National Advisory Board Report
National Geospatial Technology Center of Excellence
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The first meeting of the National Advisory Board (NAB)/National Visiting Committee (NVC) for the National Geospatial Technology Center of Excellence was held on February 11-13, 2009 at Del Mar College in Corpus Christi, Texas. Ten NAB board members were present representing industry, academia (including 3 ATE center directors), and professional societies (see Appendix A).

It was wise to hold the first NAB meeting early in year one to help provide focus for the nascent GeoTech Center. The center director, Phil Davis, provided us with read ahead materials which included a summary of five major focus areas: 1) core competencies, 2) national clearinghouse and website, 3) minority recruitment and retention, 4) leading edge geospatial technologies, and 5) professional development (see Appendix B). This NAB report provides recommendations for these focus areas plus provides additional suggestions relating to managing the work of the center and managing future meetings.

The team of PIs is clearly passionate about GIS education and has a bit of experience managing ATE projects. The GeoTech Center has the unique opportunity to launch itself on the national scene given a variety of activities underway across the country (see National Forum Report, 2008); how the center manages this opportunity will be critical to its later success and sustainability. The challenge of any new center is how to best manage all of the PIs, partners, staff, and contractors effectively to become whole that is larger than the sum of its parts. Lots of activities, especially at the local level, are typically what projects are funded to do; many of these activities are then institutionalized once the project ends. In contrast, a national center focuses on long-term efforts that have national impact and are supported by solid research. This is a very different mindset and requires an adjustment period and a bit of face to face dialog among the PIs. With that in mind, the NAB reviewed the work of the Center, and provides recommendations for maximizing the national impact of the GeoTech Center.

1) Core Competency Development

The analysis and synthesis of the core competencies is viewed as critically important to the center and something upon which the center can build services and brand. The competencies can form the core of the concentrated, focal activities of the early stage of the center. The center proposed a 2009-2010 timeline for the work in this area.

As discussed, there is no DOL position/code currently described as "GIS Technician," therefore it will be important for the center to describe the roles and responsibilities, knowledge, skills and abilities of this position and possible variants of the position. The DACUM analysis is inherently local and yet the concept of combining local DACUMs with previous national efforts and

selecting the most representative by way establishing core competencies is a thoughtful approach.

Recommendations:
- The center should advocate strongly for the acceptance of core competencies and lead the synthesis of earlier competency-related efforts with current DACUM activities to produced nationally recognized competencies.
- A short white paper on this effort should be drafted for circulation.
- Organizations that have lead/funded earlier competencies efforts should be informed of your work as soon as possible and brought to the table so there is broad acceptance and inclusion for what you are proposing (DOL, GITA, AAG, GISCI, UCGIS, NASA, ESRI). See the Forum Report for a summary of these efforts.
- There appears to be a good opportunity to work with GISCI on validating the core competencies. One of the best ways to have your voice heard by an organization is to join it. It might be a wise strategic move to have more of the PIs and NAB (where appropriate) certified if you want to maximize GISCI's buy in for what you are doing.
- The center should work closely with the DOL in anticipation of their work on the GIS Technician and GIS analyst OES code definition. The contact is Brad Wiggins, he largely oversees grants in the geospatial technology arena at the DOL. Additionally, the Center should check with Brad to see who is handling the process of establishing GIS technician/analyst OES codes. From my experience with DOL (Sullivan), different functions at the DOL can be very compartmentalized or many times farmed out to contractors. I recommend that you draft a one-page summary of your competency efforts and send it to Brad in advance of your meeting at the DOL; Brad might not be the one involved in facilitating the development of new OES codes I have also dealt with Pam Frugoli in the past and she is appears to be much closer to the establishment of OES codes (Frugoli.pam@dol.gov). Familiarize yourself with the OES code structure and the 2006 GITA/AAG study before you meet with the DOL.
- Since DACUMs are snapshots in time, the center should include approaches to update and close gaps that may appear as a result of new technologies and GIS skills (tie to leading edge technology effort).
- Accelerate the timeline of the core competency effort as much as possible.
- The DACUM validation survey can be used by the center to bring recognition and branding to the center.
- Develop recommendations for certification requirements that are aligned with the core competencies. The center, although not a certifying body, can strategically support certification; in turn, conversations should be held with certifying bodies so that they strategically support community college education within their certification framework.
- Consider convening a panel to discuss this issue at the upcoming HI-TEC 2009 conference.
- Share your plans at the ESRI User Conference.
- Recognize the core competencies will be applied to local programs – consider the development of an implementation guide that can be adapted to varied needs.

