

System and Software Development Life Cycle (SDLC) Methodology

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# Overview

## Purpose

This document presents the Utah Higher Education Assistance Authority (UHEAA) System and Software Development Life Cycle (SDLC) methodology to be used for managing all types of system and software development projects.

## Applicability

The methodology described in this document will be used to manage new system and software development projects, after it has been determined that the system change meets the requirements for the full project management process. Smaller development tasks, addressing any broken functionality, maintenance issues or emergency issues may not be subject to the full project management process but the principles and activities described in this document can be applied to those tasks to ensure that all system changes are documented, approved and disseminated appropriately.

A system change may be considered a system and software development project if some or all of the following criteria are met:

* The system change involves an outside vendor.
* The system change requires significant expenditures.
* The system change involves a significant amount of development time.
* The system change is for a new system, application or a new process.
* The system change involves more than one system and/or application.
* The system change requires new correspondence or updates to any existing type of correspondence and therefore requires approval.
* The system change is due to a change in regulations, state or Federal.
* The system change is due to efficiencies

## Methodology

The methodology used by UHEAA for system and software development projects will consist of an iterative approach to the waterfall model that is used in product development, meaning we may adopt smaller pieces of the overall project to flow through the phases at one time, providing faster “to-market” times. The waterfall model requires that a new phase cannot begin until all project stakeholders are satisfied with the progress of the phase. A stage gate review will be conducted at the end of each of these phases to review the artifacts and make a decision on whether or not to proceed to the next phase. If stakeholders are not satisfied with the progress, part or all of the phase will be repeated and a new phase will not begin until all stakeholders are satisfied.

Once the end of a phase has been reached, the stage gate review process takes place and the following activities occur. Some or all of these activities may be virtual (via email) in lieu of an actual meeting.

* Project team members discuss the artifacts of the phase including any issues or concerns identified during the phase.
* Project team members identify any additional issues or concerns that have not been previously identified and that may need to be closely monitored in subsequent phases. If possible, the root cause of the issue or concern, as well as any ways to prevent the issue or concern from recurring, are identified.
* The project manager solicits additional input from project team members.
* A clear understanding of the plan for the next phase is reviewed with all project team members.
* A formal decision is made on whether or not to proceed to the next phase.

The stage gate approval is formally documented in our tracking database.

Details about the specific activities that occur at the stage gate review at the end of each phase are included in the sections that follow.

The phases of the UHEAA SDLC are as follows:

• Charter Phase

• Requirements /Design Phase• Development/Acquisition Phase

• Testing Phase

• User Acceptance Phase

• Implementation Phase

• Post Implementation Phase

* Operations and Maintenance Phase
* Disposal Phase

Each phase consists of one or more activities which are described throughout this document.

A stage gate review will occur at the end of the following phases in the UHEAA SDLC:

* Requirements/Design Phase
* Development/Acquisition Phase
* Testing Phase

Stage gate reviews may also occur at the end of the following phases, but are not required for all projects.

* Implementation Phase
* Operations and Maintenance Phase
* Disposal/Transition Phase

In addition to the team responsible for each phase of the project, supporting representatives will contribute to all phases of the project and will participate in the stage gate reviews at the end of each phase. These supporting representatives include:

* The Development Steering Committee
* The Quality Assurance (QA) representative
* The Information Security representative
* System Users
* The Documentation representative (develops training materials)

The sections that follow contain more information on the teams that participate in each phase as well as the activities that occur prior to each stage gate review.

# Charter Phase

## Charter Phase Overview and Purpose

Once a system change has been designated as a system or software development project and the proposal section of the Project Charter is approved by the Development Steering Committee, the charter phase of the project begins. The purpose of the charter phase is to define the project’s objectives, purpose and scope. In the charter phase, the Project Charter is begun and the project team is assembled.

The Project Charter is a summary document that contains a description of the business need of the project, project goals, scope, risks, dependencies and assumptions as well as the key deliverables for the project and milestones. The Project Charter also lists the stakeholders of the project, system and human resources needed for the project, success criteria that will be used during the stage gate reviews to measure whether or not to proceed to the next phase of the project and it provides a clear understanding of what is expected and not expected throughout the development lifecycle.

There are representatives from all teams included on the overall project team. The following roles are part of the overall project team developed in this phase:

* Development Steering Committee
* Project Manager
* Quality Assurance representative
* Business Requirement representative
* System Development representative
* Business Testing representative
* System Users representative
* Documentation representative
* Change control representative
* Information Security representative
* IT representative, if necessary

For additional information on the teams within UHEAA that participate in system and software development projects, see Appendix B.

## Charter Phase Activities

The charter phase consists of several steps and activities. The following is a high-level list of the activities that will be performed in this phase.

