Digital Game and Simulation Programmer Skill Standards

TEXAS WORKFORCE
INVESTMENT COUNCIL

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Critical Work Function	Key Activity	Key Activity	Key Activity	Key Activity	Key Activity	Key Activity
1. Develop Computer Games or Simulations	1.1 Program computer graphics for games or simulations	1.2 Program rules for games or simulations	1.3 Program computer physics for games or simulations	1.4 Program computer animation for games or simulations	1.5 Program artificial intelligence for games or simulations	1.6 Program input/output for games or simulations
2. Develop Human/Computer Interactions for Games or Simulations	2.1 Create user interface for games or simulations	2.2 Program input interface for games or simulations	2.3 Program sensory feedback for games or simulations	2.4 Evaluate user interface for games or simulations		
3. Implement Network Connectivity for Games or Simulations	3.1 Program network protocols for games or simulations	3.2 Program multiplayer functionality for games or simulations	3.3 Program login process for games or simulations	3.4 Program clients/server communications for games or simulations		
4. Verify System Quality for Games or Simulations	4.1 Write unit tests for games or simulations	4.2 Test computer system integration and portability for games or simulations	4.3 Validate multi hardware/software compatibility for games or simulations	4.4 Test computer system performance for games or simulations	4.5 Validate computer system security for games or simulations	
5. Develop Documentation for Games or Simulations	5.1 Create technical design document for games or simulations	5.2 Create tutorials/demos/user guides for games or simulations	5.3 Create programming interface guides for games or simulations	5.4 Create in-code documentation for games or simulations	5.5 Create change lists for games or simulations	

