The third meeting of the National Visiting Committee (NVC) for the National Geospatial Technology Center of Excellence was held on February 9-11, 2011 at the Marriott Suites Midtown in Atlanta, Georgia. Ten NVC board members were present representing industry, academia, and professional societies (see Appendix A). On the first day of the meeting, the NVC and evaluator discussed the evaluation report and the new operational plan for the Center, on the second day the NVC heard Center highlights from each of the PIs and key consultants, and the third day was devoted to sharing NVC recommendations. The NVC was provided read-ahead materials and the agenda focused on key efforts of the Center (see Appendix B). Each of the ten NVC members has taken one topic from the agenda and has written up a detailed account of the NVC’s discussion and recommendations, which follow the executive summary.

**Executive Summary**

The GeoTech Center (GTC) is making excellent progress and is blessed with a talented and motivated group of PIs. Again, we have much praise for the Center’s work over this past year, but still find room for a little focus and improvement.

A stellar achievement this past year has been the acceptance of the new Geospatial Technology Competence Model (GTCM) by the Department of Labor; this effort was largely initiated by the GeoTech Center and orchestrated by Co-PI David DiBiase. But more than an achievement, the GTCM is a golden opportunity to guide and leverage the future work of the Center, and this opportunity cannot be understated. The GTCM provides the framework for aligning geospatial technology (GST) education (e.g. curriculum, professional development, internships, certification, and articulation) with workforce needs, and the GeoTech Center should lead this effort.

**Key recommendations for the Center:**

1. **Operational Plan:** The revised operational plan, with its adjusted goals, objectives, mission and vision, is a substantial improvement over the previous version. However, we feel the Center is still trying to do too much. We believe the ATE/NSF pre-proposal will be a good opportunity to pare down the number of objectives and make sure that nearly all of the Center’s work is tied to the GTCM in some way. Additionally, more emphasis needs to be
placed on defining the type of impact that is being achieved, not just counting the number of
people involved.

2. **Professional Development:** Up to this point, professional development has not really focused
on improving current community college GST programs, many of which are struggling and
may be out of date. At the NVC meeting we discussed a new strategy to offer professional
development to current GST instructors at community colleges by having them align their
entry-level technical (CTE) and general education (GE) GST courses with the GTCM. This
will produce an expanded audience of indoctrinated partners and provide a structure to
identify more specific faculty development needs and gaps in existing curriculum.

3. **Do Less but Improve Quality:** We recommend that the Center conduct fewer webinars but
learn how to produce a more professional product. Likewise, we suggest that the Center
produce fewer white papers, and if there is new knowledge to be disseminated, publish it in a
peer-reviewed publication.

4. **Evaluation:** A very experienced evaluator is conducting the evaluation of this project.
However, because it is a large center with co-PIs and contractors across the country, it is hard
to know what is happening in a timely fashion so that your evaluator can plan and advise
properly. In successful centers, evaluation is seamlessly integrated into the planning process
where each key staff actively thinks about the evaluation questions they want to ask and then
works with the evaluator to refine the questions and develop an appropriate evaluation
strategy. All co-PIs and Center staff should become more actively engaged in the evaluation
process. Evaluation should have quantitative and qualitative components, but narratives
related to the project goals are also helpful.

5. **Look and Sound Professional:** Now that the Center has significant products to develop and
services to offer, they should work with professional PR, marketing, communications and
graphic design people. The web site, message materials, and blogs should be critiqued by an
editorial Webmaster for content, appeal and value.

6. **Conducting the Annual Meeting:** The reporting for this meeting involved a great deal of
overlap among the focus areas. Next year the presentations should closely follow the
objectives of the Center to allow the NVC to comprehensively evaluate progress toward
those objectives.

**Focus Area Reports:**
The following focus area reports provide additional detail on the work of the Center and the
relevant NVC recommendations.

1. **Center Management, Operational Plan, Logic Model, Evaluation**
2. **GeoTech Center’s Website and Resource Clearinghouse**
3. **National Database of College and University Programs and Software Systems**
4. **GTCM**
5. **MetaDACUM**
1. Center Management, Operational Plan, Logic Model, Evaluation

The NVC was in agreement that the work completed in Year 3 is indicative of strong project management skills. The GeoTech Center (GTC) operated in a manner that respected the diversity of the PIs and the partners, but also provided an increasingly national and cohesive message. It was evident that GTC management valued the expertise of its PIs and managers, and yet recognized that each project undertaken needed to contribute to the overall mission of the GTC. The GTC management targeted the faculty, staff, and students of community colleges and is clearly having a positive impact on the capacity of these institutions to educate geospatial technicians through partnerships, enhanced skills, useful models, and a rich set of curricula. None of this would have occurred if the GTC management staff members had not been in frequent communication with each other and with Tier A and B partners, with the project’s goals in mind. This is particularly important in a project such as this, where the leaders work in many different sites across the country. The GTC uses a variety of social media and other technologies for communications, and shows leadership in its management style and effectiveness.

All of the GTC goals are addressed with skillful management and through an operational plan that provides national leadership and expertise in the areas of skills and competencies, faculty development and outreach, and student engagement and outreach. The technology, educational landscape, and broader societal situation continue to change rapidly, but the GTC management is able to adjust its practices as necessary, to the advantage of the project. A challenge with any exemplary center such as this is determining the extent to which it is appropriate to collaborate with related projects, but the Center staff is gradually doing a better job at staying focused on mission-critical tasks. This will be increasingly important as GTC becomes more widely known and opportunities for collaboration expand.

The Logic Model is one product that has enhanced the GTC, but one that could also serve other educational technology implementation projects well through its clarity and utility. The evaluation of the project by Elaine Craft continues to provide value to the NVC and to the project overall, not only in the written report, but also through her oral presentation to the NVC.
Evidence of the success of GTC management includes the completion of the Geospatial Technology Competency Model (GTCM), the branding of the GTC, the improved website functionality and navigability, and the publication of the special issue on geospatial programs of two-year colleges in the peer-reviewed URISA Journal.

