



**Australian Government**

# **CPPSIS4035A Apply GIS software to problem-solving techniques**

**Release 1**

## **CPPSIS4035A Apply GIS software to problem-solving techniques**

### **Modification History**

Unit revised and not equivalent to CPPSIS4015A Apply GIS software to problem-solving techniques

Element structure, performance criteria, and critical aspects reviewed to reflect workplace requirements

Skills and knowledge requirements and the range statement updated

### **Unit Descriptor**

This unit of competency specifies the outcomes required to apply geographic information systems (GIS) software to resolve problems, using spatial and aspatial data in an integrated manner. It requires the ability to operate GIS applications correctly in order to perform the required tasks of a spatial project. Functions would be carried out under limited supervision and within organisational guidelines.

### **Application of the Unit**

This unit of competency supports the application of the use of technology for data interpretation and collation, supervised problem solving, teamwork and interpreting technical data. The skills and knowledge acquired upon completion of this unit would support the needs of employees in the surveying and spatial information services (SSIS) industry sector in positions such as field hands, field work coordinators and data collection officers.

### **Licensing/Regulatory Information**

No licensing, legislative and regulatory requirements apply to this unit at the time of endorsement.

### **Pre-Requisites**

Nil

### **Employability Skills Information**

Not applicable.

## Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.

## Elements and Performance Criteria

- |   |   |  |
|---|---|--|
| 1 | Use GIS software to query spatial data. | <p>1.1 <b><i>Spatial data</i></b> updates are accessed, read, interpreted and edited to ensure they are in an acceptable format to meet <b><i>functional requirements</i></b>.</p> <p>1.2 <b><i>Entities</i></b> and <b><i>attributes</i></b> are used to display <b><i>spatial information</i></b> that will assist in the delivery of <b><i>spatial information services</i></b>.</p> <p>1.3 Entity and attribute queries of spatial data are used to generate summary results.</p> <p>1.4 Results from queries are used to present spatial data graphically according to <b><i>organisational guidelines</i></b>.</p> <p>1.5 Entity and attribute queries are applied when using <b><i>univariate statistics</i></b> to explore the dataset.</p> <p>1.6 Routine spatial data problems or irregularities are solved in the course of the activity or via consultation with <b><i>relevant personnel</i></b>.</p> <p>1.7 Keyboard and <b><i>computer hardware equipment</i></b> are used to meet functional requirements on speed and accuracy and according to <b><i>OHS requirements</i></b>.</p> |
| 2 | Solve problems using GIS software.      | <p>2.1 Existing spatial and aspatial data is adjusted to integrate with new data to meet <b><i>documentation and reporting</i></b> requirements and to add to personal learning and organisational intelligence.</p> <p>2.2 <b><i>Geospatial techniques</i></b> on <b><i>appropriate software</i></b> are used to combine spatial layers data to solve problems, highlight selected data features and improve the visual</p>   |

- aspect and understanding of the project.
- 2.3 ***Spatial overlay techniques*** are used to solve problems and generate results pertaining to the ***spatial project*** as specified by relevant personnel.
  - 2.4 Cartographic integrity is tested and ***validated*** to solve accuracy and quality problems.
- 3 Produce reports based on basic spatial analysis.
- 3.1 Map or plans are integrated into project reports.
  - 3.2 Results, summary statistics and graphs from a mapping application are incorporated into a project.
  - 3.3 Legal and ***ethical requirements*** are adhered to according to organisational guidelines.
- 4 Archive data.
- 4.1 Spatial dataset to be archived is manipulated where necessary to ensure completeness.
  - 4.2 ***Metadata*** is created according to accepted industry standards.
  - 4.3 New and existing spatial data is stored and archival details are recorded according to organisational guidelines.

## Required Skills and Knowledge

This section describes the essential skills and knowledge and their level, required for this unit.

### Required skills

- communication skills to:
  - discuss vocational issues effectively with colleagues
  - impart knowledge and ideas through oral, written and visual means
- literacy skills to:
  - assess and use workplace information
  - read and record data
  - research and access routine sources of spatial data
- numeracy skills to:
  - accurately record and collate
  - record and interpret statistics
  - undertake basic computations
- organisational skills to:
  - manage files
  - prioritise activities to meet contractual requirements
- spatial skills to:
  - combine spatial data layers (geoprocessing)
  - exercise precision and accuracy in all operations
  - load spatial data into a mapping application and perform entity and attribute queries
  - archive and retrieve spatial data
  - manage and manipulate spatial data
  - manage files

### Required knowledge

- cartographic design principles
- datum and projections
- geoprocessing
- logging procedures relating to a computer
- operation of relevant software packages
- organisational policies and guidelines
- printing and image formats for map production
- security management guidelines

- spatial database operation
- spatial data storage technology
- spatial information systems
- technical terminology in relation to reading help files and prompts
- univariate statistics and charting

## Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the Assessment Guidelines for this Training Package.

### Overview of assessment

This unit of competency could be assessed on its own or in combination with other units relevant to the job function, for example CPPSIS4034A Maintain spatial data.

### Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of:

- using GIS software
- solving problems using GIS software
- producing reports based on basic spatial analysis
- knowledge of GIS software system.

### Specific resources for assessment

Resource implications for assessment include access to:

- assessment instruments, including personal planner and assessment record book
- assignment instructions, work plans and schedules, policy documents and duty statements
- registered training provider of assessment services
- relevant guidelines, regulations and codes of practice
- suitable venue and equipment.

