work of the Center will have emerged.

The following formative evaluation recommendations and “food for thought” are provided to assist the GeoTech in achieving the desired outcomes and broader impacts.

Formative Evaluation Recommendations and Food for Thought

Goal 1: National Leadership and Expertise

It is recommended that the ways in which evaluation data, information, and survey feedback are being used to inform and improve the work of the GeoTech Center be shared with the external evaluator and NVC. The desired outcome of GeoTech interaction with the US Department of Labor was clearly articulated and achievement in this area is exemplary. It is recommended that a desired outcome be articulated for GeoTech interaction with other governmental entities to help guide this work and provide a basis for evaluating the effectiveness of this strategy. It might also be advisable to consider the desired outcome(s) for having all GeoTech-funded partners serve on one board or committee for a geospatial technology academic or professional organization as well as a strategy to help ensure that this objective is achieved.

Goal 2: Skills and Competencies

It is recommended that a monitoring method for determining use of the GTCM and GeoTech-provided training and tools for program alignment be designed and shared with the evaluator. Capturing this information via web statistics and other strategies will be essential to evaluate the degree to which GeoTech achieves the Center’s objectives related to program alignment and quality improvement for two-year geospatial technology programs. A strategy for following up with those who have participated in information and/or training sessions should be developed and implemented. A community of practice via the GeoTech website might help connect those who are aligning their programs to the GTCM so that they can share their experiences and help one another.

GeoTech is to be congratulated for pursuing funding to continue work in conducting regional DACUMS and Meta-DACUMs to define technician jobs in geospatial technology. As these activities are added to the scope of work of GeoTech, the objectives and corresponding evaluation metrics should be adjusted. For example, the remote sensing DACUM work that has been added via a supplemental funding award from NSF is not yet articulated in these plans. Work in other specialty areas is being planned, and it will be important to keep the “operational” and evaluation documents updated as changes occur.

Goal 3: Resources

Now that the GeoTech Center has an excellent new website infrastructure in place, attention should be focused on adding depth of content and improving usability to accommodate an increase in quantity of and variety of content. For a site that was launched in November 2010, it is understandable that not every feature is fully

functional nor are all categories of information fully populated with content at this time. As the quantity of content/resources grows, search features in particular will become increasingly important. Consideration should be given to ways that use can be tracked. For example, it may be advisable to have visitors register to download content to enable GeoTech to track the number of people who are downloading resources from the site. Rating systems should be used to inform improvements and perhaps alert the team when an item should be archived. A significant improvement over the past year is that all partners are now engaged in providing content for the website (e.g., blogs, white papers). Previously, the PI provided all of the blogs and content, and thus shouldered a disproportionate amount of the responsibility. Consideration should now be given to developing strategies for involving the broader community in this work. To achieve GeoTech's objective in this regard, editorial guidelines and procedures for accepting website content from outside the GeoTech partnership should be developed and published as soon as possible.

The Synergy project is on track to guide GeoTech in diffusion of innovation and scale-up of remote desktop access to GIS. It is recommended that consideration be given to evaluating the degree to which new users are identified, taught, and engaged in using this technology strategy. Workshop evaluations and follow-up will be essential. This activity needs to be differentiated from other types of faculty development for evaluation purposes.

Goal 4: Faculty Development and Outreach

Across the GeoTech partnership, there is a high level of activity in providing faculty development. The management team, however, needs a renewed/modified effort to capture uniform evaluation data from these events. Having survey forms readily available on the new website (where they now reside) should help (vs. having to locate them on SharePoint as was previously the case). Keeping track of upcoming events (perhaps by discussing at monthly PI meetings) and prompting/reminding the workshop or presentation provider just prior to the event date may help achieve the GeoTech objective of capturing evaluation data for 98% of the events sponsored or co-sponsored by GeoTech. A greater focus on two-year college geospatial technology educators is also recommended to increase the probability of collective national impact.

Goal 5: Student Engagement and Outreach

Students are being engaged in a number of ways including GIS Day events and competitions. Data on these activities however are not being collected and/or aggregated to support evaluation.

Work remains to be done to develop a "central message" for use by two-year college geospatial technology educators with associated recruitment materials that can be locally adapted. The process of identifying role models to encourage diversity has begun and should be continued to get the identified individuals "in front of" prospective students in meaningful ways.

It is unclear what strategies have been developed or implemented to help achieve GeoTech Center goals related to increasing internships for students. Data about internships are being collected, but strategies to increase these opportunities for students are unclear. For this and other elements of program improvement, it will be important to track how the strategies outlined in white papers, webinars, etc. are being implemented across the GeoTech partnership and with what result. Are GeoTech PIs and partners “practicing what they preach?”

Several “successful practices” publications are planned and the diffusion of these practices across the partnership should be monitored as well as the dissemination of this information to the broader geospatial technology education community.

