A Revitalizing Spark

BY GLEN THUROW AND AMY BALLARD

Newly launched Geomatics Certificate Program in New Mexico provides foundation for future professional surveyors.

"The strength of this great nation is not measured in its monetary wealth but by the education and character of its people." This statement, from David Cooper, current president of the New Mexico Professional Surveyors (NMPS), speaks volumes. It also outlines the purpose and goal of a new educational initiative at Central New Mexico Community College (CNM) in Albuquerque. From the culmination of several years' effort among local surveyors, the GIS community, academia, a local business and a nonprofit educational foundation, a new program at CNM combines elements of an existing Geographic Information Technologies program with newly created surveying courses. The result is a geomatics certificate program launched in fall 2006 that addresses the need for more surveyors in New Mexico by providing an educational foundation and path to professional status.

Addressing a Need

According to the New Mexico Board of Licensure for Professional Engineers and Surveyors, there were 696 active professional surveyors in 1996, and there are only 503 today. Some New Mexico state legislators and others were concerned about this dwindling number of surveying professionals in the state. The new program at CNM addresses this concern. Additionally, the program responds to the need for trained, competent entry-level personnel cited by many surveyors who responded to a questionnaire put out by the NMPS Educational Foundation.

Results from the questionnaire, distributed to members of the NMPS in April 2005, were presented to CNM administrators that summer. The purpose of the questionnaire was to quantify the strength of the job market across the state for three positions: entry-level surveying, CAD and GIS technicians. The status of the job market for these positions is of particular concern for school administrators who want to ensure that programs address an existing need and that graduates would be able to find gainful employment. Because of the four-year degree requirement for surveyors in the state of New Mexico, the notion exists in the minds of some that surveying and engineering companies are only interested in hiring degreed personnel. The questionnaire dispelled this erroneous assumption; responses revealed that hundreds of unfilled positions in the three categories exist. Projecting the need over a five-year period, it is estimated that more than 200 new positions will be available each year. In addition, 80 percent of the respondents indicated a willingness to offer internship positions to students enrolled in a surveying program. The underlying assumption in projecting future employment opportunities is a continued robust economy. While surveying is somewhat cyclical in nature, recent history coupled with current economic forecasts suggests continued growth in the industry, particularly in the southwest region of the country.

The data helped convince school administrators to modify CNM's existing Geographic Information Technologies (GIT) program to include the new geomatics certificate. The Geomatics Certificate represents a reintroduction of a successful survey program that existed at CNM until the early 1990s. When New Mexico began to require the four-year surveying degree for licensure in 1995, it seemed to spell the end of the original survey program. But in 2000, renewed interest in training skilled survey technicians, especially on the part of the New Mexico Department of Transportation and the Bureau of Land Management, caused school officials to rethink the options for survey training at the school. The GIT program, with its emphasis on spatial data collection, management and analysis, seemed a logical way to reinstate survey training while combining it with the new technologies regularly used in the GIS world (GPS, remote sensing and photogrammetry). Recipients of the Geomatics Certificate will, therefore, gain traditional survey skills as well as facility with GIS, CAD, GPS, remote sensing and photogrammetric technologies.

> "I found the geomatics courses at CNM to be professionally enriching and personally rewarding."
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> – Debra Healy, Cedar Crest, N.M.

The program is under the direction of Michael Cranney. Additional program faculty and staff currently include one full-time instructor/chairperson, an adjunct faculty CAD instructor, and three part-time instructors, including a licensed New Mexico surveyor, an ASPRS Certified Mapping Scientist and a GIS statistician.

Opposite page: A CNM student puts an instrument through its paces.

Why Survey and GIS?

GIS and related technologies have found their way into the toolsets of numerous industries. The geospatial industry encompasses organizations and businesses using and creating hardware and software related to mapping and map-based analysis, remote sensing and photogrammetry (among others), and was named one of the top 12 growth industries in the United States in 2002*.This trend is sure to continue as web-based applications such as Google Earth, Yahoo Maps and others improve the spatial literacy of the general population, and increase the demand for workers skilled in the implementation of these technologies. As the related disciplines of GIS and surveying increasingly converge, the market demand will grow even stronger. Individuals possessing a knowledge base encompassing the components of the geomatics program will be in demand.

*Source: Annulis, Heather M., Jon C. Carr and Cindy Gaudet. 2003, "Building the Geospatial Workforce." Urban and Regional Information Systems Association Journal, Special Education Issue. 15(1):21-30.

Coursework for Success

The Geomatics Technology Certificate is comprised of 36 credit hours that can be completed in three trimesters. In addition to such foundational courses as college algebra, trigonometry, plane surveying with construction applications and the Public Land Survey System, students also study the basic concepts of geographic information systems (GIS), computer-aided drafting (CAD) for surveying and civil engineering, photogrammetry and remote sensing. More courses, including geodetic surveying, legal principles of boundary surveying and computer applications of surveying data are planned for future terms.

The geomatics curriculum leverages existing GIT courses as well as adding new courses specifically tailored to the needs of the survey trainee. For example, while the GIT curriculum relies heavily on GIS software, the geomatics courses emphasize bridging the gap between CAD and GIS platforms, a necessary skill for survey technicians. The traditional differences between these types of packages were primarily related to the lack of precision editing possible with GIS software, and the lack of concern with real-world coordinate systems in CAD software. This gap is closing as companies like Autodesk and ESRI recognize the need to provide software that can satisfactorily accomplish tasks related to both survey and GIS. Autodesk's Civil 3D and Land Development Desktop, and ESRI's Survey Analyst are examples of this software convergence. CNM students are exposed to these and other packages and are presented with projects that incorporate both GIS and survey tasks. For example, rather than simply producing a building site map, students place the survey data in context with terrain, soil types and aerial images.

