GIS Professional Body of Knowledge

The GIS Professional Body of Knowledge is based on the Geographic Information Science and Technology (GIS&T) Body of Knowledge (created by the University Consortium for Geographic Information Science and distributed by the Association of American Geographers) and other references as a way of describing the core competencies required for professional practice. Educational courses and work experience that relates to one or more of the following knowledge areas qualifies for certification renewal points. Each of the listed knowledge areas provides a general description of the topics covered and lists the relevant GIS&T Body of Knowledge topical units. Any description of EDU or EXP points earned during the five-year certification period should reference the relevant GISP knowledge area or GIS&T knowledge unit. A single educational or work experience may include more than one knowledge area or unit.

Each of the 11 topical areas listed below describes a part of the knowledge required for the general practice of the GIS profession. The opening text explains the general knowledge required. The bulleted knowledge units from the GIS&T Body of Knowledge provide a reference to the larger description offered in that document.

Geospatial Analysis or Analytical Methods – Knowledge of the geometric representation of features in a GIS system and understanding of the effect on the measurement of these features in different coordinate systems. Understanding of basic analytical operations, such as buffer and overlay. Understanding of the spatial relationship of geometric features to each other, including connectivity and topology.

- Geometric measures – AM3
- Basic Analytical operations – AM4
- Basic analytical methods – AM5

Modeling of Features or Processes in Space or Time – Understanding of methods and limitations of modeling features (entities) and processes (events) in a computer environment. Understanding of the use of attribution to geometric or raster features in GIS to model processes over time.

- Domains of geographic information – CF3
- Elements of geographic information – CF4

Data Visualization and Cartography – Understanding of the basic factors affecting map design. Understanding of basic concepts for symbol selection and display. Understanding of the use of color in map preparation and for visualization. Understanding of various techniques for labeling features for effective communication. Understanding of the common protocols for symbolizing common features on a map, or for maps produced for common applications such as cadastral maps, geologic maps, etc. Understanding of basic techniques to assist in map interpretation and use. Understanding of the mean of map accuracy as currently defined and methods for displaying uncertainty in the information portrayed on a map.

- Principles of map design – CV3
- Map use and evaluation – CV6

Database Development and Design – Understanding of the opportunities and limitations in vector, object, and raster data models. Understanding of the basic geometric features or

primitives as applied to represent features in GIS. Understanding of topology and topological relationships as applied in GIS. Knowledge of various models to represent networks as well as the meaning of linear referencing. Understanding of the various representations for partitioning an area such as the raster data model, lattice model, or TIN. Knowledge of the various sources of information captured in a digital environment (GIS). Understanding of the different methods of abstracting and representing features in GIS in both vector and raster formats. Understanding of the reasons for and methods of data extraction and generalization. Understanding of the effects and application of various map projections. Understanding of the various tools available to model a database and the common process followed to develop a database from conceptual model to logical model to physical model

- Data considerations – CV2
- Database design – DA4
- Database management systems – DM2
- Tessellation data models – DM3
- Vector and object data models – DM4

Data Transformations or Manipulations – Understanding of the effect of various data transformations such as data format conversions, conversion between vector and raster representations. Understanding interpolation algorithms for raster data (e.g. nearest neighbor, bilinear, cubic convolution). Understanding of raster re-sampling techniques. Understanding of overall coordinate transformation techniques, projections of data, and rubber sheeting.

- Representation transformation – DN1

Data Generalization and Aggregation – Understanding of the geometric representation of features and effects on processing and display. Understanding of techniques and algorithms for generalizing vector data. Understanding of techniques to transform attribute data for analysis or display. Understanding of the value and effects of data aggregation.

- Generalization and aggregation – DN2

Georeferencing, Coordinate Systems, and Data Quality – Understanding of basic models of the earth and georeferencing of features based on those models. Understanding of the datums (horizontal and vertical) for the basic earth models. Understanding the characteristics of coordinate systems carried into map projections and their parameters. Understanding geodetic control networks such as the U.S. geodetic control network and their role in providing underlying base control for other coordinate data. Understanding the factors which affect coordinate values captured from GPS devices.

- Earth geometry – GD1
- Georeferencing systems – GD3
- Datums – GD4
- Map projections – GD5
- Data quality – GD6
- Land surveying and GPS – GD7

Remote Sensing and Photogrammetry – Understanding of the various types and characteristics of imagery and common sources. Understanding of the characteristics of rectified, ortho-rectified imagery and underlying control for these image products. Understanding of the limitations in collection of vector data from imagery.

- Aerial imaging and photogrammetry - GD10

Data Quality, Metadata, and Data Transfer – Understanding of the requirements for information (metadata) on data used or produced by your organization. Knowledge of the FGDC and ISO standards on metadata. Understanding of spatial accuracy standards such as the National Map Accuracy Standard and ASPRS Coordinate Standard. Understanding of coordinate (geometric) accuracy, thematic accuracy, and topological fidelity and how they should be reported to meet FGDC or ISO standards. Understanding of the distinctions between spatial resolution, accuracy, and precision. Knowledge of other data quality requirements for your industry or applications. Knowledge of data exchange formats and requirements such as Z39.50, Open Source formats, and Web formats. Understanding of the risks and benefits of providing and accessing information from other sources. Understanding of the limitations on data which is proprietary or considered private.

- Metadata, standards, and infrastructures – GD12
- Institutional and inter-institutional aspects – OI5

Ethics and the Role of the GIS Professional in Society – Knowledge of the ethics and rules of conduct for GISCI certified professionals. Knowledge of the limitations in practice of GIS that may apply. Knowledge of guidelines or accepted practice that apply to your work as a professional

- Ethical aspects- GS6

Coordinating Organizations and the Role of the Professional – Knowledge of and participation in coordinating organizations at the National, State, and Local levels for data development, coordination, and data exchange. Participation in professional organizations.

- Coordinating organizations – OI6