Appendix A: Modified Evaluation Plan based on Realigned Goals and Objectives



Evaluation Plan/Logic Model

GeoTech ATE National Center (NSF/ATE DUE#0801893)

(Revised for 2010 realignment of GeoTech goals and objectives, finalized January 2011)

Goal 1. National Leadership and Expertise			
<p>Goal 1: <i>The GeoTech Center will provide cohesive national leadership and expertise for community college geospatial technology educators and education programs and serve as the eyes, ears, voice, and the communication link to secondary schools, universities, government and industry.</i></p>			
Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>1.1 Use of research-based and successful strategies and practices for advanced technological education for the geospatial workforce is demonstrated.</p> <p>1.1.1 Activity: Successful strategies related to geospatial technology education and academic programs are documented, published (print, media, etc.), and used by educators.</p> <p>1.1.1.1 The number of papers written, published, and added to the GeoTech resource clearing house increases each year. GeoTech successful strategies publications are distributed to, viewed by, and/or downloaded by 50 educators or others/year.</p> <p>1.1.1.2 Surveys and web statistics show year to year increases in awareness and use of GeoTech publications.</p>	<ul style="list-style-type: none"> • # of papers written, published, and added to GeoTech resource clearinghouse/year [1.1.1.1] •GeoTech resource documents distributed to, viewed by, and/or downloaded by 50 educators or others/year [1.1.1.1] •increase in awareness and use of GeoTech resources each year [1.1.1.2] 	<ul style="list-style-type: none"> •Review of resources on website to establish content baseline and annual additions thereafter •Analyze web statistics for document downloads •Survey website users •Analysis of change in awareness of available resources and value of the resources to the user •Review project documentation of materials distribution 	<ul style="list-style-type: none"> •# new publications, Yr. 1, Yr. 2, Yr. 3, Yr. 4 •# of educators reviewing/ receiving publications, Yr. 1, Yr. 2, Yr. 3, Yr. 4 •Documented increase in awareness and use of GeoTech resources each year

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>1.2 Membership(s) and participation in academic and professional organizations provide representation and a voice for community geospatial technology educators and programs.</p> <p>1.2.1 Activity: Partners join organizations and participate in organizational activities on behalf of GeoTech and for their professional growth</p> <p>1.2.1.1 All GeoTech funded partners will belong to one or more academic or professional geospatial organizations by August 2012.</p> <p>1.2.1.2 GeoTech will become an active participant of UCGIS by sending two representatives to the winter and summer meetings and serving on the Education Committee. All GeoTech representatives to UCGIS will report about the meetings via Blogs and write at least one article about the meeting and initiatives important to colleges related to UCGIS.</p> <p>1.2.1.3 All GeoTech-funded partners will serve on at least one board or committee for a geospatial academic or professional organization by August 2012.</p> <p>1.2.1.4 All GeoTech-funded partners will present on behalf of the Center at two or more geospatially focused academic or professional organization conferences and blog about the events by August 2012.</p> <p>1.2.1.5 The GeoTech Center will host at least two webinars related to the value of joining academic and professional organizations by August 2012.</p> <p>1.3 Partnerships with geospatial technology-related governmental entities create a conduit for information and influence on behalf of community college geospatial technology educators and programs.</p>	<ul style="list-style-type: none"> •All GeoTech funded partners belong to one or more organizations by 2012 [1.2.1.1] •Two GeoTech representatives attend each meeting of UCGIS each year, beginning 2011 [1.2.1.2] •A GeoTech representative serves on the UCGIS Education Committee [1.2.1.2] •Attending GeoTech representatives report via blogs and write at least one article related to UCGIS [[1.2.1.2] •All GeoTech funded partners serve on at least one board or committee for a GST academic or professional organization by August 2012 [1.2.1.3] •All funded partners make a presentation for GeoTech at 2 or more GST-focused conferences & report via blog by August 2012 [1.2.1.4] 	<ul style="list-style-type: none"> •Count memberships •Confirm attendance for GeoTech representatives at UCGIS meetings •Confirm that a GeoTech representative serves on the UCGIS Education Committee •Count publications and blogs resulting from UCGIS participation by GeoTech representative •Count number of GeoTech representatives serving on at least one board or committee for a GST organization and document the time frame for that service •Verify that all GeoTech partners have made a presentation at GST-focused conferences and share reports via blogs. •Count the number of presentations made per partner. 	<p>The GeoTech “voice” is evident by the number of partners who are active in GST professional memberships, conference attendance, and committee service. The GeoTech “voice” resonates back to the technician education community via the number of resulting publications and blogs that share information from professional organization involvement.</p>

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>1.3.1 Activity: Partners collaborate and work with governmental geospatial entities to increase awareness of the Center and inform educators</p> <p>1.3.1.1 To increase awareness of the GeoTech Center, the Center Director will make contact with 10 governmental agencies (local, state and federal) and organizations that represent such agencies. Each partner will contact at least one local and state entity to build awareness of their community college geospatial programs and affiliation with GeoTech.</p> <p>1.4 Value-added resources and services are identified and provided based on feedback from geospatial technology community of users</p> <p>1.4.1 Activity: Monitor activity in geospatial technology education nationally at two-year colleges and secondary schools by capturing information via online surveys to include Center-sponsored events such as webinars, workshops, and presentations.</p> <p>1.4.1.1 A national survey of stakeholders will be conducted once a year.</p> <p>1.4.1.2 Evaluation surveys will be completed by participants at 90% of events (e.g., webinars, workshops, presentations) hosted by Center partners.</p>	<ul style="list-style-type: none"> •GeoTech Center will host at least two webinars related to the value of joining academic/professional organizations by August 2012 [1.2.1.5] •GeoTech Center Director contacts 10 governmental agencies or organizations that represent such agencies to share information about two-year college GST programs [1.3.1.1] •Funded partners contact at least one local or state entity each to share information about their GST programs and affiliation with GeoTech [1.3.1.1] •Annual survey is conducted [1.4.1.1] •Evaluation surveys are completed by participants at 90% of events sponsored by GeoTech partners [1.4.1.2] 	<ul style="list-style-type: none"> •Verify government or related contacts/year by GeoTech Center Director •Verify local/state government or related contacts/year by GeoTech funded partners •Compare number of GeoTech sponsored events to the number of events for which evaluation data was collected from participants •Interviews with Center Director to assess the degree to which evaluation feedback is being used to improve Center-sponsored events and inform the Center of the demographics of participants, and impact of the event on GST career awareness, program development, and/or teaching and learning. 	<ul style="list-style-type: none"> •Policy makers, legislators and others in government at all levels, state and national, are made aware of GST programs at community colleges and of the work of GeoTech on their behalf. •GeoTech conducts events that are continuously being improved, and data is being captured regarding demographics of participants and impact on GST career awareness, program development, and/or teaching and learning.