2) National Clearinghouse and Website

The GeoTech Center represents the dreams that many of in GIS/RS/GPS/Surveying education have had for years. The web site/clearinghouse represents, in many ways, the centerpiece of the GeoTech Center. It embodies the reason why the center exists—to provide a central point for community college educators, administrators, students, and employers to access resources, share, and build community. It therefore has utility for the entire community, and will be the most visible component of the Center. Trainings and presentations occur in many locations, and are often hidden from larger view and have limited impact. The tangible presence of the center lies in the clearinghouse. As it is therefore the visible manifestation of the center, the clearinghouse needs to be carefully planned, fed, and nurtured.

Quentin mentioned 4 components to the web site/clearinghouse—data, curriculum, guidance, and community. We recommend that the community college GIS faculty community be the early focus of the development of the clearinghouse. With the many tools available today, educators at the community college level can more easily connect with each other than ever before. Given that (1) Geotechnologies are a multi-faceted set of technologies and methods, (2) GIS/VG/RS/GPS is rapidly evolving, requiring new skills to be continually acquired and lessons to be continually updated, and (3) many GIS instructors in community colleges feel isolated and are not working as effectively with others in the GIS community as they could be, for the Geotech Center to take the lead in developing and nurturing an online network of instructors and students would leave a lasting legacy. To be sure, the web site/clearinghouse should include links to data and curriculum, but the value-added is a short description of each resource and how and why they could and should be used in the classroom. The community college web map can be effectively used in building the community—finding those near me, those with similar interests, and so on.

- The idea that was shared by one of the PI's that the resources in the clearinghouse could be tagged to develop a taxonomy of terms related to GIS in teaching is a powerful one. As we all know, any clearinghouse gets quickly filled with a hodgepodge of resources, and can quickly become relatively useless because of the sheer volume. The power of having the users drive the taxonomy is excellent, and can be used to make search and retrieval from the site quick and painless, which is exactly what will serve the community college instructors best.
- Make the webinars one of the top priorities for the clearinghouse to deliver and archive. This is one of the most effective means to learn and share GIS instructional methods. By spreading out the webinars among the fine and diverse talent that is associated with the GeoTech Center, the burden on one individual to conduct a webinar will be much reduced, perhaps as little as one per year.

