U.S. DEPARTMENT OF AGRICULTURE
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DEPARTMENTAL MANUAL	Number: 3200-002
SUBJECT: Management A Project Manager's Guide to Application Systems Life Cycle Management	DATE: March 3, 1988
	OPI: Agency Technical Services Division, Office of Information Resources Management

1 PURPOSE

This manual provides detailed guidance for managing major application system development projects in the Department of Agriculture. The manual presents a phased methodology for life cycle management of application systems. Project managers of software development projects may use the manual as a guide for determining tasks and preparing documentation required for lifecycle management of application systems.

2 SPECIAL INSTRUCTIONS

Departmental Regulation 3220-3, Software Management, details United States Department of Agriculture (USDA) software management policy.

Departmental Manual 3200-1, Application Systems Life Cycle Management, details the methodology for acquisition and life cycle management of ADP Information Systems.

A project manager should read the manual carefully and adopt its approach to developing major applications. Application of the methodology is flexible. An Agency may use other Life Cycle Management methodologies that closely follow the methodology presented in this manual.

Within the framework of the methodology, fourth generation tools and techniques are appropriate. Agencies should use automated project management tools, prototyping, computer aided software engineering products and other development techniques.

While this manual is primarily for major applications development projects, using it with smaller, non-major applications may be of value.

Please see hard copy or contact OIRM, IMD on 202-720-8755 for the paper copy of the following image(s): The Application Life Cycle, A Project Manager's Guide to Application Systems Life Cycle Management, Details of the Application System Life Cycle, Initiation Phase.

The Application System Life Cycle
Chapter 1

1.1 Initiation Phase. In the Initiation Phase, perform those mission process analysis activities necessary to investigate the need an application system development project.
Build a blueprint or plan
for the application, and decide whether to proceed with defining detailed requirements.
Define problems and opportunities; analyze
mission requirements; identify alternative solutions; and assess the economic, technical and operational feasibility of alternatives.

Note: The project manager must remember to define detailed functional and data requirements during the Development Phase. Initiation Phase concentrates on general application planning based on need.

A.
Pre-initiation Phase Work.
Before the initiation phase can
begin, an administrative or programmatic manager identifies a requirement. The manager must support the development of the application system. The functional manager must complete a Project Request, and forward it to the responsible information systems or ADP management in the agency. The Project Request will be no more than 5 pages long and contain at least the following:

(1) Requestor's Name and Position
(2) Need statement
(3) Need impact and/or cost
(4) Mission(s) impacted
(5) Organizational units impacted
(6) Location and size of the organizations impacted
(7) Description of the work to be automated

Please see hard copy or contact OIRM, IMD on 202-720-8755 for the paper copy of the following image: MISSION ANALYSIS STAGE RESPONSIBILITY MATRIX.

The Application System Life Cycle
Chapter 1

B.
Mission Analysis Stage.
This stage is the first of two stages during the Initiation Phase. (See Exhibit 1-1).

(1) Purpose. This stage will result in the user area describing the need for a system in general terms. Collect information about organization structure, practices and information needs and organize into models.

(2) Objectives. The tasks in this stage are:

(a) Identify mission needs.

(b) Collect and present system planning information.

(c) Provide a clear scope for an application system in lay terms.

(d) Insure functional user management participation in the description of mission needs and analysis. If an automated system results, it will address only important mission needs.

(e) Promote the uniform agency preparation of major systems planning information.

(3) Activities. These standards apply to both in-house and contracted efforts. The minimum activities are:

(a) Organize a Project Management Staff.

(i) Form a Project Management Committee, consisting of individuals having functional, financial, and technical expertise to oversee the status and progress of the project. A member of the team must have authority to approve expenditures of funds. The team also supervises planning and management of project resources, and provides reports to the Acquisition Review Team. The Project Management Committee also makes "go-no go" decision at each milestone.

(ii) Appoint an Application System Planning Project Manager, knowledgeable in the functional area. The Project Manager during the Initiation Phase should have a good knowledge of the functional area. The Project Management Committee may select a different Project Manager for the development phase. During the development phase a person with technical expertise is more appropriate as project manager.

(iii) Form an Application Planning Team to complete the activities of the Initiation Phase. Team members come from the functional area.

(iv) Form an Acquisition Review Team consisting of members from Office of Information Resources Management, Office of Operations, and the agency. The Acquisition Review Team is a part of the GSA "Go-For-12" parallel review process.

(b) Construct a model (graphical and textual) of the organizational units impacted by the proposed application. This is the Organization Model.

(c) Identify and describe the processes of each organization. This results in the Mission Process Model.

(d) Identify and chart the information needed to perform the processes and chart the information flow. This results in an Information Model.

(e) Complete a Mission Needs Statement (MNS).

(f) Validate the accuracy of the information, process, and organization model by having functional management in the impacted area review the models.

(g) Estimate the cost of the Concept Development Stage.

(h) Estimate the economic cost and justify the expense for the proposed system.

(i) Meet the Milestone 0 reporting requirements.

Note: The Project Management Committee approves the Mission Needs Statement before the Concept Development Stage begins.

(4) Mission Analysis Stage Responsibilities.

(a) Responsible functional manager.

(i) Classifies project as a "major application system."

(ii) Establishes a Project Management Committee composed of functional area managers and ADP managers.

(iii) Identifies mission needs and submits project request to the Project Management Committee, and ADP management.

(iv) Performs a preliminary cost benefit

analysis.

(v) Appoints a User Acceptor. This person may serve as Project Manager during initiation Phase.

(vi) Prepares a Project Charter.

(vii) Provides input and resources to the Project Manager during development of the work plan, and mission analysis.

(viii) Executes agreements to participate with other users in defining needs and developing the application.

(b) User acceptor.

(i) Participates in the mission analysis, monitors and tracks project status.

(ii) Submits status reports as required to the Project Manager (if someone else), and the Responsible Functional Manager.

(iii) Reviews deliverables, gives milestone concurrence in writing to Project Manager.

(iv) Is a prime candidate for Project Manager during Initiation Phase.

(c) Project management committee.

(i) Appoints Project Manager

(ii) Approves Mission Needs Statement and Project Request. Authorizes completion of the Initiation Phase.

(iii) Reviews project at regular intervals during Mission Analysis Stage and reviews recommendations at Milestone 0. Authorizes work to begin on the Concept Development Stage, if justified.

(iv) Is responsible for ensuring that the project manager meets the review requirements of OIRM.

(d) Project manager.

(i) Begins project file.

(ii) Selects methodology for mission analysis. Business systems planning, strategic information planning, and strategic systems planning are methodologies appropriate for

this work. If you are is unfamiliar with these methodologies, contact the Office of Information Resources Management in Washington, for more information.

(iii) Adapts ASLC structure to meet needs of the project. The work plan reflects the changes.

(iv) Revises cost estimates and includes them in cost benefit analysis.

(v) Assures that detailed project tasking of all work precedes the work. Establishes a clear audit trail of planned and completed project tasks. Taken together, these project tasks make up a work plan.

(vi) Assembles resources for Initiation Phase.

(vii) Performs mission analysis. Includes determination of functional process and data requirements. Determines operational and economic feasibility of automation. Usually requires services of management analysts, data analysts, and a systems analyst.

(viii) Performs A-76 analysis, and begins preliminary procurement actions as required.

(ix) Forwards approved Mission Needs Statement to Project Management Committee.

(x) Prepares detailed cost estimates for the Concept Development Stage.

(xi) Recommends future actions to the User Acceptor (if another person) and Project Management Committee.

(xii) Learns and meets Acquisition Review Team (ART) requirements.

(5) Project File Documentation.

(a) File maintenance. Place materials prepared during the Mission Analysis Stage in a project file. Retain the approved Mission Needs Statement, Project Request, and all ASLC documentation materials. Use these materials for audits, substantiation, reference, explanation, or clarification. Maintain this file throughout the ASLC. The Project Manager is responsible for the orderly storage and cataloging of its contents.

(b) Documents. Add the following documents to the file during this stage. Chapter 3 of this Manual contains information regarding the document's contents.

- o Project Request
- o Mission Analysis Methodology
- o Benefit Cost Analysis
- o Project Charter
- o Organization Model
- o Mission Need Statement
- o Mission Process Model
- o Information Model

Please see hard copy or contact OIRM, IMD on 202-720-8755 for the paper copy of the following image: CONCEPT DEVELOPMENT STAGE RESPONSIBILITY MATRIX.

C.
Concept Development Stage.
This stage is the second of two stages in the Initiation Phase. At this point in the life cycle there is no presumption that an automated system is the only solution to the mission need.

(1) Purpose. Prepare a general blueprint of the application in this stage. This blueprint or plan may divide an application into one or more modules. It is the basis for the work of the Development Phase. In this stage, accomplish information and location-oriented architectural planning, not technical ADF architectures.

(2) Objectives.

(a) Prepare system planning information, including systems, data and data communications plans.

(b) Provide a clear scope for an application system in lay terms.

(c) Make sure the system plan addresses only important mission needs.

(d) Propose a system life cycle strategy.

(e) Obtain a go/no go decision to begin System Analysis Stage.

(3) Activities. These standards apply to both in-house and contracted efforts. The minimum activities are:

(a) Complete a functional system architectural plan to serve as a blueprint for system development.

(b) Complete a data architectural plan to serve as a high-level data base blueprint.

(c) Define a general data communications blueprint. Be aware of any Departmental telecommunications contracts by contacting the Telecommunications Division of OIRM. Refer to DR 3300 for regulations regarding telecommunications requirements.

(d) Review and revise the MNS done during Mission Analysis Stage.

(e) Complete a system life cycle strategy (plan).

(f) Revise benefit cost figures.

(g) Document the management objectives of the proposed system. Include details that can be validated during system test stage.

(h) Document and retain the agreements between participating organizations about their involvement in the application project.

(i) Prepare System Decision Paper for the Milestone 1 review.

(4) Concept Development Stage Responsibilities.

(a) Project manager.

(i) Responsible for supervising the completion of the activities of this phase.

(ii) Uses a tasking method for work planning and control and makes sure that a clear audit trail exists.

(iii) Maintains the project file, and updates it with ASLC documentation required in this stage.

(iv) Reports results to the Project Management Committee at Milestone 1.

(v) Responsible for meeting any review requirements of the ART.

(b) User acceptor.

(i) Prepares a detailed description of the management objectives of the system.

(ii) Participates daily in the preparation of the work products of this stage. Might be the Project Manager.

(c) Project management committee.

(i) Reviews documentation presented for Milestone 1. Recommends approval to begin Development Phase.

(ii) Appoints a Project Manager for the ADP Project Team.

(iii) Assures that the Project Management Committee has members representing all areas impacted by the proposed system. If necessary, add new members.

(iv) Obtains written documentation of all inter-organizational agreements required to support the project.

(5) Project File Documentation.

(a) File maintenance. Add materials prepared during the Concept Development Stage to the project file. The Project Manager is responsible for the orderly storage and cataloging of its contents.

(b) Documents. Add the following documents to the file during this stage. Chapter 3 of this Manual contains information regarding the document's contents.

- System Objectives
- System Architecture
- Data Architecture
- Data Communications Architecture
- System Life Cycle Strategy
- System Milestone Dates
- System Life Cycle Resources Estimates
- Revised Benefit Cost Analysis
- Revised Mission Need Statement
- System Decision Paper 1

Please see hard copy or contact OIRM, IMD on 202-720-8755 for the paper copy of the following image(s): Development Phase and System Analysis Stage Responsibility Matrix.

1.2 Development Phase. There are 4 stages in Development Phase.

A. System Analysis Stage.

This stage is the first stage in developing or acquiring application software. Using prototyping to define requirements eliminates some of the activities listed here, but reporting documents remain much the same.

(1) Purpose. System Analysis Stage identifies and documents a comprehensive analysis of requirements. During the analysis stage, define the functional requirements in more detail; i.e., system input, functional tasks, and outputs. This process takes place at the functional level. Describe the detailed functions or tasks required on a functional level, not by specifying computer programs, files and runstreams. The emphasis of this stage is on determining what the tasks are, not how to perform those functions.

(2) Objectives. The Analysis Stage:

(a) Identifies the detailed functions and data in the current system.

(b) Identifies deficiencies in the current detailed system functions.

(c) Builds a data dictionary/directory of current system data and reporting requirements.

(d) Defines new system requirements in terms of functions and data.

(3) Activities. The effort and level of detail are to be commensurate with the size, complexity, and importance of the system. These standards apply to both in-house and contracted efforts. Activities are:

(a) Describe the current system in functional flow terms.