Goal 2. Skills and Competencies

Goal 2: The GeoTech Center assisted the Department of Labor in completing the Geospatial Technology Competency Model (GTCM) and will promote the use of the GTCM by developing and disseminating related workforce skills and competency resources to guide program development for community college geospatial technology education programs.

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>2.1 GTCM is developed in collaboration with the Department of Labor</p> <p>2.1.1 Activity: Work with the DOL, expert geospatial professionals and organizations to complete the GTCM</p> <p>2.1.1.1 GTCM is accepted and published by DOL by Summer 2010.</p> <p>2.1.1.2 Relevant geospatial occupations are defined.</p> <p>2.1.2 Activity: Conduct DACUM job analyses to define and update relevant geospatial occupations</p> <p>2.1.2.1 Three DACUMs are completed by Summer 2010</p> <p>2.1.2.1 Three additional DACUMs are completed by Summer 2012 (if supplemental funding is awarded).</p> <p>2.1.3 Activity: Compile Meta-DACUM job analyses from multiple DACUM outcomes to define and update national competencies for relevant geospatial occupations as defined by the DOL Occupation Codes</p> <p>2.1.3.1 Meta-DACUM is compiled and shared with educators by Summer 2010.</p> <p>2.1.4 Activity: Monitor changes in demand for relevant geospatial occupations</p> <p>2.1.4.1 Methods are developed to monitor and update recommendations by summer 2011.</p>	<ul style="list-style-type: none"> •GTCM accepted and published by DOL by Summer 2010. [2.1.1.1] •Relevant geospatial occupations are defined [2.1.1.2] •3 DACUM analyses are completed by summer 2010 [2.1.2.1] •3 additional DACUMS are completed by summer 2012 (if supplemental funding is awarded) •Meta-DACUM analysis completed for GIS by summer 2010 [2.1.3.1] •GeoTech works with DOL develops and provides updated recommendations for monitoring changes in GST occupational demand by summer 2011 [2.1.4.1] 	<ul style="list-style-type: none"> •Published GTCM •GST occupation definitions •DACUM and Meta-DACUM analyses •Interview with Center Director to verify the degree to which there is on-going collaboration with DOL 	<ul style="list-style-type: none"> •The GTCM and occupational definitions reflect the role of two-year GST programs in overall GST workforce development •GeoTech has become an advisor to DOL

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>2.2 A matrix is created to establish and promote career guidelines and guide curriculum development/alignment</p> <p>2.2.1 Activity: Create a GTCM matrix from GTCM and Meta-DACUM outcomes</p> <p>2.2.1.1 The GeoTech Center will develop a Guide and matrix based on the GTCM and Meta-DACUM that can be used to create, review or update geospatial curriculum and programs by August 2011.</p> <p>2.2.1.2 The GeoTech Center will document that 50 institutions nationwide have used the Geospatial Technology Competency Model (GTCM) and Meta-DACUM in creating, assessing or updating community college geospatial technology education by August, 2012.</p> <p>2.2.1.3 All funded partners of GeoTech with geospatial programs will use the guide and matrix to evaluate their program and make recommendations on the usability of the guide by December, 2011.</p> <p>2.2.2 Activity: Develop relevant career guidance documents</p> <p>2.2.2.1 Document on career guidance published by Summer 2011</p> <p>2.2.3 Activity: Broadly disseminate GTCM and related resources including Model curriculum guidelines</p> <p>2.2.3.1 Partners will attend and present on the GTCM and Model at 4 conferences by summer of 2011 and 6 additional conferences by 2012.</p> <p>2.2.4 Activity: Assist educators in using of the Matrix and Model program guidelines</p> <p>2.2.4.1 Center partners mentor 25 colleges and 50 secondary schools in the use of the GTCM and Model by Summer 2012.</p>	<ul style="list-style-type: none"> •The guide and matrix is available by August 2011 [2.2.1.1] •50 programs have used the GTCM by August, 2012 [2.2.1.2] •Recommendations related to the usability of the guide contributed by all funded partners by 2012 [2.2.1.3] •Published career guidance document(s) by August 2011 [2.2.2.1] •GTCM and Model curriculum guidelines are disseminated at 4 conferences by summer 2011 and 6 additional conferences by 2012 •25 colleges and 50 secondary schools are mentored in the use of the GTCM and Model by summer 2012 [2.2.4.1] 	<ul style="list-style-type: none"> •The Guide and matrix •Wed statistics on downloads of GTCM and alignment tools •Partner recommendations on usability of guide and matrix •Pathways documents •Conference agenda •Names and locations of those who have been mentored with date(s) when assistance was provided 	<ul style="list-style-type: none"> •GST programs are being aligned with the GCTM with the help of the guide, matrix, and mentoring provided by GeoTech •GeoTech serves as a liaison between DOL and the two-year college community for GST workforce development

