Creating Geospatial Technology Action Competencies

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Empowering Colleges: Expanding the Geospatial Workforce

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Goal!

- To add action verbs to the competencies of GISCI. So that a better understanding of depth knowledge can be obtained.

Starting Points

- GISCI has listed 44 items that someone should know before sitting for GISP Test.
- GeoTech Center has a list of Program Content (in range of 300), with varying depth levels.
- GeoTech Center has a crosswalk between the 44 items and a sub-set of Program Content areas.

Program Content Tool

Go to the GTMC Competency Model

Enter course name(s) in the columns to the right; cut/paste for additional columns or delete as needed.
Enter 0 through 4 for each course based on the Scale Below
Refer to the "Definitions" tab in this worksheet for a explanation of how it should be included in the

○ 0	Not important for this course - do not include in this course
◔ 1	Slightly important for this course, include ony if time permits:
◑ 2	Important - include at an awareness level
◕ 3	Very Important; should be included at some level above awareness
● 4	Critically important, must be included in depth

ID#	MD#	GTCM		101 - Intro to GST	102 - Spatial Analysis	103 - Data Acc & Mgmt	104 - Cartogr. Design & Vis.	105 - Intro Remote Sensing	106 - Intro Geo Programming	107 - Geo Web Ap Dev	Competency Cluster
1	MK		Explain how map scale affects data collection and management	◕ 3	◑ 2	◑ 2	◑ 2	◑ 2	○ 0	◑ 2	Cross Cutting (CC)
2	A11		Create and build topology (subtypes and domains)	◔ 1	◑ 2	◔ 1	○ 0	○ 0	○ 0	○ 0	Cross Cutting (CC)
3	MK		Describe the characteristics and appropriate uses of common coordinate systems, projections, Datums and geoids	◕ 3	◑ 2	◔ 1	◕ 3	◑ 2	○ 0	◕ 3	Cross Cutting (CC)
4	A11		Validate spatial and tabular data (e.g. topology, build, verification)	◔ 1	◑ 2	◕ 3	○ 0	○ 0	◔ 1	○ 0	Cross Cutting (CC)
5	C2		Define data's spatial reference	◕ 3	◑ 2	● 4	◔ 1	◕ 3	◑ 2	○ 0	Cross Cutting (CC)
6	C3		Transform spatial data (e.g. reprojections)	◔ 1	◕ 3	◕ 3	◑ 2	◕ 3	◑ 2	◕ 3	Cross Cutting (CC)
7	MK		Apply appropriate projections	◑ 2	◕ 3	◑ 2	● 4	◕ 3	◕ 3	○ 0	Cross Cutting (CC)
8	C2		Describe different methods of indicating locations (e.g., decimal degrees, UTM, military grid)	◕ 3	◑ 2	◕ 3	◑ 2	◔ 1	○ 0	◑ 2	Cross Cutting (CC)
9	MK		Calculate scale transformations.	◔ 1	◔ 1	◔ 1	○ 0	○ 0	○ 0	○ 0	Cross Cutting (CC)
10	A11		Resolve spatial conflicts.	◑ 2	◑ 2	◔ 1	◕ 3	○ 0	○ 0	○ 0	Cross Cutting (CC)
11	MK		Determine appropriate scale	◕ 3	◑ 2	◑ 2	● 4	◑ 2	◕ 3	◑ 2	Cross Cutting (CC)
12	MK	T2	Number Operations and Computation - addition, subtraction, multiplication, and division	◑ 2	◑ 2	○ 0	◔ 1	◑ 2	○ 0	○ 0	Cross Cutting (CC)
13	MK	T2	Number Systems and Relationships - whole numbers, decimals, fractions, and percentages	◑ 2	◑ 2	○ 0	◔ 1	◑ 2	○ 0	○ 0	Cross Cutting (CC)
14	MK	T2	Measurement and Estimation - measurement of time, temperature, distances, length, width, height, perimeter, area, volume, weight, velocity, and speed; unit conversion; numerical analysis to obtain approximate solutions when necessary	◑ 2	◕ 3	○ 0	◔ 1	◑ 2	○ 0	○ 0	Cross Cutting (CC)
15	MK	T2	Geometry - size, shape, and position of features using geometric principles to solve problems	◑ 2	◑ 2	○ 0	◔ 1	◑ 2	○ 0	○ 0	Cross Cutting (CC)
			Mathematical Reasoning and Problem Solving - inductive and deductive reasoning, conjectures,								