- The one item that generated the most excitement during the time we spent at Del Mar College was the development of the Community College web-GIS database. We recommend that this map be the front-and-center piece to www.geotechcenter.org. This will help generate interest in geospatial technologies among community college administrators and specialists from other disciplines.
- You don't need to replicate http://www.geodata.gov or the Global Land Cover Facility. Focus on unique data such as community college demographics.
- While we all want to develop the flashiest and most visited site for students, the focus of the clearinghouse should be on community college instructors and what they need. We can add other components later, after the primary audience's needs are met.
- The ability for the community to rank (a bit like Amazon.com) the clearinghouse resources is a must, through a registration process that includes a short profile for each participant. Then, people can 'follow' recommendations from a certain colleague with specific interests, and the utility of the clearinghouse grows because it is the users, and not just the project organizers, who are driving the development.
- Be thinking of all types of curriculum, not just 'traditional' geospatial technology-based lessons. Develop podcasts, video, webinar archives, and more.
- Components should include short instructional strategies for instructors; i.e. if they had an opportunity for a 20 minute presentation to their faculty, what could they/should they emphasize? What should they do for a 1 hour / half day / 1 day/1 week workshop? What could they do with a computer lab, with 1 computer, or with no computers? What are some of the core messages that they could share regarding the value of geotechnologies?
- Survey community college faculty and find out what they need in terms of the clearinghouse. Possibly combine this survey with a broader survey so you're not over-surveying and bothering busy community college faculty. The needs assessment can drive clearinghouse development.
- A top priority of the web site/clearinghouse is to reach out to campus administrators, showing them the value of Geospatial Technologies on their campuses. This includes campus safety, plant and tree species/horticulture management, recruitment, alumni networks, fundraising, sports, infrastructure, saving energy, and much more.
- The clearinghouse needs to promote geospatial technologies as vehicles for saving campus administrators valuable resources and money, and as a 'cool' career that helps graduates to help people and the planet.
- Think of the clearinghouse as 'leading edge'—improve this first, then consider other efforts. An excellent clearinghouse will drive others to the project.

◆ Getting a first-rate website up soon is paramount. Rome was not built in a day so don't think you will get the end-all be-all website by the end of your first year. First, think of your primary audience – community college GIS instructors and build for them. Second, define who at the PI level is in charge of the management of the site. (Part of the problem appears to be that no one is

truly in charge, a contractor can not be in charge of their work, they do not have the vision.) Third, come up with a detailed work plan and timeline. Think of all the types of expertise you will need – content generators, technical writer, graphic artist, website developer/host, website user testing (to make sure your web site works how you want it to work.) Don't expect to find all of this expertise in one person. Allocate money to the web site incrementally so you know what you are paying for. As for a searchable clearinghouse, build a very simple one with the curriculum you have on hand from your partners. Learn how faculty use the posted curriculum and conduct surveys to find our what they are specifically looking for. Design a better clearinghouse later once you have experience with a simple one. Many PIs voiced frustration with the web site development. Do not be afraid to cancel contracts if you don't feel like the process is working for you. A close examination as to how other centers (ATE and non ATE) develop and mange their web sites is required immediately.

Although obviously early in the center's life there has been an effort to create a presence for the center that is more than the sum of its individual partners. The web site offers opportunities for establishing the center. A survey of partners and links indicate there is an opportunity to build the center and partner connections:

- Jefferson, www.kctcs.edu/gis ; no site or geotech link
- Cayuga, www.iagt.org, well developed site no mention of GeoTech
- CNM CC, no site
- Central piedmont, no site
- SDSU, http://geoinfo.sdsu.edu/hightech/, very good linkage to Geo Tech. Note the You Tube Video contains to reference to the center or to the grant that supported the development.
- Century College, http://www.isletinitiative.org/, no link to geotech
- Gainesville, http://www.gsc.edu/academics/divisions/iesa/Pages/default.aspx, geotech is featured, can more be done?
- Lake Land College, no site yet
- Southwestern, www.swccd.edu/~gis , goetech is one of the main menu bars of this well developed site. Can geotech be more branded on the home page?
- ESRI, http://www.esri.com/, no information or link to the center.

Recommendations:

- For geotechcenter.org, it is recommended the center build in measures to gauge access and use of the material; beyond the measures of visits.
- The roll-over's on the partner's map should have a clear direct link to the partner's site. If there is no site yet, the center could offer www.geotechcenter.org/name of partner.
- The center has attempted to work to insure the collection is NSDL/ATEcentral.net compatible. The status of this effort needs to be clarified.
- Set objectives, priorities and deadline for the next phase of web development.

3) Geospatial Leading Edge Technology Recommendations

A goal of the National GeoTech Center is to define a national strategy to track leading edge technology changes in the geospatial industry and its impact on curricula and teaching at community colleges.