(b) Analyze deficiencies in the current systems and propose solutions to the deficiencies.

(c) Develop detailed functional requirements.

(d) Begin development of a logical data model.

(e) Document the analysis stage activities and results.

(f) Identify data elements needed to support mission information requirements. Cite applicable laws and regulations for each data element or report.

(4) System Analysis Stage Responsibilities.

(a) User acceptor. Reviews deliverables and gives milestone concurrence, in writing, to project manager.

(b) Project Manager. Directs the following activities of the project team.

(i) Analyze the current system to gain detailed understanding of the functions performed by the present manual or automated system. Review information flows. Identify system outputs, interfaces, inputs, stored data, processes, controls, and backup/recovery/security procedures. Compile a glossary of data definitions and stores them electronically in a data dictionary/directory. Usually requires services of a systems analyst and data administrator.

(ii) Develop most of functional system specifications. Define system inputs. Define format, type, purpose, use, content, sequence, retention, validation criteria, security and other controls. Define the stored data required by the system. Determine the logical structure of the data by identifying entities, attributes and relationships between entities. Define privacy requirements, such as access controls and physical security requirements. Define the process, both manual and automated, required to produce system outputs from stored data and inputs. Document processing logic using narrative descriptions, flow charts and/or decision tables. Define system outputs, reports, CRT screens, etc. Identify format, content, purpose, use, volume, frequency and distribution controls. Usually requires services of a systems analyst and data administrator.

(iii) Determine general data conversion strategy, user acceptance criteria, and installation strategy. Define relative responsibilities of user and ADP project development team.

(iv) Update work plan.

(v) Review and approve deliverables produced as a result of analysis phase.

(vi) Obtain end-of-stage concurrence from User Acceptor.

(vii) Ensure that deliverables are updated, as necessary, based on findings of analysis stage.

(viii) Assure that work begins on the logical data model.

(5) Project File Documentation.

(a) File maintenance. Place material prepared during the System Analysis Stage in a project file. The Project Manager is responsible for the orderly storage and cataloging of its contents.

(b) Documents. Add the following documents to the file during this stage. Chapter 3 of this Manual contains information regarding contents of the documents.

- Current System Description
- Detailed Functional Requirements
- Data Requirements

Please see hard copy or Contact OIRM, IMD on 202-720-8755 for the paper copy of the following image(s): System Design Stage Responsibility Matrix.

B.
System Design Stage.

(1) Purpose. The second stage of application development follows System Analysis (or prototyping). Even when using a commercial application software package, much of the work in this stage is needed. Translate functional specifications into system requirements for software packages, hardware and communications facilities. Create designs for computer programs, modules, data base(s), intermediate files, and manual controls and procedures. Design the application software solution for the logical requirements determined in the analysis stage.

(2) Objectives.

(a) Design a system that meets the functional requirements.

(b) Plan for system development.

(3) Activities. These standards apply to both in-house and contracted efforts. The activities are:

(a) Evaluate design alternatives.

(b) Propose a system design.

(c) Prepare a revised logical data model, and a data base design.

(d) Prepare a detailed plan showing milestones, tasks, schedule and resources for developing and implementing the proposed system.

(e) Document the design.

(4) Responsibilities.

(a) User acceptor.

(i) Participates in preparing mid-project review.

(ii) Determines need for user procedure/training manuals, and begins planning for their production.

(iii) Assists Project Manager in preparation of test plan and data conversion strategy.

(b) Project manager. Directs the following activities.

(i) Develop overall systems design. Update logical data base design. Factor system into a series of subsystems and computer programs, as necessary. Define purpose, inputs, processes, outputs and execution sequence for programs. Define logical data base design. Define control procedures for data base backup and recovery, file retention, data entry, security features, offline processing and data output. Usually requires services of systems analyst, senior programmer, data administrator and data base administrator.

(ii) Expand upon data conversion strategy addressed in analysis stage. Develop manual and automated requirements for converting data from present form to required form. Define specific responsibilities of user and the project development team.

(iii) Identify edits and internal control requirements to ensure data integrity. Create an adequate audit trail and audit capability in the application system.

(iv) Develop the test plan for testing individual programs and the overall system. Test plan will address internal testing for programs (using such techniques as structured walkthroughs, debugging aids, etc.). Unit

test to be sure that program performs as defined in external specifications. Perform integrated system testing to ensure that programs interface properly and that program performs required functions. Perform user acceptance testing to ensure that the application satisfies user's formal criteria for acceptance.

(v) Define internal structure of each program in enough detail to enable coding to take place. Using packaged software will make this step minimal.

(vi) Update work plan.

(vii) Review and approve deliverables produced as a result of the design stage.

(viii) Prepare a mid-project review report.

(ix) Obtain end-of-stage concurrence from User Acceptor and Project Management Committee.

(5) Project File Documentation.

(a) File maintenance. Place materials prepared during the System Design Stage in a project file. The Project Manager is responsible for the orderly storage and cataloging of its contents.

(b) Documents. Add this following documents to the file during this stage. Chapter 3 of this Manual contains information regarding the document's contents.

- o Design Proposal
- o Detailed Benefit Costs Analysis
- o Revised Life Cycle Strategy O System Decision Paper 2

Please see hard copy or contact OIRM, IMD on 202-720-8755 for the paper copy of the following image(s): Construction and Acquisition Stage Responsibility Matrix.

C.
System Construction and Acquisition Stage.

(1) Purpose. Develop all application and conversion programs. Perform initial internal and unit testing, and system testing.

(2) Objectives.

(a) Acquire hardware, data communications, and system

software;

(b) Prepare application software;

(c) Prove the system is ready for production.

(3) Activities. These standards apply to both in-house and contracted efforts. The tasks are:

(a) Select, acquire and test equipment, data communications, and system software.

(b) Assure that the site will be ready and available.

(c) Acquire or develop the application software.

(d) Document the acquisition and development activities.

(4) System Construction Responsibilities.

(a) Project manager. Directs the following activities.

(i) Establish the techniques and conventions to follow to promote consistency, uniformity and quality. Be sure to follow standards.

(ii) Create and test data structures.

(iii) Test programming and development.

(iv) Install software packages, security features and establish communications network. Follow direction in DR 3300-1, Telecommunications.

(v) Perform technical and unit testing.

(vi) Produce operating instruction manuals.

(vii) Plan system test.

(5) Project File Documentation.

(a) File maintenance. Place materials prepared during the System Construction and Acquisition Stage in a project file. The Project Manager is responsible for the orderly storage and cataloging of its contents.

(b) Documents. Add the following documents to the file during this stage. Chapter 3 of this Manual contains information regarding the documents' contents.

- ADPE Specifications
- Application Software Documentation
- System Test Plan

- Control, Backup and Security Summary

Please see hard copy or contact OIRM, IMD on 202-720-8755 for the paper copy of the following image(s): User Acceptance Stage Responsibility Matrix.

D.
User Acceptance Stage.

(1) Purpose. After thorough testing, prepare the system for implementation.

(2) Objectives

(a) Assure the system meets user functional and data requirements.

(b) Complete all required documentation.

(c) Assure good management and documentation of future system changes.

(d) Meet the standards of the ADP operations and maintenance area(s) (system custodians), so system operation can begin.

(3) Activities

(a) System test. Perform system test to determine the acceptability of the system's functioning and data to the system users.

(b) User acceptance. Obtain written sign-off by the User Acceptor. This sign-off shows that the functions and data provided by the system meet the users requirements. The user area does not assume system stewardship until the Implementation Stage.

(c) Generate production initiation notice. Notify all organizations affected by the system implementation date. State how it affects them, and what they must do for preparation. The operation organization concurs on the established implementation date. The notice will include:

(i) Schedule. Give the date and time for system implementation and phased activities, including any planned parallel operations.

(ii) Effect. Give a summary of the effects of the new system, and explain the differences between the old and new systems.

(iii) Coordination. Specify what activities must be completed by the users to assist in system implementation, including training

system users.

(iv) Contacts. List personnel contacts for the system.

(d) Prepare software change control procedures. Use software control procedures to: Maintain software integrity; minimize life cycle software costs; prevent unnecessary or marginal changes; establish change priorities; assure prompt action on changes; document the changes; and control the release of changed software and documentation. Use these procedures after system acceptance.

(e) Prepare user training material.

(f) Obtain production acceptance. Consider the system operational and no longer developmental after production acceptance by the system's custodians. The custodians will be responsible ADP management officials, even if contract personnel perform the operation function. Transferring operational responsibility includes:

(i) Production simulation. In addition to equipment and vendor software training, train Operations personnel to run the applications system. Before transferring the operational responsibility, ADP development and user personnel ensure that operations personnel can efficiently and effectively run the system. This includes being able to restart, recover, and backup the system. Evaluate the system's capability, emphasizing actual and potential problems. Prepare a recommendation relative to transferring the system to an operational mode.

(ii) Documentation. Make a documentation needs assessment. Show the status of vendor reference and operating documentation and evaluate the Operation and User Manuals. Identify deficiencies and make recommendations.

(iii) Contacts. Prepare a list of contacts, giving name, home and office telephone numbers, alternate personnel, and authority level. ADP and user personnel will use these contacts for problems and emergencies.

(iv) Approvals. List the officials required to approve the production initiation, and obtain their signatures.

(v) Implementation date. State the time and date

of the first production run and any special conditions. Name the personnel who are on call or who will be present for the start-up.

(g) Prepare operation instructions. These instructions are for running the application system. Personnel should already be trained to operate the equipment, operating system, peripheral devices, and non-application software.

(4) Responsibilities.

(a) Project Manager is responsible for assuring completion of all activities in this stage before the system goes to Operation Stage. The Project Manager makes sure the documentation in the Project File is complete.

(b) User Acceptor. Certifies that the application system performs according to the users functional and data requirements.

(c) Project Management Committee reviews the report of the project manager, and approves the implementation of the system.

(5) Project File Documentation

(a) File maintenance. Place materials prepared during the User Acceptance Stage in a project file. The Project Manager is responsible for the orderly storage and cataloging of its contents.

(b) Documents. Add the following documents to the file during this stage. Chapter 3 of this Manual contains information regarding the documents' contents.

- System Acceptance Report
- Implementation Plan
- Conversion Plan
- User Training Plan
- Post Implementation Review Plan
- Data Processing Manual
- User Manual
- Operations Manual
- System Decision Paper 3

Please see hard copy or contact OIRM, IMD on 202-720-8755 for the paper copy of the following image(s): Operation and Maintenance Phase.

1.3 Operation and Maintenance Phase. This phase consists of two stages.

A.
Implementation Stage.

(1) Purpose. Install the new system, converting it from a development to an operational status and conduct user/operation training.

(2) Objectives.

(a) Implement operational use of the application system.

(b) Assure that all ADP operational documentation and procedures are adequate.

(c) Implement change control procedures for the application system and its documentation.

(d) Remove the ADP development team from its custodial role with the application.

(3) Activities.

(a) Implement the application system in the operational environment in according to the implementation plan.

(b) Verify that all technical, computer program, data and user documentation prepared in earlier stages are usable.

(c) Deliver the application system to the custodianship of the application maintenance staff.

(d) Deliver the application system to the stewardship (ownership) of the functional manager.

(4) Responsibilities.

(a) Applications maintenance/operations staff.

(i) Review the installation process.

(ii) Certifies system ready for installation.

(iii) Formally accepts custodianship of the system, as system operators and maintainers.

Please see hard copy or contact OIRM, IMD on 202-720-8755 for the paper copy of the following image(s): Implementation Stage Responsibility Matrix.

(b) Project manager.

(i) Adequately trains the system operators and maintainers to perform their work on the system.

(ii) Initiates data conversion.

(iii) Performs operations training.

(iv) Assists with user training.

(v) Installs the system.

(vi) Corrects systems problems and documentation as required.

(vii) Releases custodianship of the system to operations and maintenance staff.

(viii) Ensures that the functional manager assumes full stewardship responsibility.

(c) Responsible Functional manager.

(i) Assumes full stewardship (ownership) role for the application system.

(ii) Instructs the User Acceptor to prepare the Post Implementation Review and SDP 4.

(5) Project File Documentation. Add the following document to the file.

o Application Stewardship Document (See Chapter 3).

Please see hard copy or Contact OIRM, IMD on 202-720-8755 for the paper copy of the following images(s): Maintenance Stage Responsibility Matrix.

B.
Maintenance Stage.

(1) Purpose. Keep the production system operating according to user requirements and maintain system efficiency.

(2) Objectives.

(a) Use the application system for production.

(b) Maintain and make small modifications to the system.