Access must be provided to appropriate learning and assessment support when required.

Where applicable, physical resources should include equipment modified for people with disabilities.

### Context of assessment

Holistic: based on the performance criteria, evidence guide, range statement, and required skills and knowledge.

### Method of assessment

Demonstrated over a period of time and observed by the assessor (or assessment team working together to conduct the assessment). Demonstrated competency in a range of situations, that may include customer/workplace interruptions and involvement in related activities normally experienced in the workplace. Obtained by observing activities in the field and reviewing induction information. If this is not practicable, observation in realistic simulated environments may be substituted.

### Guidance information for assessment

Assessment requires that the clients' objectives and industry expectations are met. If the clients' objectives are narrowly defined or not representative of industry needs, it may be necessary to refer to portfolio case studies of a variety of SIS requirements to assess competency.

Oral questioning or written assessment and hypothetical situations (scenarios) may be used to assess underpinning knowledge (in assessment situations where the candidate is offered a preference between oral questioning or written assessment, questions are to be identical).

Supplementary evidence may be obtained from relevant authenticated correspondence from existing supervisors, team leaders or specialist training staff.

All practical demonstration must adhere to the safety and environmental regulations relevant to each State or Territory.

Where assessment is for the purpose of recognition (recognition of current competencies [RCC] or recognition of prior learning [RPL]), the evidence provided will need to be authenticated and show that it represents competency demonstrated over a period of time.

In all cases where practical assessment is used it will be combined with targeted questioning to assess the underpinning knowledge. Assessment processes will be appropriate to the language and literacy levels of the candidate and any cultural issues that may affect responses to the questions, and will reflect the requirements of the competency and the work being performed.

## Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. ***Bold italicised*** wording in the performance criteria is detailed below. Add any essential operating conditions that may be present with training and assessment depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts.

- Spatial data*** may include:
- digital
  - hard copy
  - image
  - text
  - raster
  - vector.
- Functional requirements*** refer to:
- work deliverables.

- Entity*** refers to a single item created on the screen such as:
- arc
  - circle
  - hatch
  - line



- text.

- Attributes** are properties associated with an entity and may include:
- colour
  - layer
  - level
  - line type
  - line width
  - text.
- Spatial information** is:
- virtual data related to the location of objects on the earth.
- Spatial information services** refer to:
- virtual data that is:
    - analysed
    - collected
    - displayed
    - manipulated
    - stored
  - virtual images used for planning and implementing the efficient administration and development of natural and built resources.
- Organisational guidelines** may include:
- code of ethics
  - company policy
  - legislation relevant to the work or service function
  - manuals
  - OHS policies and procedures
  - personnel practices and guidelines outlining work roles and responsibilities.
- Univariate statistics** are summary or descriptive statistics for single variables and may include:
- arithmetic mean
  - histograms that illustrate the concepts of normal and other distributions
  - maximum
  - median
  - minimum
  - mode
  - range
  - standard deviation
  - variance.
- Relevant personnel** may include:
- colleagues
  - staff or employee representatives
  - supervisors or line managers
  - suppliers
  - users.
- Computer hardware equipment** may include:
- mobile devices such as personal digital assistants or data loggers
  - multimedia devices

- networked systems
- personal computers
- printers
- scanners.

***OHS requirements*** may include:

- Australian standards
- identification of potential hazards
- safety plan
- safe use of:
  - computer equipment
  - mobile equipment
  - regulated equipment
  - screen-based equipment
  - workstations

***Documentation and reporting*** may include:

- audit trails
- naming standards
- project management templates
- report writing styles
- version control.

***Geospatial techniques*** may include geoprocessing spatial data such as:

- clip
- dissolve
- intersect
- merge
- union.

***Appropriate software*** may include:

- commercial software application
- communication packages and presentation functions
- computer-aided design (CAD)
- database
- GIS
- graphic
- internet
- organisational
- presentation applications
- remote sensing
- surveying.

***Spatial overlay techniques*** may include:

- raster, including aerial photography and/or satellite imagery in digital format
- vector overlay, geoprocessing and the incorporation of other spatial information.

***Spatial project*** may include:

- administration (e.g. postcodes, suburbs, and federal and state electoral counties)
- analysis of environmental, land and geographic information
- asset management
- cartographic services

- civil engineering
- digital imagery
- electricity
- emergency services management
- environmental datasets
- GIS
- hydrography
- integrated services – environmental, land and geographic related datasets
- land ownership tenure system
- local government
- location-based services
- global positioning
- mapping facilities
- photogrammetry
- remote sensing
- site analysis
- survey marks
- sewerage
- telecommunications
- terrestrial survey
- town planning
- utility services such as water
- water catchment.

**Validated** means reflecting the true state of a test result, including tests for systematic distortions such as:

- confounding bias
- information/data bias
- observational bias
- recall bias
- selection bias.

**Ethical requirements** may include:

- confidentiality
- privacy.

**Metadata** refers to:

- summarised information about a spatial dataset that describes the characteristics of the dataset, including:
  - availability
  - conditions of use
  - coordinate system
  - currency
  - spatial data acquisition methodologies
  - date of acquisition
  - quality
  - source

- version control.

## **Unit Sector(s)**

Surveying and spatial information services

## **Custom Content Section**

Not applicable.