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>2.2.5 Activity: Conduct webinars, trainings and presentations on the use of the GTCM and related resources</p> <p>2.2.5.1 The GeoTech Center will host at least 4 Webinars based on the GTCM and use of the Guide and matrix by 2012.</p> <p>2.2.5.2 A paper will be written on the GTCM and DACUM process by Summer 2011 and submitted to a peer-reviewed journal for possible publication.</p>	<ul style="list-style-type: none"> •4 Webinars based on the GTCM and use of the Guide and matrix are provided by 2012 [2.2.5.1] •Paper on GTCM and DACUM process written and submitted to a peer-reviewed journal for possible publication by summer 2011 [2.2.5.2] 	<ul style="list-style-type: none"> •GTCM-related webinar schedule and evaluations •Paper on GTCM and DACUM and name of peer-reviewed journal to which the paper was submitted for publication •Publication date and final published article if accepted for publication 	<ul style="list-style-type: none"> •Broad, national /international dissemination of GeoTech-produced tools for guiding curriculum development and alignment w0ith the GTCM

Goal 3. Resources

Goal 3: The GeoTech Center will expand access to exemplary geospatial educational resources through an interactive website, resource repository clearinghouse, and regionally distributed technology infrastructure to share software through innovative technology.

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>3.1 An exemplary interactive website (geotechcenter.org) is created and maintained as a primary communication tool in support of community and technical colleges and secondary schools for geospatial technology education.</p> <p>3.1.1 Activity: Build and maintain an interactive community and technical geospatial program map and database</p> <p>3.1.1.1 Establish and activate a process to update the geodatabase of programs</p> <p>3.1.1.2 Evaluate new application interface (API) for community college program map</p> <p>3.1.2 Activity: Engage a competent web designer for www.geotechcenter.org</p> <p>3.1.2.1 Redesigned web site will be available by fall 2010.</p> <p>3.1.3 Activity: Create and populate a resource repository</p> <p>3.1.3.1 Resource Repository graphics will be updated to match redesigned web page by fall 2010.</p> <p>3.1.3.2 Editorial guidelines for entries into the resource repository will be determined and published by December 2010.</p> <p>3.1.3.3 Contributions to the resource repository will be solicited, and 25 approved curriculum and other items added yearly.</p>	<ul style="list-style-type: none">•Interactive web-based community and technical program map created [3.1.1]•Community and technical college program map is kept updated [3.1.1.1]•Application interface (API) for community college program map is evaluated [3.1.1.2]•Redesigned web site available by fall 2010 [3.1.2.1]•Resource Repository graphics match redesigned web page by fall 2010 [3.1.3.1]•Editorial guidelines for accepting/adding resources to the repository are determined and published December 2010 [3.1.3.2]• 25 or more curriculum or other items added to repository yearly [3.1.3.3]	<ul style="list-style-type: none">•Examine website to confirm that design features and content achieves stated objectives•Collect and analyze weekly web statistics•Survey registered website users	<ul style="list-style-type: none">•Web traffic demonstrates a growing number who are accessing resources and information from GeoTech•The number of registered users of the GeoTech website increases over time•Feedback from users indicates that GeoTech resources and information are used and valued•Remote access technology broadens the participation of secondary schools in GST education

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>3.1.3.4 Processes for updating repository content will keep entries current and move older resources to an archive</p> <p>3.1.4 Activity: Create, promote and provide web-based professional development</p> <p>3.1.4.1 Hold 2 webinars on web-based professional development by Summer 2011</p> <p>3.1.4.2 Document Lessons Learned about web-based professional development practices by Summer 2011</p> <p>3.1.5 Activity: Create, promote and support a community of practice via social media (Web 2.0)</p> <p>3.1.5.1 All partners active in at least one social media by Fall 2010.</p> <p>3.1.5.2 By summer 2011, 80% of partners use social media technology in response to participating in the Synergy project on use of the technology.</p> <p>3.1.6 Activity: Stimulate interaction/information sharing among project and website users.</p> <p>3.1.6.1 By fall 2010, GeoTech website design includes the ability to capture data and share information with users.</p> <p>3.1.7 Activity: The GeoTech Project Team disseminates information and outcomes for GeoTech and partners via website, social media, SharePoint, virtual meeting technology and face to face (documented on website)</p> <p>3.1.7.1 Hold quarterly virtual partner meetings via Adobe Connect</p>	<ul style="list-style-type: none"> •Process for moving older resources to archive is in place by August 2012 [3.2.3.4] •2 webinars on web-based professional development delivered by summer 2011 •Lessons learned about web-based professional development have been extracted from webinar evaluations and from the webinar hosts and are documented by summer 2011 [3.1.4.2] •1 or more Social media activities by partners are documented by fall 2010 [3.1.5.1] •80% of partners have contributed via social media , engaging in comments or discussion about the use of the technology that is the focus of the Synergy project [3.1.5.2] •Data is captured and shared with users via the GeoTech website by fall 2010 [3.1.6.1] 	<ul style="list-style-type: none"> •Interviews with Center Director •Survey GeoTech staff and partners to determine the effectiveness and value of web-based, media strategies for communication, project management, and dissemination •Review and analysis of web content and partnership participation in content development/sharing 	

