

## Does the **UCGIS Body of Knowledge** Accurately Reflect **GISP Skills**?

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## The Question

- ◆ GISCI certification is based on experience, education, and professional contribution thresholds
- ◆ GISCI Oversight Committee proposed switch from portfolio to competency-based certification process
- ◆ UCGIS *Body of Knowledge* picked as source for competency judgment

## The Motives for Change

- ◆ Concern that some applicants were being certified with very limited scope of knowledge
- ◆ Need to raise the bar to combat professional erosion
- ◆ Overcome weakness in present method regarding portfolio review
- ◆ Other professions are trying to define the scope and qualifications of GIS professionals

## Whose Profession?

- ◆ Surveyors
  - 4 state laws say “creating, preparing, or modifying geographic information systems” must be done by a licensed surveyor (IA, MS, NC, SC)
  - A majority of states say at least part of the typical work done by GISPs requires a surveying license
  - ACSM-led group discussing GIS licensure
- ◆ GLISA is developing model legislation for GIS licensure in all 50 states

## Their Reported Concerns

- ◆ Unqualified use of cadastral data threatens private property rights
- ◆ Encroachment on surveying profession
  
- ◆ Many GIS professionals see these “concerns” as attempts to block competition

## Competency Test

- ◆ Require applicants to attest to “Use” level of competency for all 24 core knowledge units
- ◆ Can show competency through experience or education

## Exam-based Certification

### ◆ Arguments for:

- All other professions require a test
- Allows percentage of *BoK* knowledge units to be applied through a minimum passing score
- Can go beyond *BoK* to include principles of professional practice

### ◆ Arguments against:

- Requires consensus on questions and answers
- GIS is too broad and its application too subjective

## GISP Input Opportunities

### ◆ General survey of GISPs in Spring 2007 regarding competency-based certification produced inadequate input

### ◆ Online survey conducted in Summer 2007

- Individually listed all 24 knowledge units
- Allowed expression of one of 5 levels of competency in each unit
- More than 550 GISPs responded

## Survey Also Asked...

- ◆ Should GISCI require competence in all or only a percent of knowledge units?
- ◆ Should GISCI use an exam to test competency?
- ◆ Should any exam be based on the *Body of Knowledge*?
- ◆ GISP comments

## My Analysis Methodology

- ◆ Level 3 selected as competency threshold:
  - 5 – Expert Knowledge
  - 4 – Very Knowledgeable
  - 3 – General Knowledge (use; routinely apply)
  - 2 – Somewhat Knowledgeable
  - 1 – No Knowledge
- ◆ Units where more than 10% of respondents indicated less than Level 3 competency classed as problem area for GISPs

## Survey Says...

- ◆ 11 knowledge units had less than 90% competency reported by GISPs
- ◆ Unit with the lowest level of competency was at 70.7%
- ◆ 7.3% declared they lacked at least general knowledge of ethical aspects of GIS

## What We Say We Know

- ◆ Geometric Measures
- ◆ Basic Analytical Operations
- ◆ Data Considerations
- ◆ Principles of Map Design
- ◆ Map Use and Evaluation
- ◆ Database Design
- ◆ Database Management Systems

## What We Say We Know

- ◆ Georeferencing Systems
- ◆ Datums
- ◆ Map Projections
- ◆ Data Quality
- ◆ Metadata, Standards, and Infrastructure
- ◆ Ethical Aspects

## No. 11 – 89.9% Competence

- ◆ Generalization & Aggregation
  - Scale & generalization
  - Point, line, & area generalizations
  - Classification & transformation of attribute measurement levels
  - Aggregation of spatial entities

## No. 10 – 89.7% Competence

- ◆ Coordinating Organizations
  - Professional organizations
  - Publications
  - Geospatial community
  - Geospatial industry
  - Federal agencies; national & international organizations & programs
  - State & regional coordinating bodies

## No. 9 – 89.5% Competence

- ◆ Institutional & Inter-institutional Aspects
  - Spatial data infrastructures
  - Adoption of standards
  - Technology transfer
  - Spatial data sharing among organizations
  - Openness
  - Balancing data access, security & privacy