(c) Maintain hardware and software performance.

(d) Monitor system cost and resource utilization.

(e) Provide feedback for the management review.

(3) Activities. These standards apply to both in-house and contracted efforts.

(a) Manage the system operation.

(b) Monitor the system performance.

(c) Perform post implementation review.

(d) Maintain and modify the system as necessary.

(i) Pure maintenance. Work directed towards making existing applications perform as defined in the specification and design documents.

(ii) Conversion. Changes required by new hardware, new versions of system software, new compilers, etc.

(iii) Modifications. Expansions, changes and new features requested by user.

(iv) Optimization. Work done to make programs cost less to operate.

(e) Perform follow-up user training as necessary.

(4) Responsibilities

(a) Responsible functional manager. Has overall accountability for the stewardship of the system, including modification plans, resource accounting, and the post implementation reviews.

(b) Systems maintenance/operations staff. Act as the system's custodians, providing the staff, methods and facilities needed for system maintenance and operation.

(5) Project File Documentation.

(a) File maintenance. Place materials prepared during the Maintenance Stage in the project file. The Functional Manager is responsible for the orderly storage and cataloging of its contents.

(b) Documents. Add the following documents to the file. See Chapter 3 for information about the documents contents.

- Post Implementation Review Report
- System Decision Paper 4

(6) Other Documentation. Although the following documentation does not go in the project file, maintain the data throughout the operation of the system.

(a) Operation and maintenance cost.

(b) Updates for the Department Information Location System inventory.

(c) Hardware performance reports.

(d) System software performance reports.

(e) Change control procedures.

(f) Change control logs (software and hardware configuration changes).

(g) Software version releases.

(h) Scheduled and unscheduled change (work orders) requirements, including justification and cost.

(i) Operation manual documentation.

(7) Change Control.

(a) Applicability. All major application systems must use a change control process. Properly document the process and the changes made by it.

Cost of changes must be within the resources budgeted for the operation and maintenance of the system. Use operation and maintenance resources requested and allocated only for the continued operation of the system and to keep it running as designed. Any major modifications, reconfigurations, or redevelopments require an independent ASLC project. Conduct the activity according to ASLC management standards.

(b) Authorization and acceptance. A procedure must exist for approval and acceptance of changes. The process may include a change control board or an individual who is responsible for ensuring that all changes have been properly evaluated. There should also be a process for making emergency changes. Review these emergency changes, however, before making them permanent.

(c) System access security. Only the individuals assigned responsibility for control of the production software will have access to the application system software. These individuals are responsible for installing system and applications in production libraries. Restrict the production system passwords to a very few. Change passwords

periodically and whenever an employee no longer has a need for the password. Users, application programmers, and anyone not responsible for installing the software are not to have access to application system software. Do not use production programs and files for development and testing. Only personnel responsible for configuration management will install system changes. Maintain a clear, verifiable audit trail of all production library changes.

(d) Version releases. If there are many changes, group logically, analyze, and make into a change library. Then test the changes in a system test environment. Schedule the installation of the changes. Let all affected organizations know in advance the changes being made to allow comments and adjustments. Assign change version numbers to the logically grouped changes.

(e) Unscheduled changes. Then changes must be made for an emergency or to meet interface schedules, the immediacy or timing of these changes say prevent their being part of a version release. Document these changes separately and include in the system test of the next version release to ensure proper interface with the rest of the system. Install emergency changes in a separate physical library, and do not move into a production library until system test and acceptance.

(8) The Post Implementation Review.

(a) General. Conduct an initial review audit at a date agreed upon by functional management and ADP management after the system is operational. Review each system periodically to determine if it meets functional requirements and if reports are valid and are being used.

(b) Review objectives.

(i) Assure the application supports the policies and functions that management has prescribed.

(ii) Review the controls and audit trails needed for management, auditor and operational review. The purpose of these controls is to ensure data integrity, security and full functionality.

(iii) Evaluate the application's efficiency and economy in operation. Re-examine the benefit costs done earlier in light of this information.

(iv) Assure the application conforms with applicable legal and regulatory requirements (reference OMB Circular A-127.) A review of financial systems must ensure compliance with generally accepted accounting principles.

(v) Produce documentation that is easily understood and facilitates system/program use, maintenance and auditing. Automate data documentation and keep up-to-date.

(vi) Review contingency plans for the degree of off-site storage and processing required.

(vii) Audit to see if the system is being operated according to current system procedures.

(c) Post implementation review report. The post implementation review report should be an evaluation addressing each of the above areas. Submit to the Project Management Committee with an information copy to the Director of OIRM.

(d) Corrective actions. Within 20 work days after the post implementation review, the team responsible for the application system maintenance will submit a corrective action plan to the Project Management Committee. The plan addresses actions to take to remedy any ADP related problems revealed by the review. It includes time frames for correcting each problem. Corrective actions will be taken based on a priority agreed upon by the user and ADP manager after identifying the benefit cost of the corrections.

C.
Application Systems Changes and Termination.

(1) Application System Chances. Much of the Maintenance Stage involves a repetition (recycling) of prior ASLC phases and stages. The ADP manager and the Responsible Functional Manager must determine which portions of the ASLC to repeat. Guidelines for ASLC repetition are:

(a) Pure maintenance. From system Construction and Acquisition Stage through Implementation Stage.

(b) Conversion. From System Design Stage through Implementation Stage.

(c) Modification. From Initiation Phase through Implementation Stage.

(d) Optimization. From system construction and acquisition through Implementation Stage.

(2) Application System Termination. A change in agency mission can lead to the termination of an application system's use. When this occurs the Responsible Functional Manager will catalog and store all Project File information. The ADP Manager responsible for operating the application will retain all technical documentation, program source code, job control language, and archived data files. Follow the written instructions of the Responsible Functional Manager. Store the technical information until written instructions are received from the Responsible Functional Manager.

Please see hard copy or contract OIRM, IMD on 202-720-8755 for the paper copy of the following image(s): Application System Life Cycle Chapter 2, Details of Project Management, Reporting and Control.

2.1 Project Teams. All major application system projects require two project teams to be formed during the ASLC. These project teams perform their work sequentially, not concurrently.

A. Application Planning Team. Form this team to complete the activities listed as part of the Initiation Phase. Team members are from the functional area sponsoring the automation project, since the work in this phase focuses upon the functional area's business needs. Assign a member of the functional area's management as Project Manager for the planning team. Consider using this same person for the User Acceptor role during the later phases of the project.

B. ADP Development Team. This team will use the work of the application planners, and complete the activities that form the Development Phase. Someone experienced in application system development management is Project Manager of this team.

2.2 Project Initiation. Activities required during the start-up of either project team are the same.

A. Project Charter Development. Develop a project charter prior to establishing an application planning team. This charter serves as a written understanding between the Project manager and the Project Management Committee. Develop a second charter for the ADP development project. Develop this charter specifically for each major application planning or ADP development team. It sets forth the scope, objectives, activities, team organization, responsibilities, and the general methods of operation. In addition, clearly identify

the lines of authority and accountability. The larger the project, the more detailed the project charter should be.

B. Staffing Project Teams.

The project charter defines the organization for the project teams. After approval of the project charter by the Project Management Committee, review the organization. Determine as accurately as possible the specific skills and quantities of staff needed and corresponding dates they should start on the project. Project personnel can include permanent and short term staff, but all project team members should work full-time on the project during their assignment. The recruitment effort should center on acquiring staff from within the agency. Employees assigned to the project team should, at the minimum, be ensured future placement in a comparable position and grade held prior to their selection. If recruitment proves to be a problem, then recruit staff from outside the agency -- either government or industry.

C. Project Manager.

System development work, whether it is major new system work or a small maintenance job, is project oriented. There is a definitive start or initiation point and a goal which, when reached terminates the system development activity. A particularly useful way of approaching such work is to appoint a project manager. For large projects, the Project Manager is usually assigned responsibility for only the one project. The Project Manager is responsible for coordinating the efforts of the many organizational units and functions. The manager of the ADP project team should have ADP project management experience. Responsibilities include:

(1) Coordinate all management and technical aspects of the AS throughout its phases.

(2) Determine the project team organization based on user and ADP recommendations.

(3) Provide detailed work assignments, making sure written tasks exist for all work. Develop measurement criteria that define what constitutes acceptable performance of each task. Ideally, performance standards should be developed for each team member.

(4) Perform system planning design and implementation.

(5) Ensure conformance with user requirements in the definition, design, acquisition and construction stages of the AS development.

(6) Schedule and direct formal milestone reviews.

(7) Resolve problems related to all stages.

(8) Oversee preparation of AS test plans and test reports.

(9) Manage system tests.

(10) Provide documents that must be produced to document the AS project, and keep them in the project file.

(11) Meet ASLC and project standards outlined in this Manual.

D. Project Management Committee (PMC).

The concept of a Project Management Committee stems from the need to secure executive management involvement. This committee represents both the user and information systems organizations, in directing and controlling the evolution of an organization's application systems. The Project Management Committee acts as a "Board of Directors" for the application system. It is responsible for overseeing the development of the life cycle strategy plans, recommending resource levels based on those plans, and reviewing, monitoring and prioritizing activities for the project. The Project Management Committee conducts milestone reviews of the project. The Project Management Committee may choose to exercise more rigorous control of the largest, most critical projects. Form the committee when forming the application planning team. The PMC continues 'to have executive responsibility until completion of the post implementation review. The PMC is responsible for initiating agreements between participants when a multi-organization application is under consideration. Budgeting and cost chargeback will be part of these agreements.

E. User Acceptor.

A key measure of success for an application system is the degree of user acceptance and satisfaction with the system. The critical factor in achieving a high level of acceptance and satisfaction is user involvement in the system development process. Establishing a User Acceptor is an organizational strategy for obtaining user participation. A User Acceptor is an individual appointed at the beginning of system development. The individual is to monitor and coordinate, from the user prospective, those system development projects in a user area. The User Acceptor interacts with the Project Manager in a "customer-contractor" relationship during the ADP project team's tenure. Specific responsibilities of the User Acceptor include the following:

(1) Participate in Mission Analysis Stage as a team member, and perhaps as the Project Manager during the Initiation Phase.

(2) Coordinate with the Project Manager all requirements for support from the user area.

(3) Monitor the progress of the project in terms of cost, schedule, and quality.

(4) Review and recommend approval of each phase of the project as it is completed.

F.
ASLC Project Monitor.

The ADP organization should have an organizational unit to control all requests for services and monitor projects. This unit provides project management and ASLC assistance to project managers.

G.
Project Scheduling.

Establishing an accurate schedule is essential to the successful conclusion of any project. Scheduling should be based on the ASLC activities and incorporated into project work plan. Initially, the schedule is one of the more important tools used to cost the project. During the life of the project, use the schedule as a basis for measuring progress.

(1) Schedules developed during a project are important to the management of the project. The budget, used to determine allocations of funds, is largely derived from the schedule. Resource allocation also uses the schedule as important input. The schedule established in the work plan is the primary measuring stick in doing progress reporting. Clearly the most accurate possible schedule is important to the successful completion of the project.

(2) Bottom-up project scheduling approaches break a project into its component tasks, determine the time requirements for each and sum the components to determine an estimated completion date for the project. As it is easier to make more accurate estimates of smaller work units, the bottom-up approaches are more accurate than the top-down. The most common bottom-up approaches are:

(a) Gantt charts. This method is good for illustrating simultaneously performed job steps.

(b) PERT charts. PERT is good for illustrating the relationship between tasks. It also shows which sequence of tasks will take the longest and therefore is the constraining factor on project completion.

(c) Critical Path Method. CPM is similar to PERT except that in a CPM diagram the tasks are boxes instead of lines.

(d) Automated methods. Various software packages exist to assist in scheduling very large projects. Most use some variation of PERT or CPM and run on personal computers. These tools are strongly recommended for major application projects.

H.
Estimating Staff Requirements.
Estimating project human resource requirements is a four step process.

(1) Understanding the Scope of the System. A comprehensive understanding of the scope of the system minimizes the likelihood of forgetting tasks or misunderstanding the complexity of the system. In general, the estimator should be an individual close to the source of the work. This means that the individuals responsible for each task should develop estimates and provide these estimates to the project manager. In this way there is a sense of responsibility for holding close to estimates during execution.

(2) Project Tasking. Identify the tasks for the team to perform before attempting to estimate. Depending on the stage in the development process for which the estimate is being prepared, identify tasks by extracting and refining larger units of work. A prerequisite to estimating the cost of a stage is compiling a definitive list of tasks. Any precedential relationships among the tasks should be well understood before beginning. Tasking for a stage will be done during the preceding stage to assure valid cost figures are used in SDP'S.

