



DEPARTMENT OF INFORMATION TECHNOLOGY

Systems Development Life Cycle (SDLC)

**Volume 2
SDLC Phases**

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INITIATION PHASE

1.0 OBJECTIVE

The Initiation Phase begins when management determines that it is necessary to enhance a business process through the application of information technology. The purposes of the Initiation Phase are to:

- Identify and validate an opportunity to improve business accomplishments of the organization or a deficiency related to a business need,
- Identify significant assumptions and constraints on solutions to that need, and
- Recommend the exploration of alternative concepts and methods to satisfy the need.

During this phase the Agency Project Sponsor designates a Project Manager who prepares a Statement of Need or Concept Proposal. IT projects may be initiated as a result of business process improvement activities, changes in business functions, advances in information technology, or may arise from external sources, such as public law, the general public or the Federal government. When an opportunity to improve business/mission accomplishments or to address a deficiency is identified, the Project Manager documents these opportunities in the Concept Proposal.

2.0 TASKS AND ACTIVITIES

The following activities are performed as part of the Initiation Phase. The results of these activities are captured in the Concept Proposal. For every IT project, the Agency should designate a responsible organization and assign that organization sufficient resources to execute the project.

2.1 Identify the Opportunity to Improve Business Functions (Business Case)

What is the value and purpose of the effort? Identify why a business process is necessary and what business benefits can be expected by implementing this improvement. A business scenario and context must be established in which a business problem is clearly expressed in purely business terms. Provide background information at a level of detail sufficient to familiarize senior managers to the history, issues and customer service opportunities that can be realized through improvements to business processes with the potential support of IT. This background information must not offer or predetermine any specific automated solution, tool, or product.

2.2 Establish Project Sponsorship

The Sponsor is the principle authority on matters regarding the expression of business needs, the interpretation of functional requirements language, and the mediation of issues regarding the priority, scope and domain of business requirement. The Sponsor must understand what constitutes a requirement and must take ownership of the requirements and input and output.

2.3 Form (or appoint) a Project Organization

This activity involves the appointment of a Project Manager who carries both the responsibility and accountability for project execution. For small efforts, this may only involve assigning a project to a manager within an existing organization that already has an inherent support structure. For new, major projects, a completely new organizational element may be formed - requiring the hiring and reassignment of many technical and business specialists.

To provide a management structure for the project, the project office should adapt, adopt, or create written processes and procedures for recurring project office activities. These include requirements management, project tracking, contractor management, verification and validation, quality assurance, change management, and risk management.

2.4 Document the Phase Efforts

The results of the efforts of this phase are documented in the Concept Proposal and the Project Management Charter. Templates for these documents can be found in Volume 4 of the SDLC.

2.5 Review and Approval to Proceed to the Next Phase

The approval of the Concept Proposal identifies the end of the Initiation Phase. Approval should be annotated on the Concept Proposal by the Sponsor and the Agency CIO.

2.6 Form Core Project Team

Once approval to proceed has been given within the Agency, a core project team with participation of a Project Manager must be established in order to move on to the System Concept Development Phase and, in the case of a major IT investment, begin completing the ITPR to initiate the Investment Review Process.

3.0 ROLES AND RESPONSIBILITIES

Sponsor: The Agency Project Sponsor is the senior spokesperson for the project, and is responsible for ensuring that the needs and accomplishments within the business area are widely known and understood. The Sponsor is also responsible for ensuring that

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adequate financial and business process resources to address their business area needs are made available in a timely manner.

Project Manager: The appointed Project Manager is charged with leading the efforts to ensure that all business aspects of the process improvement effort are identified in the Concept Proposal. This includes establishing detailed project plans and schedules.

4.0 DELIVERABLES, RESPONSIBILITY AND ACTION

The following deliverables shall be initiated during the Initiation Phase:

4.1 Concept Proposal

This document describes the need or opportunity to improve business functions. It identifies where strategic goals are not being met or mission performance needs to be improved.

4.2 Project Management Charter

This document identifies the Sponsor and Project Manager and identifies their roles and responsibilities.

5.0 ISSUES FOR CONSIDERATION

In this phase, it is important to state the needs or opportunities in business terms. Avoid identifying a specific product or vendor as the solution. The Concept Proposal should not be more than 2-5 pages in length.

6.0 REVIEW ACTIVITY

The Initiation Phase Review shall be performed at the end of this phase and ensures that the Concept Proposal is approved before proceeding to the next phase. The review ensures that the Concept Proposal is sound, does not conflict with the Enterprise Architecture and is a good investment. This is the first key decision required in the SDLC and IT Investment Management process.

7.0 PRODUCTS AND APPROVALS

Initiation Phase Products	Approved By
Concept Proposal	Agency Project Sponsor Agency CIO
Project Management Charter	Agency Project Sponsor Agency CIO

SYSTEM CONCEPT DEVELOPMENT PHASE

1.0 OBJECTIVE

System Concept Development begins when the Concept Proposal has been formally approved and requires study and analysis that may lead to system development activities.

Following review and approval of the Concept Proposal, some form of Agency approval (tasking directive) should be issued to begin the formal studies and analysis of the need. The issuing of the tasking directive initiates the System Concept Development Phase and begins the life cycle of an identifiable project.

2.0 TASKS AND ACTIVITIES

The following activities are performed as part of the System Concept Development Phase. The results of these activities are captured in the System Boundary Document (SBD) and the Risk Management Plan and their underlying institutional processes and procedures.

2.1 Analyze the Business Need

The project team, supplemented by enterprise architecture experts, if needed, should determine the acquisition strategy by analyzing all feasible technical, business process, and commercial alternatives to meeting the business need. In addition, these alternatives should then be analyzed from a life cycle cost perspective. The results of these studies should show a range of feasible alternatives based on life cycle cost, technical capability, operational feasibility and scheduled availability. Typically, these studies should narrow the system technical approaches to only a few potential, desirable solutions that should proceed into the subsequent life cycle phases. Caution is needed to ensure new and/or creative design concepts are not eliminated from consideration in a Request for Proposal that is prepared.

2.2 Plan the Project

The project team should plan the subsequent phases to allow development of project schedule, budget requirements, and the expected performance benefits. What are the expected range of costs and the programmatic and technical risks? The SBD Business Case summarizes the high level requirements for the project and justifies the need.

2.3 Form the Project Acquisition Strategy

The acquisition strategy should be included in the SBD. The project team should determine the strategies to be used during the remainder of the project concurrently with the development of the cost-benefit analysis within the SBD and Feasibility Study. Will

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the work be accomplished with available staff or do contractors need to be hired?
Discuss available and projected technologies, such as reuse or Commercial Off-the-Shelf (COTS) and potential contract types.

2.4 Study and Analyze the Risks and Alternatives

Identify all alternatives that may address the need and any programmatic or technical risks. The risks associated with further development should also be studied. The results of these assessments should be summarized in the SBD and documented in the Risk Management Plan.

2.5 Obtain Project Funding, Staff and Resources

Estimate, justify, submit requests for, and obtain resources to execute the project in the format of the Information Technology Project Request (ITPR).

2.6 Document the Phase Efforts

The results of this phase are documented in the SBD and Risk Management Plan.

2.7 ITPR

The ITPR is prepared to support the budget request for the project. Most of the information required by the ITPR is located in the SBD and the Risk Management Plan.

2.8 Review and Approval to Proceed

The results of the phase efforts are presented to project stakeholders and decision makers together with a recommendation to (1) proceed into the next life cycle phase, (2) continue additional conceptual phase activities, or (3) terminate the project. The emphasis of the review should be on (1) the successful accomplishment of the phase objectives, (2) the plans for the next life cycle phase, and (3) the risks associated with moving into the next life cycle phase. The review also addresses the availability of resources to execute the subsequent life cycle phases. The results of the review should be documented reflecting the decision on the recommended action.

3.0 ROLES AND RESPONSIBILITIES

Sponsor: The sponsor should provide direction and sufficient study resources to commence the System Concept Development Phase.

Project Manager: The appointed Project Manager is charged with leading the efforts to accomplish the System Concept Development Phase tasks discussed above.

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System Concept Development Phase

4.0 DELIVERABLES, RESPONSIBILITIES, AND ACTIONS

The following deliverables shall be initiated during the System Concept Development Phase:

4.1 System Boundary Document (SBD)

Identifies the scope of a system (or capability) and documents the business case. It should contain the high-level requirements, benefits, business assumptions, and program costs and schedules. It records management decisions on the envisioned system early in its development and provides guidance on its achievement. It provides cost or benefit information for analyzing and evaluating alternative solutions to a problem and for making decisions about initiating, as well as continuing, the development of information processing-related services. It also provides an overview of a business requirement or opportunity and determines if feasible solutions exist before full life cycle resources are committed.

4.2 Risk Management Plan

Identifies project risks and specifies the plans to reduce or mitigate the risks.

4.3 ITPR

Serves as the formal budget request for the project. Most of the information required for the ITPR is obtained from the SBD and the Risk Management Plan.

5.0 ISSUES FOR CONSIDERATION

After the SBD is approved and a recommendation is accepted by the Agency CIO and Sponsor, the system project planning can begin.

5.1 Project Approach Decisions

As identified in the Initiation Phase, each project shall have an individual designated to lead the effort. The individual selected will have appropriate skills, experience, credibility, and availability to lead the project. Clearly defined authority and responsibility must be provided to the Project Manager.

The Project Manager will work with the Agency CIO and Sponsor to verify the scope of the proposed program, participation of the key organizations, and potential individuals who can participate in the formal reviews of the project. This decision addresses both programmatic and information management-oriented participation as well as technical interests in the project that may be known at this time.

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In view of the nature and scope of the proposed program, the key individuals and oversight committee members who will become the approval authorities for the project should be identified.

The Project Manager and Sponsor will determine if any particularly unusual programmatic, technical, or information management skills or experience will be needed. Organizations not participating directly in the project may be notified if appropriate, including external organizations. Whenever the concept is shared among multiple organizations, data administration should play a strong role.

Management approval to commit resources to the proposed program marks the beginning of the subsequent system development life cycle phases.