During Year 4, we suggest that the team redouble their focus on producing an even better GTC website, limiting their outreach to one or two representative groups from each sector (academia, professional societies, government, and industry), and thinking about six-month desired outcomes in deciding whether to engage in specific professional and curricular development activities. We also suggest that you make the GTCM the focus of these efforts.

2. GeoTech Center’s Website and Resource Clearinghouse

Recommendations from the NVC – “Less is More”... and the “more” is tied to quality content

Summary: The GeoTech center has made good strides in populating the website with many articles, blogs, videos and links to maintain the center’s goal of supporting the community college educator. However, the current mission for the site should be to focus on linking the GTCM guidelines with curriculum development for basic geospatial technology and GIS courses.

A major NVC recommendation was to establish workshops for educators interested in developing a general education course on GIS. The GTC website then becomes a natural focal point to support this endeavor. Make certain that all resources developed for this program can be located easily on the website.

The GeoTech Center website elegantly states its mission: Empowering Colleges; Expanding the Geospatial Workforce. Therefore the organization of site content must consider this focus and be organized around this mission. Currently, some elements do not conform to the conventions established in other areas of the website. For example, some right column menu options are not present on every subpage. That convention needs to be followed explicitly, however, in order to maintain proper navigation throughout the site. Therefore, we offer the following observations as a way of suggesting that the PIs take a step back to question certain aspects of the content and design elements.

Map (GIS Program Finder) – Sometimes as geospatial professionals we can become too enamored with mapping technology to understand how others view their utility. Today, the program finder presents basic information on where the programs for GIS education exist. Some suggestions about the map have already been discussed at the NVC meeting. However, to encapsulate those suggestions, the main utility of the map is to deliver a handy reference as follows:
1. The type of program (certificate, degree, etc.) – this is currently represented on the map and is well organized.

2. Access to program information: The user should be able to click on any college on the map and reveal a pop up of the following:
   a. Program director (“the champion”).
   b. Number of courses offered or better yet list the courses offered.
   c. Website URL of the department offering the program.
   d. Phone number & email of relevant contact.

3. College database – the database of colleges displayed on the map should be available in alphabetical order on the map page, itself, and should be searchable, allowing a user to enter the name of the college sought or a key word or location, wherein the map should zoom directly to the location. Neither option is available in the current incarnation.

4. UPDATE PROGRAM INFORMATION – It is the experience of the evaluator that to expect that each program will keep their program information up-to-date is simply “wishful thinking.” A similar option appeared on the Directions Magazine website for over 10 years but was removed because it was difficult to maintain. However, we offer to link to the map from the Directions Magazine website as a way of bringing attention to the GTC to support this endeavor.

Narrative: Below is a deep dive into the pages and subpages of the website with both comments and questions about the content.

1. Home Page
   a. Home page notes
      i. Home page does not align with submenu structure; there is not a 1-1 correspondence between items on the home page and sub menus.
      ii. The same right column menu items on the subpages of HOME need to be listed under the HOME top menu listing; that in itself is not consistent with web conventions.
      iii. Large buttons below map need to be found somewhere under the main menu structure. They are listed as “FEATURED ITEMS” on the right column but only when you click through to a subpage from the top right buttons (and then only with “Help” or Contact us”). Be consistent with this menu structure.
      iv. Consider moving entries for the blog to simply a headline with thumbnail graphic to reduce the size of the block.
      v. Remove white space just below map.
vi. Set a cookie with respect to the Mapping Contest, otherwise visitors have to keep closing that element each time they go back to the home page.

b. Big Buttons
i. Starting a Program
   1. This is a key section and some thought needs to be given to how it should be expanded.

ii. Geospatial Careers
   1. Not linked to a top menu item but present on home page.
   2. ONET Link should also be listed under RESOURCES?

iii. Map Data and Library
   1. Necessary? Who is the target audience?
   2. Likely to become out-of-date if not maintained.
   3. Not linked to main menu.
   4. Contents are an eclectic mix and not exhaustive; where’s the link to the USGS data websites? (EROS, etc.). Again, if this is going to be maintained, then effort must be put into making it more complete. I question whether the center needs to maintain this kind of content.

iv. Curriculum Guidebook
   1. Not linked to main menu.
   2. Should be under RESOURCES but the CURRICULUM section under RESOURCES is not consistent with same links for the Guidebook.

v. Supporting Your Program
   1. "Administrative Use of Spatial Analysis" - Good example for Community College champions.

2. Projects
   a. Does the GTC need to be involved with these projects? How does such involvement benefit the community college educator?

3. Resources
   a. Note 1: This entire section should support the growth of community college Curriculum Development - Does it? Take a closer look at the materials.
   b. Note 2: Where is the right menu column when you are at the main subpage of Resources? This needs to be consistent with remainder of website.
   c. Resource Center
      i. Best Practices:
         1. Starting a new program: This is a generic guide only; not specific to geospatial.
         2. Geodata: why is this here? Geodata for what project? Research?
4. NGAC PPT: Redundant with GTCM info and not at all useful.
   ii. Data: These are only examples and hardly an exhaustive list of online mapping portals for data. Useful?
   iii. Technology
      1. Just GPS? What should this resource be? NOT COMPLETE.
   iv. Text Books: Who are these for and information on the textbook. The community college educator? Where is the focus on the educator?
   v. Curriculum (Self Assessment)
      1. Self Assessment tools very important; very thorough.
      2. Not sure why the other materials are included here (Esri ArcLessons) seems like these other resources could be listed under a different menu item.
   vi. Organizations
      1. Missing USGIF, ACSM – This area is not exhaustive.
   vii. Case Studies
      1. Explain why this is here - are these "How I started a community college GIS program?" If so, it needs to say so.
   viii. Career Pathways
      1. Where's the link to the DoL website - Again, is this a resource for the teacher or student?
   ix. Is this supposed to be just a jobs website? If so, it's missing lots of resources including those that can be found on Twitter.
   x. Where is the document shown in the "Student Resources" slide deck that showed the graphic of "Geospatial Technology Career Pathway".

   d. Publications
      i. White paper listing – OK.
      ii. Should the survey results be under Media Resources? The results are not white papers, which is the stated purpose of this section.