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>3.1.7. 2 Post recordings and documents on SharePoint of meetings 3.1.7.3 Hold weekly staff meetings – virtual 3.1.7.4 Hold twice yearly staff meetings – face to face. 3.1.8 Activity: Aggregate and share information from across the geospatial technology discipline 3.1.8.1 Upload all relevant materials from partner activities to resource repository – with each partner contributing at least one resource per year. 3.1.8.2 Capture and share news from the broader geospatial technology education community and industry: minimum of 12 news items in Year 3 and 24 news items in Year 4 with anticipated outcome of one item per week. 3.2 New tools, techniques, research outcomes and publications are developed and broadly shared. 3.2.1 Activity: Develop and publish relevant information (e.g. history of GIS Ed) 3.2.1.1 GeoTech and partners will publish 3 Successful Strategies papers per year including those documenting development of geospatial programs and other topics of interest to educators 3.2.2 Activity: Identify and publish articulation agreements 3.2.2.1 Each partner, where applicable, will publish one document on the topic of articulation by summer 2012.</p>	<ul style="list-style-type: none"> •Virtual GeoTech partner and staff meetings are held /recorded [3.1.7.1] [3.1.7.2] •Materials from GeoTech partners are placed on website [3.1.8.1] •12 or more news items (Yr. 3) and 24 (1/week, Yr. 4) from the broader GST education and industry community are captured and shared [3.1.8.2] *3 successful strategies papers/year [3.2.1.1] *Published articulation agreement samples or other documents by all partners by summer 2012 [3.2.2.1] *1 Course and 1 certificate model based on the GTCM and Meta-DACUMS developed by summer 2012 [3.2.3.1] 	<ul style="list-style-type: none"> •Review GeoTech publications, webinars, and/or web links related to articulation agreements and models 	

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>3.2.3 Activity: Collect and publish program development Models based on the GTCM and Meta-DACUMs</p> <p>3.2.3.1 Create two Models (course and certificate program) by summer 2012.</p> <p>3.2.3.2 Partners, where applicable, publish their programs as examples in the use of the GTCM and Model.</p> <p>3.2.3.3 Share the models and examples via webinars and/or web links at least annually beginning March 2011</p> <p>3.2.4 Activity: Collect and publish articles in GeoTech newsletters and social media to share with geospatial education community and others.</p> <p>3.2.4.1 Publish two Newsletters per year in hardcopy and digital formats.</p> <p>3.3 A regionally distributed network of hardware, software, and IT support is established to increase accessibility to geospatial technology education for community and technical colleges and secondary schools nationally.</p> <p>3.3.1 Activity: Identify implementation sites and key individuals for support of IT and conduct pilot studies</p> <p>3.3.1.1 The GeoTech Synergy project which is focused on remote access will be pilot tested on three campuses and recommendations for updating Logic Model and project outcomes will be used to create a Successful Practices document for dissemination by Summer 2011.</p> <p>3.3.1.2 Ten colleges will be testing the remote access technology by Summer 2012.</p>	<ul style="list-style-type: none"> • Partners publish program examples where applicable [3.2.3.2] •The GeoTech webinar series includes programming each year that includes information related to articulation agreements • 2 GeoTech annual newsletters are published in digital and hard copy formats beginning January 2011 [3.2.4.1] <ul style="list-style-type: none"> •Diffusion of the remote access innovation to *3 pilot sties by summer 2011 [3.3.1.1] *10 sites by summer 2012 [3.3.1.2] 	<ul style="list-style-type: none"> •Review GeoTech publications related to the GCTM and program alignment <ul style="list-style-type: none"> •Review GeoTech publications on remote access technology •Analyze surveys or other evaluation feedback from remote access pilot sites 	

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>3.3.1.3 The GeoTech Synergy Team will attend 4 meetings to refine the research process for developing logic models for scaling innovations by Summer 2011.</p> <p>3.3.1.4 The GeoTech Synergy Team will evaluate and disseminate outcomes including cost/benefit analysis and specifically feature secondary school implementations by summer 2012.</p> <p>3.3.1.5 The GeoTech Synergy Team will develop and publish a white paper on successful practices for remote desktop application access (RDA) including technical specifications, etc. by fall 2011.</p> <p>3.3.2 Activity: Provide training for new implementers of RDA</p> <p>3.3.2.1 Hold training on RDA at 2 sites by fall, 2011.</p>	<ul style="list-style-type: none"> •Logic model for diffusion of the remote access innovation is updated and the process is refined, published/disseminated by summer 2011 [3.3.1.3] •A cost/benefit analysis for school implementation of remote access is completed by summer 2012 [3.3.1.4] •Paper is published on the remote access application by fall 2011 [3.3.1.5] •Training events on remote sensing hosted at 2 sites by fall 2011 [3.3.2.1] 	<ul style="list-style-type: none"> •Examine project activity related to scaling the innovation of remote access • Interview project personnel regarding the usefulness of the logic model for guiding GeoTech in taking this innovation to scale •Review of publications related to scale up of the remote access innovation •Surveys of RDA training participants at time of training and after time for implementation 	

Goal 4. Faculty Development and Outreach

Goal 4: The GeoTech Center will provide community college and secondary school educators with geospatial technology professional development, help these educators benefit from geospatial technology education faculty development provided by others, and guide them in evaluating and accessing geospatial technology professional and academic organizations, user groups, and geospatial technology certification options.

