ICAGAM515A Design and create advanced particles, fluids and bodies for 3-D digital effects

Release: 1

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Modification History

Release	Comments
Release 1	This Unit first released with *ICA11 Information and Communications Technology Training Package version 1.0*

Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to produce advanced simulated effects in a 3-D and digital effects environment.

Application of the Unit

This unit applies to concept artists, game designers, games programmers, animators and other personnel working in the game development industry.

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

Element	Performance Criteria
Elements describe the essential outcomes of a unit of competency.	*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.*

Elements and Performance Criteria

1. Analyse approaches to design requirements	1.1 Analyse the design requirements for *particle systems, fluids* and *bodies* outlined in *brief and documents*
	1.2 Identify where the *advanced simulated effects* will fit into the production pipeline
	1.3 Identify factors that may influence the design approach to creating advanced simulated effects
2. Demonstrate understanding of advanced simulated effects	2.1 Review *media* and techniques that may inspire simulated effects ideas
	2.2 Respond to brief and documents and provide solutions to the creation of advanced simulated effects for *3-D environments*
	2.3 Present design ideas and *design considerations* with justification of the choice of advanced simulated effects to relevant *personnel*
3. Plan approach to simulated effects	3.1 Adapt and finalise the design according to *feedback* from relevant personnel
	3.2 Identify skills and processes required for creating advanced simulated effects systems
	3.3 Source and gather reference materials and maintain a portfolio of these references
	3.4 Plan a time line to create the advanced simulated effects
4. Produce particles, fluids and bodies for review	4.1 Use *programming languages* to create *code* to assist or produce the advanced simulated effects
	4.2 Using *toolsets, create prototype* of advanced simulated effects based on finalised design
	4.3 Implement physics and forces to the advanced simulated effects to produce the desired outcome
	4.4 Conduct *testing*
	4.5 Review results and present created effects to relevant personnel for feedback and discussion about the implementation of the effects in accordance to the requirements of the design
5. Finalise advanced simulated effects	5.1 Adapt the advanced simulated effects and the design if necessary according to feedback
	5.2 *Polish* the advanced simulated effects
	5.3 Present finalised advanced simulation effects in *requested form*, including pre-production portfolio demonstrating

	project research and development for evaluation and review by the relevant personnel

Required Skills and Knowledge

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

Required skills

- analytical skills to:
  - analyse design requirements for particle systems, fluids and bodies
  - interpret briefs, documents and conceptual information
- communication skills to:
  - check and confirm design requirements
  - collect, interpret and communicate in visual and written forms effectively for various audiences, including engineers and artists
  - communicate complex designs in a structured format drawn from industry standards, styles and techniques
  - communicate technical requirements related to software development, graphics requirements and code development to supervisors and other team members
  - provide practical advice, support and feedback to colleagues and management
- initiative and enterprise skills to exercise a high level of creative ingenuity in advanced 3-D effects and innovation
- literacy and numeracy skills to:
  - develop technical design documents
  - read briefs, work instructions, and technical and conceptual information
  - write instructions for the normal and competent operation and testing of all features and permutations
- management skills to manage teams in order to effectively extract useful feedback
- planning and organisational skills to:
  - refer decisions to a higher project authority for review and endorsement
  - balance talent, experience and budget
  - delegate tasks and responsibility appropriately
  - establish clear roles and goals to achieve required game development outcomes
  - meet project deadlines
  - organise equipment and resources to achieve required outcomes
  - organise own time to meet milestones
- problem-solving skills to recognise and address potential quality issues and problems at design development stage
- research skills to undertake practical, technical and desktop research into advanced effects
- self-management skills to complete assigned tasks
- teamwork skills to:
  - contribute to and work in a collaborative team
  - realise a unified game-play vision
- technical skills to:
  - resolve basic hardware, software and other technical issues associated with 3-D environments
  - translate design requirements into specifications
  - use correct file formats and archiving procedures.

Required knowledge

- basic programming techniques
- computer game development, including specific terminology
- current game-play hardware and software products
- environmental impact and sustainability considerations
- human resources required in the process of creating a game and their respective skills and technology requirements
- OHS requirements for:
    - ergonomics, such as when lifting
    - electrical safety
    - materials handling
    - physical hazards
- risk and critical path management
- technical constraints that hardware imposes on software development, graphics requirements, code development and creative visual design
- techniques for applying concept development skills
- techniques for applying concept visualisation skills.