5.2 Project Continuation Decisions

The feasibility analysis and cost benefit analysis should confirm that the defined information management concept is significant enough to warrant an IT project with life cycle management activities.

The feasibility study analysis should confirm that the information management need or opportunity is beyond the capabilities of existing systems and that developing a new system is a promising approach.

The Cost-Benefit Analysis should confirm that the projected benefits of the proposed approach justify the projected resources required.

6.0 REVIEW ACTIVITY

The System Concept Development Review shall be performed at the end of this phase. The review ensures that the goals and objectives of the system are identified and that the feasibility of the system is established. Products of the System Concept Development Phase are reviewed including the budget, risk, and user requirements. This review is organized, planned, and led by the Project Manager. Approval of the SBD by the Agency CIO grants approval to proceed to the Planning Phase of the SDLC. It is important in this effort not to eliminate new and creative approaches. Emphasis should be looking at the Total Cost of Ownership and not just a single system concept. Support and training issues may become very important from this perspective.

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7.0 PRODUCTS AND APPROVALS

System Concept Development Phase Products	Approved By
ITPR	Agency Project Sponsor Agency CIO Secretary of DoIT
System Boundary Document	Agency Project Sponsor Agency CFO Agency CIO
Risk Management Plan	Agency Project Sponsor Agency CIO

PLANNING PHASE

1.0 OBJECTIVE

A plan essential to the success of the entire project is created in this phase, the Project Management Plan (PMP).

2.0 TASKS AND ACTIVITIES

The following tasks are performed as part of the Planning Phase. The results of these activities are captured in various project plans and solicitation documents.

2.1 Refine Acquisition Strategy in SBD

During this phase, the decision should be made on the role of system development contractors during the subsequent phases. For example, one strategy option would include active participation of system contractors in the Requirements Analysis Phase. In this case, the Planning Phase must include complete planning, solicitation preparation, and source selection of the participating contractors (awarding the actual contract may be the first activity of the next phase).

2.2 Analyze Project Schedule

Analyze and refine the project schedule, taking into account acquisition risk and resource availability.

2.3 Create Internal Processes

Create, gather, adapt, and/or adopt the internal management, engineering, business management, and contract management internal processes that will be used by the project office for all subsequent life cycle phases.

2.4 Staff Project Office

If not already completed, further staff the project office with needed skills across the broad range of technical and business disciplines. If needed, solicit and award support contracts to provide needed non-personal services that are not available through Agency resources.

2.5 Establish Agreements with Stakeholders

Establish relationships and agreements with internal and external organizations that will be involved with the project and identified previously. These organizations may include Agency personnel offices, Agency finance offices, internal and external audit organizations, and Agency resource providers (people, space, office equipment, communications, etc).

2.6 Plan the PMP

Plan, articulate and gain approval of the strategy to execute the management aspects of the project on a PMP. Develop a detailed project Work Breakdown Structure (WBS). Develop a government WBS supported by a responsibilities matrix.

2.7 Determine the Systems Engineering Management Strategy Portion of the PMP

Plan, articulate, and gain approval of the strategy to execute the technical management aspects of the project. Develop a detailed system WBS. This will provide the technical requirements; managerial direction, and can be used in preparation of a statement of work.

2.8 Study and Analyze Security Implications

Study and analyze the security implications of the technical alternatives and ensure the alternatives address all aspects or constraints imposed by system security requirements.

2.9 Plan the Solicitation, Selection and Award

During this phase or subsequent phases, plan the solicitation, selection and award of contracted efforts based on the selected strategies in the SBD. Obtain approvals to contract from appropriate authorities. As appropriate, execute the solicitation and selection of support and system contractors and COTS developers for the subsequent phases.

3.0 ROLES AND RESPONSIBILITIES

Project Manager: The Project Manager is responsible and accountable for the successful execution of the Planning Phase. The Project Manager is responsible for leading the team that accomplishes the tasks shown above.

Project Team: The project team members (regardless of the organization of permanent assignment) are responsible for accomplishing assigned tasks as directed by the Project Manager.

Procurement Officer: The Procurement Officer is responsible and accountable for preparing solicitation documents under the guidance of the Project Manager.

Oversight Activities: Secretary of DoIT and Agency CIO oversight activities provide advice and counsel to the Project Manager on the conduct and requirements of the planning effort. Additionally, oversight activities provide information, judgments, and

recommendations to the Agency decision makers during project reviews and in support of project decision milestones.

Project Decision Maker: At an appropriate level within the Agency, an individual should be designated as the project decision authority (may or may not be the same individual designated as the sponsor in the previous phase). This individual should be charged with assessing: (1) the completeness of the planning phase activities, (2) the robustness of the plans for the next life cycle phase, (3) the availability of resources to execute the next phase, and (4) the acceptability of the acquisition risk of entering the next phase. For applicable projects, this assessment also includes the readiness to award any major contracting efforts needed to execute the next phase. During the end of phase review process, the decision maker may (1) direct the project to move forward into the next life cycle phase (including awarding contracts), (2) direct the project to remain in the Planning Phase pending completion of delayed activities or additional risk reduction efforts, or (3) terminate the project.

4.0 DELIVERABLES, RESPONSIBILITIES, AND ACTION

4.1 PMP

This plan should be prepared for all projects, regardless of size or scope. It documents the project scope, tasks, schedule, allocated resources, and interrelationships with other projects.

The plan provides details on the functional units involved, required job tasks, cost and schedule performance measurement, milestone and review scheduling. Revisions to the PMP occur at the end of each phase and as information becomes available.

The plan includes an acquisition planning section to show how all government human resources, contractor support services, hardware, software and telecommunications capabilities are acquired during the life of the project. This developed to help ensure that needed resources can be obtained and are available when needed.

The plan includes a section on change management to describe the process that will be used to identify, manage, control, and audit the project's scope. In addition, the configuration management structure, roles, and responsibilities to be used in executing these processes are defined.

5.0 ISSUES FOR CONSIDERATION

It is important that the PMP address all project activities, including:

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- System design, development, and implementation
- Acquisition and procurement
- Communications strategy and planning
- Change management
- Financial and budget milestones
- Establishment of the project office and governance process
- Security milestones
- Configuration management

Although it is often difficult at this point in the project, resources must be identified and planned, including internal and contractual staff, hardware and software, and facilities.

6.0 REVIEW ACTIVITY

Upon completion of all Planning Phase tasks and receipt of resources for the next phase, the Project Manager, together with the project team should prepare and present a project status review for the Agency CIO, Sponsor, and other stakeholders. The review should address: (1) Planning Phase activities status, (2) planning status for all subsequent life cycle phases (with significant detail on the next phase, to include the status of pending contract actions), (3) resource availability status, and (4) acquisition risk assessments of subsequent life cycle phases given the planned acquisition strategy.

7.0 PRODUCTS AND APPROVALS

Planning Phase Documents	Review and Comment	Approved By
Project Management Plan	DoIT	Agency Project Sponsor Agency CIO

REQUIREMENTS ANALYSIS PHASE

1.0 OBJECTIVE

The Requirements Analysis Phase will begin when the previous phase documentation has been approved. Documentation related to user requirements from the Planning Phase shall be used as the basis for further user needs analysis and the development of detailed user requirements. The analysis may reveal new insights into the overall information systems requirements, and, in such instances, all deliverables should be revised to reflect this analysis.

During the Requirements Analysis Phase, the system shall be defined in more detail with regard to system inputs, processes, outputs, and interfaces (both internal and external). This definition process occurs at the functional level. The system shall be described in terms of the functions to be performed, not in terms of computer programs, files and data streams. The emphasis in this phase is on determining what functions must be performed rather than how to perform those functions. This is best done through first identifying outputs, inputs, and processes. During the Requirements Phase, the Project Team will:

- Further define and refine functional and data requirements,
- Complete business process engineering of the functions to be supported,
- Develop detailed data and process models,
- Define functional and system requirements that are not easily expressed in data and process models. Functional and system requirements also include the requirements of the business process, the user requirements, and operational requirements (once the system is completed, what does it require to keep running?),
- Refine the high level architecture and logical design to support the system and functional requirements, and
- Continue to identify and mitigate risk that the technology can be phased-in and coordinated with the business.

2.0 TASKS AND ACTIVITIES

The following tasks are performed during the Requirements Analysis Phase.

2.1 Analyze and Document Requirements.

First consolidate and affirm the business needs. Then document the functional requirements and the data requirements. Connect the functional requirements to the data requirements.

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2.2 Develop Functional Requirements Document (FRD)

The FRD is a record of the above requirements. This can be established as a matrix and tracked for satisfactory in every module of the system as development progress.

2.3 Conduct Reviews

The Functional and Data Requirements Review is conducted in the Requirements Analysis Phase by the Agency CIO and Project Sponsor to ensure that the business requirements have been accurately linked to functional and data requirements.

2.4 Revise Previous Documents

The System Concept Development Phase documentation may need to be revised or updated. The Planning Phase documentation may need to be updated in this phase.

3.0 ROLES AND RESPONSIBILITIES

Project Manager: The project leader is responsible and accountable for the successful execution of the Requirements Analysis Phase. The project leader is responsible for leading the team that accomplishes the tasks shown above.

Project Team: The project team members (regardless of the organization of permanent assignment) are responsible for accomplishing assigned tasks as directed by the Project Manager.

Procurement Officer: The Procurement Officer is responsible and accountable for preparing solicitation documents under the guidance of the project manager.

Quality Assurance Staff: Continually review the state of the product so the rest of the team can focus on their tasks. Quality Assurance's goal is to support the product development processes.

Oversight Activities: Secretary of DoIT and Agency CIO oversight activities provide advice and counsel to the Project Manager on the conduct and requirements of the Requirements Analysis Phase effort. Additionally, oversight activities provide information, judgments and recommendations to the Agency decision makers during project reviews and in support of project decision milestones.

