



**Australian Government**

# **CPPSIS6040A Develop 2-D and 3-D terrain visualisations**

**Release 1**

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## **Modification History**

Unit revised and not equivalent to CPPSIS6020A Develop 2-D and 3-D terrain visualisations  
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 develop two-dimensional (2-D) and three-dimensional (3-D) visualisations in a geographic information systems (GIS) context. It requires the ability to apply wide-ranging specialised technical, creative and conceptual skills, a broad knowledge of spatial datasets and accountability for personal and group outcomes. Functions will entail complying with and developing or amending organisational guidelines.

## **Application of the Unit**

This unit of competency supports high-level project management activity in the surveying and spatial information services (SSIS) industry sector. It requires the application of initiative and enterprise, negotiation, problem-solving, planning and organisational skills; the development of technical documentation incorporating mapping and scientific techniques; and the ability to communicate graphically. The skills and knowledge acquired upon completion of this unit would support the needs of employees in cartography, town planning, mapping and GIS.

## **Licensing/Regulatory Information**

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

## **Pre-Requisites**

Nil

## **Employability Skills Information**

This unit contains employability skills.

## 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 | Prepare 2-D or 3-D digital elevation model (DEM). | 1.1 | Computer-aided design (CAD) environment or surface elevation is designed according to <b><i>organisational requirements</i></b> and <b><i>project specifications</i></b> . |
|   |   | 1.2 | Orientation is established to job requirement.   |
|   |   | 1.3 | Views are established to job requirement.  |
|   |   | 1.4 | <b><i>OHS</i></b> issues are considered at all times.  |
| 2 | Create 2-D drawings.                              | 2.1 | Spatial computing platforms and software systems are assessed for <b><i>suitability</i></b> against specification.   |
|   |   | 2.2 | <b><i>Availability</i></b> of suitable <b><i>data</i></b> is verified with the potential suppliers.  |
|   |   | 2.3 | <b><i>Constraints</i></b> on use of spatial data are assessed against specification.   |
|   |   | 2.4 | Drawing <b><i>entities</i></b> and <b><i>attributes</i></b> are linked to database attributes to suit project specification.   |
|   |   | 2.5 | Detailed views are created using various scales to meet project specification.   |
|   |   | 2.6 | Existing 2-D model is modified if necessary to meet project specification.   |

- 3 Create and modify a 3-D model or DEM.
  - 3.1 Surface elevation is modelled by mathematically defined surfaces or by point or line data and according to project specification.
  - 3.2 **Products** that can be derived from a DEM are determined.
  - 3.3 Entities are created in **3-D space** to job requirement.
  - 3.4 Entities are manipulated in 3-D space to job requirement.
  - 3.5 DEM is developed with a range of thematic data and profiles generated and draped over the model.
  - 3.6 Contour map of an area is created by employing **procedures appropriate to the data format and software**.
  - 3.7 Slope map of an area is created from gradient and aspect components.
  - 3.8 Shaded relief map of an area is created from gradient and relief map representations.
  - 3.9 Existing 3-D model is modified if necessary to meet project specification.
  
- 4 Produce output.
  - 4.1 Linked entities are documented according to organisational requirements.
  - 4.2 Drawing files are saved in the appropriate format.
  - 4.3 **Physical properties** are extracted to job requirement.
  - 4.4 Slope map of an area is used for **analytical purposes**.

## Required Skills and Knowledge

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

### Required skills

- communication skills to:
  - consult effectively with clients and colleagues
  - impart knowledge and ideas through graphic, oral, written and visual means
  - computer skills to develop business documentation
- literacy skills to:
  - assess and use workplace information
  - conduct web-based searches and use digital techniques
  - read and write key performance reports, including technical reports
  - research and evaluate to source SIS educational information
- numeracy skills to:
  - accurately record and collate
  - analyse errors
  - conduct image analysis
  - estimate costs
  - interpret and analyse statistics
  - perform mental calculations
  - undertake complex computations
- organisational skills to plan and prioritise activities to meet contractual requirements
- project management skills, including ability to meet deadlines
- research and analytical skills to determine terrain visualisation delivery options
- spatial skills to:
  - exercise precision and accuracy in relation to terrain visualisations
  - archive and retrieve spatial data
  - manage and manipulate spatial data
  - manage files
  - solve complex problems relating to height, depth, breadth, dimension, direction and position in actual operational activity and virtual representation
  - train others in spatial precision techniques