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 1. Develop Computer Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
1.1 Program computer graphics for games or simulations	1.1.1 Shading and lighting techniques are implemented in games or simulations according to current company protocols. 1.1.2 Shadowing techniques are applied in games or simulations according to current company protocols. 1.1.3 Graphics APIs (Applied Program Interface) are implemented according to game or simulation industry standards. 1.1.4 Mathematical techniques are used for implementing animations according to game or simulation industry protocols. 1.1.5 Optimization techniques are used for graphics and visual components according to game or simulation industry protocols. 1.1.6 Visual effect (VFX) techniques are implemented in games or simulations according to current company protocols.	Knowledge of relevant computer programming languages Skill in operating computer systems Understand functions and programming of shaders and rendering pipelines Knowledge of mathematical concepts (e.g. matrix, vectors, transformation, game physics) for animation Knowledge of graphics hardware Knowledge of video card Knowledge of hardware specifications Understand software build, deploy, and execute functions Ability to implement exception handling	Operational graphics hardware Libraries for API with shading language support Graphics API documentation Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 1. Develop Computer Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
1.2 Program rules for games or simulations	1.2.1 Win/Loss conditions are executed according to game or simulation design document. 1.2.2 Scoring is tracked according to game or simulation design document. 1.2.3 Initial conditions are set according to game or simulation design document. 1.2.4 User receives feedback that rules are in place and are enforced according to game or simulation design document. 1.2.5 Users' rules produce the expected outcomes according to game or simulation design document.	Knowledge of relevant computer programming languages Skill in operating computer systems Knowledge of interaction with game and simulation software Ability to implement exception handling	Design requirements document Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 1. Develop Computer Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
1.3 Program computer physics for games or simulations	1.3.1 Physical calculations are applied to achieve static/dynamic/rigid body/non-rigid body/ragdoll according to company game or simulation standards. 1.3.2 Collision detections are implemented to attain realism according to game or simulation industry standards. 1.3.3 Optics (Line of sight) calculations are implemented to determine the visibility in the game or simulation according to industry standards. 1.3.4 Boundary detection is applied according to game or simulation industry standards. 1.3.5 Physics model(s) are implemented for realism according to game or simulation industry standards.	Knowledge of relevant computer programming languages Skill in operating computer systems Knowledge of mathematical concepts (e.g. matrix, vectors, transformation, game physics) for animation Knowledge of appropriate static/dynamic/rigid body/non-rigid body/ragdoll physics calculations Knowledge of a range of physical fields (basic chemistry, aerodynamics, and optics) Ability to implement exception handling Knowledge of storyboarding Knowledge of anatomical/skeletal motion and animation process Knowledge of three point perspective	Operational physics hardware Physics libraries and API documentation Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 1. Develop Computer Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
1.4 Program computer animation for games or simulations	1.4.1 Animation plays are implemented depending on 'state of play' defined in the game or simulation design document requirements. 1.4.2 Transformation stack is executed according to algorithms established in the game or simulation industry standards. 1.4.3 Animation blending techniques are implemented to create smooth transitions between clips according to game or simulation industry standards.	Knowledge of relevant computer programming languages Skill in operating computer systems Knowledge of storyboarding Knowledge of mathematical concepts (e.g. matrix, vectors, transformation, game physics) for animation Knowledge of anatomical/skeletal motion and animation process Knowledge of three point perspective	Animation software Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 1. Develop Computer Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
1.5 Program artificial intelligence for games or simulations	1.5.1 State machines execute behavioral models as defined by the game or simulation industry standards. 1.5.2 Pathfinding algorithms are applied to employ precomputed AI movement systems according to game or simulation industry standards. 1.5.3 Decision trees are executed to define the possible games according to game or simulation industry standards 1.5.4 Logic techniques are implemented to achieve the goals according to game or simulation industry standards. 1.5.5 Probabilistic reasoning is applied to the intelligent system according to game or simulation industry standards. 1.5.6 Learning techniques are utilized according to company game or simulation standards.	Knowledge of relevant computer programming languages Skill in operating computer systems Knowledge of behavior patterns Knowledge of analysis of algorithms, probability and statistics, data structure, logic propositional, first order, and finite state machines Knowledge of pathfinding algorithms Knowledge of decision making processes, and game theory Knowledge of machine learning	Gaming engines with AI capabilities Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 1. Develop Computer Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
1.6 Program input/output for games or simulations	1.6.1 All input sources are mapped according to company game or simulation standards. 1.6.2 System reacts with the input source controls according to game or simulation design document. 1.6.3 Logs are output to timestamp events according to game or simulation design document. 1.6.4 Sensory output is received by the player according to game or simulation design document. 1.6.5 Information is sent to external devices/systems according to game or simulation design document. 1.6.6 Micro transactions (i.e., in-game purchases) are available to players according to game or simulation design document 1.6.7 Infrastructure (i.e., build systems, content development and management tools, etc.) is created according to game or simulation design document.	Knowledge of relevant computer programming languages Skill in operating computer systems Word-processing and spreadsheet skills Knowledge of logging systems (including granularity, and methodologies) Knowledge and ability to implement common and specialized input and output technologies (e.g. joysticks, motion sensors, displays, and haptic feedback) Ability to implement exception handling	Input/Output hardware Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 1:

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Digital Game and Simulation Programmer																
CWF 1. Develop Computer Games or Simulations																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
3	3	4	5	5	5	5	3	4	5	3	4	4	4	4	5	5

Statement of Assessment for Critical Work Function 1:

The statements of assessment can do any of several things:
- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

A. Tests could include: Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge and skills that could:
    1) Apply relevant knowledge or skills
    2) Focus on the application of knowledge and skills to a new situation
    3) Demonstrate an ability to plan, organize, and create a product, service, or an event.
    4) Illustrate by individual performance the attained levels of knowledge and skills.
    5) Include observation of events, groups, and individuals that focuses on the relevant traits of the skill in question