4. Education/Training - needs editing; a few typos are present here.
   a. Calendar - Sparse...needs updating; where’s the NVC meeting listing?
   b. Professional Development [Professional development for whom? The educator? The student? Consider dividing this section into separate focuses.]
      i. Online Courses and eLearning - Will this be continuously updated? Will it expand to become exhaustive?
      ii. Evaluation Forms: expected to see self-evaluation forms here like in Curriculum Resources above; why is this section here?
      iii. GeoTech Center Webinar archives:
         1. Webinars: Tiered Internship webinar...could barely understand Irina.
2. In general…hard to hear speakers who are on speaker phone
iv. Partner College Offerings – OK, but why is Esri listed here? Seems out of place and is certainly not a college.

v. Teaching Technicians- Not sure what the purpose of this is. Why does the visitor have to click through twice to get to the Teaching Teachers.org website?

vi. ATE Central – OK.


5. Partners
   a. Become a partner – OK.
   b. Educator Forum - lacking in interaction and social involvement – should this be moved to social media?
      i. Curriculum – I expect this area to have lots of traction since the idea should be to discuss curriculum development, suggestions for revising existing curricula, etc.
      ii. Data - Why is this here?… how is this different than the Resources Data section?
      iii. Professional Development - no interaction; again, this area should be a focus as it is a central mission of the GeoTech center. Consider giving this section more prominence.
   iv. Student Recruitment - purpose of this forum?
   v. Text Books - is this a discussion area for educators to recommend text books for certain courses?
   c. Featured partner - not needed; seems extraneous. Consider removing or reassigning the items to other sections.
   d. Center Partners – OK, but again I question the relevance.
   e. Industry Associates… OK.

6. News and Media
   a. Heroes - cute but looks like an Esri sponsored video
   b. Videos…not bad.
   c. Social Media - good sources but what's the plan; who is keeping it updated; do you need to focus on just one?
   d. News feed - the one, the only.
   e. Blog - good… but how is it publicized? Is the feed going directly to your social media websites? The blog needs to be a feeder for the social media outlets.
   f. Selectively prioritize blog entries.

7. Evaluation
   a. Surveys – OK.
   b. NVC – OK.
c. Might have expected to see GTCM QUALITATIVE Assessment Tool posted to this area.

8. Maps/Competition
   a. How many entered?
   b. What was the % participation from all community college programs?
   c. How many GIS instructors were contacted? Did they respond with help to promote?
   d. Star rating system? Useful - only works if you ask the reader to comment.

Social Media – Suggestions

• Comment: PIs need to ask themselves what the value of social media is to the goals of the website and how it will be maintained. To keep all social media opportunities current, the Center must make a commitment to update its social media outlets on a more regular basis, otherwise, loyalty to those outlets become ephemeral. It may not be necessary to participate in every social media outlet. While LinkedIn is viewed as a highly regarded professional network, Facebook is viewed for more “personal” information. While Facebook is certainly the most popular social media outlet, the GTC must ask itself whether this is appropriate for the Center’s mission. If it is important to be represented on Facebook, then determine what the content is and who the intended audience should be. If the audience is prospective students, then address the needs of students seeking information about classes and job opportunities.

• A blog is successful if it can be updated a minimum of three times each week.
• LinkedIn site is not active.
• Facebook has only limited information (JJ stuff really shouldn’t be there); content from website (RSS) feed needs to be sent to Facebook.
   o Redirect blog to Facebook via RSS feed so that it becomes automatically updated.
• Twitter should be fed with GeoTech Blog posts via RSS.

3. National Database of College and University Programs and Software Systems

Summary
The purpose of this portion of the review document is to evaluate: 1) the national database of the college and university geospatial programs and their web depiction; and 2) the technology related to the software systems now being employed by the GTC and its PIs. This review also comments briefly on the Synergy program, as it seems to fit best in this technology review section.
NVC members had the opportunity prior to the Atlanta meeting to examine the national college data and associated attributes more completely, and this review is based on that examination, the read-ahead material, as well as the information presented in Atlanta.

**National Database of College and University Programs**

The Co-PIs responsible for assembling and displaying the most complete set of data that exists on community college geospatial programs are to be congratulated on their work. The NVC remains convinced that this unique data set surrounding the community college geospatial programs remains a key area of interaction between and among the GTC and their community college constituency and continues to be an area where the Center has and can continue to distinguish itself.

**Concern**

While great strides have been made in assembling and displaying that data in a useful format, there are several major areas that need to be addressed to overcome remaining deficiencies. The data collected is a rich and unique data set, however its depiction on the web map still leaves a visitor with a desire for more. This is one of the few exceptions in the NVC evaluation where ‘less is not really more’.

**Suggestions**

- A means of continual updating of the community college geospatial data is and will continue to be a requirement, and this has not yet been addressed. We doubt that the Center can do this job alone, and regional assistance seems to be the only way this can be accomplished.

- The data should be made available to the geospatial community as a download from the Center website, as this information should be in the hands of the college community at-will. This will provide an additional means of data upgrade and maintenance, and it will make the data available for on-going research.

- The data displayed on the Center web map must be elevated from its present form. A means of searching by community name or location must be added, the capability of going to a selected community college website from the map must be restored, and the current college listing on the map must be alphabetized.

- The NVC recommends that the Center investigate a hosted solution for the map display and upkeep of the map, directly linked to the website as is now the case. A solution such as Esri or eSpatial (espatial.com), or any of a number of other companies with equal capabilities, providing hosting of the web map, using the latest technology, with the base data creation and maintenance remaining with the Center and its Co-PIs would keep the map fresh, on the 'cutting edge', and relieve the Center of the time and resources needed.
to do this themselves. This solution would also eliminate the student turnover problem that has contributed to the slow in-house development of the web map to date.