Use of an automated project scheduling system will help determine the impact of a change to one task upon the entire project's resources.

(3) Estimate Time Required. After identifying and documenting the tasks for a stage, estimate the amount of time for each task. Perform this job on a task by task basis, keeping in mind the quantity and experience levels of the staff assigned to a task.

(4) Review Estimates. Automated project scheduling systems will facilitate production of initial project staffing reports, and allow a regular review of the initial staffing projections throughout the life cycle. By reviewing the estimated time required to complete a specific task with the person/s actually doing the work, estimates are most likely to be accurate. As the project advances through the life cycle, this method of time estimate reviews is likely to result in increasingly accurate estimates. The Project Manager schedules these reviews as tasks are produced.

2.3 Project Reporting Requirements.

Both types of project teams, planning and ADP development, provide reports to designated authorities at each of the project milestones.
The Project Manager keeps a copy of all milestone reports and the decisions of responsible authorities, and makes

sure they are available throughout the system life cycle.

A. Milestone 0 Reporting.

Milestone 0 occurs after Mission Analysis Stage and prior to Concept Development Stage during Initiation Phase. The Application Planning Team is responsible for meeting these reporting requirements.

(1) Mission Need Statement (MNS) Preparation.

(a) Purpose. Describe a mission need, justify the exploration of alternative solutions and identify estimated costs associated with this action to the decision-makers.

(b) Discussion.

(i) Base Milestone 0 decision on the MNS document. It identifies and defines:

- A specific need within a mission area.
- The relative priority of the need within the mission area.
- The factor(s) causing the need.
- Determine the implementation date of the need or new capability.
- The general magnitude of resources which the functional sponsor must invest to fill the need.
- The effect upon mission performance if no action is taken.

(ii) Each projected major application system (AS) requires a MNS.

(iii) Define the need identified in a MNS as narrowly as possible, using terms used in the functional areas. Though narrowly defining the scope of the need identified in the MNS, do not specify solutions to the problem. Evaluate alternative concepts and associated risks during the Concept Development Phase prior to Milestone 1.

(c) Procedures.

(i) Preparer. The Application Planning Team's project manager prepares the MNS. Write the MNS in functional terms, without any attempt to use ADP terms or to specify ADP

solutions.

(ii) Length. The MNS should not exceed six pages in length.

(iii) Approval. The Project Management Committee approves the MNS. The Project Management Committee validates the need and certifies the intent to provide program funding prior to each milestone decision. The Project Manager coordinates review of the MNS by the ART.

(iv) Duplication. The User Acceptor, the responsible functional manager, and the Project Management Committee review the MNS to determine if other similar AS's are in existence which could satisfy the user's requirements. Forward a copy of each approved MNS to the ART for review.

(v) Priority. The responsible functional manager specifies the relative priority of this project to other approved projects under his sponsorship within the mission area in the MNS approval document.

(2) Appendices. Extract the following documents from your Project File and attach them as appendices:

(a) Benefit Cost Analysis.

(b) Mission Process Model.

(c) Information Model.

(d) Organization Model.

B. Milestone 1 Reporting.

The Application Planning Team is responsible for meeting these reporting requirements. Milestone 1 occurs after Concept Development Phase and before the System Analysis Stage.

(1) Reporting Process. Prepare a system decision paper (SDP) and review with the responsible functional manager. Address the continued validity of the MNS which was the basis for initiating the project, in the "Overview" paragraph of the SDP. If the MNS has changed since the previous milestone, attach a copy of the revised MNS. Along with the revised MNS, describe any changes to the previously approved MNS, and reasons for change. The Project Management Committee approves all changes, recertifies the intent to program funds, and revalidates the mission need. Do not expand the level of detail approved in the MNS unless specifically directed to do

so.

(2) System Decision Paper 1 (SDP1) Preparation.

(a) Purpose. Concisely present primary project issues and recommendations to the responsible authorities and obtain authority to begin developing an ADP system.

(b) Discussion. SDPL is a management summary of the project, as well as a decision paper for. Milestone I decisions. It references each of the detailed documents prepared and clearly defines management issues and recommends solutions. Conflicting viewpoints are summarized and documented. Keep documentation of management decisions occurring during the project life with the SDP1 in the project file.

(c) Procedures. The Project Manager prepares, coordinates, and submits the SDP1 to the Project Management Committee for review and approval.

(i) Early coordination. The Project Manager is strongly encouraged to communicate regularly with the Project Management Committee early to resolve questions and/or concerns before the formal review. The Project Charter will clearly describe the relationship between the Project Manager and the PMC.

(ii) Briefing. The Project Manager should brief the Project Management Committee regarding SDP1 at this milestone. The committee will vote for or against ADP development of the proposed application system.

(iii) Length

- Milestone 1 - SDP1 should not exceed 12 pages in length, excluding appendices.

(3) Appendices. Extract the following documents from your project file to be submitted as appendices to SDPl.

(a) System architecture.

(b) Benefit Cost analysis.

(c) Life cycle strategy.

(d) Data communications architecture.

(e) Data architecture.

(f) Revised MNS.

C.
Milestone 2 Reporting.

Milestone 2 occurs after the System Design Stage and before the System Construction and Acquisition Stage. The ADP Development Team is responsible for meeting these reporting requirements.

(1) Reporting Process. Prepare and review the SDP2 with the Project Management Committee. Address the continued validity of the MNS which was the basis for initiating the project in the "Overview" paragraph of SDP2. If the MNS has changed since the previous milestone, attach a copy of the revised MNS. Also, describe any changes to the previously approved MNS, and the reasons for change. The Project Management Committee approves all changes, recertifies intent to program funds and revalidates the mission need. Do not expand the level of detail approved in the MNS unless specifically directed to do so. If changes in the project scope are significant, consider re-entering the life cycle process beginning with the mission analysis/project initiation.

(2) System Decision Paper 2 (SDP2) Preparation.

(a) Purpose. Concisely present primary project issues and recommendations to the Project Management Committee, so they can decide whether to proceed with the system's construction.

(b) Procedures. The Project Manager prepares, coordinates, and submits the SDP2 to the Project Management Committee for review and approval.

(i) Early coordination. The Project Manager is strongly encouraged to start communicating with the committee early to resolve questions and/or concerns before the formal review.

(ii) Updating. If changes have not occurred under certain entries in the SDP, submit the prior SDP and mark "no change as of _____."

(iii) Briefing. Brief the committee on the recommendations in SDP2. They will vote to approve or deny construction of the application system.

(iv) Length

- Milestone 2 - The SDP should not exceed 20 pages in length, excluding appendices.

(3) Appendices. The following should be extracted from your project file, and included in the appendices of SDP 2.

(a) Benefit Cost analysis (Revision).

(b) Data communications requirements.

(c) Data processing equipment requirements.

(d) Revised life cycle strategy.

D.
Milestone 3 Reporting.

Milestone 3 occurs after the Development Phase and prior to placing the AS in operation. The ADP Development Team is responsible for meeting these reporting requirements.

(1) Reporting Process. The Project Manager prepares a system decision paper and reviews it with the Project Management Committee. Review the MNS to assure its continued validity, and record the results of this review in the "Overview" section of the SDP. The committee decides whether or not to proceed with system implementation.

(2) System Decision Paper 3 Preparation.

(a) Purpose. Present primary project issues and recommendations to the Project Management Committee, so they can decide whether or not to proceed with system implementation.

(b) Procedures. The Project Manager prepares, coordinates, and submits the SDP3 to the Project Management Committee for review and approval.

(i) Early Coordination. The Project Manager is strongly encouraged to start communicating with the committee early to resolve questions and/or concerns prior to the formal review.

(ii) Updating. If changes have not occurred under certain entries in the SDP, submit the prior SDP and mark "no change as of _____."

(iii) Briefing, The Project Manager briefs the committee, so they can make an informed decision regarding system implementation.

(iv) Length.

- Milestone 3 - SDP 3 should not exceed 20 pages in length, excluding appendices.

(3) Appendices. Extract the following documents from the project file, and submit as appendices to SDP 3:

(a) Benefit Cost analysis (Revised).

(b) Revised life cycle plan.

(c) Implementation plan.

(d) Conversion plan.

(e) User Training plan.

(f) Post implementation review plan.

(g) System acceptance report.

E. Milestone 4 Reporting.

Milestone 4 occurs after the AS has been put in operation. The User Acceptor and the functional manager are responsible for meeting these reporting requirements.

(1) Reporting Process. The User Acceptor prepares a system decision paper and reviews it with the Project Management Committee. The User Acceptor conducts a post-implementation review and reports the results at the same time.

(2) System Decision Paper 4 Preparation.

(a) Purpose. Present primary project issues and recommendations to the Project Management Committee, so the effectiveness of the operational system can be reviewed.

(b) Procedures. The User Acceptor Prepares, coordinates, and submits the SDP4 to the Project Management Committee for review and approval.

(i) Early coordination. The User Acceptor is strongly encouraged to start communicating with the committee early to resolve questions and/or concerns prior to the formal review cycle.

(ii) Updating. If changes have not occurred under certain entries, submit the prior SDP and mark "no change as of_____."

(iii) Briefing. The User Acceptor briefs the committee on the results of the Post Implementation Review.

(iv) Length.

- Milestone 4 - SDP 4 should not exceed 20 pages in length , excluding appendices.

(3) Appendices. Extract the following document from the project file, and submit as an appendix to SDP 4:

(a) Application stewardship document.

(a) Post implementation review report.

2.4 Management Oversight of Projects.

Management oversight and control of both types of project teams are important contributors to the successful management of application system development. There are two bodies that directly review and exercise management control of the application development and acquisition process.

A. Project Management Committee.

The PMC reviews the reports of the Project Manager at each milestone and makes a go/no go decision with regard to the next stage of the life cycle. See Section 2.5 of this chapter for a milestone review checklist used by the PMC. See Section 2.2.D of this chapter for more information about the PMC.

B. ART.

This Acquisition Review Team is an integral part of the Go-For-12 (Parallel Review) process for obtaining technical approval from GSA. Composed of the OIRM staff and representatives of the agencies, this group reviews the progress of major application system projects.

As soon as a determination is made that a major application system is to be developed, the responsible functional manager notifies the Director of OIRM in writing. The OIRM technical approval coordinator notifies the functional manager of the requirement to form an ART and the reporting requirements.

2.5 Milestone Review Checklist. The checklist is a list of criteria to be applied by the Project Management Committee at each milestone.

It is a guide to help Project Managers and others prepare for milestone review activities. The checklist is not all inclusive; it lists typical criteria applied in the past and are relevant to a broad range of application systems. All of the criteria may not be applicable to every application system.

A.
Milestone 0.

(1) The need described in the MNS is a valid concern, mission related, and worth solving.

(2) The MNS describes a mission need in mission terms, not a set of hardware and software.

(3) Clearly identify and describe existing constraints that affect the ability of the agency to meet the mission need.

(4) The resources required for Concept Development Stage are reasonable.

(5) The schedule proposed is achievable.

(6) Use a proven mission analysis methodology.

B.
Milestone 1.

(1) Reaffirm that the mission need is essential.

(2) Appoint and charter a Project Manager and approve necessary staffing.

(3) The alternative design concepts adequately address solving the mission deficiency or problem.

(4) Prioritize the functional objectives.

(5) Develop and validate the general mission functional requirements, including security requirements.

(6) Consider all reasonable alternatives.

(7) Estimate the projected resource investment for the selected alternatives and be sure it is consistent with the stated constraints.

(8) Adequately consider using available and existing automated systems.

(9) Adequately consider system consolidation the planning.

(10) Adequately consider standardization and interoperability requirements.

(11) Identify and adequately treat risks and problem areas in the planning.

(12) Describe strategies to facilitate the transition from the current functional system, whether automated or not, to

any of the alternative systems considered.

(13) Complete a life cycle strategy.

(14) Identify and assess areas involving new technology, unstable requirements, and fund availability.

(15) Prepare a benefit cost analysis.

(16) Prepare system, data and data communications architectures.

C.
Milestone 2.

(1) Reaffirm the mission need.

(2) Validate the functional system design and establish the baseline for the functional system.

(3) Validate and document the data base design in a data dictionary/directory system.

(4) Develop specifications for hardware, software, firmware, and data base.

(5) Update plans for logistics support, security protection, training, operational test and evaluation, configuration management, organizational relationships, development, acquisition, and maintenance support (this is the remainder of the life cycle management strategy).