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>4.1 Multi-day faculty development events that increase/update/upgrade geospatial technology knowledge and skills are provided to enable teachers to effectively deliver geospatial technology courses or incorporate geospatial technology into existing courses/programs.</p> <p>4.1.2 Activity: Conduct professional development workshops on geospatial technology education</p> <p>4.1.2.1 The GeoTech Center and its funded partners will provide professional development to 500 community college and secondary school educators focused on geospatial technology by August 2012.</p> <p>4.1.2.2 Workshop participants complete evaluations (90% return rate)</p> <p>4.1.2.3 All partners complete evaluation documents for activities they provide (98% reporting rate).</p> <p>4.1.3 Activity: Identify opportunities and stimulate educator participation in geospatial technology professional development events provided by others.</p>	<ul style="list-style-type: none"> •500 educators are provided with multi-day GST professional development by August 2012 [4.1.2.1] •90% of participants evaluate the experience [4.1.2.2] •98% of those providing professional development on behalf of GeoTech submit evaluation surveys from their events [4.1.2.3] 	<ul style="list-style-type: none"> •Analyze report forms collected by the GeoTech Center to determine number of professional development events produced by the Center/yr. to establish progress made toward meeting the Center’s goals. Data should include format of training, number of participants, target audience, topics, date, and location. 	<ul style="list-style-type: none"> •There is an increase in the number of educators who are aware of opportunities and participate in professional development •There is an increase in professional involvement of GST educators •An increase in GST educator capabilities is evidenced by growth in courses, certificate and degree programs nationally [community and technical college geospatial program map and database] •GeoTech partners are nationally visible and exhibit leadership in GST education •There is increased awareness and participation by students and educators in GST activities such as GIS Day and GST skills-based competitions

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>4.1.3.1 The GeoTech Center will partner with educators and industry to provide specialized geospatial professional development workshops (minimum of 3 by 2012) focused on increasing the number and elevating the quality of teachers and faculty able to offer quality geospatial education programs at all levels.</p> <p>4.1.3.2 The GeoTech Center will specifically support the California-based T3G workshop to increase the number of educators with exemplary skills in education of other educators in geospatial technology for a total of approximately 80 new educator/mentors.</p> <p>4.1.3.3 The GeoTech Center will work with geospatial organizations to increase the number of educators participating in conferences and becoming members of professional and academic organizations (baseline of 11% in 2007). The Center will, as part of its annual educator survey, double those reporting professional engagement by 2012.</p> <p>4.2 Geospatial technology awareness activities stimulate career awareness, program/course development and/or inclusion of geospatial technology into existing curricula.</p> <p>4.2.1 Activity: Participate in, present and exhibit at professional and academic meetings and conferences.</p> <p>4.2.1.1 GeoTech partners will be active participants at more than 10 conferences per year.</p>	<ul style="list-style-type: none"> •Geotech co-sponsors at least 3 GST professional development events with educators or industry by 2012 [4.1.3.1] •Co-sponsorship of the California T3G workshop provides professional development for approximately 80 new educators/mentors [4.1.3.2] •The number of GST educators participating in conferences and joining professional and academic GST organizations will double by 2012 from a 2007 baseline of 11% [4.1.3.3] •GeoTech partners actively participate in > 10 conferences per year [4.2.1.1] 	<ul style="list-style-type: none"> •Survey GeoTech partners to determine the extent to which they are presenting and exhibiting and participating in academic and/or professional organizations on behalf of GeoTech •Capture GeoTech annual survey results regarding the level of involvement of educators in GST academic or professional organizations. •Capture GeoTech annual survey results regarding memberships and conference participation rates among GST educators •Analysis of partner data reports and associated presentation, exhibits, etc. 	

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>4.2.2 Activity: Promote GIS Day activities</p> <p>4.2.2.1 At least 4 partners will sponsor or co-sponsor GIS Day activities and involve 200 students per year starting fall 2010.</p> <p>4.2.3 Activity: Stimulate more educators to support GIS Day Activities</p> <p>4.2.3.1 Produce a Webinar in fall 2011 on successful strategies for hosting GIS Day Activities</p> <p>4.2.4 Activity: Identify and annotate a listing, including contact information, of geospatial technology professional and academic organizations and user groups.</p> <p>4.2.4.1 Compile the contact list and place on GeoTech website by Fall 2011.</p> <p>4.2.6 Activity: Compile and disseminate geospatial technology Certification options.</p> <p>4.2.6.1 The GeoTech Center will promote awareness of different professional certification options for faculty by presenting two Webinars that address these options by 2012 and creating links to each option on the GeoTech website by January 2011.</p> <p>4.2.7 Activity: Collaborate with academic and professional organizations to increase educator access and participation.</p> <p>4.2.7.1 Work with professional (e.g., URISA, GITA, ASPRS) and academic (e.g., NCGE, AAG, UCGIS) organizations to reduce fees or make special arrangements for two year college faculty participation – 2 new agreements by summer 2011.</p> <p>4.2.7.2 Create a MOU to build partnerships with other entities by fall 2010.</p>	<ul style="list-style-type: none"> •GIS Day activities will be sponsored or co-sponsored by at least 4 partners and reach 200 students/year beginning fall 2010 [4.2.2.1] •Webinar provided in fall 2011 to share GIS Day strategies [4.2.2.2] •An annotated list, including contact information, is created of GST professional and academic organizations and users groups [4.2.5.1] •2 webinars are provided by 2012 that focus on GST certification options [4.2.6.1] •GST certification options are linked on website January 2011 [4.2.6.1] •By 2011 work with professional and academic organizations has reduced barriers to two-year college faculty participation/membership [4.2.7.1] [4.2.7.2] 	<ul style="list-style-type: none"> •Survey of partners to determine the number of GIS Day activities and level of participation •Confirm availability of annotated listing of professional and academic organizations on website and number of webinars provided to share/broadly disseminate this information •Analyze evaluation data from webinars •Confirm that certification options are available on website •Interview Center Director to determine the degree to which collaboration with professional and academic organizations has resulted in agreements that reduce barriers to the involvement of two-year college educators 	

