Title: A Training Model for GIS Technicians

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Abstract: Defining the "identity," competencies and skills for an entry-level GIS technician/specialist continue to be a challenge, not only among ourselves, but the general public as well. Our industry, however, can be proud of the continued bonds long established between educators, industry, and government to share current and emerging geospatial technologies. This presentation provides an example of one organization that is exploiting these "bonds," and integrating the practical GIS experiences of its staff to provide a unique approach to its GIS technician certification programs. The creative teaming of a variety of subject matter experts has helped the Advanced Skills Center (ASC) deliver a first-day-ready, state-of-the-industry prepared, professionally-rounded, entry-level "GIS Technical Professional." Senior level instructors with a combined experience of over 80 years in the GIS industry have collaborated to adjust the ever changing GIS technician curriculum, permitting the ASC to adapt quickly to the needs of both private and government employers.

Background

The William F. Goodling Advanced Skills Center (ASC), York, PA established a GIS (Geospatial Information Systems) technology education training center in November 2004 as a result of being awarded a Geospatial Sector Demonstration Grant (titled: *Geospatial Imagery Analysis and Practical Applications Grant*) from the Department of Labor in support of the President's High Growth Job Training Initiative.

The Project Description: ASC will establish a geospatial technology education training center to support the GIS industry. ASC will develop a certificate program in geospatial and imagery analysis to meet private, federal, state and municipal hiring requirements for GIS technicians. The ASC will develop 2+2+2 articulation agreements with community colleges and universities to support continuing educational requirements for GIS technicians. These 2+2+2 articulation agreements provide students and/or workers with career and education advancement tracks, enabled by linked GIS curricula at the high school, community college and university levels.

The GIS program is targeted to high-school students, dislocated workers, underemployed adults, and for those individuals desiring a career change. It also includes internship opportunities.

The GIS industry is one of the twelve sectors identified by the Department of Labor that will experience significant growth over the next decade. The GIS industry is expected to:

- Add a substantial number of new jobs to the economy as well as affect the positive growth of other industries, since GIS technologies (mapping, location analysis, finding-the-best-route, archiving and analyzing demographic data by user-selected geography, etc.) can be applied in almost any industry.
- Transform many businesses as they begin exploiting GIS applications. Examples: using routing applications to find efficient routes and locate their products; analyze their customer pool; and, establish trends and "track" competitors. Therefore, business will need GIS skills sets of their existing workers as well as new hires.

The GIS Technician Curriculum

To insure "industry completeness" and credibility of its GIS curriculum, the ASC has adopted a GIS Technician Certification curriculum, developed by Digital Quest, Inc. that has its office in the NASA (National Aerospace Space Administration) John C. Stennis Space Center. NASA, related NASA contractors, and the Department of Labor have all recognized Digital Quest's SPACESTARS™ (Spatial Products and Community Exchange/ Spatial Technology and Remote Sensing) family of products to train both high school students and adults in geospatial technologies. The GIS Technician certificate awarded by the ASC is provided by the Center for Excellence in Geospatial Technologies, also located at the Stennis Space Center.

The ASC GIS training program offers two tracks – one for high school students (360 hours) and the other for adults (currently, 280 hours). The GIS Technician Certification program differs from other GIS training programs in that it has been recognized by several, independent organizations to be a viable training program to address the President's High-Growth Initiative. As reported by several respected publications such as the Mississippi Business Journal, GISUser.com and GeoPlace.com, the Digital Quest STARS™ (Spatial Technology and Remote

Sensing) GIS Technician Certification has been recommended by the Institute Management & Training Corporation in a paper commissioned for the Department of Labor entitled, "Industry-Recognized Certificate Programs and Job Corps: Working Toward a Skilled and Qualified Workforce."

The STARS™ curriculum for both high school and adult students is comprised of four courses:

- Course 1- Introduction to GIS/RS: introduces the student to GIS and remote sensing (RS) concepts and tools.
- Course 2 – Skill Based Training in GIS/RS: consists of hands-on instruction to learn GIS skills ranging from introductory digital mapping to image analysis, with emphasis on ESRI's ArcGIS$^®$ software applications.
- Course 3 – Applications in GIS/RS: uses advanced GIS tools, i.e., GPS (Global Positioning System), geocoding, ESRI's extensions (spatial analyst, 3D analyst, and network analyst) to accurately survey the students' local community and conduct site analysis.
- Course 4 – Campus Model Project: is the capstone course, and brings all the previously learned skills together to conduct several geospatial application projects utilizing project management fundamentals in a local setting.

