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Section 5. Evaluate System

5.0 Evaluate System

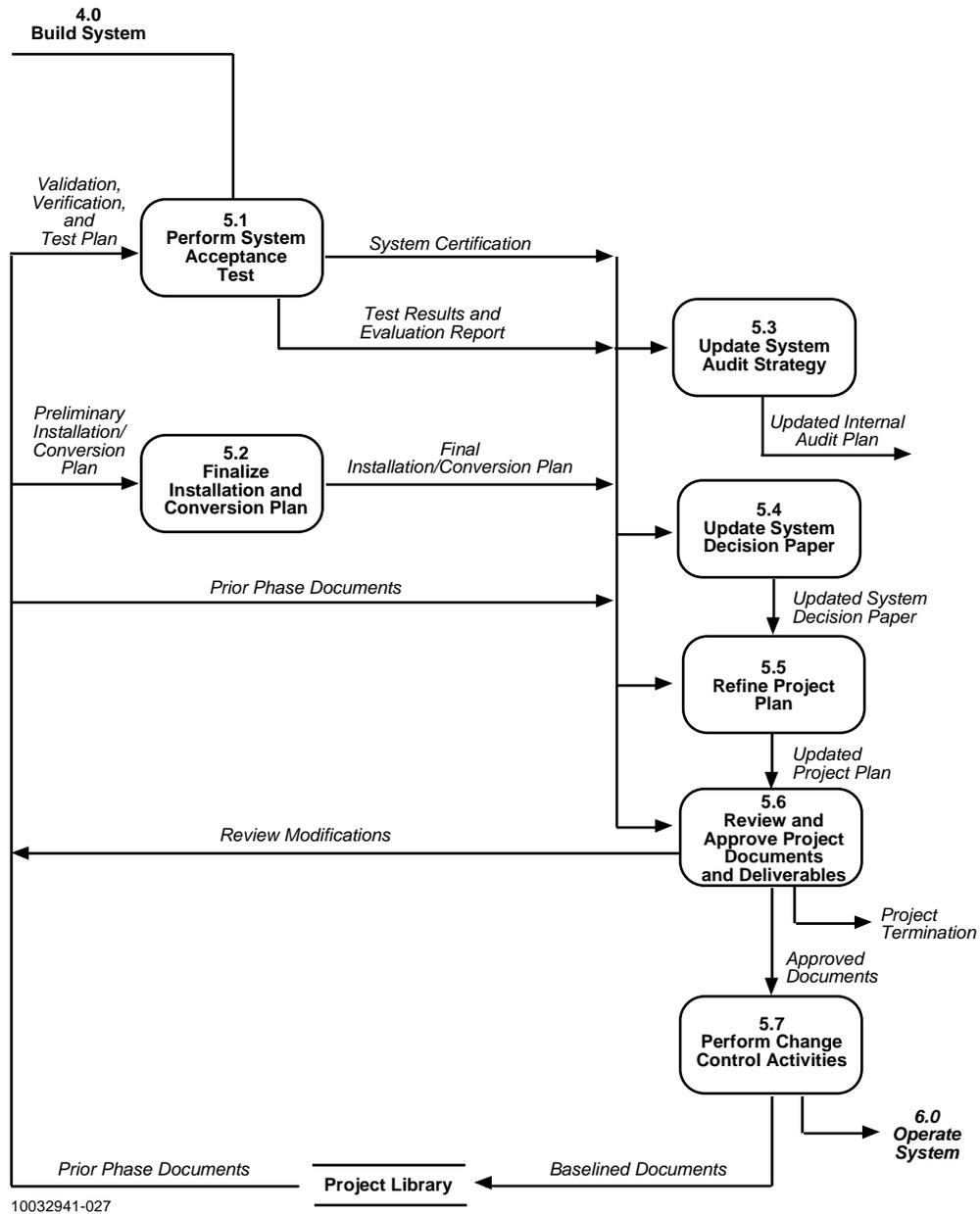


Figure 5-1. Process Flow for Evaluate System Phase

5.0 EVALUATE SYSTEM

Purpose

The Evaluate System phase is the period in which independent testers measure the system's ability to perform the functions that are required by the user and ensure an acceptable level of performance and security. After this phase of development is completed, a clear indication of the system's overall readiness for operation is evident. Figure 5-1 highlights the process flow for the Evaluate System phase.

Overview

During the Evaluate System phase, the system undergoes a complete and thorough System Acceptance Test conducted by a test team that is designated by the project sponsor and is independent of the software development organization. Each of the system acceptance test procedures and scenarios, documented in the VV&T Plan, is executed. The results of the system acceptance test, as well as the testing methods employed, are documented for final approval.

During the Evaluate System phase, conduct the following activities:

- Execute each test according to steps documented for the test's procedure or scenario in the VV&T Plan.
- Record and track results of the tests, and compare them against expected results.
- Document and report any errors detected using the project's error reporting and correction procedures. Retest corrections submitted by the project development team.
- Once all tests are executed, compile and document the results, along with a summary of the system's readiness for production, in the Test Results and Evaluation Report. Be sure to include the security certification of the system in the report.
- Submit the report for review by appropriate project personnel and review boards.
- Perform functional and physical configuration audits.
- Security certification and accreditation
- Finalize the Installation and Conversion Plan based on any modifications necessary to the system as a result of testing; address all applicable installation and conversion procedures, including pilot and production sites.
- Revise, as necessary, all deliverables produced during prior phases of development to reflect changes required by the system as a result of testing or to reflect changes in strategy as a result of activities performed during testing.