* Establish the main project team and identify each sub-team on the project including the leads as well as the members of each sub-team.
* Hold the project concept meeting.
* Begin development of the Project Charter.
* Begin development of project level requirements.
* Verify current process documentation is current and accurate, if applicable.
* Obtain final approval of the project from the Development Steering Committee.

# Requirements/Design Phase

## Requirements/Design Phase Overview and Purpose

The purpose of the requirements/design phase is to document the requirements that must be implemented to meet the needs of the new system, system changes or new process. During this phase of the development life cycle, security considerations are key to diligent and early integration, thereby ensuring that threats, requirements, and potential constraints in functionality and integration are considered. Requirements, along with any necessary design specification details, are defined at a level of detail sufficient enough for the development phase to begin. Requirements/design documentation will primarily be completed by business analysts working closely with business managers and systems development representatives.

Depending on the type, scope, and size of the project, requirements documents may include more specific design specification details to give the System Development Team a “blueprint” to follow in the development phase. In addition, requirements artifacts may include prototypes, sketches, flowcharts, or screen designs to specify what has to be developed and implemented. This type of documentation is developed to give project team members a visual and more thorough understanding of the design of the system and to allow them to see how the design of the system will support the requirements.

At the beginning of the requirements/design phase, business units have an opportunity to present a specific business problem or need to stakeholders to brainstorm and discuss proposed implementation solutions. All stakeholders are given the opportunity to provide feedback on whether proposed solutions are viable, achievable, and in line with the organization mission objectives and budgetary constraints. Based on the discussions and feedback given, stakeholders will determine the best approach for the implementation solution. The business analyst will then work on detailing the solution within the requirements documentation.

Many types of requirements are defined in this phase. These include but are not limited to:

* Business Requirements
* User Interface Requirements
* Data Requirements
* Security Requirements
* Reporting Requirements
* External Interface Requirements
* Technical Requirements
* Hardware Requirements
* Performance and Usability Requirements

Other project team members participate in the requirements phase by providing guidance and information to the managers. These project team members include but are not limited to the:

* Quality Assurance representative
* Requirements/Design representative
* System Development representative
* Testing representative
* System Users
* Documentation representative
* Information Security representative

The following artifacts are produced as needed in the requirements/design phase of the UHEAA SDLC:

* Periodic Status Reports
* Final Project Business Requirements
* Draft Job Business Requirements
* Draft Prototypes, Sketches, Flowcharts, and Screen Designs
* Draft Correspondence (letters, notices, forms and Web pages, including any translations such as Spanish translations)
* Draft Reports
* System Security Plan
* Risk Assessment Report
* Schematic of Security Integration
* Final Correspondence
* Final Job Business Requirements
* Final Prototypes, Sketches, Flowcharts, and Screen Designs
* Draft Test Plan
* Draft Test Cases (specific test scenarios)
* Draft Training Materials
* Draft Procedures
* Information and System Security Categorization
* High-Level Security Requirements
* Draft Privacy Impact Assessment changes
* Draft Business Impact Assessment changes
* Development Phase Security Training Plan
* Project Communication Plan
* Finalized Project Charter
* If needed, updated versions of the artifacts developed in the previous phase.

The main responsibilities of the Requirements/Design Team are to:

* Conduct meetings to analyze the requirements/design and resolve issues and concerns.
* Develop the business requirement products that provide detailed information on system changes, report descriptions, file layouts and interface requirements.
* Document and explain design assumptions and constraints.
* Maintain all requirements products throughout all phases of the project.
* Provide support to other teams on the project including assisting in identifying the appropriate test data to successfully test the requirements.
* Ensure that the requirements are written in a testable, traceable and unambiguous manner.
* Conduct a team review of the draft requirements products and make the appropriate updates to the requirements products in response to feedback obtained at the team review.

## Requirements/Design Phase Activities

The requirements/design phase consists of several steps and activities. After the establishment of the Requirements/Design Team for the project and the assignment of roles and areas of responsibility for each team member, the following activities must be performed.