(6) Reassess the risk analysis to reflect that total system development.

(7) Update the benefit cost analysis.

(8) Finalize acquisition plans to obtain the required ADPE and other resources.

(9) Planned computer resources meet stated operational needs.

(10) Future changes to hardware, software, firmware and data bases can be accommodated without system redesign.

(11) Interface and interoperability requirements can be met.

(12) Make trade-off between hardware, software, firmware and manual procedures.

(13) If using parallel development efforts, establish control mechanisms.

(14) Resolve contractor versus Government development issues.

(15) Planning for preparation of test and evaluation plan is

adequate.

(16) Test data are representative of the total range of data and conditions that the system might encounter.

(17) Test data meet appropriate pass/fail criteria relevant to regulatory Constraints.

(18) Testing will clearly identify whether deficiencies are software or hardware related.

(19) Preliminary plans adequately describe a concept for training, logistical support, organizational relationships, post-implementation support and operation of an automated system.

(20) The acquisition strategy effectively integrates the technical, business and management element of the project and supports the achievement of project goals and objectives.

(21) Adequately identify and define interfaces with other systems.

D.
Milestone 3.

(1) Reaffirm the mission need.

(2) Fully develop, document and test computer programs and data bases.

(3) Satisfy standardization and interoperability requirements.

(4) Develop system support documentation. This includes maintenance manuals, user manuals, and operation manuals. Automated computer system documentation can be substituted for maintenance and operation manuals.

(5) Unit and system(s) level test and evaluation results support a decision to proceed with application system installation.

(6) Complete change control procedures for use after implementation, and include updates of computer program and data documentation.

(7) The User Acceptor has confirmed that the developed system satisfies the design and functional requirements.

(8) Life cycle schedule, cost and budget estimates are realistic and acceptable.

(9) Update the cost benefit analysis.

(10) The system is cost effective and affordable and remains the best acceptable solution.

(11) Make trade-offs to balance cost, schedule and performance effectively.

(12) Update and execute the acquisition strategy.

(13) Control the end products of development as configured items.

(14) Mission planning and budgeting supports the acquisition strategy and provides flexibility for delivery dates and quantities when using options.

(15) Identify and satisfactorily resolve issues concerning delivery, quality assurance and facilities.

(16) Be sure to plan the project management structure soundly and adequately support it.

(17) Planning for implementation is adequate including manpower and training, documentation, logistics readiness, operational considerations, security, and integration with existing operational systems.

(18) Satisfactorily resolve system deficiencies revealed in testing. Deficiencies not resolved have been scheduled for a later version or release of the system.

(19) Maintenance support facilities are ready for operation.

(20) Establish plans for anticipated system improvements.

(21) ADPE acquisition is on schedule.

E.
Milestone 4.

(1) Reaffirm the mission need.

(2) Account for all changes to the system in the change control system, and keep computer program and data documentation up-to-date.

(3) System operates effectively and efficiently, in all respects.

(4) Update the Benefit Cost Analysis.

(5) System is essential to the function supported.

(6) Adequate funds are available for the system's operation.

(7) System security measures are effective.

(8) Training, logistic support, organizational relationships, post-implementation support and operations are adequate for the system.

(9) ADPE is not saturated, or plans for eliminating saturations have been developed.

(10) The responsible functional manager has signed the Application Stewardship Document, relieving the project manager of stewardship of the application system.

(11) Change control processes are being used and result in an auditable audit trail for all application system changes

Please see hard copy or contact OIRM, IMD on 202-720-8755 for the paper copy of the following image(s): Chapter 3, Application Systems Life Cycle Management Documents.

3.0 Overview. This chapter contains details of documents required during the life cycle of a major application system. while the substance of all the documents described in this chapter needs to be covered by each application development project, many of the documents can be combined with other documents at the project manager's discretion.

A. Initiation Phase Documents.

The following information components are products of the Initiation Phase. Please note that an asterisk (*) indicates that the information must be present. Give enough information to show logically a need for the project.

Many of the items may be combined into one document. For example, the feasibility study might contain Mission Analysis Methodology, Project Charter, Organization Model, Mission Needs Statement, and preliminary benefit cost analysis.

* o Project Request
o Mission Analysis Methodology
* o Cost/Benefit Analysis (preliminary)
* o Project Charter
o Organization Model
o Mission Process Model
o Information Model
* o Mission Need Statement
* o System Objectives
* o System Architecture
* o Data Architecture
* o Data Communications Architecture1
o System Life Cycle Strategy
* o System Milestone Dates
o System Life Cycle Resources Estimates
* o Revised Cost/Benefit Analysis
* o Revised Mission Need Statement

* o System Decision Paper 1

1 Refer to DR 3300 when preparing this document.

B.
Development Phase Documents

Please note that an asterisk (*) indicates that the information must be present as separate documents. Combine other items logically in one or more documents. For example, the Implementation Plan could logically contain the Conversion Plan, User Training Plan, and Post Implementation Review Plan. The Design Proposal document could have the Detailed Functional Requirements and Life Cycle Strategy as background material.

- o Current System Description
- o Detailed Functional Requirements
- o Data Requirements
- o Design Proposal
- o Detailed Cost/Benefits Analysis (revised)
- o Revised Life Cycle Strategy
- * o System Decision Paper 2
- o ADPE Specifications
- o Application Software Documentation
- o System Test Plan
- * o System Acceptance Report
- o Implementation Plan
- o Conversion Plan
- * o User Training Plan
- o Post Implementation Review Plan
- * o Data Processing Manual
- * o User Manual
- o Control, Backup and Security Summary
- * o Operations Manual
- * o System Decision Paper 3

C.
Operation and Maintenance Phase Documents.

- o Application Stewardship Document
- o Post Implementation Review Report
- o System Decision Paper 4

3.1 Initiation Phase Documents.

A.
Initiation Stage Documents.

(1) Project Request. The functional manager initiating the request for an automated system prepares this document. The document will be no more than 5 pages in length.

(a) Requestor's name and position

(b) Need statement

(c) Need impact or cost

(d) Mission(s) impacted

(e) Organizational units impacted

(f) Location, identity and size of the organizations Impacted

(g) Description of the work to be automated.

(2) Mission Analysis Methodology Description. This document, designed by the Project Manager, describes the mission analysis methodology used to produce the required initiation phase information.

(3) Benefit Cost Analysis. The initial benefit cost analysis is a valuable tool when determining whether the costs of Concept Development Stage justify continuing the project. Since it represents quantifiables, it should not be over-emphasized in developing a recommendation at this stage. OIRM has a LOTUS 123 template available for agency to use for this task.

(a) Costs. (New versus current system)

(i) Non-recurring costs. Include non-recurring costs (capital and other), such as studies, personnel training, site modifications, supplies and security procedures. Total the non-recurring costs for each system.

(ii) Recurring costs. Include recurring costs such as rental, maintenance, utilities, data communications and personnel. Total the recurring costs for each system.

(iii) Total annual cost. Total the non-recurring and recurring cost subtotals for each system.

(iv) System life cost. Calculate the total cost over the system life by summing the total costs for all years of the system life for both the existing and new systems.

(b) Benefits. Show the benefits of the new system over the existing system.

(i) Annual tangible benefits. Enter the quantifiable benefits for the year of the life cycle in which the benefits are realized.

(ii) System life benefit. Calculate the total

benefit for all years of the life cycle.

(c) Payback period. Calculate the year and month in which the sum (in current dollars) of benefits first exceeds the sum of the costs.

(d) Intangible benefits. Evaluate intangible benefits to decide whether the proposed system should be developed. List and discuss each intangible benefit, including meeting legal and regulatory requirements.

(4) Project Charter. Designed and prepared by the responsible functional manager.

(5) Organization Model. This product documents the organizational units impacted by the proposed application system. Its exact contents will vary depending upon the mission analysis methodology used.

(6) Mission Processes Model. This document describes the primary processes required to support,the mission and includes, or expands on, the processes by building a model showing functional processes by organizational unit.

(7) Information Model. This document charts the information currently required to support the business processes and lists deficiencies to be corrected. It cross-refers the information required to perform business processes with organizations. It shows validation of the information presented with business functional management and business users.

(8) Mission Need Statement (MNS).

(a) Mission area.

(i) Identify the mission area(s) addressed in the MNS. A need may be common to more than one mission area. When this occurs, identify all mission areas.

(ii) Describe current functional organization and operational environment.

(iii) Identify the lead organization for the application project, and include the reasons for selecting that organization as the lead.

(b) Mission need.

(i) Describe the scope and nature of the mission deficiency. Avoid describing the specific characteristics or capabilities of a set of hardware or an automated system. Keep descriptions in the business terminology used in the functional area being described.

(ii) Summarize the need in terms of the job to be done and the mission results or outcomes to be achieved. Describe the benefits to mission effectiveness. Remember, a MNS describes a deficiency or need, not a solution.

(c) Existing and planned capabilities. Describe existing or currently planned and programmed capabilities to perform this mission.

(d) Assessment of need. Evaluate the ability of current and planned capabilities to accomplish the mission need. Base the evaluation on one or more of the following factors.

(i) Deficiency in existing capabilities, e.g., excessive manpower, logistic support requirements, inadequate system readiness and/or mission performance.

(ii) Obsolescence of equipment or software.

(iii) Detail the short and long term effects of not developing a new system.

(e) Constraints. Identify conditions that constrain accomplishment of the mission need, such as:

(i) Timing of the need.

(ii) Relative priority within the mission area.

(iii) Limits on investment or recurring costs that can/will be placed on the alternative solutions evaluated.

(iv) Policy or organizational constraints placed on the identification and selection of alternatives.

(v) Intraagency, interagency, Federal, international standardization and/or interoperability requirements.

(vi) Potentially critical interdependencies or interfaces with other systems, new technology or development programs.

(vii) Logistic and manpower considerations.

(viii) Security and survivability or wartime considerations.

B.
Concept Development Stage Documents.

(1) System Objectives. List the major system performance objectives, such as:

(a) Reduced personnel and equipment costs.

(b) Increased processing speed (reduced turnaround time).

(c) Increased productivity.

(d) Improved management information services.

(e) Improved controls over automated decision-making systems.

(f) Compliance with laws and regulations.

(2) Application System Architecture. This document is an application systems oriented process model showing the sub-systems required to support the missions described in the mission analysis. If describing a broad area, divide the application system into multiple project modules, not one large project. Each sub-system encompasses processes logically grouped to support major parts of a mission.

(3) Data Architecture. This document is a data-oriented model showing to organize data for maximum accessibility to mission processes. A well designed data architecture is the key to data sharing, as well as system and data base integration. It is a blue print for data base design.

(4) Data Communications Architecture. This document provides a blueprint of the data communications strategy being prescribed in the preferred life cycle strategy. It describes data needed at each location served by an architecture.

(5) System Life Cycle Strategy. Develop a strategy for fulfilling system objectives that address such issues as:

(a) In-house or contract support (OMB Circular A-76, Policies for Acquiring Commercial or Industrial Products and Services needed by the Government).

(b) Immediate vs long-range needs and planning.

(c) Centralized vs decentralized processing.

(d) A comprehensive system or a partial, less costly one.

(e) Conventional, full-scale development; a pilot installation; or prototype.

(6) System Milestone Dates. Give an estimated completion date for

each of the project milestones. Also, show the projected elimination date for the new system. That is to say, plan for its removal from service or replacement date.

(7) System Life Cycle Resources Estimate. Estimate the resources required for each phase of the life cycle for the proposed strategy. The resources include personnel and costs (for contracts, equipment, etc.). Like the existing system resource estimates, these figures need be only accurate enough to determine whether to pursue the strategy to the next phase. Unlike the mission analysis, these estimates apply to a specific strategy.

(a) Alternate strategies. In addition to the recommended life cycle strategy, evaluate identifiable alternatives. The advantages and disadvantages of each are to be stated, and the reasons for not recommending them given. Be succinct.

(b) Interim measures. Assess the immediacy of needs and how to meet and incorporate into the final system.

(c) Impacts of project redirection. Evaluate the impacts of project redirection or termination at each phase. Show the effect on the mission, the effort required to return to the previous system, and the impact on related activities.

(8) Benefit Cost. Revise the figures completed in the Mission Analysis Stage, using the new figures developed here. Is development of the application cost justified?

(9) Revised MNS. Make any changes needed to the original MNS, and retain a copy of the revised version.

(10) System Decision Paper 1. This is a decision document that will help the Project Management Committee to determine whether to approve development of an application system.

(a) Overview. Address the continued validity of the MNS and briefly describe the need for and functions of the overall system. Include key objectives, assumptions, and constraints. Attach a copy of any revised MNS.