4.0 DELIVERABLES, RESPONSIBILITIES, AND ACTION

4.1 Functional Requirements Document (FRD)

Serves as the foundation for system design and development; captures user requirements to be implemented in a new or enhanced system; the systems subject matter experts document these requirements into the requirements trace ability matrix, which shows mapping of each detailed functional requirement to its source. This is a complete, user oriented functional and data requirements for the system which must be defined, analyzed, and documented to ensure that user and system requirements have been collected and documented to ensure that:

- Business process descriptions are documented.
- All requirements can be traced to the SBD or users' statement of need document.
- A logical model is constructed that describes the fundamental processes and data needed to support the desired business functionality. This logical model will show how processes interact and how processes create and use data. These processes will be derived from the activity descriptions provided in the System Boundary Document.
- Functions and entity types contained in the logical model are extended and refined from those provided in the Concept Phase. End-users and business area experts will evaluate all identified processes and data structures to ensure accuracy, logical consistency, and completeness.
- An analysis of business activities and data structures is performed to produce entity-relationship diagrams, process hierarchy diagrams, process dependency diagrams, and associated documentation.
- An interaction analysis is performed to define the interaction between the business activities and business data. This analysis produces process logic and action diagrams, definitions of the business algorithms, entity life cycle diagrams, and entity state change matrices.
- A detailed analysis of the current technical architecture, application software, and data is conducted to ensure that limitations or unique requirements have not been overlooked.

These requirements must include considerations for capacity and growth. The requirements document should include but is not limited to electronic record management, record disposition schedule, and components' unique requirements. Consideration must also be given to persons with disabilities.

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The interface control portion of the FRD provides an outline for use in the specification of requirements imposed on one of more systems, subsystems configuration items or other system components to achieve one of more interfaces among these entities.

4.2 Data Flow Diagrams (may be included in Requirements Document)

Data Flow Modeling represents the flow of information around a system. Data Flow Diagrams (DFDs) take a *'top-down'* approach, expanding the system description into more and more detail via a series of *'levels'*, so a set of DFDs will comprise a Context Diagram.

DFDs show how information flows around a system, they:

- Represent a situation from the viewpoint of the data;
- Is a technique to assist analysis of the processes of the system.

Objectives:

- To graphically document boundaries of a system;
- To provide hierarchical breakdown of the system;
- To show movement of information between a system and its environment;
- To document information flows within the system;
- To aid communication between users and developers.

4.3 Test and Evaluation Master Plan

Ensures that all aspects of the system are adequately tested and can be implemented; documents the scope, content, methodology, sequence, management of, and responsibilities for test activities. Unit, integration, and independence acceptance testing activities are performed during the development phase. Unit and integration tests are performed under the direction of the Project Manager. Independence acceptance testing is performed independently from the developing team and is coordinated with the Quality Assurance (QA) office. Acceptance tests will be performed in a test environment that duplicates the production environment as much as possible. They will ensure that the requirements are defined in a manner that is verifiable. They will support the trace ability of the requirements from the source documentation to the design documentation to the test documentation. They will also verify the proper implementation of the functional requirements.

The types of test activities discussed in the subsequent sections are identified more specifically in the Integration and Test Phase of the life cycle and are included in the test plan and test analysis report.

Volume 2 Requirements Analysis Phase

- Unit/Module Testing
- Subsystem Integration Testing
- Independent Security Testing
- Functional Qualification Testing
- User Acceptance Testing
- Beta Testing

5.0 ISSUES FOR CONSIDERATION

In the Requirements Analysis Phase, it is important to get everyone involved with the project to discuss and document their requirements. A baseline is important in order to begin the next phase. A developer obtains the requirements from the FRD which may become part of the Request for Proposals (RFP).

6.0 REVIEW ACTIVITY

Upon completion of all Requirements Analysis Phase tasks and receipt of resources for the next phase, the Project Manager, together with the project team should prepare and present a project status review for the Agency CIO, Sponsor, and other stakeholders. The review should address: (1) Requirements Analysis Phase activities status, (2) planning status for all subsequent life cycle phases (with significant detail on the next phase, to include the status of pending contract actions), (3) resource availability status, and (4) acquisition risk assessments of subsequent life cycle phases given the planned acquisition strategy.

7.0 PRODUCTS AND APPROVALS

Requirements Analysis Phase Products	Review and Comment	Approved By
Requirements Document	DoIT	Agency Project Sponsor Agency CIO
Test and Evaluation Master Plan	DoIT	Agency Project Sponsor Agency CIO

DESIGN PHASE

1.0 OBJECTIVE

The objective of the Design Phase is to transform the detailed, defined requirements into complete, detailed specifications for the system to guide the work of the Development Phase. The decisions made in this phase address, in detail, how the system will meet the defined functional, physical, interface, and data requirements. Design Phase activities may be conducted in an iterative fashion, producing first a general system design that emphasizes the functional features of the system, then a more detailed system design that expands the general design by providing all the technical detail.

For COTS products, some tasks and activities may have been performed by the developer and developer documentation may be appropriate to meet some documentation requirements. This is acceptable as long as each task and activity is performed and each document is available.

2.0 TASKS AND ACTIVITIES

The following tasks are performed during the Design Phase.

2.1 Establish the Application Environment

Identify/specify the target environment, the development environment and the design environment.

2.2 Design the Application

In the system design, first the general system characteristics are defined. The data storage and access for the database layer need to be designed. The user interface at the desktop layer needs to be designed. The business rules layer or the application logic needs to be designed. The interfaces from application to application and application to database also need to be designed and documented.

2.3 Develop Contingency Plan

The Contingency Plan will contain emergency response procedures; backup arrangements, procedures and responsibilities; and post-disaster recovery procedures and responsibilities. It is included in this phase because many of these factors will affect the design of the system.

2.4 Develop System Design Document

The system design document will be developed by the Project Manager and project team, identifying the steps used in the design of the application/system. The System Design Document is a deliverable in the Design Phase.

2.5 Begin Maintenance Manual

Begin development of the maintenance manual to ensure continued operation of the system once it is completed. This manual is completed as a deliverable in the Development Phase.

2.6 Begin Operations Manual

Begin development of the Operations Manual for mainframe systems/applications and the System Administrators Manual for client/server systems/applications. These manuals are completed as deliverables in the Development Phase.

2.7 Conduct Preliminary Design Review

This is an ongoing interim review of the system design as it evolves through the Design Phase. Detailed objective system functions, performance requirements, security requirements, and system platform characteristics will be reviewed.

2.8 Design Business Processes

The business organization, roles and procedures for designing this system/application need to be articulated.

2.9 Design Human Performance Support (Training)

The Training Plan and the User Manual are begun during the Design Phase. These will be completed as deliverables in the Development Phase.

2.10 Design Conversion/Migration/Transition Strategies

If current information needs to be converted/migrated/transitioned to the new system, plans need to be designed for those purposes, especially if converting means re-engineering existing processes. The Conversion Plan, Implementation Plan, and Contingency Plan are designed in this phase and are deliverables in the Development Phase.

2.11 Conduct a Security Risk Assessment

Conduct a security risk assessment by addressing the following components: assets, threats, vulnerabilities, likelihood, consequences and safeguards. The risk assessment

evaluates compliance with baseline security requirements, identifies threats and vulnerabilities, and assesses alternatives for mitigating or accepting residual risks.

2.12 Revise Previous Documentation

Documents from the previous phases need to be revised during the Design Phase. The updates should be signed off by the Project Manager with significant changes approved by the Agency CIO and Project Sponsor.

2.13 Conduct Final Design Review

The Project Manager conducts the final design review with approval or disapproval by the Agency CIO and the Project Sponsor. This review is conducted at the end of the Design Phase and confirms that modifications prompted by earlier reviews are incorporated.

3.0 ROLES AND RESPONSIBILITIES

Project Manager: The project leader is responsible and accountable for the successful execution of the Design Phase. The project leader is responsible for leading the team that accomplishes the tasks shown above.

Project Team: The project team members (regardless of the organization of permanent assignment) are responsible for accomplishing assigned tasks as directed by the Project Manager.

Procurement Officer: The Procurement Officer is responsible and accountable for preparing solicitation documents under the guidance of the project manager.

Oversight Activities: Secretary of DoIT and Agency CIO oversight activities provide advice and counsel to the Project Manager on the conduct and requirements of the Design Phase. Additionally, oversight activities provide information, judgments, and recommendations to the Agency decision makers during project reviews and in support of project decision milestones.

4.0 DELIVERABLES, RESPONSIBILITIES, AND ACTIONS

The content of these deliverables may be expanded or abbreviated depending on the size, scope, and complexity of the corresponding systems development effort.

4.1 Security Risk Assessment

The purpose of the risk assessment is to analyze threats to and vulnerabilities of a system to determine the risks (potential for losses), and using the analysis as a basis for identifying appropriate and cost-effective measures.

4.2 Conversion Plan

The Conversion Plan is begun in this phase and describes the strategies involved in converting data from an existing system to another hardware or software environment. It is appropriate to re-examine the original system's functional requirements for the condition of the system before conversion to determine if the original requirements are still valid.

4.3 Contingency Plan

The Contingency Plan contains emergency response procedures; backup arrangements, procedures, and responsibilities; and post-disaster recovery procedures and responsibilities. Contingency planning is essential to ensure that State systems are able to recover from processing disruptions in the event of localized emergencies or large-scale disasters. It is an emergency response plan, developed in conjunction with application owners and maintained at the primary and backup computer installation to ensure that a reasonable continuity of support is provided if events occur that could prevent normal operations. Contingency plans shall be routinely reviewed, updated, and tested to enable vital operations and resources to be restored as quickly as possible and to keep system downtime to an absolute minimum. A Contingency Plan is synonymous with a disaster plan and an emergency plan. If the system/subsystem is to be located within a facility with an acceptable contingency plan, system-unique contingency requirements should be added as an annex to the existing facility contingency plan.

4.4 System Design Document

Describes the system requirements, operating environment, system and subsystem architecture, files and database design, input formats, output layouts, human-machine interface, detailed design, processing logic, and external interfaces. It is used in conjunction with the Functional Requirements Document (FRD), which is finalized in this phase, to provide a complete system specification of all user requirements for the system and reflects the user's perspective of the system design. Includes all information required for the review and approval of the project development. The sections and subsections of the design document may be organized, rearranged, or repeated as necessary to reflect the best organization for a particular project. This document should include a requirements matrix showing where and how requirements are satisfied.