Goal 5. Student Engagement and Outreach

Goal 5: *The GeoTech Center will encourage and support an increase in the number, diversity and quality of students participating in, and completing geospatial technology courses and programs of study in community colleges and secondary schools.*

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>5.1 Resources are provided to educators to stimulate geospatial technology awareness, understanding and career pathways for students.</p> <p>5.1.1 Activity: Develop uniform content about geospatial technology education for use by community college and high school educators and others specifically to raise awareness and understanding among students of the technology, its applications, and career pathways.</p> <p>5.1.1.2 Create a career guidance handout that can be customized by partners to use with their students by Spring 2011.</p>	<ul style="list-style-type: none">•A central message on GST Career Pathways is developed [5.1.1]•A handout with the GST career guidance central message and options for local adaptation is created by 2011 [5.1.1.2]	<ul style="list-style-type: none">•Document review (career guidance central message and handout, Successful Strategies papers, Success Matrix)	<p>An increase in the number diversity and quality of student participating in and completing GST courses and programs of study</p>

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>5.1.1.3 Identify and highlight professional geospatial technology role models including those from underrepresented populations by spring 2011.</p> <p>5.1.1.4 Create a Successful Strategies paper used by GeoTech partners to increase the number, diversity and quality of student completing geospatial programs and keep up-to-date with revisions each year starting in spring 2011.</p> <p>5.1.2 Activity: Develop and support opportunities for students to participate in national/international geospatial programs</p> <p>5.1.2.1 Participate in at least two international events per year starting with Fall 2010 through Summer 2012.</p> <p>5.1.2.2 Select and nominate two students/year from GeoTech partner institutions as nominees for AACC scholarships to attend the annual ATE PI Conference in Washington, DC.</p>	<ul style="list-style-type: none"> •GST role models from underrepresented populations are identified and highlighted by spring 2011 [5.1.1.3] •The published successful strategies are updated and the published paper is revised/updated annually beginning spring 2011 [5.1.1.4] •Number of Geotech partners participating in international events/yr. [5.1.2.1] •2 students/yr. participate in the NSF/ATE PI Conference on AACC scholarships [5.1.2.2] 	<ul style="list-style-type: none"> •Interview Center Director regarding role model activity, participation in international events, and level of student participation at annual ATE PI Conference 	

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>5.1.3 Activity: Create/support geospatial technology competitions that raise awareness and increase geospatial technology skills.</p> <p>5.1.3.1 Conduct GeoTech Bizarre Mapping Competition (BMC) in spring 2010.</p> <p>5.1.3.2 Present winners of BMC competition at ESRI user conference summer 2010.</p> <p>5.1.3.3 Promote new national competition for community college students.</p> <p>5.2 Strategies for broadening participation and increasing enrollment in geospatial technology courses/programs are identified and/or developed.</p> <p>5.2.1 Activity: Define measures of student success for geospatial technology studies related to job attainment.</p> <p>5.2.1.1 The GeoTech Center will build a new “Success Matrix” to better define and quantify criteria by which student success should be measured for a program focused on increasing the quality, quantity and diversity of the geospatial workforce by May 1, 2011.</p>	<ul style="list-style-type: none"> •GeoTech Bizarre Mapping competition event completed in spring 2010 with winners recognized at the Esri User’s Conference in summer 2010 [5.1.3.1] • GeoTech stimulates broad student participation in a national GIS student competition for community college students [5.1.3.3] •Number and diversity of students enrolling in and completing GST certificate and degree programs at partner institutions [5.2]Student Success Matrix is created by May 1, 2011 [5.2.1.1] •20% increase in number of nontraditional students participating in and completing GST programs at secondary schools and two-year colleges [5.2.2.1] •Job placement of GST course/program completers (from participating/partner programs) 	<ul style="list-style-type: none"> •Interview Center Director to determine the level of GeoTech involvement in sponsoring and/or promoting GIS competitions, numbers of participating students, and the perceived value of student competitions to accomplishing the goals of the Center •Analysis of data from GeoTech partners on student enrollment, program completion, and student/graduate demographics •Interviews with GeoTech staff and partners to assess the degree to which their program graduates are meeting employer demand 	<ul style="list-style-type: none"> •The quantity, quality and diversity of technicians with geospatial technology skills increases/improves to meet employer demand •An increasing number of internships are provided for two-year college GST students that enhance learning and positively contribute to the development of a skilled GST/technician workforce