(b) Alternatives. Summarize system alternatives considered, the alternative selected, and the reason for the selection. Major costs, benefits, savings and risks for each feasible alternative should be presented in summary form.

(c) Schedule of events. Summarize major events and actions accomplished in the previous phase and projected for the next phases to include estimated start and completion dates. Include dates for critical milestone and acquisition events.

(d) Resources. Summarize resources (personnel and funding)

expended to date, resources needed for the next phase, and projected resources needed for the remainder of the system's life. As an appendix, provide a copy of the budget exhibits from your project file.

(e) Acquisition strategy. Summarize the proposed acquisition strategy for each element of this project, including software, ADP equipment, data communications, and services. Identify the proposed source, in-house or contract, and cost for each element.

(f) Data communications. Summarize the data communications network concept for the selected automation alternative. As an appendix, provide the data communications section from your project file.

(g) Problem areas. Identify problem areas to date or projected problem areas that may impact accomplishment of objectives. Examples include inadequate resources, milestone slippages, contractual difficulties, etc. Identify what actions have been taken or will be taken to correct the problem areas.

(h) Preliminary risk assessment. Identify threats to the continuation of an automated system, the financial impacts of these threats, and recommend cost effective safeguards. Recommendation of a back-up plan is one response to risks.

(i) Conflicting viewpoints. Based on up-front coordination with the user acceptor, data communications authority and ADP management, summarize any conflicting viewpoints. Show the rationale for rejection of conflicting viewpoints or explain the resolution.

(j) Approvals. Identify guidance needed from the responsible authorities and specific approvals requested relative to the SDP. Express in terms consistent with permission to proceed to the next milestone and application system development /modification/revision approval, ADP equipment acquisition approval, and ADP services approval. Explain the mission impact if the SDP is disapproved.

3.2 Development Phase Documents.

A.
System Analysis Stage Documents.

(1) Current System Description Document.

(a) Mission summary. Describe the missions supported by the current system.

(b) Functional and data summary. Identify and briefly describe the functions and data of the current

system. Indicate those functions and data structures to be absorbed by a new system. This is a general description. If no current system exists, explain the reasons for the new functions. Create a data dictionary/directory containing the data in the current system. Please note that the current system may be manual or automated.

(c) Responsibilities. List the organizations responsible for the various functions of the existing system and include the number, grade, and series of the personnel, and the percentage of time spent on the system.

(d) Equipment. List equipment used by the existing system and indicate the portion of time or resource of that equipment dedicated to the existing system.

(e) Inputs/outputs. Describe inputs and outputs, including forms, data elements, media, geographical location, sequences, distribution, volumes, frequency, retention and accuracy requirements for the existing system.

(f) Processing procedures. List the sequence of processing events for the current system. Show personnel responsibility; backup, restart and recovery capability; calculations and manipulations; and equipment used. Provide processing and/or hierarchical charts. Describe both manual and automated processes, and give a distribution of the effort and resources required for each.

(g) Control, Backup, Security Summary. Document the features in the current system that provide effective controls over work routines, data handling, security and backup.

(h) Cost. Present a cost analysis that shows the system cost for current functions and for those that would still be required. Show costs for equipment, personnel, etc., and show costs by functions.

(i) Deficiencies and limitations. Explain why the existing system can not meet the requirements proposed or why it is inefficient in doing go. Include information concerning laws/regulations or policies not met by the current system, and indicate why the current system can't meet current requirements.

(2) Detailed Functional Requirements Document.

(a) Performance objectives. State the reasons for the system; specifically, what it will accomplish in relation to the mission. Derive this information from the objectives listed during concept

development stage.

(b) System functional description. Identify and briefly describe each major functional entity needed. This list will be expanded to identify specific functional requirements and system design specifications. If experimentation or prototyping are to be done, explain the potential benefit. Justify all activities which can not be analyzed.

(c) Inputs/outputs. Explain and show examples of the data inputs. Specify the format, range of values, accuracy, volumes and sources, and develop data input edit criteria where requirements are definite. Sufficiently define all I/O requirements to permit development of a system design proposal. Provide examples and explanations of the data outputs required of the system. Include descriptions or examples of hard copy reports (routine, situational and exception) as well as graphic or display reports and formats, volumes, distribution, etc., where available. If unknown, develop I/O requirements during the next stage.

(d) Functional task. Show tasks (detailed processes) and data manipulations, including formulas, mathematical processes, source of input, transfer of output, retention criteria, and interfaces with other functional tasks and data.

(e) Data characteristics. Describe individual and composite data elements, their related coded representations (if already known), as well as relevant dictionaries, and complete a logical data model.

(f) Performance criteria.

- Accuracy. Mathematical, logical, legal, transmission.

- Validation. Approach to be taken; this will not include the details of an acceptance and validation test.

- Timing. Response, processing, data transfer and transmission throughout.

- Flexibility. For changes in modes of operation, environment, interfaces, accuracy and validation, and enhancements.

(g) Interfaces. Reference any existing systems that must be interfaced. Include hardware, data communications, and processing requirements mandated by either manual or automated systems. Indicate the reason for the interface and any options for

compliance.

(h) Failure contingencies. Describe and justify failure backup requirements. (i.e. backup must be available within 24 hours to meet payroll).

(i) Control, backup, security. Specify the control security, backup, audit and privacy requirements to protect the applications software, the data files, and their access. State all requirements for system access control and auditing, including change monitoring and physical site security.

(3) Data Requirements Document. This document gives a description of the detailed data requirements of the system.

(a) Subject data needed. Summarize the subject areas of the data being stored.

(b) Data entities. Describe the data entities and their attributes by subject area. Many data entities will be used in more than one subject area. Also, identify any data in the system that constitute "official records."

(c) Logical data structures. Identify the logical data structures (logical records), that will need to be stored by the new system.

(d) Data elements. Identify and define the data elements to be stored in the logical data structures.

Note: This document should be produced by printing it as an output from an automated data dictionary/directory system.

B.
System Design Stage Documents.

(1) Design Proposal.

(a) General. More than one design may satisfy the functional requirements; select the most economical and efficient design. To determine which alternative is best, evaluate each alternative against preliminary criteria, and then apply further criteria to those that will remain as viable alternatives. The result of this further evaluation determines which alternative is the recommended Design Proposal.

(b) Preliminary evaluation criteria. For a design proposal to be viable it should be technically, operationally, and economically feasible. By establishing preliminary evaluation criteria,

infeasible proposals may be recognized without a detailed evaluation. Each alternative should be evaluated against the following list of criteria.

(i) Cost. Developmental and operational costs for the life cycle of the system.

(ii) Life cycle. Development or delivery time and useful life of the system.

(iii) Flexibility. Ability of the design to accommodate changes in policy, procedure, environment, etc.

(iv) Maintenance. Requirements and effect of the operation.

(v) Operations. Personnel and facility to run the system.

(vi) Training. The level of complexity and amount of training required.

(vii) Organizational impact. Effect of the design on established organizational responsibilities and division of functions.

(viii) Logistics. Communications requirements resulting from geographic or functional separations.

(ix) Sensitivity. Ability of the system to respond to changes in volume, interface, workload six, timing, etc.

(x) Complexity. Interrelation, such as the impact of one function or piece of equipment on others.

(c) Alternative design proposals. For each alternative meeting the criteria of the preliminary evaluation, further define, describe, and evaluate the following.

(i) System description. Present the overall system concept and describe how it meets the functional requirements.

(ii) Equipment. Describe new equipment requirements and changes required to current equipment.

(iii) Software. Describe new software requirements and modifications to existing applications and support software.

(iv) Organizations. Describe organizational,

personnel and skill requirement changes.

(v) Operations. Describe operational effects on areas such as user operating procedures, operating center procedures, operating center and user retrieval, output reporting, and system failure consequences and recovery procedures.

(vi) Development. Describe developmental impacts such as user support requirements, data base development, system test requirements, privacy and security implications.

(vii) Site. Describe special building modification requirements.

(d) Recommended design proposal. State which design is being proposed and why. The proposal is a definitive course of action. If using contract support, then recommend the contract award. In addition, provide the following for the recommended Design Proposal:

(i) System design. Define the external system design in functional (i.e. user) terms. Identify the equipment type (not manufacturer) and the operating capabilities including the specifics for volumes, capacity, times, speed, retention, access, interfaces, display performance, maintenance response, and other technical specifications. Also identify failure contingencies. When approving the design proposal, this information is used to develop specifications for acquisition and benchmarking.

(ii) Data model. Present a logical model of the data needed, and their relationships and attributes. Complete a logical design for any data bases planned.

(iii) Cost Sensitivity analysis. Assess the extent to which costs and benefits are sensitive to changes in key factors such as length of system life; volume, mix or pattern of workload; requirements; and configuration of equipment or software.

- Methodology. Determine the approach, assumptions and model for the sensitivity analysis. Use algorithms where possible to develop sensitivity relationships. Include considerations such as:

  - Length of system life. The effects

of a shorter and or a longer system life.

- Volume, mix, or pattern of workload. The effects of variation in the estimated volume, mix, or pattern of workload.

- Requirements. The effects of potential changes in requirements resulting from either legislative mandate or changes in functional or organizational structure.

- Configuration of equipment or software. The effects of changes in configuration of hardware, software, and data communications.

- Assumptions. The effects of alternative assumptions concerning objectives, requirements, and operations. Consider the effects of alternative assumptions concerning inflation rate; residual value of equipment, facilities and software; and length of development.

o Sources of data. Identify the sources of data, and the method of data collection.

o Other factors. Identify and explain other factors that cannot be accurately analyzed, but which may qualitatively or quantitatively affect the assessment of costs and benefits of one or more of the alternatives.

(iv) Risk analysis. Take a cost/beneficial approach to avoid threats to the system caused by natural disasters, security violations, and system failures. Justify costs for the preventative actions specified in the requirements and design of the system, including physical and ADP security and backup. The responsible functional management participates in the analysis and ensures that definitive action is taken, both initially and throughout the life of the system. The Office of Information Resources Management furnishes guidelines for conducting risk analyses, and the Project Management Committee ensures that they are conducted.

(e) Rejected proposals. Explain reasons for rejecting an alternative.

(2) Detailed Benefit Cost Analysis. The detailed benefit cost analysis is a valuable tool for alternative selection analysis, but it is limited to quantifiables and, therefore, should not be over-emphasized in developing a recommendation. This analysis is more detailed than the analysis done in earlier stages, since it is used to determine whether software development and procurement is justified.

(a) Costs

(i) Non-recurring costs. These are one-time costs in the development and acquisition process.

- Site. The cost of erecting or modifying a site and surrounding facilities to meet the needs of the proposed system, e.g., costs to enlarge a computer room, and additional space required for personnel involved in this process, etc.
- ADP equipment. The cost for hardware, e.g., CPUs, disk drives, etc.
- Data communications. The cost for data communications hardware, communication lines and dedicated data communications software.
- Software purchase. The cost for system software packages procured for the direct support of the proposed system.
- Database development. The cost of implementing database system software and database applications software.
- Software development. The cost of implementing application programs.
- Studies. The cost of studies associated with the requirements, design, development or implementation of the proposed systems.
- Conversion. The cost of converting present data and program logic.
- Procurement. The cost of procuring hardware, software and data communications such as RFP preparation, vendor evaluation, and contract

preparation.

- o Training. The cost of training, including user, operations, and management training.
- o Travel. The cost for visits to sites or regions outside the main agency complex.
- o System test. The cost of evaluating the system.
- o Parallel operations. The cost of running parallel operations for the old system and the proposed system.
- o Management overhead. The cost of management interface in the development process defined in terms of hours required for meetings, reviews and administrative functions associated with continued system operation, etc.

(ii) Recurring costs. These are costs that continue throughout all, or most of, the system life.

- o Maintenance and lease of ADP equipment. The cost for lease and/or maintenance contracts for ADP equipment.
- o Timesharing. The cost of buying computer time from a commercial source.
- o Communications maintenance. The cost for the rental, lease or maintenance of data communications equipment,, services and facilities.
- o Software maintenance. The cost of maintaining application software.
- o Personnel. The salaries and fringe benefits for operations, data entry, and other personnel assigned to the system. Part-time activities should be prorated accordingly.
- o Training and travel. The cost of training and travel for new employees and upgrades.
- o Space occupancy. The cost of equipment space, personnel and support facilities, and administrative offices.

- Supplies and utilities. The cost of both technical and administrative supplies.

- Security and privacy. The cost of security guards, security devices, etc.