* Present the business problem or need to stakeholders to brainstorm and discuss proposed implementation solutions.
* Identify all the sources of requirements. Analyze the requirements materials and identify requirements that are ambiguous, incomplete or unclear.
* Conduct the necessary internal and external working sessions needed to clarify the requirements and any issues or concerns.
* Develop the draft requirements documents. Requirements documents may include but are not limited to business requirements documents, correspondence (letters, notices, forms and Web pages) reports, and draft design documents. One or more of any of these documents may be used depending on the needs of the project.
* Conduct an internal (Business Requirements Team) review of the draft requirements documents.
* Incorporate comments from the internal review into the draft requirements documents.
* Conduct a requirements review meeting for all project team members.
* Initiate Project-Security Planning
  + Ensure all key stakeholders have a common understanding of security implications, considerations, and requirements.
  + Outline initial key security milestones including time frames or development triggers that signal a security step is approaching.
  + Identify the key security roles to be carried out in the development of the system.
* Categorize Information system
  + Identify the information to be processed, transmitted, or stored and evaluate for security requirements.
  + Identify sources of security requirements, such as relevant laws, regulations, and standards.
* Identify the security requirements for Confidentiality, Integrity and Availability of the information.
* Design the security architecture and take into account services obtained externally, planned system interconnections, and the different orientations of system users.
* Analyze the security requirements and select NIST800-53 baseline security controls. Document the security controls in the System Security Plan
* Assess Privacy Impact
* Assess Business Impact
  + Linkage to Business Drivers
  + List of Core System Components
  + Initial Recovery Time and Point Objectives
* Ensure Secure System Development
  + Security Training for Development Team
  + Quality Assurance Plans
  + Development and Coding Standards including development environment
* Conduct a security risk assessment and use the results to supplement the baseline security controls.
* Conduct a stage gate review for the requirements/design phase.

## Role of Other Teams in the Requirements/Design Phase

Other project teams perform activities during the Requirements/Design Phase. These activities include:

* The Quality Assurance representative participates in the requirements/design process by reviewing the requirements documentation and test plans for accuracy and completeness.
* The Requirements/Design, Development and Testing representatives provide input into the requirements gathering process by participating in requirements/design review discussions.
* The Testing representative drafts the Test Plan and outlines the Test Cases.
* The System users provide end-user input into the requirements gathering process by participating in requirements review discussions.
* The Documentation representative develops an outline of the training materials and procedures that need to be developed.
* The Information Security representative ensures that the necessary security requirements are incorporated into the requirements/design. This includes ensuring that there are appropriate access levels established and the confidentiality and integrity of the data is not compromised by the design approach.
* The IT representative ensures alignment with current and future IT initiatives and standards.
* The Development Steering Committee participates in the stage gate review for the requirements/design phase and plays a key role in deciding whether the requirements/design phase can end and the development phase can begin.

## Requirements/Design Phase Stage Gate Review

The requirements/design phase stage gate review is a key milestone in the SDLC.

The requirements/design phase stage gate review occurs as documentation is completed with the following approval team members: Director of Support Services, Director of Operations, Manager of Systems Support, Manager of Application Development, and Information Security Officer, Operations BU Manager, and Systems Development Representative. These individuals will decide whether the requirements/design phase is complete and the development phase can begin. The following activities are completed as part of the stage gate review process.

* The project manager affirms that all tasks for the phase have been completed according to the project plan.
* The Requirements/Design representative attests that the requirements/design products are complete.
* The Requirements/Design representative explains any risks included in the design approach and the strategies that will be adopted to mitigate these risks.
* The Quality Assurance representative reviews the requirements/design products to ensure completeness, accuracy and consistency.
* The System Development representative confirms that the design is feasible and can be achieved with the development tools at hand.
* The Testing representative verifies that the requirements products were thorough enough to begin writing Test Cases.
* The Change Control representative confirms that the design is feasible and can be integrated into the existing system environment and architecture.
* The system users attest that the requirements products reflect the operating needs of the business.
* The Documentation representative attests that the requirements products were thorough enough to begin drafting the training materials and procedures.
* The Information Security representative attests that the requirements products reflect the necessary information system security requirements.
* The Information Security representative will evaluate the planned system design and potential integration with other systems as well as incorporation of shared services and common security controls.All project team members are given the opportunity to review the requirements products and any known issues or concerns ahead of the meeting to verify that the concept is still viable, complete, achievable, and in line with organization mission objectives and budgetary constraints.
* The Requirements Team recommend the Acquisition Strategy (if applicable) to be used throughout the remainder of the development process.
* The IT team reviews the requirements to ensure that the project harmonizes with IT vision, standards, and business requirements, as well as security alignment with current and imminent security services.
* The Development Steering Committee performs a Financial Review to verify that the system will be aligned with Capital Planning and Investment Control artifacts and guidance while balancing the cost implications associated with risk management.
* The Information Security representative performs a Risk Management Review to reduce ambiguity in managing system risk.

During the stage gate review meeting, a formal decision is made on whether or not to proceed to the development/acquisition phase.

# Development/Acquisition Phase

## Development/Acquisition Phase Overview and Purpose

The purpose of the development/acquisition phase is to convert the design proposed in the previous phase into system components. The development/acquisition phase is where new or modified system modules are developed or acquired and then unit tested to ensure they work according to the requirements developed in the requirements phase and conform to the design developed in the design phase. Developers will build the new software components from scratch or by modifying existing components, or components will be acquired. At the end of the development/acquisition phase, the results are verified by other project team members to ensure they are in compliance with project expectations. The development/acquisition phase is considered complete when all of the original requirements have been met and when the results correspond to the specified design.