4.5 Implementation Plan

The Implementation Plan is begun in this phase and describes how the information system will be deployed and installed into an operational system. The plan contains an overview of the system, a brief description of the major tasks involved in the implementation, the overall resources needed to support the implementation effort (such as hardware, software, facilities, materials, and personnel), and any site-specific implementation requirements. This plan is updated during the Development Phase; the final version is provided in the Integration and Test Phase and used for guidance during the Implementation Phase.

4.6 Maintenance Manual

The Maintenance Manual is begun in this phase and provides maintenance personnel with the information necessary to maintain the system effectively. The manual provides the definition of the software support environment, the roles and responsibilities of maintenance personnel, and the regular activities essential to the support and maintenance of program modules, job streams, and database structures. In addition to the items identified for inclusion in the Maintenance Manual, additional information may be provided to facilitate the maintenance and modification of the system. Appendices to document various maintenance procedures, standards, or other essential information may be added to this document as needed.

4.7 Operations Manual (mainframe) or Systems Administration Manual (client/server)

These manuals are begun in this phase and completed in the Development Phase. For mainframe systems, the Operations Manual provides computer control personnel and computer operators with a detailed operational description of the information system and its associated environments, such as machine room operations and procedures. The Systems Administration Manual serves the purpose of an Operations Manual in distributed (client/server) applications.

4.8 Training Plan

The Training Plan is begun in this phase and outlines the objectives, needs, strategy, and curriculum to be addressed when training users on the new or enhanced information system. The plan presents the activities needed to support the development of training materials, coordination of training schedules, reservation of personnel and facilities, planning for training needs, and other training-related tasks. Training activities are developed to teach user personnel the use of the system as specified in the training criteria. Includes the target audience and topics on which training must be conducted on the list of training needs. It includes, in the training strategy, how the topics will be

addressed and the format of the training program, the list of topics to be covered, materials, time, space requirements, and proposed schedules.

4.9 User Manual

The User Manual is begun in this phase and contains all essential information for the user to make full use of the information system. This manual includes a description of the system functions and capabilities, contingencies and alternate modes of operation, and step-by-step procedures for system access and use.

5.0 ISSUES FOR CONSIDERATION

5.1 Project Decision Issues

The decisions of this phase re-examine in greater detail many of the parameters addressed in previous phases. The design prepared in this phase will be the basis for the activities of the Development Phase. The overall objective is to establish a complete design for the system. The prerequisites for this phase are the SBD, Project Plan, and FRD. A number of project approach, project execution, and project continuation decisions are made in this phase.

Project approach decisions include:

- Identifying existing or COTS components that can be used, or economically modified, to satisfy validated functional requirements.
- Using appropriate prototyping to refine requirements and enhance user and developer understanding and interpretation of requirements.
- Selecting specific methodologies and tools to be used in the later life cycle phases, especially the Development and Implementation Phases.
- Determining how user support will be provided, how the remaining life cycle phases will be integrated, and newly identified risks and issues handled.

Project execution decisions include:

- Modifications that must be made to the initial information system need.
- Modifications that will be made to current procedures.
- Modifications that will be made to current systems/databases or to other systems/databases under development.
- How conversion of existing data will occur.

Project continuation decisions include:

- The continued need of the information system to exist.
- The continued development activities based on the needs addressed by the design.
- Availability of sufficient funding and other required resources for the remainder of the systems life cycle.

The system user community shall be included in the Design Phase actions as needed. It is also in the Design Phase that new or further requirements might be discovered that are necessary to accommodate individuals with disabilities. If so, these requirements shall be added to the FRD.

5.2 Security Issues

The developer shall obtain the requirements from the Security Risk Assessment and the FRD and allocate them to the specific modules within the design for enforcement purposes. For example, if a requirement exists to audit a specific set of user actions, the developer may have to add a workflow module into the design to accomplish the auditing.

Security operating procedures are guidance documents that provide users and administrators with detailed requirements on how to operate and maintain the system securely. They should address all applicable computer and telecommunications security requirements, including: system access controls; marking, handling, and disposing of magnetic media and hard copies; computer room access; account creation, access, protection, and capabilities; operational procedures; audit trail requirements; configuration management; processing area security; employee check-out; and emergency procedures. Security operating procedures may be created as separate documents or added as sections or appendices to the user and operations manuals. This activity should be conducted during the Design Phase.

6.0 REVIEW ACTIVITY

This section describes the joint management reviews for both requirements and design that shall be held during the Design Phase. Prior to the design reviews, the acquirer shall have reviewed the deliverables initiated, updated, or completed during the Design Phase.

6.1 Requirements Reviews

System/subsystem and software requirements reviews are held at the beginning of the Design Phase to resolve open issues regarding the specified requirements for a software system or subsystem.

6.2 Design Reviews

A system/subsystem design review is held at the end of the Design Phase to resolve open issues regarding one or more of the following:

- The system-wide or subsystem-wide design decisions
- The architectural design of a software system or subsystem

A software design review is held at the end of the Design Phase to resolve open issues regarding one or more of the following:

- The software-wide design decisions
- The architectural design of a software item
- The detailed design of a software item or portion thereof (such as a database)

Upon completion of all Design Phase tasks and receipt of resources for the next phase, the Project Manager, together with the project team should prepare and present a project status review for the Agency CIO, Project Sponsor, and other stakeholders. The review should address: (1) Design Phase activities status, (2) planning status for all subsequent life cycle phases (with significant detail on the next phase, to include the status of pending contract actions), (3) resource availability status, and (4) acquisition risk assessments of subsequent life cycle phases given the planned acquisition strategy.

7.0 PRODUCTS AND APPROVALS

Design Phase Products	Review and Comment	Approved By
System Design Document	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
Security Risk Assessment	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
Contingency Plan	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
Conversion Plan (begin)	Agency technical and functional staff	
Implementation Plan (begin)	Agency technical and functional staff	
Operations Manual (begin)	Agency technical and functional staff	
Maintenance Manual (begin)	Agency technical and functional staff	
System Administration Manual (begin)	Agency technical and functional staff	
Training Plan (begin)	Agency technical and functional staff	
User Manual (begin)	Agency technical and functional staff	

DEVELOPMENT PHASE

1.0 OBJECTIVE

The objective of the Development Phase will be to convert the deliverables of the Design Phase into a complete information system. Although much of the activity in the Development Phase addresses the computer programs that make up the system, this phase also puts in place the hardware, software, and communications environment for the system and other important elements of the overall system.

The activities of this phase translate the system design produced in the Design Phase into a working information system capable of addressing the information system requirements. The development phase contains activities for requirements analysis, design, coding, integration, testing, and installation and acceptance related to software products. At the end of this phase, the system will be ready for the activities of the Integration and Test Phase.

For COTS products, some tasks and activities may have been performed by the developer and developer documentation may be appropriate to meet some documentation requirements. This is acceptable as long as each task and activity is performed and each document is available.

2.0 TASKS AND ACTIVITIES

2.1 Process Implementation

This activity consists of several tasks that are the responsibility of the developer. The developer shall place the outputs under configuration control and perform change control. The developer shall also document and resolve problems and non-conformances found in the software products and tasks.

The developer shall select, tailor, and use those standards, methods, tools, and computer programming languages that are documented, appropriate, and established by the organization for performing the activities in the Development Phase.

Plans for conducting the activities of the development phase should be developed, documented and executed. The plans should include specific standards, methods, tools, actions, and responsibility associated with the development and qualification of all requirements including safety and security. Separate plans may be developed. The detailed project Work Breakdown Structure (WBS) developed during the Planning Phase should be expanded to incorporate the WBS structure into each module or software configuration item to be developed.

2.2 Software Requirements Analysis

Establish and document software requirements, including the quality characteristics specifications, described below.

- Functional and capability specifications, including performance, physical characteristics, and environmental conditions under which the software item is to perform.
- Interfaces external to the software item.
- Qualification requirements.
- Safety specifications, including those related to methods of operation and maintenance, environmental influences, and personnel injury.
- Security specifications, including those related to compromise of sensitive information.
- Human-factors engineering (ergonomics), including those related to manual operations, human-equipment interactions, constraints on personnel, and areas needed concentrated human attention, that are sensitive to human errors and training.
- Data definition and database requirements.
- Installation and acceptance requirements of the delivered software product at the operation and maintenance site(s).
- User documentation.
- User operation and execution requirements.
- User maintenance requirements.

Evaluate the software requirements using the criteria listed below and document them.

- Trace ability to system requirements and system design.
- External consistence with system requirements.
- Internal consistency.
- Testability.
- Feasibility of software design.
- Feasibility of operation and maintenance.

Conduct joint reviews. Joint reviews are at both project management and technical levels and are held throughout the life of the contract. This process may be employed by any two parties, where one party (reviewing party) reviews another party (reviewed party).

2.3 Software Architectural Design

Transform the requirements for the software item into an architecture that describes its top-level structure and identifies the software components. Ensure that all the

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requirements for the software item are allocated to its software components and further refined to facilitate detailed design.

Develop and document a top-level design for the interfaces external to the software item and between the software components of the software item.

Develop and document a top-level design for the database.

Develop and document preliminary versions of user documentation.

Define and document preliminary test requirements and the schedule for Software Integration.

Evaluate the architecture of the software item and the interface and database designs using the criteria listed below.

- Trace ability to the requirements of the software item.
- External consistency with the requirements of the software item.
- Internal consistency between the software components.
- Appropriateness of design methods and standards used.
- Feasibility of detailed design.
- Feasibility of operation and maintenance.

Conduct joint reviews. Joint reviews are at both project management and technical levels and are held throughout the life of the contract. This process may be employed by any two parties, where one party (reviewing party) reviews another party (reviewed party).

2.4 Software Detailed Design

Develop a detailed design for each software component of the software item. The software components shall be refined into lower levels containing software units that can be coded, compiled, and tested. Ensure that all the software requirements are allocated from the software components to software units.

Develop and document a detailed design for the interfaces external to the software item, between the software components, and between the software units. The detailed design of the interfaces shall permit coding without the need for further information.

Develop and document a detailed design for the database.

Update user documentation as necessary.

Define and document test requirements and schedule for testing software units. The test requirements should include stressing the software unit at the limits of its requirements.

Update the test requirements and the schedule for Software Integration.

