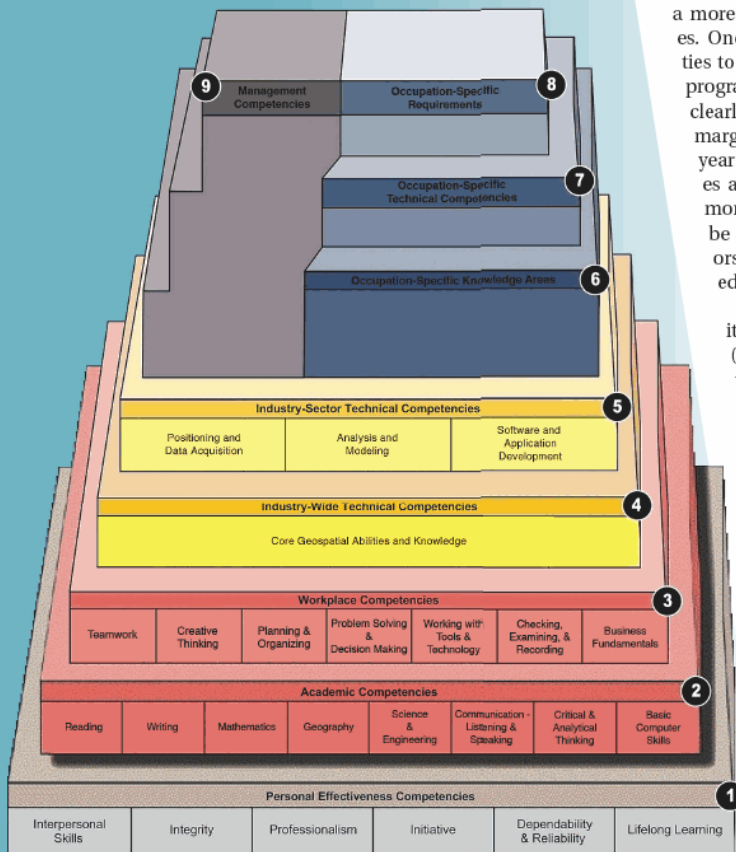


education in surveying

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The Geospatial Technology Competency Model



Implications for Surveying Education

It is no secret that the surveying profession is experiencing a crisis with respect to formal education. The profession itself is expanding due to the integration of revolutionary technologies, such as GNSS, GPS, and remote sensing. More states are requiring four-year degrees for surveying licensure (Gibson's "Rules of the Game," January 2010), and the National Council of Examiners for Engineers and Surveyors is proposing the equivalent of a master's degree for engineering licensure.

During this transition, most practicing surveyors with less formal education have been grandfathered into licensure based on their professional experience, with the expectation that they will voluntarily seek training to keep current with technology development. Numerous formal and informal continuing education opportunities are available to them, including vendor training, industry publications, workshops, and conferences.

However, someone entering the field anew needs a more comprehensive and complete set of resources. One might have expected colleges and universities to foresee the need for surveying and geomatics programs to support these trends, yet the opposite is clearly true. Across the country, surveying has been marginalized, if not eliminated, from many four-year institutions, leaving it to community colleges and two-year programs that individually serve more limited populations. The resulting crisis can be summed up quite simply: Who are the surveyors of the future going to be, and how will they be educated?

In June, the Department of Labor released its Geospatial Technology Competency Model (GTCM) that identifies what successful geospatial professionals should know and what they should be able to do. The GTCM was developed by a panel of experts convened under the auspices of the Geospatial Technology Center of Excellence, sponsored by the National Science Foundation. The model is based on a pyramid; at the lower levels (Tiers 1-3) the model articulates the common personal and professional skills needed to succeed generally in employment. Tier 4 describes the fundamental body of technical knowledge that all geospatial professionals share. Specialization with the geospatial profession is represented at higher levels of the pyramid. A complete description of the model is available at <http://www.careeronestop.org/competencymodel/>.

What does the GTCM imply for educator and educational institutions? The GTCM does not prescribe curricula and is not a set of requirements

for academic accreditation. Instead, the model clearly establishes outcomes by which the employability of a graduate will be measured. These outcomes can be interpreted by educational institutions as goals or guidelines for program development. Institutions that follow this guidance will be preparing their graduates to be successful in the current job market and to adapt to future changes in the rapidly evolving world of geospatial data, technology, and applications. Training an individual to use GPS or a total station GPS to survey property boundaries, create subdivisions, stake a construction site, or make a map with GIS software is certainly important, but that training alone does not prepare the graduate for a 30- to 40-year-long career in a rapidly changing, economically fluctuating job market.

As described in Tier 4, individuals entering the geospatial profession are expected to be competent in areas including, but not limited to, earth geometry, georeferencing systems, surveying methods, terrain modeling, photogrammetry, multispectral and hyperspectral imagery, spatial and topological data relationships and analysis, and metadata. In addition to the technical competencies, there is an expectation for the individual to understand legal and ethical issues of practice, including property rights (real property, as well as data and information), privacy, and rules of conduct.

Tier 5 apportions the geospatial profession into industry sectors representing clusters of more specialized competencies. After achieving mastery of the broad competencies described in Tier 4, an individual will often make a career decision to become expert in one of these sectors: 1) data acquisition, 2) data analysis and modeling, or 3) software and application development. Professional certification and licensure may be required for some occupations at the Tier 5 level, and a demonstration of Tier 4 knowledge and experience is often a requirement for this type of credential.

The number of traditional jobs in land development and construction are rapidly decreasing, bright students are not attracted to this diminishing job market, and educational institutions are justified in dropping courses and programs due to lack of enrollment. On the other hand, the geospatial profession is growing explosively; its boundaries are expanding and intersecting with many other industries and applications. Opportunities for exciting jobs are emerging in technology companies such as Google, Microsoft, and Nokia, in the green energy sector, and in business intelligence.

There is legitimate concern that individuals filling those jobs may be using many geospatial technologies (GPS, GIS, remote sensing) as a black-box, without proper preparation in the principles contained within. Surveyors and other "traditional" practitioners should be concerned about the increasing substitution of the black box for a less-thoughtful form of calculation and analysis. No one should be opposed to increased efficiency, but all should be concerned about the consequence of using automated tools in the absence of educated judgment.

The only answer to this concern is education and a lot of it, delivered in a format that compels students and ignites in them the passion for pursuit. They must see, and educational institutions must present, the surveying profession as an excit-

ing, evolving, challenging, and potentially lucrative career opportunity. The GTCM attempts to describe, structure, and map this opportunity in a comprehensive and very practical way. The GTCM can be used by individuals to plot the long-term course of their careers, it can be used by employers to guide hiring and adapt organizational structure, and finally it can be used by educational institutions to make strategic program decisions. All who read this article should take the time to become familiar with this important publication by the Department of Labor and to think about how they can use it to help themselves and mentor others as well as how they can encourage educational institutions to adopt this model into existing and new curriculum development. ↓

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Schuckman and Van Sickle were both members of the panel that wrote the GTCM.

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