Other project team members participate in the development/acquisition phase by providing input to the Development Lead and Developers. The project team members include but are not limited to the:

* Quality Assurance representative
* Requirements representative
* Design representative
* Testing representative
* System users
* Change Control representative

The following artifacts are produced as needed in the development/acquisition phase of the UHEAA SDLC:

* Periodic Status Reports
* New Modules
* Modified Modules
* Preliminary Unit Tests
* Final Test Plan
* Final Test Cases
* Security Assessment Scenarios
* Initial documents for security assessment and authorization process.
  + - CM Plan
    - CP Plan
    - Continuous Monitoring Plan
    - Security awareness and training plan
    - Incident Response Plan
* Final Unit Tests
* Draft Release Specification
* If needed, updated versions of any of the artifacts developed in previous phases.

The main responsibilities of the System Development Team are to:

* Perform the development and coding of the new system components and system changes.
* Perform QA testing.
* Document QA test results.
* Provide support to other teams on the project including supporting the Testing Team by providing various builds, creating queries to find test cases and providing corrections to defects identified by the Testing Team.
* Conduct a Peer Review where unit test results are demonstrated and make the appropriate updates to system components in response to feedback obtained at the Peer Review.

## Development/Acquisition Phase Activities

The development /acquisition phase consists of several steps and activities. After the establishment of the System Development Team for the project and the assignment of roles and areas of responsibility for each team member, the following activities must be performed.

* Determine the appropriate development tools.
* Identify the official artifacts of the project produced to date. This may include the Project Requirements Document, the final DSD and any other necessary artifacts needed to gain an understanding of the development requirements.
* Analyze the project artifacts and identify any issues or concerns.
* Conduct the necessary internal and external working sessions needed to clarify any issues or concerns.
* Identify the specific modules that require modifications and the new modules that need to be developed to meet the requirements.
* Develop the necessary new modules and modify specific code in existing modules.
* Define, create and maintain databases and tables.
* Develop a plan to install the new or modified code into a production environment.
* Draft module promotion instructions
* Perform QA testing and document preliminary unit test results.
* Conduct the Peer Review of the preliminary unit test results. Participants are given the opportunity to walk through the preliminary unit test results in their entirety and to elaborate in any areas where they have questions. Written comments are brought to the meeting. Additional comments during the meeting are documented. Minutes from the Peer Review are then published.
* Incorporate comments from the Peer Review into the new or modified modules. This includes written comments collected at the Peer Review as well as any issues discussed at the meeting.
* Conduct a stage gate review for the development phase.
* Deliver the completed new and modified modules to the Testing Team.
* Security controls are implemented and become part of the system rather than applied at completion.
* Develop potential security assessment scenarios to identify vulnerabilities or limitations.
* Develop Security Documentation and prepare initial documents for security assessment and authorization process.
  + - CM Plan
    - CP Plan
    - Continuous Monitoring Plan
    - Security awareness and training plan
    - Incident Response Plan

## Role of Other Teams in the Development/Acquisition Phase

Other project teams perform activities during the development phase. These activities include:

* The Quality Assurance representative reviews the unit tests to ensure that they meet the requirements.
* The Requirements, Design, and Testing representatives, System Users and Information Security representative respond to and resolve questions from the developers and review the preliminary and final unit test results to ensure that they meet the business requirements, functional design and security requirements. Any changes to previous document drafts must be finalized.
* The Testing Team finalizes the test plan and test cases.
* The Change Control representative reviews the plan for installing the new or modified software modules or systems into production.

## Development/Acquisition Phase Stage Gate Review

The development /acquisition phase stage gate review is a key milestone in the SDLC.

The Manager of Application Development provides input into whether the development phase is complete and the testing phase can begin.

The following activities are completed during the stage gate review process:

* The System Development representative attests that development is complete.
* The Manager of Application development verifies:
  + All previous Stage Gates are complete
  + Any code review findings have been implemented (if code review completed at this stage)

The “Application Development – Code Review” document has been filled out for scripts (if the code review was completed at this stage).

During the stage gate review process, a formal decision is made on whether or not to proceed to the testing phase.

# Testing Phase

## Testing Phase Overview and Purpose

The purpose of the testing phase is to demonstrate that the development performed in the development phase conforms to the requirements defined in the requirements phase and the design specified in the design phase. This phase also includes the process of verifying that various components of the system are integrated together properly and work together as a whole. *This phase is more than likely the biggest use of project resources because it occurs relatively late in the project and may cause one or more previous phases to be partially or completely repeated if deficiencies are found.* However, due to the stage gate reviews performed in previous phases, the probability of needing to completely repeat previous phases is expected to be minimal.