The NVC agrees that, while the Center focus should be primarily on GTCM alignment for the remainder of this term, the area of data creation, update, and expansion should remain a Center product with a high priority in its second phase of existence.

**Software Systems and Technology for Deployment**

The Co-PIs responsible for the technology investigations in which the Center has been involved to date are to be congratulated. In addition, the excitement shown by the Center personnel in response to work in these areas and the equally excited response from the college and high school community from the anecdotal sharing was evident in Atlanta. The NVC recognizes the importance and the need for developing a server/virtualization technology that can be implemented by a college or high school to allow the students access to Esri software from such an implementation, and agrees that this work should continue.

**Concern**

However, the NVC questions the expenditures in time and resources by the Center in continuing to make this area a priority, in light of the focus on developing resources that leverage the GTCM. The question that arises is whether the Center should be a 'center' of technology advancement and application, or whether that area of development should be left to others who have had and will continue to work independently. In these early years of establishing itself as the go-to organization of community college geospatial activity, it cannot do all things at once. In addition to the concern regarding the priorities just mentioned, several members of the NVC question whether the trend of technology to the area commonly called the 'Cloud' will replace and/or reduce the future need for on-site technology, solving the license and student connectivity problem that now looms so large in selected instances of deployment within the educational community. The NVC believes that the technology curve is changing so rapidly that the Center cannot ignore this aspect and must continually reinvestigate its position in this area to remain current.

**Suggestion**

- The Center should quickly and seriously investigate the place of technological creativity and advancement as a continuing part of its core activities, both in its short- and long-term program and decide whether these can remain without jeopardizing its current mission. While it is desirable and beneficial for GTC members to remain abreast of technological advancements, the GTC might better serve community colleges by providing suggested resources and information about relevant services rather than the services themselves.

**Synergy Initiative**
Last year, the NVC heard of the opportunity provided to the Center to become involved with the recently NSF-funded project, The Synergy Initiative, which as a program designed to facilitate centers in project management and the ‘scaling-up’ local or regional projects to a nation level. We expressed some concerns about the wisdom of the Center’s involvement in such an activity, but saw enough of a possibility that we gave cautious approval to participating, while expressing concern that this could divert resources needed elsewhere.

Concern
The NVC remains skeptical about whether this activity is worthwhile for the Center at this phase of its existence. From the reports provided in Atlanta, we have difficulty seeing the benefit to be gained from participation.

Suggestion
We urge the Center to strongly consider whether the gain in continued involvement is worth the expenditure of Center time and resources, in light of the importance of other areas of activity and the specific goals and objective of the Center.

4. GTCM

The GTC successfully met their goal to assist “the Department of Labor (DOL) in completing the Geospatial Technology Competency Model (GTCM) and …. 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.” This effort was led by David DiBiase, John Johnson and Chris Semerjian. In this Year 3 NVC meeting, the NVC was in complete agreement that Year 2 accomplishments for the GTCM exceeded expectations. The GTC cooperation with the DOL and geospatial professionals/organizations resulted in the GTCM being accepted and published by DOL. In addition, DOL defined new geospatial occupations in Summer 2010. Throughout the two-day meeting, the NVC repeatedly emphasized the importance of the national recognition received by GTC for completion of the Competency Model. Quotes by NVC members included:

“The GTCM is a game changer.”
“The GTCM is an accomplishment that has put the GeoTech Center on the map.”
“This is a home run hit outside the park.”

In addition to the acceptance of the GTCM and establishment of the Geospatial Information Scientists and Technologists and Geospatial Information Systems Technicians occupations, evidence of success also includes the contribution of two articles to the special issue of the *Journal of the Urban and Regional Information Systems Association* on GIS Education. One article focused on the GTCM and workforce needs (DiBiase et. al., 2010) and the other
synthesized tasks performed by GIS Technicians as determined by DACUM analysis (Johnson 2010), landmark accomplishments for the GTC. Further evidence of success for this goal was the creation and testing of GTCM Assessment Tool by Chris Semerjian. This tool will allow community college faculty to evaluate existing geospatial curricula to assess if current programs meet core competencies, plan for program improvement and market community college programs for workforce training and retraining.

In light of the acknowledged importance of the GTCM, Meta-DACUM analysis and GTCM Assessment Tool, the NVC advises the GTC to concentrate Year 4 efforts on GTCM promotion and the development of products and services derived from the GTCM that can be used by community colleges, especially those with existing geospatial programs. Plans to hold two geospatial workshops on both east and west coasts (four total) with a general geospatial awareness focused on general education and one targeting geospatial skills for ancillary users from other disciplines are applauded by the NVC. It is critical that the GTC focus their efforts on the success of these workshops and avoid being diluted or distracted by tangential efforts. As NVC member Bill Hodge noted, “The GTC should concentrate on the GTCM flagship and not try to build a flotilla.”

5. Meta DACUM

The NVC is pleased with the progress and results so far on the Meta DACUM and related work. Multiple DACUMs have been completed along with a compilation of other DACUM results as reported in the Year Three report. These efforts are complementary to the GTCM in that they provide critical information on how frequently tasks are performed and how difficult these tasks are to learn. This is essential for effectively aligning the GTCM with educational products and services.

The success of this section of the Center’s goals is due primarily to the hard work of John Johnson. Mr. Johnson has done an outstanding job in not only defining the task to be completed but delivering on that work. Using eight individual job analyses the Meta-DACUM identified 55 common “meta-tasks”, 35 “meta-knowledge and skills” and 27 “meta-behaviors” that were documented and ranked. This comprehensive national job analysis for the GIS industry will be a valuable guide for developing new training and education, certificates and curriculum for GIS Technicians. The report emphasizes that the DACUM committee must be made up of workers actually doing the task of an entry level job and also that each program developed using this work will need to be localized to fit the regional needs.