Remote sensing and its related technologies are increasingly prevalent in the GIT world; thus, the program incorporates a single introductory course in remote sensing designed to give the geomatics student some familiarity with the range of applications of this type of data. Topics include an introduction to the physical principles of remote sensing, aerial photography and satellite imagery. Students perform image

First-term GIT students are introduced to the use of mapping-grade GPS.

correction and classification using specialized remote sensing software. CNM geomatics students also take an introductory photogrammetry course that introduces the fundamentals of orthophoto creation, a data resource that has become ubiquitous in the geospatial arena.

The geomatics program also includes introductory and intermediate GIS classes. These courses emphasize the application of GIS software to answer geographic questions and to display spatial data. The geospatial professional is increasingly required to present data in electronic- and web-based formats. Students must become proficient in obtaining, processing and analyzing spatial data. In addition, the GIS course series introduces geomatics students to the use of mapping-grade GPS in preparation for training with survey-grade GPS in the survey portion of the program.

A Stepping Stone to the Future

The program's success depends in large part on the attraction and retention of qualified students. To that end, a high school path is being proposed as a lead into the geomatics program. Students have the option of completing nine credit hours while in high school via articulated and dual-credit coursework. It is envisioned that all four introductory classes—plane surveying, cartography, GIS and PLSS surveying—will be offered to high school students in a concurrent enrollment situation that allows college credit to be earned. This opportunity is a powerful recruitment tool that could lead students to the planned 36-hour certificate program.

After high school graduation, students can complete the certificate program in two terms or eight months. Students who wish to continue working toward an associate degree will be able to do so in the Geographic Information Technology-AAS Degree program. This degree, with an additional 30 credits necessary for completion, concentrates studies in GIS-specific coursework but with related links to surveying. Survey classes under the geomatics program are required coursework under the AAS degree. This in turn creates a path to the four-year Surveying Technology program at New Mexico State University (NMSU). With the certificate in geomatics and the AAS degree in GIS working in tandem, the administration anticipates a student body sufficient to keep both programs viable.

Students who plan to pursue professional licensure by attending the four-year surveying degree program at NMSU can add advanced electives such as calculus to their schedules. Some of the credits obtained in the CNM Geomatics Certificate program will be transferable to the university surveying program.

Students will be encouraged to follow either a technical or professional track while at CNM. Upon graduation, this dual-track concept enables students to either immediately enter the workforce or transfer credits to NMSU. It should be emphasized that this new educational opportunity is not contemplated as a substitute for the four-year degree program at NMSU. Rather, it serves as a stepping stone for students who may be interested in obtaining a degree in surveying and ultimate licensure as a professional surveyor, but aren't ready to make that commitment directly from high school. It also provides an opportunity to obtain entry-level skills, enabling the graduate to secure a well-paying job within the surveying industry.

> "I have nothing but positive things to say regarding the geomatics program at CNM. The teachers and administrators have been very supportive from day one, and their collective positive attitude made entering the program a very easy transition for me as a student. I now feel as though there may be some exciting career paths in my not-so-distant future."
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> – Amos Watkins, Albuquerque, N.M.

It's All About Support

Community support is a key to the successful deployment of a new program at a vocationally focused institution such as CNM. New Mexico has an active geospatial community that encompasses professional organizations including the New Mexico Geographic Information Council (NMGIC) and the Geographic Advisory Council (GAC) as well as numerous commercial, government and nonprofit institutions using geospatial tools and providing jobs for CNM graduates. A combined advisory committee comprised of local, state and federal government, and private concerns in both GIS and surveying fields regularly meets to assess the progress of the program and make recommendations for future development.

CNM students are invited to regularly present the results of their research at NMGIC meetings, increasing their exposure to potential employers. Community support also comes in the form of cooperation from local businesses and professionals willing to host groups of students for tours and make presentations in classes.

Support for the CNM Geomatics Certificate program has been spearheaded in the commercial arena by Tony Trujillo, president of Holman's Inc., an Albuquerque-based dealer specializing in survey-related equipment and software.

"The shortage of qualified applicants has reached an all-time high for our industry," Trujillo says. "Our needs have increased with the new high-tech products and the time is now to support our teachers, students and schools. Central New Mexico Community College has teamed up with the New Mexico Professional Surveyors Association, local small businesses and the public schools to offer courses to meet the goals of our community. The program in time should fill the needs of the surveying profession and support student development."

The New Mexico Professional Surveyors Association hosts area high school students at its annual convention, and many members directly interact with schools during career days. Intra-institution support at CNM includes cooperation of CAD instructors who have undertaken the design and instruction of some courses. Future curriculum for the geomatics program will be based on recommendations of the advisory committee, best practices of other similar programs, as well as input from NMSU.

A Winning Combination

Initial enrollment in the geomatics program is strong and interest is growing, rekindling a long absent desire on the part of students to obtain traditional surveying skills. This program can add a revitalizing spark to the surveying profession in New Mexico. It can provide trained, competent, entry-level personnel to the workforce and act as a conduit to the professional four-year program at NMSU. When these skills are combined with cutting-edge technological advancements, a winning combination is achieved. Visit www.cnm.edu for more information.

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