### Required knowledge

- budgetary mechanisms and restraints

- computer platforms and software for CAD and DEM
- data quality integrity
- existing spatial datasets and dataset sources
- digital image processing techniques
- image enhancement, manipulation and merger techniques
- information management
- OHS policies
- organisational policies and guidelines
- relevant legislative, statutory and industry requirements and standards
- resource management processes
- risk analysis principles
- spatial data formats, handling and structure
- spatial referencing systems

## 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.

<b>Overview of assessment</b>	This unit of competency could be assessed on its own or in combination with other units relevant to the job function, for example CPPSIS5059A Determine suitable information sources to create new spatial datasets, and CPPSIS6024A Design a spatial project plan.
<b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b>	<p>A person who demonstrates competency in this unit must be able to provide evidence of:</p> <ul style="list-style-type: none"><li>• applying CAD and DEM technology</li><li>• communicating graphically</li><li>• understanding copyright and ownership constraints</li><li>• determining data requirements</li><li>• evaluating suitability of available data against project specifications</li><li>• identifying sources of data</li><li>• knowledge of image enhancement, manipulation and merger technique, and spatial reference systems.</li></ul>
<b>Specific resources for assessment</b>	<p>Resource implications for assessment include access to:</p> <ul style="list-style-type: none"><li>• assessment instruments, including personal planner and assessment record book</li><li>• assignment instructions, work plans and schedules, policy documents and duty statements</li><li>• registered training provider of assessment services</li><li>• relevant guidelines, regulations and codes of practice</li><li>• suitable venue and equipment.</li></ul> <p>Access must be provided to appropriate learning and assessment support when required.</p> <p>Where applicable, physical resources should include equipment modified for people with disabilities.</p>
<b>Context of assessment</b>	Holistic: based on the performance criteria, evidence guide, range statement, and required skills and knowledge.
<b>Method of assessment</b>	<p>Demonstrated over a period of time and observed by the assessor (or assessment team working together to conduct the assessment).</p> <p>Demonstrated competency in a range of situations, that may include customer/workplace interruptions and involvement in related activities normally experienced in</p>

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.

***Organisational***

***requirements*** may include:

- Australian Computer Society code of ethics
- company policy
- legislation relevant to the work or service function
- manuals

- OHS policy and procedures
- personnel practices and guidelines outlining work roles, responsibilities and delegations.

- Project specifications*** refer to:
- detailed technical descriptions of the spatial data and its requirements.
- OHS*** may include:
- Australian standards
  - development of site safety plan
  - identification of potential hazards
  - inspection of work sites
  - training staff in OHS requirements
  - use of equipment and signage.
- Suitability*** may include:
- assessment of whether the spatial data will meet the specification in regard to:
    - accuracy
    - completeness
    - coverage
    - density
    - logical consistency.
- Availability*** includes:
- assessment of whether the spatial data can be obtained and used for client requirements.
- Data*** may include:
- angles
  - area
  - length
  - perimeters
  - raster
  - vector.
- Constraints*** may include:
- administrative
  - copyright
  - financial
  - legal and legislative
  - technical limitations.
- Entities*** may include:
- events
  - objects.
- Attributes*** refer to:
- properties associated with an entity and may include:
    - colour
    - layer
    - level
    - line type
    - line width
    - text.
- Products*** may include:
- aspect maps
  - contour plans
  - line of sight maps

- slope maps
  - visualisation estimation
  - volume estimation.
- 3-D space* may include:
- line of sight (intervisibility) maps
  - fly through products.
- Procedures appropriate to the data format and software* may include:
- classifying cells into height classes
  - designing point or line images
  - manipulating spatial data.
- Physical properties* may include:
- centre of gravity
  - mass
  - volume.
- Analytical purposes* may include:
- catchment analysis
  - stream analysis.

## Unit Sector(s)

Surveying and spatial information services

## Custom Content Section

Not applicable.