The NVC is impressed with the effort to coordinate the Meta-DACUM results and the new GTCM. With the DOL- GTCM definition of a GIS/Geospatial Technician and the results of the
Meta-DACUM, community colleges wanting to develop a GIS program now have the tools to design their curriculum. The NVC also supports the initiative to develop a spreadsheet-based assessment tool similar to the one produced for the GTCM for assessing a program in comparing the Meta-DACUM results with their individual program.

The NVC endorses the proposal to develop a Meta-DACUM for the remote sensing industry. In addition, the NVC recommends that the Center look into: 1) conducting a DACUM-like analysis for a broad cross section of workers who are ancillary users of GIS; and 2) identify knowledge and skills needed to satisfy the growing role of IT in the work of the entry level GIS technician. Additionally, the Center might also consider conducting more extensive pre-DACUM surveys to better define new occupational clusters and the demographics of the workforce prior to conducting new DACUMs. Deidre Sullivan at the MATE Center is happy to provide examples of pre-DACUM surveys.

6. GTCM Quantitative Assessment Tool

GeoTech partners, largely under the leadership of Chris Semerjian, have developed a draft assessment tool and have begun efforts to assemble a similar tool to help institutions create aligned curricula and articulate courses. Both instruments will be spreadsheet-based forms that can be used by faculty and administrators to determine which key competencies are addressed in their courses and at what level. This is a major leap forward in leveraging the GTCM and Meta-DACUM to have practical applications nationwide.

The NVC has recommended that the GTC focus on developing model course curricula for two courses, based on the GTCM and Meta-DACUM. The GTC partners presented a plan for developing the curricula, and the NVC approved the plan. One of the course curricula will be a general education course aimed at student awareness and interest in geospatial technology. The other will be an introductory GIS course designed to provide students with fundamental skills, knowledge and competencies. The latter would be aimed at serving the needs of ancillary users of GIS and serve as the first course in a GIS program for technicians.

Recommendations:

- The work on assessment tools and the model curricula should be central to the GTC efforts in the coming year. This strategy will leverage the GTCM and Meta-DACUM to achieve maximum national impact on community college GIS programs. Also, model introductory course curricula will be especially useful tools for community colleges seeking to add GIS courses.

- In moving forward with the assessment tool, it will be important to work on indexing competencies to the meta-DACUM and provide guidance for prioritizing and ordering
In designing model curricula, assessment tools and outreach based on the GTCM and Meta-DACUM resources, focus on the two main audiences for community college GIS courses and programs: aspiring GIS technicians and incumbent workers who are/would be ancillary users of GIS. While K12 students are important for community college admissions, the GTC should focus on supporting community college outreach to K12, rather than doing direct outreach to K12 students.

Over the past 20 years, the body of GIS education research has grown, but only slowly. In particular, it is missing assessment research of GIS-based curricula, certification efforts, and programs. In the dissemination efforts, include journals that publish GIS-related assessments, such as the Journal of Geography, the International Research in Geography and Environmental Education, the Annals of the AAG, and the Journal of Geography in Higher Education.

In targeting outreach on the GTCM, assessment tools and model curricula, look for opportunities to focus more on outreach beyond the geospatial community. Cultivate opportunities to attend conferences and work with organizations such as the American Association of Community Colleges, the Rural Community College Alliance, associations of minority serving institutions/faculty (such as Historically Black Colleges and Universities, and the Hispanic Association of Colleges and Universities) and professional associations connected to large ancillary user communities/industries such as environmental science, computer and cyber security, marine sciences, engineering and manufacturing. Again, well-established ATE centers associated with such fields would be a good place to start.

7. Student Retention Study

The GTC presented the results of a student retention study designed to understand the best practices for retaining students. The study consisted of two nationwide surveys, one for GST
faculty and another for GST students. Although the results are interesting, especially on how the responses vary from one demographic to another, it would have been extremely valuable to survey the students who dropped out of GST courses and programs. This would allow us to understand why this audience is no longer participating in GST.

Additionally, the NVC strongly recommends that you include your evaluator in the planning process before initiating any study like this. Her expertise in writing and analyzing surveys will make any such instrument much more robust and useful, and would allow integration with overall assessment efforts. Think about publishing the results in an education-oriented journal, for the reasons noted in the previous section.

8. Professional Development

The GeoTech Center and its partners continue to stress, through Goal 4, the professional development of community college faculty that teach GIS courses. This goal also includes exploring ways to attract students into GIS programs at community colleges and to assist secondary school teachers in developing GIS capabilities to foster GIS career interest among high school students.

The GTC has demonstrated success in conducting numerous professional development activities for college faculty and high school teachers. The use of geographic information science and technology for campus-focused projects, seminars, and a high school competition, highlighting the capabilities of geospatial technologies are especially applauded for raising awareness and support for geospatial faculty. The NVC continues to encourage the GTC in this regard and to use the newly created GTCM in its professional development activities.

However, the NVC Continues to stress that the PIs seek out data and feedback from community college faculty regarding which has been learned from these professional development activities and whether College faculty are seeing progress in the development of GIS programs at their community colleges. We do note that the Center has produced a monthly data collection form to track communication between PIs and industry partners, and PI involvement in professional development. These data are important and will be needed to demonstrate the effectiveness of all the professional development activity that has been tracked.

Again, the NVC recommends that GTC researchers continue to identify two-year college faculty who have geospatial skills and who have successfully developed an ongoing GIS program (e.g. course, certificate, degree) as the primary target audience for professional development in these early year(s) of the grant. These activities should also link to the GTCM effort once that has taken form. Center-sponsored professional development activities should be replicable to the
extent possible through clearinghouse materials posted on the web site. One critically needed piece from the geospatial community is the web-enabling of courses, particularly due to rising costs of travel and increased travel restrictions due to budgetary and time constraints on community college faculty. If the Center took the lead on developing a web course, community college GIS faculty needs could be more effectively met. The partnership with ESRI to co-sponsor the T3G (Teachers Teaching Teachers GIS) has been bearing fruit, but it is recommended that the Center develop their own national training model, and test that model during its own national institute. The outcomes from each professional development activity should be documented and assessed, in consultation with the evaluator, to identify what is most effective.

