



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **ICAGAM404A Apply artificial intelligence in game development**

**Release: 1**

## ICAGAM404A Apply artificial intelligence in game development

### Modification History

Release	Comments
Release 1	This Unit first released with <i>ICAI1 Information and Communications Technology Training Package version 1.0</i>

### Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to incorporate the principles of artificial intelligence (AI) into a game.

### Application of the Unit

This unit applies to people contributing to the creation of computer-controlled objects in games.

### Licensing/Regulatory Information

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement but users should confirm requirements with the relevant federal, state or territory authority.

### Pre-Requisites

Not applicable.

### Employability Skills Information

This unit contains employability skills.

## Elements and Performance Criteria Pre-Content

<b>Element</b>	<b>Performance Criteria</b>
<i>Elements describe the essential outcomes of a unit of competency.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.</i>

## Elements and Performance Criteria

<p>1. Conduct research on artificial intelligence (AI) strategies</p>	<p>1.1 Describe the <i>terminology</i> involved in AI as it relates to games and the game industry</p> <p>1.2 Identify and analyse the range of AI <i>pathfinding</i> strategies, including appropriate <i>genre and environments</i> and how they influence the design and development</p> <p>1.3 Discuss AI strategies and ideas and collaborate as required with relevant personnel to ensure contribution of a range of ideas and creative solutions to fulfil the requirements of the brief</p> <p>1.4 Organise research and findings for use by relevant personnel throughout the development process, updating as required</p>
<p>2. Design AI strategy for games</p>	<p>2.1 Generate a <i>range of possible goals and actions</i> and <i>other factors</i> in the design of an AI non-player character (NPC)</p> <p>2.2 Select the AI strategies for NPCs for the game design which are technically feasible, respond to the brief and provide creative solutions to all design issues</p> <p>2.3 Continuously reflect on and assess the AI strategies for implications on budget, time line, technical feasibility and suitability for the brief</p>
<p>3. Implement AI strategy</p>	<p>3.1 <i>Implement a pathfinding algorithm</i> in a game</p> <p>3.2 Implement an <i>NPC AI strategy</i> in a game</p>
<p>4. Evaluate game, based on NPC AI</p>	<p>4.1 Review the game design and AI strategies for its fulfilment of the design brief</p> <p>4.2 Discuss and confirm additional requirements or modifications to the game design and undertake any necessary amendments</p>

## Required Skills and Knowledge

*This section describes the skills and knowledge required for this unit.*

### Required skills

- analytical skills to analyse game NPC goals and strategies to suit a game design brief
- literacy skills to read a game design brief
- technical skills to integrate designed AI into a game.

### Required knowledge

- implications of basic pathfinding algorithms on game development
- overview of AI terminology used in the game industry
- development process for creating AI strategies for NPCs in a game.

## Evidence Guide

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

<b>Overview of assessment</b>	
<b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b>	<p>Evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• demonstrate an understanding of a broad knowledge base of AI strategies</li> <li>• design and implement AI strategies in a game.</li> </ul>
<b>Context of and specific resources for assessment</b>	<p>Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• research tools, such as the internet</li> <li>• pathfinding libraries, algorithms or codes</li> <li>• development tools to implement AI strategies</li> <li>• appropriate learning and assessment support when required</li> <li>• modified equipment for people with special needs.</li> </ul>
<b>Method of assessment</b>	<p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> <li>• direct observation of candidate discussing and designing AI strategies</li> <li>• verbal or written questioning to assess candidate's knowledge of AI strategies</li> <li>• development of a game involving AI strategies</li> <li>• review of candidate's documented game design.</li> </ul>
<b>Guidance information for assessment</b>	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, where appropriate.</p> <p>Assessment processes and techniques must be culturally appropriate, and suitable to the communication skill level, language, literacy and numeracy capacity of the candidate and the work being performed.</p> <p>Indigenous people and other people from a non-English speaking background may need additional support.</p> <p>In cases where practical assessment is used it should be combined with targeted questioning to assess required knowledge.</p>



## 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, if used in the performance criteria, is detailed below. 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) may also be included.

<b>Terminology</b> may include:	<ul style="list-style-type: none"> <li>• agent systems</li> <li>• AI</li> <li>• decision trees</li> <li>• flocking</li> <li>• fuzzy logic</li> <li>• obstacle avoidance</li> <li>• state machines</li> <li>• steering behaviours.</li> </ul>
<b>Pathfinding</b> may include:	<ul style="list-style-type: none"> <li>• A*</li> <li>• Dijkstra</li> <li>• grid-graph representation</li> <li>• waypoints</li> <li>• navigation mesh</li> <li>• heuristics</li> <li>• path smoothing.</li> </ul>
<b>Genre and environments</b> may include:	<ul style="list-style-type: none"> <li>• 2-D or 3-D</li> <li>• first person shooter</li> <li>• outdoors or indoors</li> <li>• strategy game.</li> </ul>
<b>Range of possible goals and actions</b> may include:	<ul style="list-style-type: none"> <li>• AI states such as hunt, run and search</li> <li>• decision making</li> <li>• who to attack based on game data.</li> </ul>
<b>Other factors</b> may include:	<ul style="list-style-type: none"> <li>• cost versus benefit to implement</li> <li>• emotional responses</li> <li>• realism</li> <li>• suit the design brief, genre and target audience.</li> </ul>
<b>Implementing a path-finding algorithm</b> may include:	<ul style="list-style-type: none"> <li>• code the algorithm</li> <li>• using a library to implement pathfinding</li> <li>• using graphical tools.</li> </ul>
<b>NPC AI strategy</b> may include:	<ul style="list-style-type: none"> <li>• flock</li> <li>• game balancing - help the losing player by attacking the leading player to keep everyone in the game</li> <li>• hunt, chase and flee</li> </ul>



	<ul style="list-style-type: none"><li>• patrol</li><li>• search for object or player.</li></ul>
--	---

## **Unit Sector(s)**

Game development