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 2. Develop Human/Computer Interactions for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
2.1 Create user interface for games and simulations	2.1.1 Intended audience demographic is identified as specified in the game or simulation design document. 2.1.2 User interface is easily sensed by intended audience as specified in the game or simulation design document. 2.1.3 User interface is easily understood by intended audience as specified in the game or simulation design document. 2.1.4 User interface is adequate for intended audience as specified in the game or simulation design document. 2.1.5 User interface accommodates the minimum latency for intended audience as specified in the game or simulation design document.	Knowledge of relevant computer programming languages Skill in operating computer systems Ability to program user interfaces Knowledge of device drivers Knowledge of event handling Knowledge of intended hardware and software platform(s) Knowledge of GUI (Graphical User Interface) tools Basic knowledge of color theory	Access to GUI (Graphical User Interface) design tools Multiple output devices available for development and testing Multiple input devices available for development and testing Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 2. Develop Human/Computer Interactions for Games or Simulations		Occupational Skills, Knowledge & Conditions	
Key Activity	Performance Criteria *How do we know when the key activity is performed well or performed successfully?*	Occupational Skills & Knowledge *What should the technician know and what skills should the technician have in order to do the activity?*	Conditions *What tools must the technician use in order to do the activity?*
2.2 Program input interface for games and simulation	2.2.1 User interface accommodates the minimum latency for intended audience according to the game or simulation design document. 2.2.2 User interface is adequate for intended audience according to the game or simulation design document. 2.2.3 Interface device functionality is defined according to the game or simulation design document.	Knowledge of relevant computer programming languages Skill in operating computer systems Ability to program input interface Knowledge of device drivers Knowledge of event handling Knowledge of intended hardware and software platform(s) Knowledge of GUI (Graphical User Interface) tools Basic knowledge of color theory	Multiple input devices available for development and testing Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 2. Develop Human/Computer Interactions for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
2.3 Program sensory feedback for games and simulations	2.3.1 User interface accommodates the minimum latency for intended audience according to the game or simulation design document. 2.3.2 Sensory feedback is audience appropriate according to the game or simulation design document. 2.3.3 Sensory feedback provides required information for the user to interact with the environment according to the game or simulation design document.	Knowledge of relevant computer programming languages Skill in operating computer systems Ability to program sensory feedback Knowledge of device drivers Knowledge of event handling Knowledge of intended hardware and software platform(s) Knowledge of GUI (Graphical User Interface) tools Basic knowledge of color theory	Multiple input devices available for development and testing Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 2. Develop Human/Computer Interactions for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
2.4 Evaluate user interface for games or simulations	2.4.1 User interface accommodates the minimum latency for intended audience according to the game or simulation design document. 2.4.2 Duration of task is within ranges as defined for the intended audience according to the game or simulation design document. 2.4.3 "Human in the loop" testing using independent third party subjects are as specified in the game or simulation design document.	Knowledge of relevant computer programming languages Ability to program user interfaces Knowledge of device drivers Knowledge of event handling Knowledge of intended hardware and software platform(s) Knowledge of GUI (Graphical User Interface) tools Basic knowledge of color theory	Access to the intended audience Adequate testing area for the "human in the loop" testing Operational software and licenses Multiple input devices available for development and testing Multiple output devices available for development and testing

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 2:

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Digital Game and Simulation Programmers																
CWF 2. Develop Human/Computer Interactions for Games/Simulations																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
4	3	5	5	5	5	4	4	4	5	4	4	3	4	4	5	4

Statement of Assessment for Critical Work Function 2:

The statements of assessment can do any of several things:
- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

A. Tests could include: Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge and skills that could:
1) Apply relevant knowledge or skills
2) Focus on the application of knowledge and skills to a new situation
3) Demonstrate an ability to plan, organize, and create a product, service, or an event.
4) Illustrate by individual performance the attained levels of knowledge and skills.
5) Include observation of events, groups, and individuals that focuses on the relevant traits of the skill in question