- Track all deliverable products produced using the project's CM procedures, to include placing products under configuration control when originally produced and controlling changes when modifications to the controlled items are made.
- Perform project reviews of all products shown in Table 5-1; obtain approval of Evaluate System phase products from the appropriate review boards.
- Present the System Decision Paper and supporting documentation to the appropriate review board at the end of this phase. Projects that receive review board approval continue to the next phase, the Operate System phase.

Table 5-1. Evaluate System Phase Functions and Products

Evaluate System Functions	Products
5.1 Perform Systems Acceptance Test	Test Results and Evaluation Report
5.2 Finalize Installation and Conversion Plan	Installation and Conversion Plan (final)
5.3 Update System Audit Strategy	Internal Audit Plan (updated)
5.4 Update System Decision Paper	System Decision Paper (updated)
5.5 Refine Project Plan	Project Plan (updated)
5.6 Review and Approve Documents and Deliverables	New and revised products Management Summary ¹
5.7 Perform Change Control Activities	Change control records

¹A management summary is prepared for each product produced or revised during the Evaluate System phase. This one-page summary includes a summary of the essential data collected in a document product, conclusions that may be drawn from the document, and potential impacts on the project, if applicable.

Standards and Guidelines

Follow HUD SDM documentation standards and project guidelines during development of the Evaluate System phase products.

In accordance with the Federal Information Security Management Act (FISMA), HUD is required to comply with the guidance in the following NIST special publications:

- (SP) 800-12, *Introduction to Computer Security: the NIST Handbook*
- (SP) 800-14, *Generally Accepted Principles and Practices for Securing Information Technology Systems*
- (SP) 800-18, *Guide for Developing Security Plans for Information Technology Systems*
- (SP) 800-30, *Risk Management Guide for Information Technology Systems*
- (SP) 800-37, *Guide for the Certification and Accreditation of Federal Information Systems*
- (SP) 800-53, *Recommended Security Controls for Federal Information Systems*
- (SP) 800-60, *Guide for Mapping Types of Information and Information Systems to Security Categories*
- (SP) 800-64, *Security Considerations in the Information System Development Life Cycle*

- FIPS 199, *Standards for Security Categorization of Federal Information and Information Systems*

These publications are located at <http://csrc.nist.gov/publications/nistpubs/index.html>.

The HUD *Enterprise Data Management Policy* (Handbook 3260.1) and *Total Information Quality Management Handbook* (3300.1) are also applicable to all HUD system development efforts.

Roles and Responsibilities

Throughout the Evaluate System phase of development, key personnel are required to perform the various tasks and activities outlined in the SDM. Table 5-2 lists types of personnel required and the activities for which they are responsible.

Table 5-2. Roles and Responsibilities for Evaluate System Phase (1 of 2)

Role	Responsibility
Project Sponsor	Provides input and approves changes to project schedule and Project Plan. Provides input to Installation and Conversion Plan. Reviews and approves system certification.
Project Manager	Assists activities of the system acceptance test team. Coordinates security certification and accreditation. Reviews and approves system certification. Issues Release Request. Coordinates with IG staff, as required. Updates System Decision Paper, as necessary. Determines needed changes to prior phase documents and ensures revision in accordance with the overall Project Plan. Coordinates review of Evaluate System phase deliverables. Determines level of required review and schedules required reviews. Attends reviews and presents deliverables. Updates Evaluate System phase deliverables to include any recommendations received during review. Obtains appropriate concurrences and approvals for Evaluate System phase document deliverables and associated Management Summaries. Obtains appropriate concurrences and approvals of updated documentation. Updates Project Plan to include actual costs incurred and specific activities accomplished for the Evaluate System phase; and revises project schedule, plans, strategies, resources, and requirements for the Operate System phase, as required. Reviews, for approval, the quality process planned by users and developers for the next phase.
Project Development Team (User and Developer)	Determines additional resource and support requirements. Determines additional support requirements. Finalizes Installation and Conversion Plan.

	<p>Supports System Acceptance Testing.</p> <p>Resolves issues raised during System Acceptance Testing, as required.</p> <p>Reviews Test Results and Evaluation Report and concurs with system certification.</p> <p>Provides input to Project Manager on required Evaluate System phase tasks and activities.</p> <p>Assists in the revision of prior phase products.</p> <p>Assists with preparation of Evaluate System phase deliverables for review.</p> <p>Attends deliverable reviews.</p> <p>Provides technical expertise during the review process.</p> <p>Reviews and updates the quality process planned for the next phase.</p>
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Table 5-2. Roles and Responsibilities for Evaluate System Phase (2 of 2)