Several types of testing occur as needed in this phase. They include:

* Integration Testing (to verify that all developed components work together)
* QA testing (to verify functionality)
* Section 508 Compliance Testing (to verify that the functionality is accessible to persons with disabilities), where applicable
* Security Testing or Security Assessment and Authorization Testing (to verify that all security components of the system work properly)
* Inter-System Testing , when applicable (to verify that the system as a whole is capable of interfacing with other internal or external systems)
* Stress Testing (to verify that the system is capable of performing beyond the limits of normal operation)
* Regression Testing (to test the functionality from start to finish)

In the testing phase, components are also tested to ensure that they are capable of meeting data, performance and usability requirements documented in the requirements products during the requirements phase.

Other project team members participate in the testing phase by providing guidance and information to the Test Lead and to the Test Analysts. These project team members include but are not limited to the:

* Quality Assurance representative
* Requirements representative
* System Development representative
* System Users
* Documentation representative
* Information Security representative

The following artifacts are produced as needed in the Testing Phase of the UHEAA SDLC:

* Periodic Status Reports
* Periodic Test Summary Reports
* Completed Test Results
* Defect Summary Report
* Final Training Materials
* Final Procedure Manuals
* If needed, updated versions of the artifacts developed in previous phases.
* Security Assessment and Authorization Plan
* Verified List of Operational Security Controls
* Completed System Security Documentation
* Security Assessment Report
* Input for POA&M
* Potential list of documentation updates
* Security authorization package
* Security authorization decision
* Final security authorization package

The main responsibilities of the Testing Team are to:

* Develop the Test Plan.
* Develop the Test Cases.
* Develop the acceptance criteria and tolerances for testing.
* Define the acceptable number of test cycles for each type of testing that is performed in the Testing Phase.
* Provide support to other teams on the project including providing comments and feedback on requirements products, design products and any other project artifacts as appropriate.
* Participate in establishing the appropriate test environments to perform all types of testing.
* Assist in identifying the appropriate test data to successfully test the requirements.
* Execute the Test Cases.
* Coordinate and Participate in Inter-System testing with external parties, when applicable.
* Document test results for all types of testing.
* Identify a defect management strategy.
* Track defects and support re-test activities that are needed as a result of defects.
* Perform functional and security testing.

## Testing Phase Activities

The testing phase consists of several steps and activities. After the establishment of the Testing Team for the project and the assignment of roles and areas of responsibility for each team member, the following activities must be performed as needed.

* Identify the official artifacts of the project produced to date. This may include the Project Requirements Document, the final DSD and any other necessary artifacts needed to gain an understanding of the design requirements.
* Analyze the project artifacts and identify any issues or concerns.
* Establish the testing environment ensuring that it mirrors the planned production environment.
* Obtain official versions of the modified code or new code developed in the development phase.
* Perform Integration Testing and document results.
* Perform QA testing and document results.
* Perform Section 508 Compliance Testing, where applicable, and document results.
* Perform Security Testing and document results.
* Perform Inter-System Testing and document results.
* Perform Stress Testing and document results.
* Perform Regression Testing and document results.
* Perform final code review.
* Implement code review findings before completion of testing.
* Make recommendations to update artifacts developed in previous phases based on any of the test results.
* Certify that the system changes conform to (or do not conform to) the requirements.
* Configure and enable system security features.
* Information Security to perform security testing.
* Conduct a stage gate review for the testing phase.

## Role of Other Teams in the Testing Phase

Other project teams perform activities during the testing phase. These activities include:

* The Quality Assurance representative reviews the test results to ensure that they are complete.
* The Requirements representative reviews the test results to ensure that they are consistent with the requirements.
* The System Development representative reviews the test results to ensure that the Test Cases were executed properly.
* The System users review the test results to ensure that they reflect end user requirements and the operating needs of the business.
* The Information Security representative reviews the test results to ensure that they conform to the information security requirements identified in the Requirements Phase of the project.

## Testing Phase Stage Gate Review

The testing phase stage gate review is a key milestone in the SDLC and is a critical decision point on whether end users will be given the opportunity to perform final validation and user acceptance of the system changes in the user acceptance phase of the project.

The testing phase stage gate review occurs as documentation is completed with the following approval team members: Director of Support Services, Manager of Application Development, Information Security Officer, and the BU representative. These individuals provide their feedback as to whether the testing phase is complete and the user acceptance phase can begin. The following activities are completed during the stage gate review.