Presentations and collateral materials developed by the GTC have demonstrated that the known universe of community college GIS programs and faculty is expanding. Also, data from the DOL and efforts associated with the development of the GTCM have shown a rising demand for geospatial technicians and professionals. The NVC congratulates the Center on its efforts to follow and document this growing body of GIS programs, educators, and industry demand. With the number of faculty nationwide now identified, the NVC recommends that the Center explore the possibility of initiating a Community College GIS Faculty Forum or Society to encourage a bi-annual meeting so faculty can present useful experiences and promote faculty development. A voluntary organization with an informal structure to minimize costs and to encourage participation could be explored. This meeting can and should include some hands-on skill building in GIS to maximize its practical impact as well as its networking impact.

In summary, the NVC recommends that the GTC:
- Continue to focus professional development on community college faculty who teach GIS.
- Tie professional development to the GTCM.
- Work closely with your evaluator to define desired outcomes for each professional development activity. Characterizing impact and quantifying that impact are more important than having lots of participants doing something with little focus.
- Encourage GIS faculty to seek out professional qualifications, such as the GISP certification, to strengthen their GIS credentials.
- Continue development of an effective professional development information center on your web site. This might include:
  - Long lead times (aim for six months) for local and regional opportunities for faculty development such as workshops, conferences, training and career requirements.
  - Continue online courses and training materials for self-instruction.
  - Explanation of certification options and benefits.
  - Advantages of belonging to a professional society and links to society home pages.
--- Personal testimonies of benefits of professional development that show diversity and inclusiveness in the geospatial community.

9. **Student Engagement and Outreach:**

From Goal 5: Encourage and support an increase in the number, diversity and quality of students participating in and completing geospatial technology courses and programs in undergraduate and secondary schools. In general, this goal has been addressed carefully and successfully. Specific comments and recommendations are included below.

Objective 1. Resources are provided to educators to stimulate geospatial technology awareness, understanding, and career pathways for students.

**Resources that support geospatial technology awareness:**
- Well-selected videos and podcasts and wide range of other relevant materials are now available on the website.

**Recommendations:**

- a. Post a prominent central message to educators on the website regarding the need for and ways to generate geospatial technology awareness. Such a message should direct instructors to the website resources. These would be much easier to locate if the Resources section had a separate category for “Geospatial Technology Awareness.” (A search identifies 200+ website resources that address geospatial awareness, ranging from highly to marginally relevant.)

- b. As new items are added to these resources, they should include materials that are easy to use with students, developed specifically for this purpose.

- c. Address the needs of members of the existing workforce who seek training, as well as the needs of traditional students. (In many programs, incumbent workers constitute a very large proportion of the students.)

- The GTC has successfully addressed its mission to “develop opportunities for students to participate in national/international geospatial programs” by providing national student competitions and bringing students to major conferences, including the Esri EdUC and the annual ATE conference.

**Recommendation:** Do not include student activities that require overseas travel. This would divert valuable staff time to efforts that have relatively narrow student impact.

**Competitions that raise geospatial awareness and increase geospatial skills.**
- The 2010 Bizarre Mapping Competition generated much student interest, (albeit mainly at four-year institutions) both in participating and in seeing the completed maps. The competition gave students an opportunity to apply professional mapping
skills in a lighthearted context, which was nicely balanced by the more serious 2011 competition.

- The 2011 National Geospatial Skills and Competencies Competition is exceptionally well developed. The first round, a test based on the GTCM, will enable students to assess their skills in relation to workforce requirements. This makes the Recognition Certificates for scores of 85% or better valuable additions to student portfolios. Making the second round, which has students creating a video-based project, open to only to those who pass the first round, is both an incentive for students to do well on the exam and a good means of ensuring better project quality than if this portion of the competition were open to all students.

- Important benefits of the competitions include bringing students to the GTC website, where they are exposed to resources that stimulate their interest in geospatial technology, and having the finalists participate in the Esri EdUC. The latter not only enables these students to participate in an important conference, but also raises awareness about the EdUC among other students who participated in or followed the earlier rounds of the competition.

Recommendations: Ensure awareness of and participation in GTC competitions by community college students.

Resources that support career awareness and career preparation:

- Website information: “Geospatial Careers” is one of the website’s five key information access points. It provides links to twelve useful sources of career information. The website also offers several effective career role models (but still lacks minority role models) and provides links to other organizations which provide career information. A Successful Strategies paper, "Developing and Sustaining Geospatial Programs in Community Colleges" by Ann Johnson and Christine Lewis, is currently available in draft form. Ken Yanow’s 2009 white paper, ”Successful Recruitment Strategies: General Education, Accessibility, Awareness, and Outreach”, also addresses many of these issues.

A very valuable career-based resource is David DiBiase’s assessment tool for enabling both students and instructors to compare what is taught in specific courses with the career skills identified in the GTSM. Chris Semerjian’s more detailed assessment tool, currently available as a prototype, will be posted soon. These assessment resources will be major contributions to effective career-preparation.

Recommendations:

- In the future, consider providing information on the website about regional job availability. Help the Center partners to do the research and map the information.

- Consider providing models on the website for effective career mentoring (see other ATE center websites for ideas) and community career fairs.
• Career guidance handout: This handout was completed on schedule and is an excellent resource. It is both attractive and informative.

Recommendations: The handout is not easily accessible on the website. Make it available in several places, including the Careers section on the home page.

Objective 2. Identify and/or develop strategies for broadening and increasing enrollment in geospatial technology courses and programs.

• Measures of success for geospatial technology education in relation to job requirements have been addressed very effectively in David DiBiase’s course and program assessment worksheets and in the more detailed assessment instrument being developed by Chris Semerjian. Because they are keyed to the GTCM, these resources will be invaluable for aligning education with workforce needs.

Recommendations: These excellent initiatives address the "success matrix" activity listed in this objective. While they very effectively deal with the criteria that will “increase the quality and quantity” of the geospatial workforce, it is not clear how the matrix can help to “increase the diversity” of the workforce. Such activity is perhaps better addressed elsewhere.