Role	Responsibility
Computer Services	<p>Confirms and approves additional project support requirements.</p> <p>Participates in review of Project Plan (optional).</p> <p>Participates in System Acceptance Testing.</p> <p>Reviews Test Results and Evaluation Report and concurs with system certification.</p> <p>Revises capacity planning estimates, as required.</p> <p>Approves Release Request.</p>
ADP Security	<p>Reviews Evaluate System phase deliverables to ensure that all necessary security requirements have been thoroughly tested.</p> <p>Reviews revised products to ensure that the necessary security standards and guidelines have been addressed.</p> <p>Reviews Test Results and Evaluation Report to ensure that all necessary security requirements have been addressed.</p>
IG Staff	<p>Coordinates with project manager as necessary.</p> <p>Updates internal audit plan to incorporate information received from the project manager.</p>
Quality Assurance	<p>Reviews revised products to ensure they meet all applicable HUD standards and guidelines.</p> <p>Ensures that all review procedures are followed, as required.</p> <p>Reviews Evaluate System phase deliverables to ensure they meet all applicable HUD standards and project guidelines.</p> <p>Coaches users and developers in the planning for quality in the next phase.</p>
Configuration Management	<p>Establishes change control over new hardware and software configuration items.</p> <p>Performs version control for revised hardware and software.</p> <p>Provides CM reports to project management as requested or required.</p> <p>Assists the project manager in preparing Evaluate System phase deliverables for review.</p>
System Acceptance Test Team	<p>Updates system acceptance testing strategy.</p>

	Performs system acceptance testing. Prepares system certification. Provides technical expertise during review process. Develops Test Results and Evaluation Report. Updates requirements matrix.
Project Data Administrator	Documents final logical database.
Project Database Administrator	Participates in review of Project Plan (optional). Provides control over test data and test database. Provides monitoring and tuning of applications.

5.1 PERFORM SYSTEM ACCEPTANCE TEST

Until this point, all testing has used procedures and scenarios generated by the project development team and has emphasized correct operation as specified in the analysis and design documentation. System acceptance testing emphasizes the proper functioning of the system from the user's point of view. System acceptance testing is the process of demonstrating whether the program meets the user's written set of measurable objectives. The primary focus of the test should be on translation errors, which are errors made in the process of transforming objectives and requirements of the system (documented in the Functional Requirements Document and the Data Requirements Document) into design specifications (System/Subsystem, Program and Database) and, finally, into an operational system. The classes of tests listed below provide a general description of the testing that is executed during this phase of testing.

- **Requirements Validation.** This class of testing ensures that all functional requirements are implemented as originally envisioned by the users and that all requirements are accounted for in the system.
- **Functional Testing.** Functional testing stresses the correct operation of the application; the correct addition, modification, and deletion of data from the system; and the correct operation of any audit trails in the system.
- **Performance/Volume/Stress Testing.** Performance testing shows whether the program satisfies its performance or efficiency requirements. Volume testing is intended to demonstrate the system's capability to handle the volume of data specified in the requirement. Stress testing determines the maximum capacity of the system, given user requirements for response time and throughput.
- **Security Testing.** Security testing, using techniques including penetration testing, checks the adequacy of security processes and procedures by trying to violate the control measures in place. Both authorized and unauthorized transactions and processes are attempted.
- **Ease of Use.** Testing the system for ease of use ensures that the system is user friendly, the processes and messages are easy to understand, online documentation is available and useful, the use of function keys is standardized throughout the system, and the presentation and data content quality of the screens and reports are the same as those approved by the user group during the Define System phase.

- **Operational Testing.** Operational testing tests the procedures for installing and operating the systems software on its related hardware. It also tests the backup and recovery procedures.
- **Documentation Testing.** Documentation testing evaluates documentation for content, clarity, and consistency. Content refers to the relevance and completeness of the documentation and its applicability to the computer system. Consistency refers to the maintenance of standards throughout the documentation, uniform terminology, and consistency with other documents. The instructions from the user documentation are checked for accuracy against actual operation of the system.
- **Procedure Testing.** Procedure testing examines the interface between the programs (system) and any manual systems or human procedures, such as those followed by the system operator, database administrator, or terminal user.
- **Interface Testing.** Interface testing evaluates the system's ability to perform required interfaces with other systems operated by HUD and outside organizations.

During this phase of the system's development, final preparations for performing system acceptance testing are undertaken, including finalizing the VV&T Plan and readying the test environment. The requirements matrix is updated to reflect the specific tests used to verify the requirements. Each test identified in the VV&T Plan is executed, and the results of the test are evaluated against expected results.

After testing is completed, the Test Results and Evaluation Report is prepared, and the system is determined to be ready for production. The decision regarding the production readiness of the system should take into account the certification of management, operational and technical security controls, and any risks to the agency from operating the system. Reviews are held to determine the quality and thoroughness of the system acceptance testing as documented in the Test Results and Evaluation Report and the requirements matrix. Approval and concurrence for both documents is received from the appropriate review board, and the project sponsor organization certifies and accredits the system before its release into production. Activities include the following:

- 5.1.1 Prepare for system acceptance testing.
- 5.1.2 Execute tests.
- 5.1.3 Evaluate results
- 5.1.4 Perform configuration audits.
- 5.1.5 Determine readiness.