* The Testing Lead attests that all test scripts have been executed and that testing is complete.
* The Testing Lead attests that all defects have been addressed.
* The Quality Assurance representative reviews the test results to ensure completeness. Test results are compared to requirements, design and unit tests to ensure completeness and consistency.
* The Requirements representative attests that the requirements products have been updated to reflect any changes or clarifications obtained while executing test scripts or addressing defects.
* The System users attest that the test results reflect the requirements and that the defects have been addressed properly.
* The Manager of Application development verifies:
  + Any code review findings have been implemented.
  + The “Application Development – Code Review” document has been filled out (for scripts only).
* The Information Security representative verifies that security requirements have been tested and that the test results conform to the system security requirements.

During the Stage gate review a formal decision is made on whether or not to proceed to the next phase.

# User Acceptance/Authorization Phase

## User Acceptance Phase Overview and Purpose

The purpose of the user acceptance/authorization phase is to obtain final verification of the proper functioning of the system and to ensure that the business needs driving the project have been met and that the newly developed system does not in any way impede the ability for end users to perform their work. While system users are involved in most of the previous phases of the project including Stage gate reviews, the User acceptance phase is where the system users will be given the final opportunity to review the system changes to ensure changes are compatible with business operations.

In the user acceptance/authorization phase, the project manager’s goal is to obtain from the System users a level of confidence that the system changes meet the end users’ day-to-day needs. In addition, the User acceptance phase is the final opportunity to detect any defects that were not previously identified.

Finally, if there are any governmental, legal or contractual acceptance criterion that must be met before the system changes can be implemented, this consensus is obtained in the User acceptance/authorization phase. This includes the security assessment and authorization by Department of Education/FSA.

At this point, the training materials developed during the project are implemented and the new Procedure Manuals are rolled-out by the Documentation representative to all end users.

Other project team members participate in the User acceptance/authorization phase by providing input and assistance to the System users. These project team members include but are not limited to the:

* Quality Assurance representative
* Requirements representative
* Testing representative
* Documentation representative
* Information Security representative

The following artifacts are produced when only user acceptance is required in the User acceptance/authorization phase of the UHEAA SDLC:

* User Acceptance Sign-Off and Approval (can be electronic)

The following artifacts are produced when System Authorization is required in the User acceptance/authorization phase of the UHEAA SDLC:

* User Acceptance Sign-Off and Approval
* Security Assessment and Authorization Plan
* Security Assessment Report
* Security Authorization Decision (ATO)
* Final Security Authorization Package

The system users are the team primarily responsible for the activities performed in the User acceptance portion of this phase of the project. The main responsibilities of system users are to review the developed and tested code to:

* Ensure that it conforms to the requirements
* Ensure that it meets the day-to-day needs of end users
* Ensure that it does not impede business operations
* Identify any areas where re-testing or additional testing may be needed
* Participate in Regression Testing with the Testing Team
* Manage the User Acceptance Sign-Off process

The System Owner, assessor, Information Security representative, Audit Coordinator and Authorizing Official are the team primarily responsible for the activities performed in the System Authorization portion of this phase of the project. The main responsibilities of this team are to:

* Prepare and manage the security assessment
* Ensure that all material required for the security assessment are updated and conduct remediation actions based on assessment findings
* Perform the security assessment and issue a Security Assessment Report
* Prepare the POA&M and assemble the security authorization package
* Submit the security authorization package for security authorization decision
* Review security authorization package and make security authorization decision

## User Acceptance/Authorization Phase Activities

The User acceptance/authorization phase consists of several steps and activities. After the establishment of the team of system users for the project and the assignment of roles and areas of responsibility for each team member, the following activities must be performed.

* Review Integration Testing results
* Review Acceptance Testing results
* Review Section 508 Compliance Testing results, where applicable
* Review Security Testing results
* Review Inter-System Testing results
* Review Stress Testing results
* Review Regression Testing results
* Recommend re-testing where needed
* Recommend additional testing where needed
* Participate in Regression Testing with the Testing team if needed
* Certify that the system changes conform (or do not conform) to the needs of the business
* Training materials are distributed
* Procedures are distributed

After the User acceptance activities are performed, if the system must be formally assessed prior to being granted formal authorization to operate, the phase also includes the following activities:

* The Audit Coordinator arranges for an independent security assessment
* The assessor validates the security controls and provides a Security Assessment Report.
* The Authorizing Official provides the Security Authorization Decision.

## Role of Other Teams in the User Acceptance/Authorization Phase

Other project members perform activities during the User acceptance phase. These activities include:

* The Quality Assurance representative reviews the User Acceptance Sign-Off and Approval to ensure it is complete.
* The Testing representative performs Regression Testing as needed.
* The Documentation representative finalizes the training materials that were developed as a result of the project requirements.
* The documentation team distributes training materials after user acceptance is finalized.
* The documentation team distributes updated procedures after user acceptance is finalized.
* The Change Control representative prepares for the Production Readiness Review (PRR) and prepares to install the software into a production environment.
* The Audit Coordinator prepares and facilitates the security assessment.
* An independent assessor performs the security assessment.
* The Authorizing Official provides the Security Authorization Decision.