To accomplish this,

- A white paper should be written to address and define a national strategy on technology changes in order to give the GeoTech center a clear objective   With the fast pace of technological advances in the geospatial realm, it is prudent to have a consistent system of reporting developments on leading edge technologies.
- The GeoTech Center should also set up a clear way to convey this information to the Community College Professorial audience. To perform these tasks, ongoing literature reviews should be conducted. These reviews will be a critique of publications addressing emerging technologies and their relevance to geospatial science and education (this might be broken into two strands — changes in GIS technology and changes in technology that can improve pedagogy. Access to these reviews as well as to their supporting documents should be provided via the GeoTech Center website. These literature reviews could be posted online and discussed in blog format allowing feedback from the users. The special topic report on Geospatial Technology Future Trends from the Forum report will provide a useful starting point.
- The leading edge technology section of the website should first focus on the remote access virtualization system technology set in place by Vince DeNoto at Jefferson College. As seen from the presentation, this is a technology that should be pursued and promoted. However, it was not clear how much of Vince's time is devoted to just this. A cost-benefit analysis should be conducted to understand if this remote access technology will be cost effective in the community college environment as well as a class time saver. With the rise of broadband access, the ability to create remote virtual campuses for distance education has become a reality for the community college environment. The GeoTech Center website should disseminate this information to community colleges and include the facts and figures used in the presentation to explain the process and cost associated with setting up such a system.
- Along with the remote access virtualization system, the leading edge technology portion of the website should also have pages dedicated to the ongoing advancement of mobile technologies. Apple's iPod and Google's open source mobile operating system, Android, allow for applications to be added to their respective mobile devices. Many of these applications either are, or will, deal directly with geospatial technology and information about these technologies and should be included in the web site. Web site pages should have a Web 2.0 "feel" allowing for interaction from users of the site. Possible additions to these pages could include tutorials in creating applications for these mobile devices in the hope of leading the way for new geospatial applications that could be used either in the practical or theoretical setting.

In all, these recommendations share the goal of disseminating information and assisting community colleges in adapting the DACUMS and core competencies effort to future trends.

With the resources provided by the GeoTech Center, it is hopeful that geospatial curricula will become more standardized throughout the community college system.

The goal to educate community college faculty on leading edge technology changes in the geospatial industry is an important one. Time constraints prevent community college professors undertaking in depth investigations of emerging technologies due to the vast number of reporting sites available in print and on the world-wide-web. By posting summaries like Vince DeNoto's overview of remote access to GIS software, community college professors will be able to keep abreast of fast moving developments in geospatial technology and remain focused on those technologies that work best in the community college setting.

The NAB/NVC recommends that during the PI and Co-PI's periodic meetings (either virtual or in person), the chair should set aside an agenda item to ask participants to share knowledge on recently reported developments in geospatial technologies. Notes on these new technologies and any web site links should be reported on the GeoTech web site.

4) Recruiting and Retention Initiatives

The PIs have launched several individual activities targeting recruiting the first year of the grant. Several of these activities address overall recruiting and some are specific to minority and underrepresented students groups. The most notable is an effort to get an "Introduction to GIS" course accepted as a General Education requirement in the community college curriculum. Where this has been achieved, the program offering these courses have seen increased interest in GIS and they feel that the only limit to offering more sections of the course is trained faculty to teach the course. With such positive results in this area, we recommend that the PIs assigned to retention and recruiting concentrate on identifying the barriers to students choosing this course or continuing in other GIS courses. An examination of the state by state restrictions to offering Intro to GIS as a Gen Ed course would be very beneficial to other community colleges (at least in the states where partners are located, as a start).