Table 5-3 defines roles and responsibilities of key personnel for performing system acceptance testing.

Table 5-3. Roles and Responsibilities for Performing System Acceptance Testing (1 of 2)

Role	Responsibility
Project Sponsor	Designates the independent test team. Reviews and approves system certification.

Project Manager	Assists activities of the system acceptance test team. Conducts physical and functional configuration audits. Coordinates security certification and accreditation Reviews and approves system certification. Issues Release Request.
User	Determines additional resource and support requirements. Participates in System Acceptance Testing. Reviews Test Results and Evaluation Report and concurs with system certification.
Developer	Resolves issues raised during System Acceptance Testing, as required. Performs physical and functional configuration audits.
System Acceptance Test Team	Updates system testing strategy. Updates requirements matrix. Performs system acceptance testing. Develops Test Results and Evaluation Report. Prepares system certification.

Table 5-3. Roles and Responsibilities for Performing System Acceptance Testing (2 of 2)

Role	Responsibility
Computer Services	Confirms and approves additional project support requirements. Participates in System Acceptance Testing. Reviews Test Results and Evaluation Report and concurs with system certification. Approves Release Request.
ADP Security	Reviews Test Results and Evaluation Report to ensure that all necessary security requirements have been addressed.
Project Data Administrator	Documents final logical database.
Project Database Administrator	Provides control over test data and test database. Provides monitoring and fine-tuning of applications.
Configuration Management	Controls software test environment. Processes changes to software test environment.
Quality Assurance	Monitors conduct of system acceptance testing. Verifies problem reporting procedures. Monitors physical and functional configuration audits.

5.1.1 Prepare for System Acceptance Testing

Undertake final preparations that allow for execution of the VV&T Plan that was finalized and approved during the Build System phase. Make final modifications to the test procedures, scenarios and test data developed during the Build System phase. Ensure that the objectives and requirements are correctly outlined by the project development team in the Functional Requirements Document, Data Requirements Document, and the System/Subsystem, Program,

and Database Specification documents. Update the requirements matrix to validate that all functional and security requirements are verified by one or more tests.

Finalize Test Procedures and Scenarios

Modify test procedures and scenarios to reflect any changes to the system that were made to correct errors found during integration testing. Make any necessary changes to the procedures in the following areas:

- Objectives of each test or test description
- Resources needed to execute the test
- Steps to be taken to execute the test
- Expected test results

Prepare Test Data

The test data or testbed that was created for the unit and integration tests performed during the Build System phase may prove sufficient to serve as the system acceptance testing testbed. Modify the data, if necessary, to allow all test conditions to be executed. Make any necessary final modifications to the test data by using utilities provided by the DBMS, SQL, or other data manipulation tools. Perform the tests as outlined in the test procedure or scenario. Coordinate with the project's Database Administrator (DBA) and with Computer Services as necessary to initialize the database and provide adequate space for the test data. Make any provisions at this time for restoring test data after test executions.

Finalize Test Environment

Before the start of the test, ensure that all necessary resource requirements have been met and are in place at the test site(s). Ensure that the hardware has been installed and that computer time has been made available for the test team (if the tests are to be run using production hardware).

5.1.2 Execute Tests and Verify Results

The standard test cycle includes the activities described in the following sections. Execute each test as stated in each test procedure or scenario, and document the tests in the approved VV&T Plan. After test execution, verify the results of the test against expected results, and formally record the test results. Repeat the test cycle, if needed, for a given program or portion of the system after errors are corrected by the development staff.

Execute Test

For each test, follow the steps necessary to execute each test procedure (or scenario) as documented in the VV&T Plan. If any additional steps are necessary to execute the test, record the additional steps in the test procedure documentation.

Record and Verify Test Results

Upon completion of each individual test identified in the VV&T Plan, compare the actual output generated by the test against the expected output documented in the test procedures and scenarios. If deviations from the expected results are discovered, review the predetermined results to ensure the results are correctly stated. Include the following information when recording the results of a test:

- Name and version number of the application or document that was tested
- Identification of the input data used in the test (e.g., reel number or file ID)
- Identification of the hardware and operating systems on which the test was run
- Time, date, and location of the test
- Names, work areas, and phone numbers of personnel involved in the test
- Detailed description of the nature of any deviations from predetermined results that were found during the test
- Identification of the output (e.g., reel number or file ID) in which the deviation was found
- Names, work areas, and phone numbers of development area personnel who were informed about the deviations
- Date the developers were informed about the potential problem
- Name and version number of the application or document that was issued to correct the error
- Date the new version was reissued

Record this information each time a test or retest is performed, and log the information in chronological order to serve as an historical document of the test.

If it is determined that the deviation is an error in the system's software, hardware, or documentation, document the error and notify the appropriate development area by using problem reporting procedures established for the project. Include with the documentation a detailed description and supporting documentation when describing the error. Supporting documentation may include images of the test data before and after the test was executed, series of screen images with narratives showing the exact sequence of events that led up to the error, and actual system reports with errors highlighted.

For large-scale development efforts, design a control system to allow one-to-one traceability from the test data to the predetermined result. Group predetermined results in the same order as the input data to allow for easier output review.