# Implementation Phase

## Implementation Phase Overview and Purpose

Implementation occurs after all prior Stage gate reviews have been performed and after the User Acceptance Sign-Off and Approval is completed by the system users. The implementation phase is when the system changes developed during the project are installed into a production environment and the new system is rolled out to end users who begin using it in day-to-day operations. Prior to implementation, the Change Control representative conducts a Production Readiness Review (PRR) with all project stakeholders. The PRR is the last opportunity for management to decide if the system changes will be implemented as scheduled or if the installation of the software should be postponed. If the decision is made to implement the system changes, all impacted departments and users of the system are notified.

In addition to the PRR, the Change Control representative is responsible for completing an Implementation Checklist and Release Specification. The Implementation Checklist ensures that no tasks are overlooked during the installation of the software and that the migration of the system changes into a live production environment is successful. The Release Specification provides a technical summary of the system changes that are included in the software installation.

Other project team members participate in the implementation phase of the project as well. The project members include but are not limited to the:

* Quality Assurance representative
* Documentation representative

The following artifacts are produced in the implementation phase:

* Implementation Checklist
* Release Specification

The main responsibilities of the Change Control representative are to:

* Perform software builds under the appropriate level of configuration management.
* Ensure that the new software is operational in a production environment.
* Participate in post-implementation activities as needed.

## Implementation Phase Activities

The implementation phase consists of several steps and activities. After the establishment of the Implementation Team for the project and the assignment of roles and areas of responsibility for each team member, the following activities are performed.

* Sign-offs from all phases of the project are collected and retained
* The Implementation Checklist is finalized
* The Release Specification is developed
* The PRR is conducted
* The software is installed in the production environment

## Role of Other Teams in the Implementation Phase

Other project teams perform activities during the implementation phase. These activities include:

* The Quality Assurance representative reviews the Implementation Checklist and Release Specification for accuracy and completeness.

# Post Implementation Phase

## Post Implementation Phase Overview and Purpose

The post implementation phase occurs after the system changes have been installed in the production environment. The purpose of the post-implementation phase is to identify and report any issues or problems that were not encountered in any of the previous phases. If issues are serious enough, management may decide to ‘roll back’ the changes and revert to the version of the software that was in production prior to implementation of the changes. Other objectives of the post-implementation phase include performing periodic system security reviews, identifying changes to improve efficiency and performance and addressing any additional user requirements that were not previously addressed. The team of system users is the team that is primarily responsible for performing the activities in the post-implementation phase but other project team members, such as the Information Security representative may also play a role in this process.

The following artifacts are produced in the Post Implementation Phase of the UHEAA SDLC:

* Post-Implementation Issues Log
* Corrective Action Plan for Post-Implementation Issues

The main responsibilities of the System users in the post implementation phase are to:

* Identify issues with the system changes that have been moved into production that impede day-to-day operations.
* Coordinate the implementation of re-developed modules with the Change Control Representative.
* Identify opportunities to improve the user experience.

## Post Implementation Phase Activities

The post-implementation phase consists of several steps and activities. After the establishment of the Post-Implementation team (i.e., the System users) for the project and the assignment of roles and areas of responsibility for each team member, the following activities must be performed as needed.

* Issues identified by the Post-Implementation representative are logged and prioritized.
* Issues are prioritized and tracked.
* A corrective action plan for each issue is developed.
* Issues and the corrective action plan for each issue are reviewed with the project team.
* The project team makes a decision on whether or to address each issue and the best time to address each issue.
* One or more of the activities or phases are repeated as needed (i.e., testing or user acceptance may be repeated).

Software changes may be made and promoted to correct small errors and omissions not found during any of the previous stages. These changes must fall under the purview of the current requirements documentation for the job.

# Operations and Maintenance Phase

## Operations and Maintenance Phase Overview and Purpose

In this phase, systems are in place and operating, enhancements and/or modifications to the system are developed and tested, and hardware and/or software is added or replaced. The system is monitored for continued performance in accordance with security requirements and needed system modifications are incorporated. The operational system is periodically assessed to determine how the system can be made more effective, secure, and efficient. Operations continue as long as the system can be effectively adapted to respond to the organization’s needs while maintaining an agreed-upon risk level. When necessary modifications or changes are identified, the system may re-enter a previous phase of the SDLC.