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>5.2.2 Activity: Conduct surveys to collect data from current and former students on job placement.</p> <p>5.2.2.1 By 2012, increase the number of nontraditional students participating and completing geospatial technology courses and programs of study in community/ technical colleges and secondary schools nationwide by 20% as defined using the new baseline data.</p> <p>5.2.3 Activity: Provide data on geospatial related internship opportunities and participation by students.</p> <p>5.2.3.1 A survey of Center partners is completed that documents successes and recommended practices and this information is used to update the GeoTech Successful Practices document by August 31, 2011</p> <p>5.2.4 Activity: Provide resources to educators to increase student diversity.</p> <p>5.2.4.1 Sponsor activities, including professional development and internship opportunities, at tribal colleges.</p>	<ul style="list-style-type: none"> •Data is collected from partners on internships and successful practices related to internships in GST by August 31, 2011[5.2.3.1] •Data is collected on GeoTech activities and internships at tribal colleges [5.2.4.1] •A paper on Successful Practices related to broadening participation is published Spring of 2010 [5.2.4.2] •Examples of GST courses that qualify for general education credit are captured and published [5.2.5] 	<ul style="list-style-type: none"> •Review GeoTech Center data on internships at partner institutions, activities and internships at tribal colleges, and job placement of current and former students 	

Objective	Target/Metrics	Methodology/Data Source	Outcomes/Evidence
<p>5.2.4.2 Publish Successful Practices related to broadening participation by underrepresented student populations by Spring of 2010.</p> <p>5.2.5 Activity: Provide examples and resources that have been successfully used to qualify geospatial courses as required general education credit that may be applied to degree completion/transfer.</p> <p>5.2.5.1 Write a Successful Practices document on GE with examples by Spring 2010.</p> <p>5.2.5.2 Review/Update paper annually beginning 8/3/2011</p> <p>5.2.6 Activity: Provide examples and resources for developing articulation agreements (2+2+2)</p> <p>5.2.6.1 Write Successful Practices articulation document with examples and update annually starting in fall 2010.</p> <p>5.2.7 Activity: Provide resources to educators to use to increase teaching of geospatial technology across the campus</p> <p>5.2.7.1 Write Successful Practices document with examples and update annually starting in fall 2011.</p>	<ul style="list-style-type: none"> •A Successful Practices document related to degree completion and transfer with examples is written by Spring 2010 and reviewed/ updated annually by August 31 in 2011 and 2012 [5.2.5.1] [5.2.5.2] •A Successful Practices document with examples and resources for developing articulation agreements (2 +2+2) is written by fall 2010 and annually updated [5.2.6.1] •A Successful Practices document with examples and update annually starting in fall 2011 [5.2.7.1] 		

Appendix B: GEOTECH Data Collection for Project Evaluation (amended 2010)

- Data Elements Included in the Spreadsheet
- Name of Institution
- Academic Term for Data Reported
- Year
- GIS Degree or Certification offered (Type of Certification, # of Degrees or Certifications)
- GIS Courses offered at the college during the reporting term (course name, course number, credit hours, course student contact hours)
- Student Enrollment Information for Each Course
 - Number enrolled at end of non-penalty drop-add period
 - Number of males
 - Number of females
 - Number of Hispanic/Latino
 - Number of American or Alaska Native
 - Number of Asian
 - Number of Black or African American
 - Number of Hawaiian or other Pacific Islander
 - Number of Multiracial
 - Number of White Non-Hispanic/Latino
 - Number of students requesting accommodation under the Americans with Disabilities Act
 - Number of incumbent workers (individuals employed as technicians at the same time they are taking coursework)
- Number of program completers
 - Number of certificate completers
 - Number of associate degree completers
 - Number of baccalaureate degree completers (only SDSU)
- Articulation Agreements for Geospatial Technology Courses/Programs
 - Number of Articulation agreements in place for high school to 2-year college
 - Number of Articulation agreements in place for 2-year college to 4-year college
 - Number of Articulation agreements in place that provide for concurrent matriculation – dual enrollment of student at high school and 2-year college
 - Number of Articulation agreements in place that provide for concurrent matriculation – dual enrollment of student at 2-year college and 4-year college
- Mentoring Activities in GIS by semester
 - Number of one-on-one meetings with another college teacher about GIS education
 - Number of contacts with high school teachers about GIS education
 - Number of industry contacts About GIS education or students
- Number of visits to industry
- Number of times industry has visited your institution
- Industry partners

List of industry partners for [time frame]

- Industry contributions
 - Name of industry partner
 - Donated money/\$ value
 - Donated equipment or software/ \$ value
 - Donated time/ # of hours
 - Used a paid intern from your college, # of interns
 - Used a non-paid intern from your college, # of interns
 - Provided advice/ # of meetings
 - Assisted with recruitment/ # activities
 - Other?
- Outreach in past semester:
 - List venues where presentations were made (date of event, audience, age/type group (i.e., K-8, 9-12))
 - Specify the number of papers or articles submitted for publication (number of papers submitted, number of articles submitted, name of publication(s), number of article published/accepted).