5.1.3 Evaluate Results

Compile the outcome of each individual test documented in the VV&T Plan in the Test Results and Evaluation Report along with the evaluation of test methods and test administration procedures. Record the results of each test execution, and compare the test results to the expected results recorded as part of the test documentation. Prepare the Test Results and Evaluation Report, and make a final determination regarding the readiness of the system. Submit the Test Results and Evaluation Report for approval. If the system is approved for production, formally record the decision and certify the system for release.

Compile Test Results

As system acceptance testing continues, maintain information on the execution of each test and the results of all tests in a central repository for the project. Once the execution of all tests and retests is complete, use this information to form the core of the Test Results and Evaluation Report.

Prepare Test Results and Evaluation Report

At the completion of system acceptance testing, prepare a Test Results and Evaluation Report to describe the test procedures and scenarios and the results that were found following their execution. Prepare the Test Results and Evaluation Report following HUD SDM documentation standards. To prepare the report,

- ***Describe purpose of report.*** Identify the project, by name and number, for which the Test Results and Evaluation Report was developed. Document all of the purposes of the report. At a minimum, every Test Results and Evaluation Report will serve the purposes listed below:
 - To document the results of all system acceptance tests
 - To identify deviations from the VV&T Plan
 - To assist in assigning responsibility for resolving issues raised as a result of the system acceptance testing
 - To report on the system's ability to fulfill its intended objectives
 - To document the effectiveness of system security controls
 - To provide a basis for estimation of the project completion time
- ***Provide summary of project references.*** List the high-level requirements the system was supposed to meet upon completion of its development. Provide summary information about the sponsoring organization and those organizations involved in developing, testing, using, and operating the system. Also provide any additional information, such as terms, definitions, and acronyms that will provide clarification for the reader.

- **Describe security considerations.** Provide a detailed description of the security requirements that have been built into the system and verified during system acceptance testing. Identify and describe any security issues or weaknesses that were discovered as a result of testing.
- **Provide test analysis of each function tested.** Provide summary information for each system acceptance test executed. Identify the test, the purpose of the test, the function or capability demonstrated by the test, an analysis of the system's ability to meet the requirements of the test, and any deviations from the original VV&T Plan that occurred during test execution.
- **Describe system deficiencies.** Describe the deficiencies that remain after the system test is completed. Provide traceability to the problem report that was written when the deficiency was detected, and provide the status of the deficiency. Be sure to reference any security control issues.
- **Recommend improvements as required.** Provide a detailed description of any recommendation discovered during testing that could improve the system, its performance, security, or its related procedures. If additional functionality is seen as a potential improvement for the user, although not specified in the FRD, it should be included here. Provide a priority ranking of each recommended improvement relative to all suggested improvements for the system.
- **Summarize capability of the system to meet requirements.** Provide a summary of the state of the system upon completion of system acceptance testing. This summary should support one of the following test recommendations:
 - The system is virtually error free and should be released into production.
 - Errors still exist that should be addressed, but a decision could be made to fix these errors in production and not delay release of the system.
 - The system has major shortcomings and should not be released into production at this time; instead, it should be returned for further development and retesting.

5.1.4 Perform Configuration Audits

The objective of a configuration audit is to assess whether a system, subsystem, or configuration item meets its technical requirements and if any unauthorized changes are scheduled for the delivery. There are two types of configuration audits: the functional configuration audit (FCA), and the physical configuration audit (PCA).

After acceptance testing for a CI release, perform an FCA to determine if the test results demonstrate that the CI meets its allocated requirements. Perform a PCA to determine if the CI's documentation is complete and consistent with the "as-built" CI.

If a configuration audit uncovers any deviations or discrepancies, or results in action items, the audit leader prepares an action item list and audit report. A satisfactory corrective action plan or deviation authorization must be prepared by the project manager and approved by the user and sponsoring organization before the product can be certified and delivered.

5.1.5 Security Certification and Accreditation

Security certification is a comprehensive assessment of the management, operational and technical controls in an information system to determine the extent to which the controls are implemented correctly, operating as intended, and producing the desired outcome with respect to meeting system security requirements. Security accreditation is the official management decision by a senior agency official to authorize operation of the system and to explicitly accept the risk to agency operations, agency assets, or individuals based on the implementation of an agreed-upon set of security controls. Certification and accreditation (C & A) are required by OMB and FISMA policy guidance. Coordinate and document a review of all management, operational and technical security controls consistent with NIST SP (800-37), *Guide for the Security Certification and Accreditation of Federal Information Systems*

The results of security certification help provide the factual basis for the authorizing management official to make an accreditation decision.

5.1.6 Determine Readiness

Determine whether the system is fit for use in a production environment based on review and approval of the Test Results and Evaluation Report, the certification of security controls, and the physical and functional configuration audits. If the developed system is deemed fit for production, obtain authorization from the appropriate authorizing management official(s) and coordinate production release.