Recommendations: With so many activities launched in the first year of this center's operation there seems to be a need for a better defined strategy for approaching the recruiting and retention needs. The center should concentrate on fewer initial activities and more on developing the recruiting and retention strategy and on developing one initiative such as the Intro GIS Gen Ed course. Data should be collected at the three schools already using GIS as a Gen Ed course. This data should examine why students choose a GIS course over other Gen Ed courses (or why not), what percent complete the course and what percent continue onto another GIS course and why. The Center should concentrate on the development of a recruitment strategy for the first year and then develop a strategy for retention in the second year. Once these two major strategies have been implemented with appropriate activities, the Center should be in a good position to develop new strategies for future years, based on research and feedback received.

During the NAB meeting, it was stated that the center is using Best Practices for recruiting and retention. If these Best Practices have been identified then they should be documented and published on the center website with relevant data to share with other community colleges.

Another strategy might be to examine the success of other programs, such as Project Lead the Way, PLTW. This nationwide effort has incorporated six Engineering Technology courses in a High School curriculum, many of which transfer into two and four year institutions. Either a national approach like PLTW, or even adding GIS to the PLTW program might be a new area the center should examine.

Several underrepresented groups have been targeted by the center for recruiting. There should also be an overall strategy to examine unique elements of learning GIS that might be attractive to the younger and culturally diverse next generation students who might choose GIS as a career path. This would involve a review of literature and research.

Activities of the center initially have concentrated on recruiting. Recruiting should be the first half of the effort with retention following in the second year. Retention efforts should include examination of such things as mentoring and tutoring as well as baseline data collection of retention data.

Finally, once strategies for recruiting and retention have been defined, appropriate activities should tie back to the core competencies that the center is developing.

5) Professional Development

The efforts and planned activities of GeoTech Center partners to-date demonstrate the success of motivated individuals and institutional support of partner institutions. The use of geographic information science and technology (GISci&T) for campus-focused projects that highlight the capabilities of geospatial technologies are especially applauded for raising awareness and support for geospatial faculty.

However, at this early stage of the GeoTech Center, the NAB recommends that the PIs take a step back to examine professional development needs, limitations, and barriers on a national scale and prioritize their professional development activities accordingly. We need a health check of current GIS programs, some are doing well and some are not, producing more failing programs is something that should be avoided. The NAB recommends that GeoTech Center researchers identify two-year college faculty who have geospatial skills and current GIS courses/programs as the only target audience for professional development outreach in the early year(s) of the grant. Outcomes of the leading edges technologies focus area should be used to help inform professional development and training and these activities also should link to the core competencies 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.

A needs assessment should help identify specific professional development goals. The NAB expects that these may include 1) enhancing GIS skills (integration of remote sensing and GIS, new geospatial technologies and industry trends (e.g. enterprise GIS), 2) student recruitment into GIS classes/programs, 3) the role of GIS in supporting college administrative tasks, 4) student retention strategies and pedagogy, and 5) instruction on how to align curricula with core competencies, once they are developed.

The GeoTech Center web site should be the vehicle for information on GIS faculty training, organization of online materials, dissemination of training materials, notification of workshops, links to professional societies, contacts for mentors and explanations of options for geospatial certification. First-person testimonies of two-year college faculty on the benefits of professional development will also provide the opportunity for the GeoTech Center to display images and stories of people from diverse backgrounds to tie back to the Recruitment and Retention Initiative. Strategies for professional development should remain mindful of generational differences in learning, interests, and needs for geospatial training.

In summary, the NAB recommends that the GeoTech Center:
- Focus professional development on community college faculty who teach GIS.
- Conduct a needs assessment as to the type of professional development that faculty require (this might be coupled with a "state of GIS" white paper that describes the trends in GIS since faculty may not be aware of many of the recent trends.)
- Review the results of the 2006 survey conducted during the NSF Planning Grant for a GeoTech Center that pertain to professional development. (See http://www.marinetech.org/workforce/geospatial/)
- Work closely with your evaluator to define desired outcomes for each professional development activity. Defining the type of impact and being able to quantify that impact is more important than having lots of participants doing something with little focus.
- Produce an effective professional development information center on your web site. This might include:
  - Local and regional opportunities for faculty development such as workshops, conferences, training and career requirements
  - 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
  - Suggestions and case studies for campus projects and applications most likely to educate administrators about GISci&T
  - Links between identified leading edge technologies, core competencies and professional development