The following artifacts are produced in the Operations and Maintenance phase of the UHEAA SDLC:

* Evaluation of security implications due to changes
* CCB Decisions
* Updated Security Documentation
* Security Evaluations
* POA&M Review
* Documented Results of Continuous Monitoring
* Security Reauthorization Decision when necessary

## Operations and Maintenance Phase Activities

The Operations and Maintenance phase consists of several steps and activities. After the establishment of the Operations and Maintenance team (i.e., the System users) for the project and the assignment of roles and areas of responsibility for each team member, the following activities must be performed.

* Review Operational Readiness
* Configuration Management and change control activities
* Continuously monitor system performance against pre-established user and security requirements

## Role of Other Teams in the Operations and Maintenance Phase

Other project teams perform activities during the operations and maintenance phase. These activities include:

* The Change Control representative reviews configuration management and change control activities.
* The Information Security Office continuously monitors system performance against security requirements.

## Operations and Maintenance Phase Change Control Review

The operations and maintenance phase change control review is a key milestone in the SDLC and an ongoing component in information system configuration management.

The Information Security and Change Control representatives have input into whether all activities in the operations and maintenance phase are complete and if the continued operation of the information system is authorized. The Change Control Board has final decision on any changes to the baseline configuration of the hardware, software, and firmware components for the information system. The following activities are completed during the Change Control Board meeting.

* Operational Readiness Review to evaluate technical and security implications due to system changes
* Change control board review of proposed changes
* POA&M Review
* Authorization Decision (Every 3 years or after a major system change)

During the Change Control Board meeting, a formal decision is made on whether or not to proceed with modifications.

# Disposal/Transition Phase

## Disposal/Transition Phase Overview and Purpose

The Disposal/Transition phase, the final phase in the SDLC, provides for disposal of a system in place. Information security issues associated with information and system disposal should be addressed explicitly. When information systems are transferred, become obsolete, or are no longer usable, it is important to ensure that government resources and assets are protected.

Usually, there is no definitive end to a system. Systems normally evolve or transition to the next generation because of changing requirements or improvements in technology. System security plans should continually evolve with the system. Much of the environmental, management, and operational information should still be relevant and useful in developing the security plan for the follow-on system.

The following artifacts are produced in the Disposal/Transition phase of the UHEAA SDLC:

* Disposal/Transition Plan
* Index of Information, Location, and Retention Attributes
* Media Sanitization records
* Disposition Records for Hardware and Software
* Documentation Verifying System Closure

## Disposal/Transition Phase Activities

The disposal/transition activities ensure the orderly termination of the system and preserve the vital information about the system so that some or all of the information may be reactivated in the future, if necessary. Particular emphasis is given to proper preservation of the data processed by the system so that the data is effectively migrated to another system or archived in accordance with applicable records management regulations and policies for potential future access.

The following activities must be performed.

* Develop plans for discarding system information, hardware and software
* Ensure Information Preservation
* Dispose of Hardware and Software
* Sanitize Media
* Close System
* Update the system security plan

## Role of Other Teams in the Disposal/Transition Phase

Other project teams perform activities during the disposal/transition phase. These activities include:

* The Change Control representative reviews the plan for discarding the information, hardware and software.
* The Information Security representative updates the system security plan and ensures the preservation of information.
* The Information Technology representative disposes of the hardware and software, and sanitizes the media.

## Disposal/Transition Phase Change Control Board Review

The disposal/transition phase change control review is a key milestone in the SDLC to ensure the orderly termination or transition of the system.

The Information Security and Information Technology representatives have input into whether all activities in the disposal/transition phase are complete. The Change Control Board has final decision on system disposal and transitions. The following activities are completed during the Change Control Board meeting.

* Validate all necessary activities are complete
* Security Review of Closure

# Teams That Participate in Software Development Projects

|  |  |
| --- | --- |
| **Organization** | **Team Members** |
| Development Steering Committee | AED for Operations  Director of Support Services  Director of Operations  Manager of Systems Support  Manager of Application Development  Information Security Officer (ISO)  Manager of Operational Accounting (Accounting rep)  Collections Officer III (Guarantor Ops rep) |
| Project Team | Business unit representative  AED for Operations  Director of Support Services  Director of Operations  ISO  Manager of Operational Accounting, if applicable  Collections Officer III, if applicable  Business analyst  Programmer(s)  Testing representative  Documentation representative  QA representative |
| Business Requirements/Design Team | Business unit representative  Business Analyst  Programmer(s)  Documentation representative  Testing representative  Training representative  ISO |
| System Development Team | Programmer(s) |
| Testing Team | Business Analyst  Testers  ISO |
| Quality Assurance (QA) team | Business unit representative |
| Documentation Team | Business unit rep assigned to procedures  Business unit rep assigned to training |
| System Users | Business unit representatives |