Accredit System

Prepare an accreditation regarding the readiness of the system to be released into the production environment. Summarize the current state of the system emphasizing the effectiveness of security controls. Provide the name and version numbers of the system software, hardware, and related documentation and guides that are covered under the accreditation. Accredit the system under one of the following categories:

- ***Authorized to Operate:*** The system is virtually error free, the risks to agency operations, assets or individuals are acceptable, and it should be released into production. This type of authorization, without significant limitations or restrictions on operations, represents accreditation in accordance with OMB policy.
- ***Interim Authorization:*** Errors and risks still exist that should be addressed, but a decision could be made to fix these issues in production and not delay release of the system. This type of limited authorization does *not* constitute accreditation under OMB policy guidelines. When the security-related deficiencies are adequately addressed, the interim authorization can be lifted and the system fully authorized to operate.
- ***Authorization Denied:*** The system has major risks or shortcomings and should not be released into production at this time; instead, it should be returned for further review, development and retesting.

5.2 FINALIZE INSTALLATION AND CONVERSION PLAN

Complete the strategies and procedures for system installation and data conversion. Document in the installation strategy the procedures for installing the system application software, support software, security software and hardware, telecommunications equipment, and peripheral devices at all sites. Indicate in the conversion strategy the procedures for converting existing automated and manual files and for ensuring the correctness of the data after conversion. The appropriate organizations within HUD then review and approve the Installation and Conversion Plan. Include the following activities:

- 5.2.1 Finalize installation and conversion procedures.
- 5.2.2 Document the finalized plan.
- 5.2.3 Issue release request.

Table 5-4 defines roles and responsibilities of key personnel for finalizing the Installation and Conversion Plan.

Table 5-4. Roles and Responsibilities for Finalizing Installation and Conversion Plan

Role	Responsibility
Project Sponsor	Provides input to the Installation and Conversion Plan.
User	Finalizes the Installation and Conversion Plan.

5.2.1 Finalize Installation and Conversion Procedures

Complete development of strategies for installing the system hardware and software in the production environment and for converting existing data to the format required by the new system. Update the Installation and Conversion Plan to reflect the final strategy, and submit the plan for review and approval by the appropriate organizations before execution of the Installation and Conversion Plan.

Finalize System Installation and Conversion Procedures

Complete the final updates to the strategies for installing and converting the system to the operational environment begun during the Build System phase of development. Include any additional information discovered during the Evaluate System phase of development that may have an impact on these procedures. This is the final update of the plan before data conversion and hardware and software installation. In the procedures, include information on the following:

- Additional climate control
- Wiring and power conditioning
- Physical security and access controls
- Floor plan
- Required supplies

- Hardware and peripheral equipment

Also, finalize decisions on the following:

- Organizations involved and how each organization is involved
- Procedures for installing the system for each site and the sequence of site installations
- Sequence and schedule for the complete (or incremental) installation of the system
- Identification of organizations involved with system installation, each organization's role, and methods (e.g., meetings and communications) for keeping each organization informed about the status of the installation

Account for the following in data conversion procedures:

- Converting existing automated files
- Converting existing manual files
- Staffing requirements and organization for conversion
- Checking accuracy of converted data
- Schedule for data conversion
- Organizations involved with data conversion effort and each organization's role in the effort
- Methods (e.g., meetings and communications) for keeping all organizations informed about the status of the conversion

5.2.2 Document Finalized Plan

Complete the Installation and Conversion Plan to include any updates as outlined above. Ensure that the finalized Installation and Conversion Plan has been developed to meet all applicable HUD SDM documentation standards. Also ensure that the plan complies with IT procedures appropriate for the system's target platform.

5.2.3 Issue Release Request

After the Installation and Conversion Plan is finalized and the system is certified and accredited, submit a Release Request in the HUD Application Release Tracking Systems (HARTS) to the Test Center Branch of Computer Services for approval to install the system in the production environment.

5.3 UPDATE SYSTEM AUDIT STRATEGY

Notify the IG staff about any work products completed during the Evaluate System phase. Inform them of any changes that may have an impact on internal data processing controls as they were described in the Evaluate System phase documentation. Activities include coordinating with IG staff, providing input to IG staff, and updating the Internal Audit Plan.

Table 5-5 defines roles and responsibilities of key personnel for updating system audit strategy.

Table 5-5. Roles and Responsibilities for Updating System Audit Strategy

Role	Responsibility
Project Manager	Provides project information to IG staff, as requested.
IG Staff	Coordinates with project manager, as necessary. Updates internal audit plan.

Activities include the following:

- **Coordinate with IG staff.** Schedule meetings with the IG staff to inform them of any developments that occurred during the Evaluate System phase. Determine the scope of the information required from the project manager so the IG staff can perform the necessary updates to the Internal Audit Plan.
- **Provide input to IG staff.** Provide the IG staff the necessary information.
- **Update Internal Audit Plan.** Update the Internal Audit Plan to include information provided by the project manager.

5.4 UPDATE SYSTEM DECISION PAPER

Update the System Decision Paper to include a summary of the progress made during the Evaluate System phase and the schedule of events for Operate System phase activities. Include the project's current status. List in detail any changes to the original plan for developing the project and the parties responsible for approving those changes. Submit the updated System Decision Paper for review and approval by the appropriate management officials. Include the following activities:

- 5.4.1 Summarize progress of system.
- 5.4.2 Identify changes.
- 5.4.3 Summarize schedule of events.
- 5.4.4 Document results.