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 3. Implement Network Connectivity for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
3.1 Program network protocols for games or simulations	3.1.1 Custom network connections are verified according to company game or simulation standards. 3.1.2 Network interruption requests are processed by the interrupt handler according to company game or simulation standards. 3.1.3 Real-time and non-real-time network protocol layers necessary for communication performance are implemented according to company game or simulation standards. 3.1.4 Network API is used for each layer according to company game or simulation standards.	Knowledge of relevant computer programming languages Skill in operating computer systems Knowledge of network topologies Knowledge of network layers Ability to implement exception handling	Network emulator (inject bad packets, set ping rates, and drop packets) Socket server or deployable hardware server Separate isolated network for server and clients Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 3. Implement Network Connectivity for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
3.2 Program multiplayer functionality for games or simulations	3.2.1 Channels for communication, including audio, chat, user state, and gaming state are implemented according to the game or simulation design document. 3.2.2 Server side user management database is implemented according to the game or simulation design document. 3.2.3 Grouping of players (including online and local networks) is implemented according to the game or simulation design document. 3.2.4 Team balancing mechanics are implemented as specified in the game or simulation design document. 3.2.5 System uses encrypted user data with salted keys as detailed in the game or simulation design document.	Knowledge of relevant computer programming languages Skill in operating computer systems Knowledge of databases (e.g., queries, structure, and Entity Relationship Diagram [ERD] design choices) Ability to implement exception handling Knowledge of multiplayer systems Knowledge of ranking systems, such as Elo rating system, named after Arpad Elo, the inventor of the rating system Knowledge of data transmission formats, such as Extensible Markup Language (XML) Knowledge of network security techniques Knowledge of encryption schemas	Database software deployed on a designated server Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 3. Implement Network Connectivity for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
3.3 Program login process for games or simulations	3.3.1 User connection management is implemented according to company game or simulation protocols. 3.3.2 Login is authenticated against third party servers according to company game or simulation protocols. 3.3.3 User account creation/recovery methods are implemented according to company game or simulation protocols.	Knowledge of relevant computer programming languages Skill in operating computer systems Ability to implement exception handling Knowledge of multiplayer systems and databases	API and documentation for third party authentication systems Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 3. Implement Network Connectivity for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
3.4 Program client/server communications for games or simulations	3.4.1 Division of authority between client and server is defined according to company game or simulation protocols. 3.4.2 Data is packaged and transmitted between client and server according to company game or simulation protocols. 3.4.3 Client/Server version control and patching system is implemented according to company game or simulation protocols. 3.4.4 Network data is verified for structural integrity according to company game or simulation protocols. 3.4.5 Telemetry functionality is implemented according to game or simulation design document.	Knowledge of relevant computer programming languages Skill in operating computer systems Ability to implement exception handling Knowledge of message structure and message passing protocols Knowledge of authority/optimization techniques between server and client	Multiple computers Operational software and licenses

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 3:

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Digital Game and Simulation Programmer																
CWF 3 Implement Network Connectivity for Games/Simulations																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
3	3	5	5	5	5	4	3	4	4	3	3	3	4	4	5	4

Statement of Assessment for Critical Work Function 3:

The statements of assessment can do any of several things:
- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

A. Tests could include:
   1)   Multiple Choice and essays that demonstrate understanding of knowledge being assessed.
   2)   Preparation and justification of a reasonable solution to a problem scenario.

B.   Hands-on exercises or simulations to demonstrate acquisition of knowledge and skills that could:
   1)   Apply relevant knowledge or skills
   2)   Focus on the application of knowledge and skills to a new situation
   3)   Demonstrate an ability to plan, organize, and create a product, service, or an event.
   4)   Illustrate by individual performance the attained levels of knowledge and skills.
   5)   Include observation of events, groups, and individuals that focuses on the relevant traits of the skill in question

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 4. Verify System Quality for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
4.1 Write unit tests for games or simulations	4.1.1 Comprehensive unit tests exist for units according to the game or simulation design document. 4.1.2 A test exists for functions of the unit according to the game or simulation design document. 4.1.3 Log of unit test execution exists for functions of the unit according to the game or simulation design document. 4.1.4 Successful tests are documented for functions of the unit according to the game or simulation design document. 4.1.5 Failed tests are logged for correction for functions of the unit according to the game or simulation design document.	Skill in operating computer systems Word-processing and spreadsheet skills Knowledge of unit test framework Knowledge of testing methodologies	Unit test framework Word-processor Spreadsheet

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 4. Verify System Quality for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
4.2 Test computer system integration and portability for games or simulations	4.2.1 The system integration test is designed to cover all requirements according to the game or simulation design document. 4.2.2 Supported platforms are successfully tested with client software according to the game or simulation design document. 4.2.3 System functionality is completed according to the game or simulation design document.	Skill in operating computer systems Word-processing and spreadsheet skills Knowledge of hardware and software compatibility Knowledge of system requirements Knowledge of supported platforms	Hardware and software release configuration All supported platforms Operational software and licenses Word-processor Spreadsheet