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.

Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Evidence of the ability to: • demonstrate knowledge of advanced simulated effects • adapt design according to feedback • develop advanced simulation effects according to a production plan • use appropriate effects, such as particles, fluids and rigid or soft bodies • use programming languages to assist the creation of advanced simulation effects • maintain a portfolio of reference materials • produce a polished and finalised deliverable.
Context of and specific resources for assessment	Assessment must ensure access to: • computer hardware, software, games engines and file storage • internet access for research purposes • copyright and intellectual property legislation • OHS legislation and enterprise policy • appropriate learning and assessment support when required • modified equipment for people with special needs.

Method of assessment	A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:
	• evaluation of fault finding
	• observation of working prototypes
	• verbal questioning or interview concerning aspects of development, including:
	  • creation of advanced simulated effects
	  • design and choice of advanced simulated effects
	• review of reports and logbooks
	• review of working polished deliverable.

Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, where appropriate. 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.
	Indigenous people and other people from a non-English speaking background may need additional support.
	In cases where practical assessment is used it should be combined with targeted questioning to assess required knowledge.

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.

Particle systems may include:	• 3-D or 2-D system that simulates effects, such as:
	    • blood
	    • clouds
	    • dust
	    • explosions
	    • falling leaves
	    • fire
	    • fog
	    • fur
	    • grass
	    • hair
	    • light
	    • meteor trails
	    • moving water
	    • rain
	    • snow
	    • sparks
	    • splashing water
	• 3-D or 2-D system that creates abstract effects, such as:
	    • glowing trails
	    • magic effects.

Fluids may include:	• 3-D or 2-D simulation of effects, such as:
	    • blood
	    • gas
	    • lava
	    • oil
	    • plasma
	    • water.

Bodies may include:	• soft or rigid • fluids • primitives • solids.

Brief and documents may include:	• concept drawings, such as:
	   • illustrations
	   • models
	   • sketches
	• designer notes
	• development environment description
	• game design document
	• game-play designs
	• help notes
	• information design
	• operating manual
	• storyboard
	• style and design principles
	• style and medium
	• target market information
	• technical design document
	• technical design review process.

Advanced simulated effects may include:	• fluids • particle systems • rigid bodies • soft bodies.
Media may include:	• designs • games • images • movies • videos.
3-D environments may include:	• 3-D animations • 3-D games.
Design considerations may include:	• aesthetics • genre • target market • cultural context • resource limitations and constraints.
Personnel may include:	• animators • concept artists • game-play designers • graphic designers • instructional designers • modellers • motion capture technicians

	• other specialist staff • other technical staff • producers • programmers • project manager • sound engineers • team members • technical director • writers.
Feedback may involve:	• accepting and responding to comment, critique and suggestions from: 　• target audience representatives 　• clients 　• colleagues.
Programming languages may include:	• 3-D software embedded software language • C++ • Java • Ruby on Rails.
Code may include:	• code libraries • code objects • control loops • scripts.
Toolsets may include:	• integrated development environments, such as: 　• Code::Blocks 　• Eclipse 　• Microsoft Visual Studio 　• Net Beans • game assets, such as: 　• current work files 　• development kits 　• existing digital product libraries, e.g. character models, environments, motion capture data and sound effects 　• game engines, including customised game engines • 3-D modelling and animation software, such as: 　• 3ds Max 　• Blender 　• Cinema 4D 　• Houdini 　• Lightwave 　• Maya

	• Modo
	• XSI
	• ZBrush
	• compositing software, such as:
	    • after effects
	    • digital fusion
	    • flame
	    • nuke
	    • premier
	    • smoke.

Creating prototype may involve:	• bug fixing, bug databases, creating stable code bases and game tuning
	• building flexible systems, configurable by others
	• code review and test harnesses
	• designing and implementing tests and incorporating feedback from quality assurance
	• knowledge of games as dynamic systems:
	    • applying advanced simulated effects strategies in light of feedback from relevant personnel
	    • working with quality assurance and understanding test feedback
	• use of appropriate tools and skills for fast, interactive development.

Testing may include:	• unit • integration • system.
Polish may involve enhancing:	• game play • graphics • speed.
Requested form may include:	• 3-D application executable • 3-D game executable • 3-D rendered sequence.

Unit Sector(s)

Game development

     Innovation and Business Skills Australia