Evaluate the software detailed design and test requirements considering the criteria listed below.

- Trace ability to the requirements of the software item.
- External consistence with architectural design.
- Internal consistency between software components and software units.
- Appropriateness of design methods and standards used.
- Feasibility of testing.
- Feasibility of operation and maintenance.

Conduct joint reviews. Joint reviews are at both project management and technical levels and are held throughout the life of the contract. This process may be employed by any two parties, where one party (reviewing party) reviews another party (reviewed party).

2.5 Software Coding and Testing

Develop and document each software unit and database as well as test procedures and data for testing each software unit and database.

Test each software unit and database ensuring that it satisfies its requirements. Document the results.

Update the user documentation as necessary.

Update the test requirements and the schedule for Software Integration.

Evaluate software code and test results considering the criteria listed below.

- Trace ability to the requirements and design of the software item.
- External consistency with the requirements and design of the software item.
- Internal consistency between unit requirements.
- Test coverage of units.
- Appropriateness of coding methods and standards used.
- Feasibility of software integration and testing.

- Feasibility of operation and maintenance.

2.6 Software Integration

Develop an integration plan to integrate the software units and software components into the software item. The plan shall include test requirements, procedures, data, responsibilities, and schedule.

Integrate the software units and software components and test as the aggregates are developed in accordance with the integration plan. It shall be ensured that each aggregate satisfies the requirements of the software item and that the software item is integrated at the conclusion of the integration activity.

Update the user documentation as necessary.

Develop and document, for each qualification requirement of the software item, a set of tests, test cases (inputs, outputs, test criteria), and test procedures for conducting software Qualification Testing. Ensure that the integrated software item is ready for Software Qualification Testing.

Evaluate the integration plan, design, code, tests, test results, and user documentation considering the criteria listed below.

- Trace ability to the system requirements.
- External consistency with the system requirements.
- Internal consistency.
- Test coverage of the requirements of the software item.
- Appropriateness of test standards and methods used.
- Conformance to expected results.
- Feasibility of software qualification testing.
- Feasibility of operation and maintenance.

Conduct joint reviews. Joint reviews are at both project management and technical levels and are held throughout the life of the contract. This process may be employed by any two parties, where one party (reviewing party) reviews another party (reviewed party).

2.7 Software Qualification Testing

Conduct qualification testing in accordance with the qualification requirements for the software item. Ensure that the implementation of each software requirement is tested for compliance.

Update the user documentation as necessary.

Evaluate the design, code, tests, test results, and user documentation considering the criteria listed below.

- Test coverage of the requirements of the software item.
- Conformance to expected results.
- Feasibility of system integration and testing, if conducted.
- Feasibility of operation and maintenance.

Support audit(s) which could be conducted to ensure that:

- As-coded software products (such as software item) reflect the design documentation.
- The acceptance review and testing requirements prescribed by the documentation are adequate for the acceptance of the software products.
- Test data comply with the specification.
- Software products were successfully tested and meet their specifications.
- Test reports are correct and discrepancies between actual and expected results have been resolved.
- User documentation complies with standards as specified.
- Activities have been conducted according to applicable requirements, plans and contract.
- The costs and schedules adhere to the established plans.

The results of the audits shall be documented. If both hardware and software are under development or integration, the audits may be postponed until the System Qualification Testing.

Upon successful completion of the audits, if conducted, update and prepare the deliverable software product for System Integration, System Qualification Testing, Software Installation, or Software Acceptance Support as applicable. Also, establish a baseline for the design and code of the software item.

2.8 System Integration

Integrate the software configuration items with hardware configuration items, manual operations, and other systems as necessary, into the system. The aggregates shall be tested, as they are developed, against their requirements. The integration and the test results shall be documented.

For each qualification requirement of the system, a set of tests, test cases (inputs, outputs, test criteria), and test procedures for conducting System Qualification Testing shall be developed and documented. Ensure that the integrated system is ready for System Qualification Testing.

Evaluate the integrated system considering the criteria listed below. The results of the evaluations shall be documented.

- Test coverage of system requirements.
- Appropriateness of test methods and standards used.
- Conformance to expected results.
- Feasibility of system qualification testing.
- Feasibility of operation and maintenance.

2.9 System Qualification Testing

Conduct system qualification testing in accordance with the qualification requirements specified for the system. Ensure that the implementation of each system requirement is tested for compliance and that the system is ready for delivery. The qualification testing results shall be documented.

Evaluate and document the system considering the criteria listed below.

- Test coverage of system requirements.
- Conformance to expected results.
- Feasibility of operation and maintenance.

The developer shall support audits. The results of the audits shall be documented.

Upon successful completion of the audits, if conducted, update and prepare the deliverable software product for Software Installation and Software Acceptance Support. Also establish a baseline for the design and code of each software configuration item.

2.10 Software Installation

Develop a plan to install the software product in the target environment as designed. The resources and information necessary to install the software product shall be determined and be available. The developer shall assist the acquirer with the set-up activities. Where the installed software product is replacing an existing system, the developer shall support any parallel running activities that are required. The installation plan shall be documented.

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Install the software product in accordance with the installation plan. Ensure that the software code and databases initialize, execute, and terminate as specified in the contract. The installation events and results shall be documented.

2.11 Complete Support Documentation

Complete the Conversion Plan, Implementation Plan, Maintenance Manual, Operations Manual or systems Administration Manual, Training Plan, and User Manual.

2.12 Software Acceptance Support

Support the acquirer's acceptance review and testing of the software product. Acceptance review and testing shall consider the results of the Joint Reviews, Audits, Software Qualification Testing, and System Qualification Testing (if performed). The results of the acceptance review and testing shall be documented.

The developer shall complete and deliver the software product as specified.

The developer shall provide initial and continuing training and support to the acquirer as specified.

3.0 ROLES AND RESPONSIBILITIES

Project Manager: The project leader is responsible and accountable for the successful execution of the Development Phase. The project leader is responsible for leading the team that accomplishes the tasks shown above.

Project Team: The project team members (regardless of the organization of permanent assignment) are responsible for accomplishing assigned tasks as directed by the Project Manager.

Procurement Officer: The Procurement Officer is responsible and accountable for preparing solicitation documents under the guidance of the project manager.

Oversight Activities: Secretary of DoIT and Agency CIO oversight activities provide advice and counsel to the Project Manager on the conduct and requirements of the Development Phase. Additionally, oversight activities provide information, judgments, and recommendations to the Agency decision makers during project reviews and in support of project decision milestones.

4.0 DELIVERABLES, RESPONSIBILITIES AND ACTION

The content of these deliverables may be expanded or abbreviated depending on the size, scope, and complexity of the corresponding systems development effort. The following deliverables shall be initiated during the Development Phase:

4.1 Software Development Document

Contains documentation pertaining to the development of each unit or module, including the test cases, software, test results, approvals, and any other items that will help explain the functionality of the software.

4.2 System (Application) Software

Used for the Test Phase and finalized in this phase before implementation of the system. Include the disks (or other medium) used to store the information.

4.3 Test Files/Data

Used for system testing. Provide the actual test data and files used.

4.4 Integration Document

This document explains how the software components, hardware components, or both are combined and the interaction between them.

4.5 Test Analysis Report

This is the formal documentation of the software testing as defined in the Test Analysis Report.

4.6 Conversion Plan

The Conversion Plan is completed in this phase and describes the strategies involved in converting data from an existing system to another hardware or software environment. It is appropriate to re-examine the original system's functional requirements for the condition of the system before conversion to determine if the original requirements are still valid.

4.7 Implementation Plan

The Implementation Plan is completed in this phase and describes how the information system will be deployed and installed into an operational system. The plan contains an overview of the system, a brief description of the major tasks involved in the implementation, the overall resources needed to support the implementation effort (such as hardware, software, facilities, materials, and personnel), and any site-specific

implementation requirements. The final version is provided in the Integration and Test Phase and used for guidance during the Implementation Phase.

4.8 Maintenance Manual

The Maintenance Manual is completed in this phase and provides maintenance personnel with the information necessary to maintain the system effectively. The manual provides the definition of the software support environment, the roles and responsibilities of maintenance personnel, and the regular activities essential to the support and maintenance of program modules, job streams, and database structures. In addition to the items identified for inclusion in the Maintenance Manual, additional information may be provided to facilitate the maintenance and modification of the system. Appendices to document various maintenance procedures, standards, or other essential information may be added to this document as needed.

4.9 Operations Manual (mainframe) or Systems Administration Manual (client/server)

These manuals are completed in this phase. For mainframe systems, the Operations Manual provides computer control personnel and computer operators with a detailed operational description of the information system and its associated environments, such as machine room operations and procedures. The Systems Administration Manual serves the purpose of an Operations Manual in distributed (client/server) applications.

4.10 Training Plan

The Training Plan is completed in this phase and outlines the objectives, needs, strategy, and curriculum to be addressed when training users on the new or enhanced information system. The plan presents the activities needed to support the development of training materials, coordination of training schedules, reservation of personnel and facilities, planning for training needs, and other training-related tasks. Training activities are developed to teach user personnel the use of the system as specified in the training criteria. Includes the target audience and topics on which training must be conducted on the list of training needs. It includes, in the training strategy, how the topics will be addressed and the format of the training program, the list of topics to be covered, materials, time, space requirements, and proposed schedules.

4.11 User Manual

The User Manual is completed in this phase and contains all essential information for the user to make full use of the information system. This manual includes a description of the system functions and capabilities, contingencies and alternate modes of operation, and step-by-step procedures for system access and use.

5.0 ISSUES FOR CONSIDERATION

There are three phase prerequisites that should be completed before beginning this phase.

- Project management plan and schedule indicating target date for completion of each module and target date for completion of system testing.
- System design document, containing program logic flow, identifying any existing code to be used, and the subsystems with their inputs and outputs.
- Unit/module and integration test plans, containing testing requirements, schedules, and test case specifications for unit and integration testing.

6.0 REVIEW ACTIVITY

Upon completion of all Development Phase tasks and receipt of resources for the next phase, the Project Manager, together with the project team should prepare and present a project status review for the Agency CIO, Project Sponsor, and other stakeholders. The review should address: (1) Development Phase activities status, (2) planning status for all subsequent life cycle phases (with significant detail on the next phase, to include the status of pending contract actions), (3) resource availability status, and (4) acquisition risk assessments of subsequent life cycle phases given the planned acquisition strategy.