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 4. Verify System Quality for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
4.3 Validate multi hardware/software compatibility for games or simulations	4.3.1 Each type of client is tested against the server according to company game or simulation protocols. 4.3.2 Mixed version system is compatible or reacts according to the game or simulation design document. 4.3.3 Multiple technologies integrate according to defined borders in the game or simulation document.	Skill in operating computer systems Word-processing and spreadsheet skills Knowledge of hardware and software compatibility Knowledge of system requirements	Operational software and licenses Word-processor Spreadsheet All supported platforms

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 4. Verify System Quality for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
4.4 Test computer system performance for games or simulations	4.4.1 Profiler is run to check for memory and Central processing unit (CPU)/ Graphics processing unit (GPU) usage and performance according to the company game or simulation standards. 4.4.2 System latency is acceptable (e.g., responsiveness, and frame rate) according to the company game or simulation standards. 4.4.3 Bandwidth usage is acceptable according to company game or simulation standards. 4.4.4 Load times are acceptable according to company game or simulation standards. 4.4.5 Install size is acceptable according to company game or simulation standards.	Skill in operating computer systems Word-processing and spreadsheet skills Knowledge of software profiler output Ability to create effective surveys	Software profiler User's feedback survey Operational software and licenses Word-processor Spreadsheet Survey builder

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 4. Verify System Quality for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
4.5 Validate computer system security for games or simulations	4.5.1 All user data is encrypted according to company game or simulation protocols. 4.5.2 System performs basic integrity and security check according to the company game or simulation standards.	Skill in operating computer systems Word-processing and spreadsheet skills Knowledge of encryption methods Knowledge of security principles Knowledge of system administrative functions	Encryption keys Operational software and licenses Word-processor Spreadsheet

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 4:

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Digital Game and Simulation Programmer																
Critical Work Function 4. Verify System Quality for Games or Simulations																
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
4	4	4	5	5	5	5	3	3	4	3	3	3	4	4	4	4

Statement of Assessment for Critical Work Function 4:

The statements of assessment can do any of several things:
- *Define tools or strategies that industry could use to assess the level of competency a worker has attained in a particular critical work function.*
- *Define for trainers and educators how to assess the level of competency a student has attained relevant to the critical work function.*
- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

A. Tests could include:
1) Essays that demonstrate understanding of knowledge being assessed.
2) Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge and skills that could:
1) Apply relevant knowledge or skills
2) Focus on the application of knowledge and skills to a new situation
3) Demonstrate an ability to plan, organize, and create a product, service, or an event.
4) Illustrate by individual performance the attained levels of knowledge and skills.
5) Include observation of events, groups, and individuals that focuses on the relevant traits of the skill in question

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 5. Develop Documentation for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
5.1 Create technical design document for games or simulations	5.1.1 Computer based design is created according to the company game or simulation standards. 5.1.2 Design document is created for intended audience according to the company game or simulation standards. 5.1.3 Software requirements are identified according to the company game or simulation standards. 5.1.4 Technical design document is created to describe the internal structure of the code according to the company game or simulation standards. 5.1.5 Technical design document contains deliverable milestone expectations according to the company game or simulation standards. 5.1.6 Subset of complete technical design document is extracted according to the company game or simulation standards.	Skill in operating computer systems Knowledge of system modeling Knowledge of linear critical-path Ability to convert project specifications to technical designs Ability to identify gaps in project specifications Word-processing and spreadsheet skills	Flowcharting tool System modeling tool (e.g. Unified Modeling Language [UML]) Electronic publishing tools (word processing, web, wiki, presentation software)

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 5. Develop Documentation for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
5.2 Create tutorials/demos/ user guides for games or simulations	5.2.1 End user content is created to expose only public functionality according to the company game or simulation standards. 5.2.2 Features of the software are documented and validated according to the company game or simulation standards. 5.2.3 Subset of features is retrieved based on a demo document according to the company game or simulation standards. 5.2.4 Tutorial is implemented according to the company game or simulation standards.	Skill in operating computer systems Word-processing and spreadsheet skills Knowledge of supported platforms	Word-processor Hardware and software release configuration All supported platforms Features document