(iii) Present value cost. The total annual cost can be converted to present value cost for each year of the system life. The present value will give a more equitable base when alternatives have a wide dispersion in the funding years. A percentage rate must be applied to each year's cost to calculate the present value and aggregate the total system cost. Refer to FIPS PUB 64 and OMB Circular A-94 (revised March 27, 1982) when present value calculations are required.

(iv) Non-recurring benefits. These are one-time benefits that have a dollar value. The benefits may occur at any point in the life cycle, but they are not continuing benefits. The alternative benefit calculation is based on the alternative(s) with which it is being compared (usually the present system).

- Cost reduction. The value of eliminated owned equipment excessed equipment and inventory, eliminated cash-on-hand accounts, or any other one-time source of quantifiable benefit.

- Value enhancement. The value of additional tangible procurements (depreciable, not consumable) and improvements to owned facilities and equipment.

(v) Recurring benefits. These are benefits received throughout all, or most of, the system life. They are quantifiable with comparable (for analysis) the recurring costs.

- Maintenance and lease of ADP equipment. The savings for on going lease and/or maintenance contracts for ADP equipment.

- Communications maintenance. The savings on rental, lease or maintenance of data communications equipment, services, and facilities.

- Software maintenance. The projected savings on the maintenance of

application software.

- o Personnel. The salaries and fringe benefits saved (net savings) for operations, data entry, and other personnel.
- o Training and travel. Savings due to less training and travel (as compared with other systems).
- o Space occupancy. Savings on equipment space, personnel and support facilities, and administrative offices.
- o Supplies and utilities. Reduction of both technical and administrative supplies.
- o Security and privacy. Savings on security guards, devices, etc.

(vi) Intangible benefits. Many important benefits can be received from a system without being able to easily quantify them, such as:

- o Faster processing.
- o Lower error rate.
- o Enhanced organizational image.
- o Improved morale.
- o Simplified procedures.
- o Standardization.

These benefits, in many cases, can be quantified, but not always accurately. Therefore, they should be treated so as not to distort the analysis.

(b) Total costs.

(i) Total annual cost. Total non-recurring and recurring cost subtotals for each year of the system life.

(ii) Total system life cont. Calculate the total cost over the system life by summing the total costs for all years of the system life.

(iii) Total present value cost. Calculate present value cost over the entire system life using present value factors based on the

discounting methods on OMB Circular A-94.

(iv) Residual value estimate. Calculate the remaining economic value of ownership of all ADP resources as of the last month of the system life.

(v) Present value factor. Show the rate used for adjusting values to present value.

(vi) Discounted residual value. Use the present value factor to calculate the discounted residual value.

(vii) Total adjusted cost. Calculate the adjusted cost by subtracting the discounted residual value from the total present value cost.

(c) Total benefits

(i) Annual tangible benefits. Enter the quantifiable benefits for the year of the life cycle in which the benefits are realized.

(ii) System life benefit. Calculate the total benefit for all years of the life cycle.

(iii) Present value benefit. Adjust the benefits over the system life cycle to their present value.

(iv) Total Net present value. Calculate the net present value by subtracting the adjusted cost from the total present value of benefits. See Part IV of the supplement to OMB Circular A-76, the cost comparison handbook, for use when contracted support is being compared to inhouse resources.

(v) Benefit/cost ratio. Calculate the benefit/cost ratio by dividing the total present value of benefits by the adjusted cost.

(vi) Payback period. Calculate the year and month in which the sum (in current dollars) of benefits first exceeds the sum of the costs.

Evaluate intangible benefits to decide whether to develop the proposed system.

(d) Advantages and disadvantages. Explain the advantages and disadvantages of each alternative.

(3) Revised Life Cycle Strategy. Information added at this time builds upon information provided in the Concept

Development Stage document of the same name.

(a) Life cycle strategy summary. Review the acquisition strategy and development approach. The acquisition strategy addresses in-house and contract decisions, existing or new equipment and services, shared resources, acquisition timing, resource sources, etc. The development approach includes the system design concept and consideration of data base, centralized versus decentralized processing, interfaces with other systems, phased implementation, system flexibility, and a logical identification and distribution of application software responsibilities.

(b) Milestones. List the milestones and give a short explanation of each one. Estimate the completion date for each one while noting all slippages from the prior stage's estimate. Develop network and project planning charts.

(c) Development Tasks. Identify each project task or set of tasks to perform in order to reach each milestone in the system life. Include identification of organizational and individual responsibilities for the tasks or portions of tasks.

(d) Resource requirements. Estimate the resources required to perform each task. The resource utilization should be auditable at the milestone level. It will be monitored to show both estimated and actual resources used.

(e) Responsibilities. In addition to task responsibilities, define system ownership responsibilities, system stewardship development and operation responsibilities. Define responsibilities for funding, submitting and approving changes, and validating the system.

(f) Schedule. Prepare a schedule for developing and implementing the system, include time relationships, interdependencies, critical path identification, slack time, and contingencies for critical activities. Include a schedule for document preparation. Use an automated scheduling system.

(g) Contingency plan. Evaluate the impact of project plan changes to identify milestones sensitive to change, and to estimate the potential problems and their effects on the system. Develop contingency plans to resolve the problems.

(4) System Decision Paper 2. This paper can be prepared by altering a copy of SDP 1 to reflect new information outlined below.

(a) Overview. Update the SDP 1 overview statement and discuss overall progress since last milestone.

(b) Requirements. Present any significant changes to the functional requirements since Milestone 1.

(c) Alternatives. Summarize system design, and the reasons for selecting the overall system design. Significant changes in costs, benefits, savings and risks from previous economic analyses should be presented. Identify any significant changes to functional requirements since Milestone 1 which impacted the selection of alternatives. Provide updated benefit cost analysis documentation from your project file, as an appendix to SDP 2.

(d) Schedule of events. Summarize the schedule of events accomplished in the previous phase and projected for the next phases. Highlight changes made since Milestone 1. Compare current and previous schedules and explain any overall schedule slippages greater than 20 percent.

(e) Resources. Summarize personnel and funding resources expended to date, resources needed for the next phase, and projected resources needed for remainder of the system's life. Compare current cost estimates, funded and unfunded, with previous estimates and explain any increases greater than 20 percent. As an appendix to SDP 2, provide updated budget exhibits from your project file.

(f) Acquisition strategy. Discuss the progress to date and any changes regarding the acquisition strategy depicted in SDP 1. If an approval is required for this action, indicate its status.

(g) Project logistics

(i) Personnel. Briefly discuss action taken to satisfy anticipated technical and functional personnel requirements for this project.

(ii) Facilities. Briefly discuss significant facility requirements related to this project.

(h) Training. Summarize training requirements, costs, and how the requirement will be satisfied.

(i) Standardization. Discuss how you determined that no existing Department of Agriculture system could satisfy your requirement.

(j) Interoperability. Describe any interoperability requirement among other AS(s).

(k) Transition and backup strategy. Summarize the transition strategy from the status quo to the selected alternative. Briefly synopsize your course of action if the selected alternative fails.

(l) Control and security. Provide a short overview of the control and security plan regarding this application.

(m) Privacy. If the proposed AS contains privacy data, summarize steps necessary to comply with the Privacy Act.

(n) Software. Discuss the magnitude of the requirement for both system and application software. Explain how the software will be acquired. Where application software in to be converted, discuss the need for and accomplishment of a software conversion study. Where application software is to be newly developed, discuss the use of modern software development concepts, such as prototyping teams, structured walkthroughs, use of standard high order language, testing concepts, etc. Ensure resource estimates associated with the software are clearly discernible in the benefit cost analysis.

(o) Data communications. Provide a diagram of the selected data communications alternative and discuss why the proposed data communications alternative was selected. Summarize projected data communications costs. As an appendix, provide the data communications section from your project file.

(p) ADP equipment configuration. Provide a diagram of the proposed ADP equipment configuration indicating relative size of components. Where multiple sites are involved, provide a diagram for a typical site and identify variations for other sites.

(q) Supporting documentation. Provide the status of all supporting documentation, including system documentation. Include the status of any hardware and/or software specifications.

(r) Test and evaluation. Synopsize the approach to testing and evaluation for this system. Identify significant elements of the AS to be tested and quantify the expected results.

(s) Problem areas. Identify problem areas to date or projected problem areas that may impact accomplishment of objectives. Examples include inadequate resources, milestone slippages, contractual difficulties, etc. Identify what action has been taken or will be taken to correct the problem areas.

(t) Conflicting viewpoints. Based on up-front coordination with the user acceptor, ADP management, and project management committee summarize any conflicting viewpoints and show the rationale for their rejection or resolution.

C.
System Construction and Acquisition Stage Documents.

(1) System Test Plan. This is a plan for conducting or monitoring a test of the entire system. This plan will furnish the user with the results to be evaluated for system acceptance during the next stage.

(a) Functional summary. Describe the functions of the system.

(b) Schedule. Identify the time and place for the test. Identify participating organizations and their responsibility. List the organizations and personnel that develop the plan, conduct the tent, review the output, and approve the results.

(c) Test resources.

(i) Equipment. Show the expected period of use, types, and quantities of the equipment needed for the system tent that are not part of the system being tested.

(ii) Software. Identify the software needed to support the testing, but is not part of the system being tested.

(iii) Personnel. List the number and types of personnel to be available during the test from both user and development groups. Include any special requirements, such as multishift operation or key personnel.

(d) Method and constraints.

(i) Methodology. Describe the testing method and strategy.

(ii) Conditions. Specify the types of input, such as live or test data, as well as the volume and frequency of input, and iterations.

(iii) Extent. Indicate the extent of the testing, such as total or partial.

(iv) Data recording. Discuss the method for recording the test results such as printouts-or file dumps.

(v) Constraints. Indicate anticipated test limitations such as incomplete or partial interfaces, equipment, personnel, ind data bases.

(e) Test materials. List materials needed for the test and their sources, such as:

(i) Documentation.

(ii) Software to be tested and its medium.

(iii) Test inputs and outputs.

(iv) Test control software.

(d) Test procedure.

(i) Control. Describe the test control, such as manual, semiautomatic or automatic insertion of inputs, sequencing of operations, and recording of results.

(ii) Inputs. Describe the input data and input commands used during the tent.

(iii) Outputs. Describe the output and intermediate data expected as a result of the test.

(iv) Procedure. Specify the step-by-step procedures for test setup, initialization, processing, and termination, including test progression or sequencing.

(v) Restart and recovery. Describe the process for ensuring that the system can be restarted or recovered at the designated checkpoints.

(e) User acceptance plan. Base acceptance planning on satisfaction of functional and data requirements. Determine specific files and values after completing the test data design. Finalize the detailed validation process after completing the system specifications. Validation occurs during system test.

(i) Validation process. Assign input, process, and output criteria and validation responsibilities. Prepare data to compare a manual (or prior) process with the newly automated process. People responsible for validation should prepare a schedule of valid data element combinations and values to check the adequacy of edits. Validate results of all on-line transaction types and

batch runs.

(ii) Time. List throughput time and sequence requirements.

(iii) Distribution. List the distribution centers for each input and output, including transfers.

(iv) Interface. Show the interdependencies of processing systems and the process flows affecting the outputs, and the procedure used to verify them.

(v) Retention. Give file retention requirements for successive iterations; show restart and recovery points, and develop criteria for satisfactory execution.

(vi) Process. Show the algorithms and procedures being tested.

(vii) Volume. Show the technique used to ensure adequate file sizes and that volume-dependent processing will not saturate the system.

(2) ADPE Specifications.

(a) Equipment and software performance specifications. These specifications are for equipment, system software, and utilities, but not application software and data communications. The specifications should address:

(i) Run/response time per message/ transaction.

(ii) Throughput time for specified volumes and processes.

(iii) CPU memory size.

(iv) Operating system characteristics, utilities, and compilers.

(v) Operations complexity/resources.

(vi) Storage types and volumes.

(vii) I/O types, speed, volumes.

(viii) Security.

(ix) Accuracy/error detection.

(x) Interchangeability/compatibility.

(xi) Data access methods and procedures.

(xii) Backup/recovery.

(xiii) Downtime tolerances.

(xiv) Maintenance response time and contingencies.

(xv) Special performance criteria.

(c) Data communications performance specifications. These specifications should address:

(i) Response time per message/transaction.

(ii) Throughput time for specified volumes and processes.

(iii) Terminal displays/interfaces.

(iv) Line Transmission speed.

(v) Transmission techniques.

(vi) Upgrade capability.

(vii) Operations complexity/resources.

(viii) Communications network design.