Managing Centers

With a group of PIs and partners spread across the country, it is vitally important to have clear work plans with roles and responsibilities. First, the PI needs to devote a 110% of his time to this center and should avoid being involved in other grants and other distractions in the first year, or longer, until the center has a clear vision and a work plan to attain that vision. Second, the NAB/NVC has given the center a number of recommendations that will allow the center to greatly focus its energy on doing a few things very, very well. The five focus areas of the center are good ones and they all feed off of and support each of the other focus areas. This will create

a center that is larger than the sum of its parts. We recommend that for each focus area, a person be put in charge of that focus area. You should prepare a detailed internal document that describes what the center plans to accomplish in year one - what is the overarching strategy, who are the target audiences, what are the measurable objectives (i.e. how will you know that you accomplished your year one goals), a detailed work plan of the steps involved and who will do them. You should prepare a second internal document that is a detailed organization chart that has each PI, partner and contractor listed with their roles, responsibilities, deliverables and time allocated to the center. Make sure the roles and responsibilities match up to that person's knowledge, skills, and aptitudes and that you are not overloading or underloading people. With a center as distributed as this, good planning documents are indispensable. Make sure that all your contractors have excellent oversight, this will take a bit of PI time; do not underestimate the time it takes to mange contractors (until you have years of proven history with them.) On your org chart, make sure every contractor reports to a specific person. This undoubtedly will take a number of face to face meetings to make sure that everyone shares and has bought into the strategies used to attain the vision and fulfill the mission of the center.

Another area that should be clearly defined is how decisions are made. What types of decisions are made by the PI, what decisions are based on consensus of the PI and Co-PIs?

Building Institutional Support

A center can be a hard entity for the college administration to grasp. You will need to function in a very entrepreneurial way and, at times, make decisions quickly. Having an efficient process for travel and for facilitating and paying for the travel of others is essential. The more your institution sees value in what you do, the better. All of the PIs have a tremendous opportunity to use GIS to do something for their college that will make their administrations proud. Of course high enrollments are best, but in addition to that, providing maps that make the administration look sophisticated and knowledgeable is a great way to get buy in Plus this will help provide examples and templates for the administrative tasks that GIS can assist with. This is something all the PIs and partners should consider. And of course every map would shamelessly exhibit the GeoTech logo!

Conducting NAB/NVC meeting

Work with the NAB Chair two months prior to the meeting and provide an outline of the agenda and the meeting materials you plan to share at the meeting. Plan to send out the pre-meeting materials 3 weeks prior to the meeting in a nice, organized binder.

- Do not spend time at the meeting telling us things we can read in advance.
- If you would like us to comment on the web site or printed materials, give us homework in advance of the meeting.
- It is not recommended to have people call in during the meeting. If they are important to your work, bring them to the meeting.

- Make sure all PPT slides are readable from across the room. Provide handouts of PPT slides (two slides to a page). Micro font on a handout is no better than micro font on the screen.
- Work with NAB Chair to define an effective methodology to convey important information on focus areas at the meeting. For each focus area it might include: a vision; a target audience; a list of problems, obstacles or concerns; a solution(s) that the center plans to pursue (a strategy); a general methodology; anticipated impact; and a timeline.
- Make sure that all the PIs stay for the entire meeting; the NAB is there for them.
- Due to time constraints of many very busy people, it might make sense to have the meeting in Denver and take up the generous offer to have ESRI host the meeting.
- It is advisable for the PIs to arrive a day early and practice their presentations so they are well coordinated.

The NAB believes in this center, its vision and mission, and its PIs. You are building something that has not been built before and it is not easy. But it truly is a once in a life time experience, so enjoy it! The NAB is committed to your success.