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GISCI Competencies

- Knowledge of spatial relationships such as distance (e.g., horizontal and vertical), direction, and topology (e.g., adjacency, connectivity, and overlap) that are particularly relevant to geospatial data analysis;
- Knowledge of standard spatial data models, including the nature of vector, raster, and object-oriented models, in the context of spatial data used in the workplace;
- Understanding of the conceptual foundations on which geographic information systems (GIS) are based, including the problem of representing change over time and the imprecision and uncertainty that characterizes all geographic information;

Personal Assessment Tool

- More than 180 items selected to assist individuals in knowing how prepared they are for the GISP exam. Accessible from the GeoTech Center's Website.
- Responders use a modified Bloom's Taxonomy to self assess.
- Results classified into 43 unique study areas based upon major categories
- Results returned with descriptive assessment of abilities.
- N>195, reviewed N>395
- Supplement personal assessment may be developed in areas outside of the GISP exam.
- Remote Sensing will be added.

Score Determined

- Based on the crosswalk between 180 prompts and 44 competencies a score for each item was determined.
- The score was normalized to an eight point scale.

Lumina Verb List

The following tables provide prompts to help develop competency statements using the Beta Connecting Credentials Framework. Included are examples of possible verbs for use.

Competency Prompts and Verbs for Developing Competency Statements

Knowledge describes what a learner knows, understands and can demonstrate in terms of the body of facts, principles, theories and practices related to fields of application (study and work). The requirements and competencies are described in terms of: • Depth • Breadth • Dimension

Level	Competency Prompts for Domains	Examples of Verbs
1	What general knowledge is demonstrated?	Demonstrate, Categorize, Classify, Define, Describe, Determine, Frame, Identify, Prioritize, Specify, List, State, Label, Name
2	How is the general knowledge used? What principles and practices are known?	Use, Apply, Build, Compose, Construct, Craft, Create, Design, Develop, Generate, Model, Shape, Simulate
3	What extended knowledge is demonstrated and applied (including technical & theoretical concepts)? What procedures can be demonstrated? Which solutions are used for predictable problems?	Solve, Access, Acquire, Collect, Accumulate, Extract, Gather, Obtain
4	What comprehensive theoretical and technical knowledge is demonstrated and applied? How is this knowledge used to solve unfamiliar problems?	Conduct, Employ, Implement, Perform, Produce
5	What specialized knowledge (theoretical and professional) is demonstrated? How is comprehensive knowledge integrated?	Integrate, Assimilate, Consolidate, Merge, Connect, Integrate, Link, Synthesize, Summarize
6	What is the specialized knowledge demonstrated from a scientific perspective of the field? What critical understanding of the specialized knowledge and range of methodologies is demonstrated? How is this knowledge applied to solve complex problems? How are complexities of knowledge and applications further developed?	Analyze, Compare, Contrast, Differentiate, Distinguish, Formulate, Map, Match, Equate
7	What state-of-the-art knowledge is demonstrated? How is this knowledge applied strategically? How is this knowledge extended to other applications?	Produce, Activate, Assess, Evaluate, Combine, Consolidate, Coordinate, Initiate, Design, Revise
8	How is state-of-the-art knowledge used to innovate and/or expand the field? How is other knowledge integrated and synthesized into this field? How is this knowledge used to influence other fields?	Change, Create, Disseminate, Forecast, Plan, promote, Stimulate, Predict

Initial Determination of Verb

- A small group looked at the score and the list of competencies. An appropriate word was selected.
- Not always did the words work for the specific item so some variations were selected, for example a score of 7.2 might fit better with the words for a score of an 8.

Examples

- Differentiate spatial relationships such as distance (e.g., horizontal and vertical), direction, and topology (e.g., adjacency, connectivity, and overlap) that are particularly relevant to geospatial data analysis;
- 6 / 5.66
- Compare and Contrast standard spatial data models, including the nature of vector, raster, and object-oriented models, in the context of spatial data used in the workplace;
- 6 / 5.78
- Assimilate the conceptual foundations on which geographic information systems (GIS) are based, including the problem of representing change over time and the imprecision and uncertainty that characterizes all geographic information
- 5 / 5.34

Next Steps

- Share the list with a group of geospatial educators, to review.
- Each item will be either recommended for acceptance or a suggestion of another verb.
- Conduct a conference call to debate those areas which have extensive disagreement.

Questions and Answers

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