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 5. Develop Documentation for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
5.3 Create programming interface guides for games or simulations	5.3.1 Parameter names are self-descriptive according to the company game or simulation standards. 5.3.2 Output types are identified for the user experience according to the company game or simulation standards.	Skill in operating computer systems Word-processing and spreadsheet skills Knowledge of professional programming interface guides	Electronic publishing tools (word processing, web, wiki, presentation software)

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 5. Develop Documentation for Games or Simulations		**Occupational Skills, Knowledge & Conditions**	
Key Activity	**Performance Criteria** *How do we know when the key activity is performed well or performed successfully?*	**Occupational Skills & Knowledge** *What should the technician know and what skills should the technician have in order to do the activity?*	**Conditions** *What tools must the technician use in order to do the activity?*
5.4 Create in-code documentation for games or simulations	5.4.1 In-code documentation meets maintenance requirements according to the company game or simulation standards. 5.4.2 Names created are self-descriptive according to the company game or simulation standards.	Skill in operating computer systems Knowledge of language specific best practices	Programming software Style guide if available

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Occupational Title: Digital Game and Simulation Programmer			
Critical Work Function 5. Develop Documentation for Games or Simulations		Occupational Skills, Knowledge & Conditions	
Key Activity	Performance Criteria *How do we know when the key activity is performed well or performed successfully?*	Occupational Skills & Knowledge *What should the technician know and what skills should the technician have in order to do the activity?*	Conditions *What tools must the technician use in order to do the activity?*
5.5 Create change lists for games or simulations	5.5.1 Change list contains up-to-date information in accordance with company game or simulation standards. 5.5.2 Change list is accurate, clear and current according to the company game or simulation standards. 5.5.3 Change list is compared and added to historical change lists according to the company game or simulation standards. 5.5.4 Change list is archived according to the company game or simulation standards. 5.5.5 Change list is submitted for publication according to the company game or simulation standards.	Skill in operating computer systems Word-processing and spreadsheet skills Knowledge of requested software changes Knowledge of change process for games or simulations Knowledge of software change history	Word-processor Spreadsheet Revision control system

DIGITAL GAME AND SIMULATION PROGRAMMER SKILL STANDARDS

Academic and Employability Knowledge and Skill Matrix for Critical Work Function 5:

On a scale of 1 (lowest) to 5 (highest), identify the level of complexity required in each of these skills for the worker to perform the critical work function. Keep in mind that this scale is not for rating an individual's proficiency. It is intended only for rating the level of complexity required to do the work.

Occupational Title: Digital Game and Simulation Programming																	
CWF 5. Develop Documentation for Games or Simulations																	
Listening	Speaking	Using Information and Communication Technology	Gathering and analyzing Information	Analyzing and Solving Problems	Making Decisions and Judgments	Organizing and Planning	Using Social Skills	Adaptability	Working in Teams	Leading Others	Building Consensus	Self and Career Development	Writing	Reading	Mathematics	Science
4	4	5	5	4	4	5	4	4	4	3	3	3	5	5	3	3

Statement of Assessment for Critical Work Function 5:

The statements of assessment can do any of several things:
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- *Define the level of mastery of the critical work function that indicates that a worker or student has achieved an entry-, intermediate-, or advanced level of mastery of a critical work function.*

A. Tests could include:
    1)   Essays that demonstrate understanding of knowledge being assessed.
    2)   Preparation and justification of a reasonable solution to a problem scenario.

B. Hands-on exercises or simulations to demonstrate acquisition of knowledge and skills that could:
    1)   Apply relevant knowledge or skills
    2)   Focus on the application of knowledge and skills to a new situation
    3)   Demonstrate an ability to plan, organize, and create a product, service, or an event.
    4)   Illustrate by individual performance the attained levels of knowledge and skills.
    5)   Include observation of events, groups, and individuals that focuses on the relevant traits of the skill in question