7.0 PRODUCTS AND APPROVALS

Development Phase Products	Reviewed and Comment	Approved By
Software Development Document	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
System Software	Agency technical and functional staff	Agency Project Sponsor Agency CIO
Test Files/Data	Agency technical and functional staff	Agency Project Sponsor Agency CIO
Integration Document	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
Test Analysis Report	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
Conversion Plan (complete)	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
Implementation Plan (complete)	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
Operations Manual (complete)	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
Maintenance Manual (complete)	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
System Administration Manual (complete)	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
Training Plan (complete)	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
User Manual (complete)	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO

INTEGRATION AND TEST PHASE

1.0 OBJECTIVE

The objective of this phase is to prove that the developed system satisfies the requirements defined in the FRD. Another purpose is to perform an integrated system test function as specified by the design parameters. This function shall be the responsibility of the system testers and will be heavily supported by the user participants.

Prerequisites of this phase are the FRD, project management plan and schedule, system baseline software and documents, and a test plan containing all test requirements and schedules.

Several types of tests will be conducted in this phase. First, subsystem integration tests shall be executed and evaluated by the development team to prove that the program components integrate properly into the subsystems and that the subsystems integrate properly into an application. Next, the testing team conducts and evaluates system tests to ensure the developed system meets all technical requirements, including performance requirements. Next, the testing team and the Security Manager conduct security tests to validate that the access and data security requirements are met. Finally, users participate in acceptance testing to confirm that the developed system meets all user requirements as stated in the FRD. Acceptance testing shall be done in a simulated “real” user environment with the users using simulated or real target platforms and infrastructures.

2.0 TASKS AND ACTIVITIES

The following tasks should be completed during the Integration and Test phase.

2.1 Start test phase

The test and evaluation team is responsible for establishing the test team and creating the test files/data.

2.2 Conduct Subsystem/System Testing

The test and evaluation team is responsible for creating/loading the test database(s) and executing the system test(s). All results should be documented on the Test Analysis Report, Test Problem Report, and on the Test Analysis Approval Determination. Any failed components should be migrated back to the development phase for rework, and the passed components should be migrated ahead for security testing.

2.3 Conduct Security Testing

The test and evaluation team will again create or load the test database(s) and execute security (penetration) test(s). All tests will be documented, similar to those above. Failed components will be migrated back to the development phase for rework, and passed components will be migrated ahead for acceptance testing.

2.4 Conduct Acceptance Testing

The test and evaluation team will create/load the test database(s) and execute the acceptance test(s). All tests will be documented, similar to those above. Failed components will be migrated back to the development phase for rework, and passed components will migrate ahead for implementation.

2.5 Revise previous phase documentation

During this phase, the documentation from all previous phases will be finalized to align it with the delivered system. The Project Manager coordinates these update activities.

3.0 ROLES AND RESPONSIBILITIES

Project Manager: The project leader is responsible and accountable for the successful execution of the Integration and Test Phase. The project leader is responsible for leading the team that accomplishes the tasks shown above.

Project Team: The project team members (regardless of the organization of permanent assignment) are responsible for accomplishing assigned tasks as directed by the Project Manager.

Procurement Officer: The Procurement Officer is responsible and accountable for preparing solicitation documents under the guidance of the project manager.

Oversight Activities: Agency and Secretary of DoIT oversight activities provide advice and counsel for the Project Manager on the conduct and requirements of the Integration and Test Phase. Additionally, oversight activities provide information, judgments, and recommendations to the Agency decision makers during project reviews and in support of project decision milestones.

4.0 DELIVERABLES, RESPONSIBILITY, AND ACTION

The following deliverables shall be initiated during the Integration and Test Phase:

4.1 Test Analysis Approval Determination

Attached to the test analysis report as a final result of the test reviews and testing levels above the integration test; briefly summarizes the perceived readiness for migration of the software.

4.2 Test Problem Reports

Document problems encountered during testing; the form is attached to the test analysis reports.

4.3 Information Technology Systems Security Certification & Accreditation

In the State, the certification process includes completing a Security Risk Assessment, Sensitive System Security Plan, Security Operating Procedures, Security Test and Evaluation, and Certification Statements. Only when the previous items are completed should a system be accredited. The systems security plan and certification/accreditation package should be prepared prior to system use and updated whenever system modifications are made. Use the State Certification & Accreditation Guide for templates on completing these documents.

5.0 ISSUES FOR CONSIDERATION

Security controls shall be tested before system implementation to uncover all design and implementation flaws that would violate security policy. Security Test and Evaluation (ST&E) involves determining a system's security mechanisms adequacy for completeness and correctness, and the degree of consistency between system documentation and actual implementation. This shall be accomplished through a variety of assurance methods such as analysis of system design documentation, inspection of test documentation, and independent execution of function testing and penetration testing. Results of the ST&E affect security activities developed earlier in the life cycle such as security risk assessment, sensitive system security plan, and contingency plan. Each of these activities will be updated in this phase based on the results of the ST&E. Build on the security testing recorded in the software development documents, unit testing, integration testing, and system testing.

6.0 REVIEW ACTIVITY

Upon completion of all Integration and Test Phase tasks and receipt of resources for the next phase, the Project Manager, together with the project team should prepare and present a project status review for the Agency CIO, Project Sponsor, and other stakeholders. The review should address: (1) Integration and Test Phase activities status, (2) planning status for all subsequent life cycle phases (with significant detail on the next phase, to include the status of pending contract actions), (3) resource availability status,

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and (4) acquisition risk assessments of subsequent life cycle phases given the planned acquisition strategy.

7.0 PRODUCTS AND APPROVALS

Integration and Test Phase Documents	Review and Comment	Approved By
Test Analysis Approval Determination	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
Test Problem Reports	Agency technical and functional staff	Agency Project Sponsor Agency CIO
IT Systems Security Certification & Accreditation	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO

IMPLEMENTATION PHASE

1.0 OBJECTIVE

In this phase, the system or system modifications are installed and made operational in a production environment. The phase is initiated after the system has been tested and accepted by the user. Activities in this phase include notification of implementation to end users, execution of the previously defined training plan, data entry or conversion, completion of security certification and accreditation and post implementation evaluation. This phase continues until the system is operating in production in accordance with the defined user requirements.

The new system can fall into three categories, replacement of a manual process, replacement of a legacy system, or upgrade to an existing system. Regardless of the type of system, all aspects of the implementation phase should be followed. This will ensure the smoothest possible transition to the organization's desired goal.

2.0 TASKS AND ACTIVITIES

The following activities are performed as part of the implementation phase. A description of these tasks and activities is provided below.

2.1 Notification of implementation

The implementation notice should be sent to all users and organizations affected by the implementation. Additionally, it is good policy to make internal organizations not directly affected by the implementation aware of the schedule so that allowances can be made for a disruption in the normal activities of that section. The notice should include:

- The schedule of the implementation;
- A brief synopsis of the benefits of the new system;
- The difference between the old and new system;
- Responsibilities of end user affected by the implementation during this phase; and
- The process to obtain system support, including contact names and phone numbers.

2.2 Execution of Training Plan

It is always a good business practice to provide training before the end user uses the new system. Because there has been a previously designed training plan established, complete with the system user manual, the execution of the plan should be relatively simple. Typically what prevents a plan from being implemented is lack of funding. Good budgeting should prevent this from happening.

2.3 Data entry or conversion

With the implementation of any system, typically there is old data which is to be included in the new system. This data can be in a manual or an automated form. Regardless of the format of the data, the tasks in this section are two fold, data input and data verification. When replacing a manual system, hard copy data will need to be entered into the automated system. Some sort of verification that the data is being entered correctly should be conducted throughout this process. This is also the case in data transfer, where data fields in the old system may have been entered inconsistently and therefore affect the integrity of the new database. Verification of the old data becomes imperative to a useful computer system.

One of the ways verification of both system operation and data integrity can be accomplished is through parallel operations. Parallel operations consists of running the old process or system and the new system simultaneously until the new system is certified. In this way if the new system fails in any way, the operation can proceed on the old system while the bugs are worked out.

2.4 Install System

To ensure that the system is fully operational, install the system in a production environment.

2.5 Post-implementation evaluation

After the system has been fielded, a post-implementation evaluation is conducted to determine the success of the project through its implementation phase. The purpose of this evaluation is to document implementation experiences to recommend system enhancements and provide guidance for future projects.

In addition, change implementation notices will be utilized to document user requests for fixes to problems that may have been recognized during this phase. It is important to document any user request for a change to a system to limit misunderstandings between the end user and the system programmers.

2.6 Review previous documentation

During this phase, the documentation from all previous phases will be finalized to align it with the delivered system. The Project Manager coordinates these update activities.

3.0 ROLES AND RESPONSIBILITIES

Project Manager: The project leader is responsible and accountable for the successful execution of the Implementation Phase. The project leader is responsible for leading the team that accomplishes the tasks shown above.

Project Team: The project team members (regardless of the organization of permanent assignment) are responsible for accomplishing assigned tasks as directed by the Project Manager.

Procurement Officer: The Procurement Officer is responsible and accountable for preparing solicitation documents under the guidance of the project manager.

Oversight Activities: Agency oversight activities, including the IT office, provide advice and counsel for the Project Manager on the conduct and requirements of the Implementation Phase. Additionally, oversight activities provide information, judgments, and recommendations to the Agency decision makers during project reviews and in support of project decision milestones.

4.0 DELIVERABLES, RESPONSIBILITIES, AND ACTION

The following deliverables are completed during the Implementation Phase:

4.1 Delivered System

After the Integration and Test Phase is completed and all documents are approved, the system - including the production version of the data repository - is delivered to the customer for the Operations and Maintenance Phase.

4.2 Change Implementation Notice

A formal request and approval document for changes made during the Implementation Phase.

4.3 Version Description Document

The primary configuration control document used to track and control versions of software released to the operational environment. It is a summary of the features and contents for the software build and identifies and describes the version of the software being delivered.