• A “Best Practices” document on internships (based on a completed survey of Center partners) is underway. Job placement surveys of current and former students and professional development activities for tribal colleges are scheduled for 2011. Resources focused on increasing student diversity currently consist of website links to reports on successful practices for recruiting women into technology programs and for retaining Hispanic students. A Successful Practices paper for broadening participation by under-represented students, planned for 2010, is not yet available on the website.

Recommendations:
• Continue to develop resources that focus on increasing diversity. Few community colleges have budgets or skills for marketing their programs to underserved populations, and they need resources that can easily be adapted to their outreach efforts. Seek opportunities to work with the Hispanic Association of Colleges and Universities, the American Association for Women in Community Colleges, and Historically Black Colleges and Universities. If working with these associations are not yielding the desired results, shift efforts and move to other organizations that have the same diversity mission.

• The GTC planned to develop Successful Practices documents in 2010 regarding articulation agreements, the qualification of geospatial courses for general education credit, and the teaching of geospatial technology across campus. These documents are not yet available, but Ken Yanow’s 2009 white paper covers some of these issues, and
his recorded webinar provides excellent information about general education credit possibilities. Good examples of articulation initiatives at Austin Community College and in Oregon (Oregon College and University Articulation Agreement) are posted on the website. The Oregon documents include valuable worksheets which can be adapted elsewhere.

Recommendations: Do produce all three Successful Practices papers. They will be important additions to the website.

9. The Future of the GeoTech Center

The GTC is a collaborative effort among and between colleges, universities and industry to expand the geospatial workforce. The Partners of the Center work together to provide professional development, teaching and curriculum resources, career pathways and model core competencies for geospatial technicians. (Newsletter - Vol. 2 No. 1 • January 2011)

The hard work of this dedicated group has produced many accomplishments such as: assisting the DOL in the development of the GTCM; completion of research on the Meta-DACUM Analysis of Common Core Competencies for GIS Technologists; the Remote Desktop Application (RDA); elevating the voice of community college geospatial faculty, DTC membership in the University Consortium of Geospatial Information Science (UCGIS); the development of web-based mapping technologies; promotion of alternative GIS software; Professional development opportunities; the NSF ATE Synergy Project; and, working with the GIS Certification Institute (GISCI) promoting an examination element as part of GISP certification. This also serves as evidence that the talented GTC staff may be taking on too much and now needs to develop a targeted and clear mission.

Focus

The word ‘focus’ seems to be the best way to express the NVC challenge to the great people who make up the GTC staff. As GTC approaches NSF funding deadlines, the GTC must create a clear and powerful identity that will be immediately recognized by community colleges as the most important resource available for improving existing GIS certification and associates degree programs and the most important resource available for creating new programs.

“2010: The Year the Geospatial Technology Industry Came of Age—a momentous year indeed.”

When the DOL recognized the geospatial sciences as a separate and distinct industry classification, our world changed. The DOL also recognized that the geospatial industry is among the top three fastest growing industries in the U.S. (and the world). This recognition gives the GTC increased credibility and importance.

When the GTCM was announced and published, it immediately struck the NVC that this model would have far-reaching impact. It will likely affect the way in which RFPs are written by local,
state, and federal government agencies; the way in which job descriptions are written; the way in which job interviews are conducted and the manner in which candidates are selected. The GTCM will become an important tool in the evaluation of employee performance. Managers may be directed to use it as the guiding tool for evaluating proposals. It may also be used to evaluate the ability of contractors to provide evidence that they have adequate staff with specific competencies to ensure the successful completion of a project. Educators will use the GTCM for curriculum development and writing course descriptions.

The NVC has recommended that the GTC staff write course descriptions for: (1) a general education geospatial course; and (2) a GIS skills course. The courses are to be written using the GTCM as the foundation. Clearly written course descriptions tied directly to GTCM core competencies will be a great tool for community college instructors and will encourage improvement of existing programs and the development of new programs.

**Questions**

It seems that the GTC has matured enough to become a leader of rather than a participant in professional development conferences and related events. How will the renewed focus on the GTCM, general education geospatial course and skills course descriptions be reflected in upcoming events? Is the Center’s role one of presenter, panelist, or workshop host? Does the GTC play a leadership role in any of these events? How will the effectiveness of these events be evaluated?

**Upcoming Events**

- 2/16-18/2011 North Carolina GIS Conference Raleigh, NC [www.cgia.state.nc.us/ncgis2011](http://www.cgia.state.nc.us/ncgis2011)

**Specific Recommendations**

**Taking the lead**

One suggestion that came from our meetings was that the GTC host an event that will provide a stage for the GeoTech mission. Such an event would certainly be tailored to community college instructors and, perhaps, Career Technical Education (CTE) and Area Vocational Program (AVP) counselors and administrators.

The GTCM and the development of course models should be the primary focus of any such event.
Taking the lead also means for GTC to be at the forefront in leading community college faculty into emerging geospatial technologies and modalities. The Center needs to encourage faculty to go beyond the way they may have been teaching GIS for years or decades, and in particular, to expand their courses and sections of courses to embrace Server/Cloud, mobile/fieldwork, and citizen science/volunteered geographic information. The Center should also actively seek to draw in community college administrators to support their instructors. These administrators need to be shown through face-to-face PD, webinars, and through direct contact that the administrative use of GIS on community colleges can save them time and funds, and make their operations more efficient.

**Marketing and Public Relations**
Retain the services of marketing and public relations consultants to:
1. improve the effectiveness of hard copy marketing materials
2. improve the written effectiveness of hard copy marketing materials
3. improve the verbal messages used to discuss and promote the GTC
4. improve the effectiveness of electronic tools such as the website and email messaging used in marketing

**Evaluation**
Evaluation and assessment tools should be an integral part of every activity and event. Evaluation design and methodologies should be developed according to the specific activity or event at the outset and become an integral activity in everything we do. Results of evaluations must be used to revise and improve DTC procedures, materials, and outreach to community college faculty.