Table 5-6 defines roles and responsibilities of key personnel for updating the System Decision Paper.

Table 5-6. Roles and Responsibilities for Updating the System Decision Paper

Role	Responsibility
Project Manager	Updates System Decision Paper, as necessary.
Developer	Provides input to System Decision Paper.
Quality Assurance	Reviews System Decision Paper for adherence to standards.

5.4.1 Summarize Progress of System

Summarize the progress of project development through the Evaluate System phase, and update the System Decision Paper accordingly.

5.4.2 Identify Changes

Document any changes to the system development milestones and schedule or any modifications made to the project strategy, and update the System Decision Paper accordingly.

Describe Changes in Milestones, Schedules, and Tasks

Provide a description of any Evaluate System phase occurrences that may have had an impact on the projected milestones, schedules, and tasks of the development effort. Provide a brief explanation of the nature of these impacts, and describe any changes to the milestones or schedule that may occur as a result of these changes.

Describe Modifications to Project Strategy

Provide a description of any modifications to the project strategy that have occurred during the Evaluate System phase of development. Provide a brief explanation of these modifications to indicate the reasons for the changes and any anticipated impacts.

5.4.3 Summarize Schedule of Events

Develop a brief summary of the events that took place during this phase of development and a description of the remaining schedule of development activities. Show the impact these events have had on the original schedule and any anticipated impacts on future development activities.

Describe the portion of the project schedule completed through the Evaluate System phase. Also, describe the schedule of remaining activities planned for the project.

5.4.4 Document Results

Document all information for this phase in the System Decision Paper in accordance with HUD SDM documentation standards.

5.5 REFINE PROJECT PLAN

The Project Manager controls the project by monitoring phase activities, taking corrective action where necessary; refining the project plan to account for changes attributable to actions taken in the current phase and new information for upcoming phases; and reviewing the quality planning process developed by users, developers, testers, and quality assurance for the next phase. Activities include the following:

- 5.5.1 Update Project Plan.
- 5.5.2 Review planned quality process.

Table 5-7 defines roles and responsibilities of key personnel for updating the Project Plan.

Table 5-7. Roles and Responsibilities for Refining Project Plan

Role	Responsibility
Project Sponsor	Approves changes to project schedule. Approves changes to Project Plan.
Project Manager	Updates Project Plan to include actual costs incurred and specific activities accomplished for the Evaluate System phase; and revises project schedule, plans, strategies, resources, and requirements for the Operate System phase, as required. Reviews, for approval, the quality process planned by users and developers for the next phase.
User	Provides input to project manager on required Operate System phase tasks and activities. Attends review of Project Plan to provide input to the review process as required. Works with developer to review and update the quality process planned for the next phase.
Developer	Provides input to project manager on Required Operate System phase tasks and activities. Participates in review of Project Plan. Works with user to review and update the quality process planned for the next phase.

5.5.1 Update Project Plan

Update the plan with cost, schedule, and budget data for the current phase (Evaluate System) to the level of detail necessary to reflect the project's status. Review the plan and determine if any activities, described for the next phase (Operate System), are affected by the completion status of the current phase activities. Adjust schedules and resource requirements for activities in the next phase, if necessary, and assign starting and ending dates for affected activities. Take into account that the starting date for some activities may depend on the completion of other activities. Update milestones, schedules, and resource requirements for the remainder of the project.

5.5.2 Review Planned Quality Process

Users, developers, testers, and QA work closely together to determine the process to be used to build the product with the desired quality. Activities include tailoring the planned quality process for the next phase and identifying the standards and procedures to be used. The project manager reviews the quality process for approval and execution in the next phase.

5.6 REVIEW AND APPROVE DOCUMENTS AND DELIVERABLES

Review and approval of documents and deliverables is an iterative process as each phase provides more definition and products are revised. In addition, the approval process offers senior management the capability to monitor the project. Activities include the following:

- 5.6.1 Review revised products from prior phases, as required.
- 5.6.2 Submit Evaluate System phase documents for review.
- 5.6.3 Obtain approval of technical and documentation deliverables.

Table 5-8 defines roles and responsibilities of key personnel for reviewing and approving documents and deliverables.

Table 5-8. Roles and Responsibilities for Review and Approval of Deliverables and Documents

Role	Responsibility
Project Sponsor	Participates in project review (optional).
Project Manager	Determines needed changes to prior phase documents and ensures revision in accordance with the overall Project Plan. Coordinates review of Evaluate System phase deliverables. Determines level of required review and schedules required reviews. Attends reviews and presents deliverables. Ensures that Evaluate System phase deliverables are updated to include any recommendations received during the review. Obtains appropriate concurrences and approvals for Evaluate System phase document deliverables and associated management summaries. Obtains appropriate concurrences and approvals for revised documentation.
User	Revises prior phase products when applicable. Assists the project manager with the preparation of Evaluate System phase deliverables for review. Attends deliverable reviews.
Developer	Revises prior phase products when applicable. Assists the project manager with preparation of Evaluate System phase deliverables for the review. Provides technical expertise during the review process.
System Acceptance Test Team	Provides technical expertise during the review process.
ADP Security	Reviews Evaluate System phase deliverables to ensure that all necessary security requirements have been thoroughly tested. Reviews revised products to ensure that the necessary security standards and guidelines have been addressed.