4.4 Post-Implementation Review Report

This report is created at the end of the Implementation Phase. It is conducted to ensure that the system functions as planned and expected; to verify that the system cost is within the estimated amount; and to verify that the intended benefits are derived as projected.

5.0 ISSUES FOR CONSIDERATION

Implementation represents the culmination of many threads of activity within the project. As the Project Manager pulls them all together, it's important not to overlook critical activities that are not directly associated with the technology implementation, such as:

- Execution of the communications strategy and plan to ensure all participants understand their roles and the objectives of each implementation activity.
- Effective delivery of user training.
- Close management of the data conversion process and products.
- Change management and data verification to ensure that users develop trust in the system's products as early in the process as possible.
- Rigorous documentation of all activities.

6.0 REVIEW ACTIVITY

A post-implementation review shall be conducted to ensure that the system functions as planned and expected; to verify that the system cost is within the estimated amount; and to verify that the intended benefits are derived as projected. Normally, this shall be a one-time review, and it occurs after a major implementation; it may also occur after a major enhancement to the system. The results of an unacceptable review are submitted to the Agency CIO for review and follow-up actions. The Agency CIO may decide it will be necessary to return the deficient system to the responsible system development Project Manager for correction of deficiencies.

During the Implementation Phase Review, recommendations may be made to correct errors, improve user satisfaction or improve system performance. For contractor development, analysis shall be performed to determine if additional activity is within the scope of the statement of work or within the original contract.

7.0 PRODUCTS AND APPROVALS

Implementation Phase Documents	Review and Comment	Approved By
Delivered System Documentation	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
Change Implementation Notice	Agency technical and functional staff	Agency Project Sponsor Agency CIO
Version Description Document	Agency technical and functional staff	Agency Project Sponsor Agency CIO
Post-implementation Review Report	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO

OPERATIONS AND MAINTENANCE PHASE

1.0 OBJECTIVE

More than half of the life cycle costs are attributed to the operations and maintenance of systems. In this phase, it is essential that all facets of operations and maintenance are performed. The system is being used and scrutinized to ensure that it meets the needs initially stated in the planning phase. Problems are detected and new needs arise. This may require modification to existing code, new code to be developed, and/or hardware configuration changes. Providing user support is an ongoing activity. New users will require training and others will require training as well. The emphasis of this phase will be to ensure that the users needs are met and the system continues to perform as specified in the operational environment. Additionally, as operations and maintenance personnel monitor the current system they may become aware of better ways to improve the system and therefore make recommendations. Changes will be required to fix problems, possibly add features, and make improvements to the system. This phase will continue as long as the system is in use.

2.0 TASKS AND ACTIVITIES

2.1 Systems Operations

Operations support is an integral part of the day-to-day operations of a system. In small systems, all or part of each task may be done by the same person. But in large systems, each function may be done by separate individuals or even separate areas. The Operations Manual was developed in previous SDLC phases. This document defines tasks, activities, and responsible parties and will need to be updated as changes occur. Systems operations activities and tasks need to be scheduled, on a recurring basis, to ensure that the production environment is fully functional and is performing as specified. The following is a checklist of systems operations key tasks and activities:

- Ensure that systems and networks are running and available during the defined hours of Operations.
- Implement non-emergency requests during scheduled Outages, as prescribed in the Operations Manual.
- Ensure all processes, manual and automated, are documented in the operating procedures. These processes should comply with the system documentation.
- Acquisition and storage of supplies, e.g., paper, toner, tapes, removable disk.
- Perform backups (day-to-day protection, contingency).
- Perform the physical security functions including ensuring adequate UPS, Personnel have proper clearances and proper access privileges etc.
- Ensure contingency planning for disaster recovery is current and tested.

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- Ensure users are trained on current processes and new processes.
- Ensure that service level objectives are kept accurate and are monitored.
- Maintain performance measurements, statistics, and system logs. Examples of performance measures include volume and frequency of data to be processed in each mode, order and type of operations.
- Monitor the performance statistics, report the results, and escalate problems when they occur.

2.2 Data / Software Administration

Data / Software Administration is needed to ensure that input data and output data and databases are correct and continually checked for accuracy and completeness. This includes insuring that any regularly scheduled jobs are submitted and completed correctly. Software and databases should be maintained at (or near) the current maintenance level. The backup and recovery processes for databases are normally different than the day-to-day DASD volume backups. The backup and recovery process of the databases should be done as a Data / Software Administration task. A checklist of Data / Software Administration tasks and activities are:

- Performing production control and quality control functions (Job submission, checking and corrections).
- Interfacing with other functional areas for day-to-day checking / corrections.
- Installing, configuring, upgrading and maintaining database(s). This includes updating processes, data flows, and objects (usually shown in diagrams).
- Developing and performing data / database backup and recovery routines for data integrity and recoverability. Ensure documented properly in the Operations Manual.
- Developing and maintaining a performance and tuning plan for online process and databases.
- Performing configuration and design audits to ensure software, system, parameter, and configuration are correct.

2.3 Problem and Modification Process

One fact of life with any system is that change is inevitable. Users need an avenue to suggest change and identified problems. A User Satisfaction Review which can include a Customer Satisfaction Survey can be designed and distributed to obtain feedback on operational systems to help determine if the systems are accurate and reliable. Systems administrators and operators need to be able to make recommendations for upgrade of hardware, architecture and streamlining processes. For small in-house systems, modification requests can be handled by an in-house process. For large integrated systems, modification requests may be addressed in the Requirements document and may take the form of a change package or a formal Change Implementation Notice and may

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require justification and cost benefits analysis for approval by a review board. The Requirements document for the project may call for a modification cut-off and rollout of the system as a first version and all subsequent changes addressed as a new or enhanced version of the system. A request for modifications to a system may also generate a new project and require a new project initiation plan.

2.4 System / Software Maintenance

Daily operations of the system /software may necessitate that maintenance personnel identify potential modifications needed to ensure that the system continues to operate as intended and produces quality data. Daily maintenance activities for the system, takes place to ensure that any previously undetected errors are fixed. Maintenance personnel may determine that modifications to the system and databases are needed to resolve errors or performance problems. Also modifications may be needed to provide new capabilities or to take advantage of hardware upgrades or new releases of system software and application software used to operate the system. New capabilities may take the form of routine maintenance or may constitute enhancements to the system or database as a response to user requests for new/improved capabilities. New capabilities needs may begin a new problem modification process described above.

At this phase of the SDLC all security activities have been at least initiated or completed. An update must be made to the System Security plan; an update and test of the contingency plan should be completed. Continuous vigilance should be given to virus and intruder detection. The Project Manager must be sure that security operating procedures are kept updated accordingly.

2.5 Review Previous Documentation

Review and update documentation from the previous phases. In particular, the Operations Manual, System Boundary Document, and Contingency Plan need to be updated and finalized during the Operations and Maintenance Phase as required.

3.0 ROLES AND RESPONSIBILITIES

This list briefly outlines some of the roles and responsibilities for key maintenance personnel. Some roles may be combined or eliminated depending upon the size of the system to be maintained. Each system will dictate the necessity for the roles listed below.

System Manager: The System Manager develops, documents and execute plans and procedures for conducting activities and tasks of the Maintenance Process. To provide for an avenue of problem reporting and customer satisfaction, the Systems Manager should create and discuss communications instructions with the systems customers.

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Systems Managers should keep the Help Desk Personnel informed of all changes to the system especially those requiring new instructions to users.

Technical Support: Personnel which provide technical support to the program. This support may involve granting access rights to the program. Setup of workstations or terminals to access the system. Maintaining the operating system for both server and workstation. Technical support personnel may be involved with issuing user IDs or login names and passwords. In a Client server environment technical support may perform systems scheduled backups and operating system maintenance during downtime.

Vendor Support: The technical support and maintenance on some programs are provided through vendor support. A contract is established outlining the contracted systems administration, operators, and maintenance personnel duties and responsibilities. One responsibility which should be included in the contract is that all changes to the system will be thoroughly documented.

Help Desk: Help Desk personnel provide the day-to-day users help for the system. Help desk personnel should be kept informed of all changes or modifications to the system. Help Desk Personnel are contacted by the user when questions or problems occur with the daily operations of the system. Help Desk Personnel need to maintain a level of proficiency with the system.

Operations or Operators (turn on/off systems, start tasks, backup etc): For many mainframe systems, an operator provides technical support for a program. The operator performs scheduled backup, performs maintenance during downtime and is responsible to ensure the system is online and available for users. Operators may be involved with issuing user IDs or login names and passwords for the system.

Customers: The customer needs to be able to share with the systems manager the need for improvements or the existence of problems. Some users live with a situation or problem because they feel they must. Customers may feel that change will be slow or disruptive. Some feel the need to create work-arounds. A customer has the responsibility to report problems or make recommendations for changes to a system.

Program Analysts or Programmer: Interprets user requirements, designs and writes the code for specialized programs. User changes, improvements, enhancements may be discussed in Joint Application Design sessions. Analysts programs for errors, debugs the program and tests program design.

Process Improvement Review Board: A board of individuals may be convened to approve recommendations for changes and improvements to the system. This group may

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be chartered. The charter should outline what should be brought before the group for consideration and approval. The board may issue a Change Directive.

Users Group or Team: A group of computer users who share knowledge they have gained concerning a program or system. They usually meet to exchange information, share programs and can provide expert knowledge for a system under consideration for change.

Contract Manager: The Contract Manager has many responsibilities when a contract has been awarded for maintenance of a program. The Contract Manager should have a certificate of training for completion of a Contracting Officer's Technical Representative (COTR) course. The Contract Manager's main role is to make sure that the interests of the Procurement Office are protected and that no modifications are made to the contract without permission from the Procurement Office.

Data Administrator: Performs tasks which ensure that accurate and valid data are entered into the system. Sometimes this person creates the information systems database, maintains the databases security and develops plans for disaster recovery. The data administrator may be called upon to create queries and reports for a variety of user requests. The data administrator responsibilities include maintaining the databases data dictionary. The data dictionary provides a description of each field in the database, the field characteristics and what data is maintained with the field.

Telecommunications Analyst and Network System Analyst: Plans, installs, configures, upgrades and maintains networks as needed. If the system requires it, they ensure that external communications and connectivity are available.