**Results**
As the GTC becomes established as the ‘go to’ resource for community college faculty throughout the country, the NVC looks forward to seeing improved programs, new programs, and programs designed in alignment with GTCM competency standards.
# Appendix A

## National Visiting Committee Members Present

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deidre Sullivan (NVC Chair)</td>
<td>Director and PI for the MATE Center</td>
</tr>
<tr>
<td>Elaine Craft (NVC)</td>
<td>External Evaluator, SCATE</td>
</tr>
<tr>
<td>Osa Brand (NVC Member)</td>
<td>Director of Education for the National Council on Geographic Education (NCGE)</td>
</tr>
<tr>
<td>Joe Francica (NVC Member)</td>
<td>Directions Magazine</td>
</tr>
<tr>
<td>Joseph Kerski (NVC Member)</td>
<td>Education Industry Curriculum Development – Esri</td>
</tr>
<tr>
<td>Tora Johnson (NVC Member)</td>
<td>University of Maine at Machias</td>
</tr>
<tr>
<td>Marguerite Madden (NVC Member)</td>
<td>University of Georgia</td>
</tr>
<tr>
<td>Bill Hodge (NVC Member)</td>
<td>GIS Division Manager of the City of Midland, TX</td>
</tr>
<tr>
<td>Sid Shrum (NVC Member)</td>
<td>Greenville Technical College, South Carolina</td>
</tr>
<tr>
<td>Richard Serby (NVC Member)</td>
<td>GeoSearch, Inc.</td>
</tr>
<tr>
<td>Gary Jeffress (NVC Member)</td>
<td>Texas A&amp;M University – Corpus Christi</td>
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## Partners/CoPI’s Present

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>David DiBiase</td>
<td>Pennsylvania State University</td>
</tr>
<tr>
<td>John Johnson</td>
<td>DACUM Specialist</td>
</tr>
<tr>
<td>Rodney Jackson</td>
<td>Central Piedmont Community College</td>
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<tr>
<td>Mike Rudibaugh</td>
<td>Lake Land College</td>
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<td>Chris Semerjian</td>
<td>Gainesville State College</td>
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<tr>
<td>Ken Yanow</td>
<td>Southwestern College</td>
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<tr>
<td>Vince DiNoto</td>
<td>Kentucky Community Technical College System</td>
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## GeoTech Center Staff Present

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<thead>
<tr>
<th>Name</th>
<th>Position</th>
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<tbody>
<tr>
<td>Phillip Davis</td>
<td>GeoTech PI/Director</td>
</tr>
<tr>
<td>Ann Johnson</td>
<td>GeoTech CoPI/Outreach Manager</td>
</tr>
<tr>
<td>Minerva Borger</td>
<td>GeoTech Center Coordinator</td>
</tr>
</tbody>
</table>
Appendix B

NVC Read-Ahead Printed Reports

1. NVC Agenda for 2011 Visitation
3. National Visiting Committee Report Year Two—Chair’s report to renew member’s memory of their year two recommendations.
4. External Evaluation Report Year Two—evaluation report for year two operation discussing the Center’s efficacy in meeting its goals.
5. PI Annual Report for GeoTech Center Year Two—formal report to NSF ATE program officer from the PI for year two.
6. PI Annual Report for GeoTech Center Year Three—current year’s formal report on Center impact and operation in draft format.

NVC Read-Ahead Online Reports

8. GeoTech Center Research Reports:
   a. GTCM Research Report
   b. GTCM Program Self Assessment Tool
   c. Meta-DACUM Research Report
   d. Recruitment Best Practices Guide
   e. Best Practices in Developing and Sustaining Geospatial Programs in Community Colleges Guide
   f. 2009 National Faculty Survey Results
   g. 2010 National Faculty Survey Results
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<th>DATE</th>
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<th>WHO</th>
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<td>9-1pm</td>
<td>CoPIs</td>
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<td>Ann Johnson</td>
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<td>Phillip Davis</td>
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<td>Mike Rudibaugh</td>
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# Matrix of Goals and Presentations

**Goal 1—National leadership and expertise**

**Goal 2—GTCM completion and implementation**

**Goal 3—Website and Resource clearinghouse**

**Goal 4—Faculty development and outreach**

**Goal 5—Student engagement and outreach**

<table>
<thead>
<tr>
<th>Session</th>
<th>Presenter</th>
<th>Goal</th>
<th>Duration</th>
<th>Topic</th>
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<tr>
<td>1</td>
<td>Phillip Davis</td>
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<td>5</td>
<td>Macro overview of GeoTech operation in past 12 months.</td>
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<td>Ann Johnson</td>
<td>1-5</td>
<td>10</td>
<td>Operational plan, Logic Model, and Synergy project update.</td>
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<td>Phillip Davis</td>
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<td>10</td>
<td>Website functionality tour and Resource clearinghouse demonstration.</td>
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<tr>
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<td>Mike Rudibaugh</td>
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<td>5</td>
<td>National database of college and university geospatial programs.</td>
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<td>Vince DiNoto</td>
<td>3</td>
<td>5</td>
<td>National map interfaces including Adobe FLEX, Microsoft Silverlight, and HTML-5 with web-enabled database editing functionality.</td>
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<td>2</td>
<td>David DiBiase</td>
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<td>GTCM update and impact on national geospatial policy and operation.</td>
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<td>Chris Semerjian</td>
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<td>GTCM quantitative and qualitative assessment tools overview and explanation.</td>
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<td>John Johnson</td>
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<td>Meta-DACUM update and plans for future DACUMs and impact on the Dept. of Labor’s geospatial Standard Occupation Codes.</td>
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<td>Ken Yanow</td>
<td>3-4</td>
<td>10</td>
<td>Student retention methods and survey results.</td>
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<td>10</td>
<td>Student outreach and the new National GTCM Student Competition</td>
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<td>Phillip Davis</td>
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<td>10</td>
<td>Future of the GeoTech Center for 2012 and beyond.</td>
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