## No. 8 – 88.8% Competence

### ◆ Aerial Imaging & Photogrammetry

- Nature of aerial image data
- Platforms & sensors
- Aerial image interpretation
- Stereoscopy & orthoimagery
- Vector data extraction
- Mission planning

## No. 7 – 86.9% Competence

### ◆ Earth Geometry

- History of understanding Earth's shape
- Geoids
- Spheres & ellipsoids

## No. 6 – 84.6% Competence

### ◆ Representation Transformation

- Impact of transformations
- Data model & format conversion
- Interpolation
- Raster resampling
- Vector-to-raster & raster-to-vector conversions
- Coordinate transformations

## No. 5 – 82.9% Competence

### ◆ Domains of Geographic Information

- Space
- Time
- Relationships between space & time
- Properties

## No. 4 – 81.4% Competence

### ◆ Basic Analytical Methods

- Point pattern analysis
- Analyzing multidimensional attributes
- Kernels & density estimation
- Cartographic modeling
- Spatial cluster analysis
- Multi-criteria evaluation
- Spatial interaction

## No. 3 – 80.1% Competence

### ◆ Elements of Geographic Information

- Discrete entities
- Events & processes
- Fields in space & time
- Integration models

## No. 2 – 80.0% Competence

### ◆ Vector & Object Data Models

- Geometric primitives
- Spaghetti model
- Topological model
- Classic vector data models
- Network model
- Linear referencing
- Object-based spatial models

And the area of lowest GISP  
competence is ...

## No. 1 – 70.7% Competence

### ◆ Tessellation Data Models

- Grid representations
- Raster model
- Grid compression methods
- Hexagonal model
- TIN model
- Resolution
- Hierarchical data models

## Possible Inferences

- ◆ Many GISPs lack competence in core knowledge areas
- ◆ *BoK* does a poor job of explaining core units; i.e., GISPs don't understand terms but do understand concepts
- ◆ *BoK* includes core units that are not central to GISP job performance

## Needed Core Units

- ◆ Surveying
- ◆ Programming skills
- ◆ Public speaking
- ◆ GPS

## Competency-based Certification

- ◆ 18.9% - Use all core units
- ◆ 71.8% - Use percent of core units
- ◆ 9.4% - Don't base certification on *BoK* core knowledge units
  
- ◆ *Primary complaint:* too academic

## Add Exam to Certification

- ◆ 30.0% - Yes, this is an immediate priority
- ◆ 54.3% - Maybe, but it should be studied further
- ◆ 15.7% - No, keep the current portfolio system

## Test-based Certification

- ◆ 18.5% - Require exam
- ◆ 21.7% - Allow option of test or portfolio
- ◆ 42.3% - Shorter portfolio plus exam
- ◆ 9.7% - No exam
- ◆ 7.9% - Other choice specified by GISP (mostly details on portfolio + exam)

## Should Exam Be Based on *BoK*?

- ◆ 84.5% - Yes
- ◆ 15.5% - No
- ◆ 122 GISPs supplied comments
  - *BoK* is too academic; need real-world test
  - GIS is too broad to test thoroughly
  - Needs to weight some areas more than others

## Conclusions

- ◆ GISPs appear to support competency-based certification as an immediate step to improve the credential
- ◆ GISPs appear to support exam-based certification, with portfolio threshold to qualify for the exam, as a long-term solution
- ◆ Some education of applicants on core knowledge units is required for implementation

## Next Steps

- ◆ Clarify core knowledge units for GISP credential
- ◆ Implement competency-based certification process
- ◆ Begin process of developing exam questions and answers covering GIS&T
- ◆ Define principles of professional practice for other exam questions

## Most Important Need

- ◆ GISP education is urgently needed
  - Continuing education for current GISPs to overcome identified deficiencies
  - Exam prep for applicants
- ◆ Role here for URISA through workshops and online courses

## Our Goal

- ◆ Create a uniformly competent GISP community
- ◆ Allow GISPs to be perceived as equal to other geospatial professions

## Contact

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