Computer Systems Security Officer (CSSO): The CSSO has a requirement to review system change requests, review and in some cases coordinate the Change Impact Assessments, participate in the Configuration Control Board process, and conduct and report changes that may be made that effect the security posture of the system.

4.0 DELIVERABLES, RESPONSIBILITIES AND ACTION

4.1 In-Process Review

The In-Process Review occurs at predetermined milestones usually quarterly, but at least once a year. The performance measure should be reviewed along with the health of the system. Performance measures should be measured against the baseline measures. Ad hoc reviews should be called when deemed necessary by either party.

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4.2 User Satisfaction Review

User Satisfaction Reviews can be used as a tool to determine the need to proceed with a Process Improvement Review Board meeting or initiate a proposal for a new system. This review can be used as input to the In-Process Review. (See Appendix C-33)

5.0 ISSUES FOR CONSIDERATION

5.1 Documentation

It cannot be stressed enough, that proper documentation for the duties performed by each individual responsible for system maintenance and operation should be up-to-date. For smooth day-to-day operations of any system, as well as disaster recovery, each individual's role, duties and responsibilities should be outlined in detail. A systems administrator's journal or log of changes performed to the system software or hardware is invaluable in times of emergencies. Operations manuals, journals or logs should be readily accessible by maintenance personnel.

5.2 Guidelines in determining New Development from Maintenance

Changes to the system should meet the following criteria in order for the change or modification request to be categorized as Maintenance; otherwise it should be considered as New Development:

- Estimated cost of modification are below maintenance costs
- Proposed changes can be implemented within 1 system year
- Impact to system is minimal or necessary for accuracy of system output

6.0 REVIEW ACTIVITY

Review activities occur several times throughout this phase. Each time the system is reviewed, one of three of the following decisions will be made:

- The system is operating as intended and meeting performance expectations.
- The system is not operating as intended and needs corrections or modifications.
- The users are/are not satisfied with the operation and performance of the system.

The In-Process Review (conducted at least annually) shall be conducted in this phase. The In-Process Review shall be performed to evaluate system performance, user satisfaction with the system, adaptability to changing business needs, and new technologies that might improve the system. This review is diagnostic in nature and can lead to development or maintenance activities. Any major system modifications needed

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after the system has been implemented will follow the life cycle process from planning through implementation. A project management plan, including a feasibility study, will identify modifications to existing system documentation (change pages) rather than new system documentation (for example, a functional requirements document, a system design document, etc.). The appropriate reviews and testing will be conducted, based on the scope of the modification.

7.0 PRODUCTS AND APPROVALS

Operations and Maintenance Phase Documents	Review and Comment	Approved By
Program Trouble Reports	Agency technical and functional staff	System Manager
Change Implementation Notice	Agency technical and functional staff	System Manager Agency CIO
In-Process Review	Agency technical and functional staff	System Manager Agency CIO
User Satisfaction Review	Agency technical and functional staff	System Manager Agency CIO

DISPOSITION PHASE

1.0 OBJECTIVE

The Disposal Phase will be implemented to either eliminate a large part of a system or, in most cases, close down a system and end the life cycle process. The system in this phase has been declared surplus and/or obsolete and will be scheduled for shutdown. The emphasis of this phase will be to ensure that data, procedures, and documentation are packaged and archived in an orderly fashion, making it possible to reinstall and bring the system back to an operational status, if necessary, and to retain all data records in accordance with State policies regarding retention of electronic records. The Disposition phase represents the end of the systems life cycle. A Disposition Plan shall be prepared to address all facets of archiving, transferring, and disposing of the system and data. Particular emphasis shall be given to proper preservation of the data processed by the system do that it is effectively migrated to another system or archived in accordance with applicable records management regulations and policies for potential future access. The system disposition activities preserve information not only about the current production system but also about the evolution of the system through its life cycle.

2.0 TASKS AND ACTIVITIES

The objectives for all tasks identified in this phase are to retire the system, software, hardware and data. The tasks and activities actually performed are dependent on the nature of the project. The disposition activities are performed at the end of the systems life cycle. The disposition activities ensure the orderly termination of the system and preserve vital information about the system so that some or all of it may be reactivated in the future if necessary. Particular emphasis shall be given to proper preservation of the data processed by the system, so that the data are effectively migrated to another system or disposed of in accordance with applicable records management and program area regulations and policies for potential future access. These activities may be expanded, combined or deleted, depending on the size of the system.

2.1 Prepare Disposition Plan

The Disposition Plan must be developed and implemented. The Disposition Plan will identify how the termination of the system/data will be conducted, and when, as well as the system termination date, software components to be preserved, data to be preserved, disposition of remaining equipment, and archiving of life cycle products.

2.2 Archive or Transfer Data

The data from the old system will have to be implemented into the new system or if it is obsolete, archived.

2.3 Archive or Transfer Software Components

Similar to the data that is archived or transferred, the software components will need to be transferred to the new system, or if that is not feasible, disposed of.

2.4 Archive Life Cycle Deliverables

A lot of documentation went into developing the application or system. This documentation needs to be archived, where it can be referenced if needed at a later date.

2.5 End the System in an Orderly Manner

Follow the plan in the Disposition Plan for the orderly breakdown of the system, its components and the data within.

2.6 Dispose of Equipment

If the equipment can be used elsewhere in the organization, recycle. If it is obsolete, notify the property management office to excess all hardware components.

2.7 Prepare Post-termination Review Report

This review will be performed at the end of the Disposition Phase and again within 6 months after disposition of the system.

3.0 ROLES AND RESPONSIBILITIES

Manager of Application: Authors the Disposition Plan and ensures that all aspects of the Disposition Plan are followed. The Disposition Plan should outline all roles and responsibilities for all actions related to the close down and archive of the system. Prepares Post-termination Review Report.

Project Manager: Works with the Manager of the Application to ensure that the Disposition Plan is followed. The Project Manager is the one who finalizes the Disposition process.

Technical Support or Vendor Support: The Disposition Plan may call for the Technical Support Personnel to send system related hardware to a warehouse or may reassign equipment to a new or replacement system. Technical Support Personnel or Operators may perform the cutoff of users access per instructions from the Security Manager. Technical Support personnel may assist with the archive of the Information Systems data. They would perform the actual archive process.

Data Administrator: The Disposition Plan may direct that only certain systems data be archived. The Data Administrator would identify the data and assist technical personnel with the actual archive process. The Data Administrator may be involved with

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identifying data which due to its sensitive nature must be destroyed. They would also be involved with identifying and migrating data to a new or replacement system.

Users Services (Training & Help Desk): User Services includes the training, telecommunications, and the help desk. The training component coordinates and schedules the development and delivery of all training and facilitates the development of systems training methods and materials. It advises and assists development teams in the preparation of user training and monitors user feedback on training adequacy. In this phase, the Users Services may assist with the retraining of users to facilitate the transfer to a new or replacement system.

Operations: (turn off systems, start tasks, backup etc) interfaces with the computer facility that will host the system being developed. This group also schedules, executes, and verifies production job streams; distributes specified outputs; handles other production control activities; and maintains and monitors centralized mainframe database management system software and runtime environments. It also acquires, maintains, customizes and tunes operating system software, assesses the affect of new or changed systems upon the operational environments, manages system software capacities, and advises on or arranges accommodation of new application systems. In this phase, the Operators would assist Technical Support, Security Manager and Data Administrators with the actual archive process.

Program Manager / Analysts: Program Managers need to plan and schedule a smooth shutdown. They also should be sure that all documentation is accumulated to be archived with the system.

Customers (User Groups): The user group ensures the active participation of users at all levels in the definition, design, and development of a re-engineered automation system for the capture, processing, tracking, and reporting. The purpose of the user group is to provide a forum for end users' input, coordination, and validation of their automation requirements. The group will provide a consistent work force responsible for initiating and resolving issues relating to system development efforts and expeditiously resolve issues relating to the identification and documentation of requirements.

Security Managers: The security managers will need to make sure that all access authority has been eliminated for the users. Any users that only use the application should be removed from the system while others that use other applications as well as this one may still need access to the overall system, but not the application being shutdown. If there is another application that is taking the place of this application, the security managers should coordinate with the new security managers.

4.0 DELIVERABLES, RESPONSIBILITIES AND ACTION

The following deliverables are initiated and finalized during the Disposition Phase

4.1 Disposition Plan

The objectives of the plan are to end the operation of the system in a planned, orderly manner and to ensure that system components and data are properly archived or incorporated into other systems. This will include removing the active support by the operations and maintenance organizations. The users will need to play an active role in the transition. All concerned groups will need to be kept informed of the progress and target dates. The decision to proceed with Disposition will be based on recommendations and approvals from an In-Process Review or based on a date (or time period) specified in the System Boundary Document (SBD).

This plan will include a statement of why the application is no longer supported, a description of replacement / upgrade, list of tasks/activities (transition plan) with estimated dates of completion and the notification strategy. Additionally, it will include the responsibilities for future residual support issues: identifying media alternatives if technology changes; new software product transition plans; alternative support issues (once the application is removed); parallel operations of retiring and the new software product; archiving of the software product, associated documentation, movement of logs, code; and accessibility of archive, data protection identification, and audit applicability.

4.2 Post-termination Review Report

A report at the end of the process that details the findings of the Disposition Phase review. It includes details of where to find all products and documentation that has been archived.

4.3 Archived System

The packaged set of data and documentation containing the archived application.

5.0 ISSUES FOR CONSIDERATION

Update of Security plans for archiving and the contingency plans to reestablish the system should be in place.

All documentation about the application, system logs and configuration will be archived along with the data and a copy of the Disposition Plan.

6.0 REVIEW ACTIVITY

The Post-Termination Review shall be performed after the end of this final phase. This phase-end review shall be conducted within 6 months after disposition of the system.

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Disposition Phase

The Post-Termination Review Report documents the lessons learned from the shutdown and archiving of the terminated system.

7.0 PRODUCTS AND APPROVALS

Disposition Phase Documents	Review and Comment	Approved By
Disposition Plan	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO
Post-termination Review Report	Agency technical and functional staff DoIT	Agency Project Sponsor Agency CIO