The Adult GIS Technician Certification Training Program is designed to provide realistic and focused training at the technician/entry-level to produce a competent, "ready-to-go GIS technician" to fill existing and projected open job requirements. The basic curriculum is the STARS™ curriculum, but with the addition of introducing the students to other GIS/CADD industry-standard software products: Pictometry$^®$, MapInfo$^®$, Manifold$^®$, Intergraph's GeoMedia$^®$, and AutoCAD$^®$. Also, adult students receive enhanced ESRI ArcGIS$^®$ instruction (basic and advanced levels) from an authorized ESRI instructor, and their final projects concentrate on real-world, GIS projects, working directly with local municipalities.

GIS Staff

The team assembled to deliver the curriculum has a combined experience of over 80 years in the GIS/mapping/remote sensing industries. With both breadth and depth in the industry, the team can prepare students in the program to meet the challenges in the real-world scenarios that they will encounter. In addition to delivering the technical materials backed with real life project experience, the educational team has a network of contacts in the industry to provide students with a direction to pursue in their career search.

The connections within the industry, coupled with the backgrounds of the senior staff help to make the ASC a resource that serves the economic region of Pennsylvania and extends nationwide as students complete their certification and move on to start working in the industry. To date, 16 graduates (high school and adults) have found jobs in the GIS Industry and/or have articulated to a community college or university with a GIS degree program. This represents a 53% placement rate with the current program (not officially the mission of the group, but it has helped to show success).

Outreach & Awareness

The ASC has established GIS awareness seminars/workshops for individuals and/or organizations that have specific-GIS applications needs; these workshops are open to the general public and local businesses. The first workshop – *GIS for Emergency Responders and Services Personnel* – a GIS training course on Homeland Security – was presented in May 2005. *Introduction to ArcGIS*® I and *Introduction to ArcGIS*® II have been offered in the Fall of 2005. An *Introduction to GIS,* an *Introduction to Pictometry*®, and a GIS Summer Camp (for Middle School students) workshops were offered in Spring 2006.

The ASC has also established the York County Center for Geospatial Applications in order to bring together GIS-users within the County to promote information-sharing of GIS topics of interest as well as provide GIS coordination and consultation to the community as a whole. The Center is establishing a web site to serve as both an educational outlet as well as a platform for searching for and retrieving publicly-available geospatial information for the benefit of all. The Center

represents York County on the Pennsylvania Geospatial Technologies Council, and participates in technical and procedural geospatial issues and benefits as a participant in contractual agreements, typically designated solely for State agencies.

The Center, in conjunction with the Cooperative Extension/Geospatial Technology Program at Penn State, has completed a GIS Needs Assessment for York County (including all townships, boroughs, and private users/developers of GIS), PA. From this study, the Needs Assessment Team is compiling recommendations to the York County Board of Commissioners for future uses, consolidation, and/or expansion of GIS activities to best meet the County's future needs and requirements for GIS technology.

Collaboration

The Advanced Skills Center has been very fortunate to establish partnerships with numerous organizations and individuals to provide leadership, management and technical assistance, and outreach opportunities to communicate the critical need for GIS education and trained GIS workers.

Partnerships

The Pennsylvania Bureau of Geospatial Technologies (BGT) has recognized the Advanced Skills Center's York County Center for Geospatial Applications as the official representative representing York County on the BGT's Geospatial Technologies Council. This opportunity has allowed the Center to receive technical advice and support as well as to participate in many geospatial contract initiatives as if the Center was a State agency. As example of this partnership, the Center is receiving Tele Atlas™ products, free-of-charge, and is able to provide copies (and training) of this data to local municipalities throughout York County.

Collaborative Relationships – Business & Education

The Board of Commissioners of York County, Pennsylvania has overwhelmingly endorsed York County Geospatial Technical Advisory Council (G-TAC) – this body is composed of all the organizations within York County that are directly involved in mapping and GIS activities). The purpose of the Council is to promote GIS technologies and act as a coordinator to provide technical expertise of

GIS as well as examine GIS activities and data to insure standardization and guard against redundancies of effort.