(ix) RJE I/O interfaces.

(x) Security.

(xi) Accuracy/error detection.

(xii) Interchangeability/compatibility.

(xiii) Traffic monitoring/reporting/switching.

(xiv) Backup/recovery.

(xv) Downtime tolerances.

(xvi) Maintenance response time/contingencies.

(xvii) Special performance criteria.

(4) Application Software Documentation.

(a) Note that all data base and data dictionary documentation will be stored in an automated data dictionary/directory. This will allow use by auditors, system maintenance staff and functional managers.

(b) System and subsystem specifications. Divide the

tasks into separate entities to facilitate preparing programming specifications and to allow concurrent coding which reduces development time. This also promotes modular testing capability and aids in the identification of change requirements and throughput analysis.

(i) Functional requirements grouping. Identify criteria that promotes a logical grouping of functional requirements into separate entities and establish these groups as subsystems.

(ii) Interfaces. Identify the commonality that links each group of functional requirements to others and show the required sequencing.

(iii) Inputs/outputs. List the inputs and outputs of each subsystem. Give the origin of inputs and the destination of outputs if used by other subsystems.

(iv) Retention. Show data retention requirements for inputs/outputs.

(v) Performance. List any specific subsystem performance criteria, such as accuracy, validation, timing, and flexibility.

(vi) Operating environment. List any restraints placed on the subsystem specifications resulting from of the design proposal, such as equipment, software, interfaces, security and privacy, or operating controls.

(vii) Naming conventions. Create naming conventions to distinguish subsystems, interfaces, application programs, job control programs, sorts, files, or other identifying information. Establish names, numbers and symbol for the subsystems.

(c) Data Base Documentation. Describe the logical and physical characteristics of the data bases used by the system.

(i) Logical characteristics. Identify, define, and describe the relationships among data sets, records, and individual data elements in the system. Update the logical data models prepared earlier.

(ii) Physical characteristics. Describe the storage requirements for data, specific access methods, and physical relationships of access (index, device, area), design considerations, and access security

mechanisms for the data base.

(iii) Data identification. Identify the system data elements and state the subsystem and interface requirements.

(iv) Software/hardware. List the software and hardware that will be accessing the data, including DBMS proprietary software.

(iii) Security/privacy. Specify the data security and privacy requirements.

(iv) Update. Show the methods and frequency of data updating.

(v) Access. List the data elements for sorting and accessing.

(vi) Volume/retention. Estimate the volume of data to be entered into, and drawn from, the system, the level of processing activity, and data retention requirements.

(vii) Data base construction. Develop a data base design (data files or data management system), identifying the data files and their content. Coordinate the final product with the detailed processing design and program specifications.

(d) Detailed process design. Identify the types and sequences of processing within the subsystems. Identify the inputs, their sources, the processes performed on them, and the distribution and interface of the outputs. Coordinate the input and output record layouts, file names and definitions, program names, and processing algorithms in the data base design and program specifications. A project manager may elect to automate all of the following documentation.

(i) Subsystem processing. Identify processing that must be performed within each subsystem. Describe the processing, its sequence, inputs and outputs.

(ii) Interface processing. Identify processing sequences between subsystems. Describe the processes, sequences, inputs and outputs.

(iii) Failure/backup processing. Identify processing for backup, recovery, and restart.

(iv) Processing charts. For application and command language programs, show the

processing relationships and sequences; use functional flow charts or processing charts. Show the data files and specific elements used. This information is used to develop the program specifications.

(v) Program identifications. Identify and name, using the established naming convention, each application and command language program and state its purpose. List the input and output files and data elements to be accessed.

(e) Program specifications. Information from the system and subsystem specifications, data base design, and detailed processing design, should be extensive enough that specifications for each application and command program can be made. A programmer should need no additional information to develop the code.

(i) Identification. Designate the program and project. Identify the language used.

(ii) Requirements.

- Program description. Provide a general description of the program.
- Processing functions. State the functions of the program to be developed. If the program does not fully satisfy a system/subsystem function, show the relationship to other programs which aggregately satisfy that processing function.
- Performance. Specify the performance requirements.
- Accuracy. Describe data accuracy requirements imposed on the program, such as:
  - Mathematical.
  - Logical.
  - Legal.
  - Transmission.
- Validation. Describe the data validation requirements imposed on the program.
- Timing. Describe the timing requirements imposed on the program,

such as:

- Response time.
- Update processing time.
- Data transfer and transmission time.
- Throughput and internal processing time.

o Flexibility. Describe the capability for adapting to requirement changes, such as:

- Modes of operation.
- Operating environment.
- Interfaces with other programs.
- Accuracy, validation, and timing.
- Planned changes or improvements.

(iii) Operating environment.

o Equipment. Identify the system's operating equipment.

- Processor and size of internal storage.
- Storage (on-line and off-line, media, form, and devices).
- Input/output devices (on-line and off-line, and capacities).
- Data transmission devices.

o Support software. Identify the support software and describe any test programs. If the operation of the-program depends on changes to support software, identify the nature and planned date of these changes.

o Interfaces. Describe interactions with other software, including sequential or procedural relationships and data interfaces.

o Storage. Specify the storage requirements, constraints and conditions.

- Internal. Describe the use of internal storage areas, including indexing and working areas. Briefly state the equipment constraints and design considerations that affect the use of internal storage.

- Device. List by device type all peripheral storage required. Briefly state constraints imposed on storage requirements by each storage device. State requirements for permanent and temporary storage.

- Off-line. Describe the form, media, and storage requirements for off-line storage.

o Security and privacy. Describe the security and privacy requirements for the program, the inputs, and the data bases.

- Controls. Describe the program controls such as record counts, accumulated counts, and batch controls. Identify the sources of these controls.

(iv) Design characteristics.

o Operating procedures. Describe the operating procedures and program functions or requirements. Describe the load, start, stop, recovery, and restart procedures. Describe other interactions of the program with the operator.

o Inputs. Give information about the characteristics of each input to the program, such as;

- Title and tag.

- Format and type of data, such as a record layout.

- Validation criteria.

- Volume and frequency.

- Means of entry.

- Source document and its disposition, or specific interface source.

- Security and privacy conditions.

o Program logic. Describe the program logic. Present the flow in graphic form (hierarchical logic charts, Chapin charts, flowcharts, decision logic tables, etc.), supplemented with narratives.

o Outputs. Provide information about the characteristics of each output from the program, such as:

o Title and page.

o Format specifications, such as a report format.

o Selection criteria for display, output, or transfer.

o Volume and frequency.

- Output media.

- Description of graphic displays and symbols.

- Security and privacy conditions.

- Disposition of products.

- Description of display sequences and contents, fixed and variable formats, and display of error conditions.

(f) Test data design. Develop the program test data and system test data and create a listing of the test data files.

Each program requires test data and a comprehensive test data base. Program test data may be furnished by the user, developed by the programmer, or extracted from the system test data library, depending upon which is most practical. The user should design and create system test data. Address the items listed for each set of data.

(i) Test conditions. List the purpose of the test file.

(ii) Preparation responsibility. List, by name

and organization, the person who prepares the test data, how it is prepared, and in what format it will enter the system.

(iii) Control. State the procedure for modifying the test data base.

(iv) Negative data. Show the conditions being tested, and list the negative data developed to test these conditions.

(v) Output recycling. Identify output generated from test data that must be used for additional iterations through the system, and maintain, for comparison, data listings of these files.

(vi) Data listings. Maintain a binder of test data listings for each test data file; include the date of the creation/change. For changed files, show the change made.

(g) Data dictionary. The data base design defines the files of the system and the detailed processing design specifies data element processing. In order to complete the cross-references and to provide a flow/process/interface for each data element through the system, prepare a data dictionary. This dictionary must be automated in a data dictionary/directory system. Printed documentation from the data dictionary/directory will suffice for the documentation requested here.

(i) Data element name. Include the title of the data element and its mnemonic name.

(ii) Description. Describe the purpose and meaning of each data element.

(iii) Source. Give the source (origin) of the data element. If calculated or derived, state the processor algorithm.

(iv) Termination. Show all outputs that contain the data element. If one in part of a cumulative or derived result, show how it was processed.

(v) Files. List all files in which the data element appears. This includes temporary files and history files. For cumulative or processed files using this data element, give the file name, data element number, and process used on the data element.

(vi) Process. Show the process and sequence in which the data element is manipulated

through the system, including branching and decision logic for inclusion, exclusion or termination. The data dictionary/directory should be able to report which programs update each data element.

(5) Control, Backup and Security Summary.

(a) Produce a report that summarizes control, backup and security features included as part of the application system.

(b) Topics covered by this document will include:

(i) Validation processes.

(ii) Edit procedures.

(iii) Verification.

(iv) Controls and data security;

(v) Site Security; and

(vi) Backup plans in the event of a disaster.

D.
User Acceptance Stage Documents.

(1) System Acceptance Report. This document records the acceptability of the system to the system user. Custodianship of the system remains with the project manager at this stage.

(a) Development test. The development test in a preliminary applications software test conducted when the developer completes the system. It is not a system acceptance test; it is a coding test.

(i) Objectives. List the specific objectives of the test, including identification of the project, subsystems, job streams, and programs in the test.

(ii) References. Give references, such as previous test results.

(iii) Responsibility. State where and when to perform the test. List personnel and their duties.

(iv) Test method. Describe the test process.

(v) Abnormal conditions. List unique conditions, such as dummy files, partial runs, etc.

(vi) Input. Define the input data used in the test.

(vii) Output. Describe the data obtained from the test (source, type, limitations, etc.).

(viii) Analysis. Describe how the test results were analyzed and who approved the results.

(ix) Accomplishments. Identify specific test accomplishments.

(x) Problems. Identify problems encountered.

(xi) Action. List specific actions to be taken, such as accept test results, perform additional tests, revise coding, etc.

(xii) Equipment used. The equipment for the development test must be comparable to that intended for permanent use. The support software, such as compilers, operating systems, data base managers, and utilities should be copies of the software that will be used permanently. The test data is prepared by the developer.

(b) Hardware, software, and data communications acceptance. Evaluate the vendor-furnished components of the system in their environment. This includes the hardware, data communications, system software, utilities, compilers, environmental factors (climate control and security), and other system requirements except the data base and applications software. Where practical, use separate acceptance reports for the various segments of the system. The test and report are for the specific hardware installed on site. Unlike benchmarks, this test does not demonstrate equipment type capability; it tests the capability of specific hardware and software, and ensures satisfactory performance of the entire system configuration. Each piece of hardware and software must meet functional requirements and design specifications, and interface properly. This test may uncover design errors or omissions, as well as deficient products. If the entire system, including applications software, is developed by one vendor, this testing may be included in one comprehensive system test. Acceptance should include the following activities:

(i) Test results.

- Hardware, software, and data communication. Evaluate the technical performance of these items using the

criteria presented in equipment performance specifications, data communications specification, and RFP's. Unlike individual evaluations, however, emphasis is placed on interface characteristics such as I/O and CPU time ratios, processing mixes, and communications and queuing efficiency. Also, evaluate volume (data and processing) dependencies, capacities and system saturation points, backup, recovery, problem analysis, and ability to monitor the system performance.

- o Environment. Evaluate the facility according to facility design specifications. Test for stress and efficiency on such requirements as power (distribution, surges, cycle and voltage fluctuations, and damage due to sudden losses), heat, air conditioning, humidity, construction, maintenance access to equipment, safety, and security.

- o Applications software. This is not a test of the actual software, but in a test to ensure that the application software will run on the system provided. The test ensures that the operating system, utilities, compilers, communications, and hardware performs properly. The development test data and software used by development personnel may be used. This part of the test is not necessary if the applications software was developed on-the permanent configuration.

(ii) Responsibility. Identify by name, organization, and function, the personnel who design, conduct, review, and approve the test.

(iii) Operation training. List the personnel by title, grade, and training level who have been, or will be, trained on the system operation. This is not the same as operation training for the production application software. Show the vendor or other backup sources.

(iv) Support. Identify system support including on-site or immediate-access vendor representatives, engineering and maintenance support (including preventative maintenance

schedules and system down contingencies). Identify and plan for acquisition of ADP supplies, such as disk packs, tapes, special forms and paper, and logs.

(v) Changes. Identify changes to the functional requirements or specifications, and show how the changes have been evaluated. Identify requirements omitted or improved during testing or test preparation. Show how these changes were included in the system.

(vi) Action. List the deficiencies and recommendations.

(c) Data base validation. The complete system test will verify the inclusion of all data elements, test each access, and ensure the capability to accommodate all conditions. