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## *Competency Models In Action:*

# **The Geospatial Technology Competency Model: Providing a Conceptual Framework for Academia**

May 2014

- Using the Geospatial Technology Competency Model to align curricula with workforce needs
- Developing geographic information systems courses for specialists and casual users
- Identifying and addressing geographic information systems curricula gaps

### **Introduction**

Dr. Don Boyes, a senior lecturer in geographic information systems (GIS) at the University of Toronto, is a believer in ETA's Geospatial Technology Competency Model (GTCM). He has successfully used the GTCM as a conceptual framework in his periodic curriculum review process. Utilizing the Competency Model Clearinghouse's Curriculum Analysis Worksheet, the GTCM enables him to align his curricula with workforce needs in the geospatial industry.

### **The Workforce Need**

According to the Bureau of Labor Statistics, the job outlook for GIS-related occupations is excellent. Increasing use of geographic technologies and data is expected to fuel growth in employment of geographers. Recent enhancements in mapping technology have led to new uses for maps and a need for more of the data used to build maps. As a result, it is anticipated that the demand for surveying and mapping technicians will accelerate. In addition, growing use of maps for national security and local government planning is expected to result in increased employment for cartographers and photogrammetrists. All of these occupations will have above average projected growth rates from 2012 to 2022.<sup>1</sup>

"In addition to formal GIS occupations, there is a continuing need for GIS generalists or casual users," says Dr. Boyes. "In a growing number of industry sectors, employers expect their workforce to perform GIS tasks as part of their jobs. This includes such diverse fields as city planning, wildlife biology and emergency management."

### **Approach**

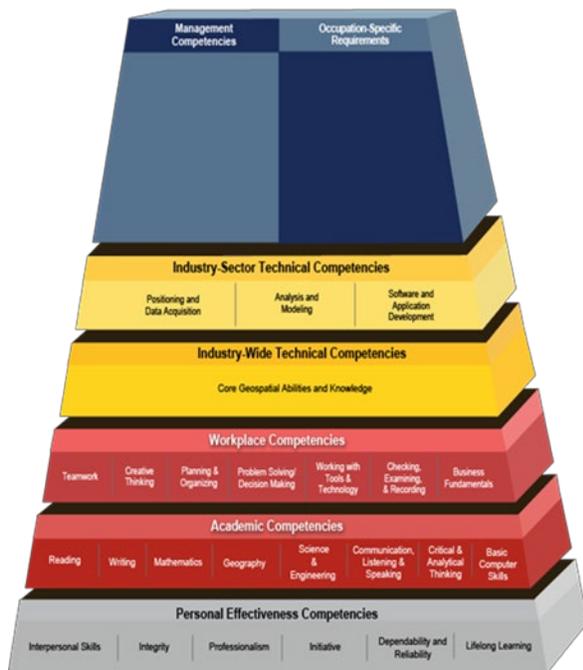
"Prior to the development of the GTCM and the related University Consortium for Geographic Information Science and Technology's Body of Knowledge, GIS educators had no credible tools to align their curriculum with workplace needs," says Dr. Boyes. "There were some earlier attempts, such as the National Center for Geographic Information and Analysis's core curriculum project in 1990, that were not sufficiently comprehensive."

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<sup>1</sup> Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook, 2014-2015 Edition

Dr. Boyes teaches five GIS courses at the university, four for undergraduates (beginner, intermediate, advanced and capstone research project) and one for graduate students. In 2011, he undertook a rigorous curriculum review process using the GTCM and the Curriculum Analysis Worksheet to match the competencies to his curriculum. He plans to revisit this process in 2014.

As a result of the 2011 analysis, Dr. Boyes was able to identify specific gaps in his curricula that have been addressed. Selected examples follow:



### Curricula Gaps Identified Using the GTCM

#### Tier 2 – Academic Competencies Gaps

- Mathematics-Statistics and Probability
- Science and Engineering-Scientific Method
- Communication, Listening and Speaking-Scientific Method

#### Tier 3 – Workplace Competencies Gaps

- Teamwork
- Planning and Organizing-Time Management
- Problem Solving-Identifying the Problem

#### Tier 4 – Industry Wide Technical Competencies Gaps

- Data quality
- Metadata, Standards and Infrastructure
- Professional Certification and Licensing Bodies

#### Tier 5 – Industry-Sector Technical Competencies Gaps

- Field Data Collection
- Basic Analytical Methods
- Network Analysis

“This was a very interesting process,” says Dr. Boyes. “It forced me to prioritize. I had to decide which competencies were most important in each course, and what changes should be made from course to course. Since the GTCM resembles a layer cake, perhaps we should think of individual courses as ‘slices of the cake.’ It is not realistic to have each course in a sequence match each tier in the model, but it makes sense to select elements of each tier. As a curriculum designer, this is the tricky part, providing the casual user with enough in one or two courses to become competent in typical GIS tasks, but also establishing a foundation for those who will go on to more advanced courses.”<sup>2</sup>

### Next Steps

“I would like to see more information about aligning the GTCM competencies with professional GIS certifications,” says Dr. Boyes. “Individuals can earn the GIS Professional Certificate by documenting relevant educational achievements and professional experience. In contrast, an Esri Technical Certificate requires a passing score on an examination that demonstrates

<sup>2</sup> [www.donboyes.com](http://www.donboyes.com)

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expertise in desktop, developer or enterprise software. The GTCM can help individuals make an informed decision about appropriate certification venues to pursue.”

### **Related Links**

Competency Model Clearinghouse

Geospatial Technology Competency Model, Curriculum Analysis Worksheet

<https://www.careeronestop.org/competencymodel/competency-models/pyramid-download.aspx?industry=geospatial-technology>

University Consortium for Geospatial Information and Technology

<https://www.ucgis.org>

National Center for Geographic Information and Analysis

<http://www.ncgia.ucsb.edu/>

Esri Software Certification

<https://www.esri.com/training/certification/>

GISP Certification

<https://www.gisci.org/>