The Skills Center and has begun to establish 2+2+2 articulation agreements with local community colleges and universities to produce GIS technicians. These 2+2+2 articulation agreements provide students and/or workers with career and education advancement tracks, enabled by linked curriculum and levels of education, training and certifications at the high school, community college and university levels. Currently, Harrisburg University will award fifteen (15) academic credits to those successfully completing the GIS Technician Certification Program and accepted into their Geographic and Geospatial Imaging undergraduate degree program; Harrisburg Area Community College will award fourteen (14) academic credits towards their Geospatial Technology Associate in Science Degree program. ASC is working with California University of PA, Millersville University, Kutztown University, Pennsylvania State University, and Shippensburg University to potentially develop GIS curriculum articulation agreements with these universities.

The ASC is working with the Economic Development Corporation for York County to establish an "Incubator Model" to encourage either existing GIS companies and/or GIS start-up firms to begin operations in York County, PA. York County Department of Public Safety, 9-1-1 Communications has been the first local agency to request GIS workers to assist them with updating their operational maps and related addresses for emergency responders; one of the GIS adult course graduates has been hired as a fulltime GIS Analyst. This flexibility and expertise to meet a client's need is an example of the Skills Center's responsiveness to support businesses, local government, and the community.

Performance Outcomes

Initial performance goals were established in late 2004; ASC's outcomes, to date:

Performance Goals:	To Date:
100 adults trained as GIS Technicians or……………..	20 trained as technicians
attending awareness seminars and/or	
supporting municipal workers	825 attended awareness
	training/workshops

25 high school students trained as GIS Technicians …………... 10 trained/38 in training

25 individuals filling needed positions
South Central PA Manufacturers' Association member companies, the State of PA and/or area municipalities…………………………………….. 11 hired*/7 pursuing

*some graduates filled positions outside the South Central PA area

25 trained in post-secondary programs ……………… 2 enrolled/3 accepted

Linking Services to Demand Occupations, Economic Development and Community Benefit

This GIS program meets the training needs of both businesses and job-seekers by offering:

- State-of-the-art, current GIS software applications used to analyze and offer solutions in practical, real-world scenarios.
- GIS skill certification establishes credibility for the student and the program and provides businesses with a professional assurance that graduates will be able to "drive the application" immediately upon hire, i.e., there is no "lost time" from on-the-job training.

As previously mentioned, the joint GIS Needs Assessment between the Advanced Skills Center and Pennsylvania State University will serve the York County community very well. This Assessment has identified redundancies, short-comings, and weaknesses as well as strengths of GIS activities throughout the County. This groundwork effort has established recommendations for improvements in GIS technologies and efficiencies.

Replicability

Since the GIS program has been operating for about $1^{1/2}$ years, the ASC is focusing on completing its initial objectives. ASC's long-term strategy is to continue and build-upon the GIS program over the next several years. Early evidence of

replicability is the commitment of three local high schools implementing the GIS program into their junior class offerings; three other local school districts are currently reviewing the curriculum to consider like action in 2006.

The York County-wide GIS Needs Assessment has recommended that a centralized department/organization and/or GIS coordinator be established to conduct, oversee and facilitate the coordination, archiving and maintenance of both GIS policies and data sets. This will establish the needed continuity and oversight of this important resource which in turn will enable replication of this model to other organizations within and outside York County, PA.

In addition to continuing to offer and build the GIS training programs, the ASC plans to add sustainability to the GIS initiatives after the end of the Grant (November 2006) by offering GIS professional services and products to both small businesses and local municipalities.

Summary

The GIS Technician Certification program at the Skills Center faces two major challenges:

- Identifying entry-level GIS technician job positions within the Commonwealth of Pennsylvania, and
- Extending the program's "reach" to recruit adult students that live outside a reasonable commuting distance to York, PA.

To attempt to assist our graduates with job placement, an important bottleneck needs to be solved - establish an official job code and a job description for GIS Technicians for the Commonwealth of Pennsylvania. In addition, a national certification program, requiring a formal application, examinations, and administrative oversight, would certainly bring standardization to the definition to the term "certification" and establish credibility to our industry, academia, and for the employer.

The Training Model for GIS Technicians established at the Advanced Skills Center in York, PA has been successful to date due to the dedication of a seasoned GIS staff, the leadership of the Skills Center's Board and administration,

the establishment of a current and thorough GIS curriculum, and by the guidance and funding provided by the Department of Labor's Employment and Training Administration.

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