Computer Services	Participates in review of documents and deliverables.
Configuration Management	Assists project manager with review preparation.
Quality Assurance	Ensures that all review procedures are followed as required. Reviews Evaluate System phase deliverables to ensure they meet all applicable HUD standards and guidelines.

5.6.1 Review Revised Documents from Prior Phases as Required

Review the activities performed during the Evaluate System phase to determine if they have an impact on any documents produced during the previous phases. If changes are required to prior lifecycle phase documents, update these documents to reflect current project developments. Project personnel review revised documents in a manner similar to reviews for current phase documents to ensure the changes are within the scope of the project's requirements and are in compliance with HUD and project standards and procedures. For each revised document, prepare a management summary that summarizes the essential revisions. Submit the revised products to the appropriate review board for approval. Use the appropriate document review checklist in Appendix E to assist in the reviews. File affected product change records with CM for appropriate version control updates.

5.6.2 Conduct Review for Evaluate System Phase Documents and Deliverables

Conduct a project review with project personnel and system stakeholders to ensure that the project documents and deliverables for the Evaluate System phase include the necessary level of detail, fulfill the system's requirements, and meet the appropriate HUD and project standards and guidelines. Be sure to include the management official(s) responsible for security certification and accreditation. Use the appropriate document review checklists in Appendix E for Evaluate System phase deliverables to aid in the document reviews.

A minimum of 10 working days before the scheduled review, notify the personnel required to attend and provide each with a copy of the product for pre-review. Discuss all comments or objections raised during the review, and reach a consensus on one of the following before the review session terminates:

- The documents are correct and complete, as is, without any further changes.
- Additional changes that need to be made are minor and do not require further review. In this case, the updates should be made and change pages should be distributed by an agreed upon date.
- Required changes will have a major impact on the plan. A second review must be scheduled. The changes must be incorporated and the resulting change pages distributed a minimum of 10 working days before the second review.

Prepare a management summary for each document that includes the essential data collected in the document, lists conclusions that may be drawn from the document, and describes the potential impacts on the project, if applicable. Submit the management summaries to the appropriate review board for approval. Documents for approval include the following:

- Test Results and Evaluation Report
- Installation and Conversion Plan
- System Decision Paper (updated)

5.6.2 Obtain Approval of Project Documents and Deliverables

Present the project documents and deliverables to the chairperson of the appropriate review board for approval at least 10 days before the scheduled decision date. Include the management summary information, approval (sign-off) record, the System Decision Paper, and any other required or requested information. The review board chairperson coordinates review board comments, recommendations, and approval signature(s), and returns the approval record to the project manager. Recommendations on the approval record are addressed by the project, and the document should be resubmitted to the board if requested. Approval will be assumed if there is no response or if the response is “no comment.” Project approval records are maintained by the project’s configuration management (CM) function. A copy is inserted into the central project library.

The project proceeds to the next phase after all project documents and deliverables are approved.

5.7 PERFORM CHANGE CONTROL ACTIVITIES

Any products developed or procured during the Evaluate System phase are baselined and subjected to version control in accordance with the project CM Plan. Products baselined during prior activities are assigned new version control numbers when they undergo change (e.g., an update or rewrite). CM reports are provided to the Project Manager as requested or required.

Table 5-9 defines roles and responsibilities of key personnel for performing change control activities.

Table 5-9. Roles and Responsibilities for Performing Change Control Activities

Role	Responsibility
Project Manager	Approves controlled products for distribution.
Configuration Management	Performs change control for new and revised products. Provides status reports to project management as requested or required.
Quality Assurance	Audits products to ensure only approved changes are addressed.

The CM function prepares the baseline for configuration control. The baseline includes any new technical and document deliverables that will comprise the project configuration baseline. For the baseline items, CM performs the following activities:

- **Verify changes made to product.** Review the updated product to ensure that the changes have been made as described in supporting documentation. Supporting documentation may be comments received from document reviews. Supporting

documentation for software may be software change requests or discrepancy reports generated during testing.

- ***Assign version number.*** The version number must follow conventions established by HUD and enable the project's CM to monitor updates to the product and assist in its distribution. For software (CIs) programs, increment the version number each time a change is made to the software to correct deficiencies found during testing.
- ***Store approved version in central library.*** After each baselined product has been completed and approved, according to HUD procedures, store the approved version in the project's central library. The project's CM function controls access to the library. For software, the library can be a subdirectory or dataset where all baselined software CIs will be stored.
- ***Record product information in inventory log.*** Maintain an inventory log that includes the title of the product, release date, version number, name and version or model numbers of the software and hardware used in the development of the product, name of the organization responsible for development of the product (usually the sponsoring organization), and the product distribution list.
- ***Distribute copies of products as required.*** The project's CM function distributes copies of the products according to a distribution list maintained as part of the inventory log information, with distribution based on need and the security level of the product
- ***Archive old versions of products.*** Archive and retain outdated versions of all products for the required period of time, in keeping with HUD standards and guidelines.

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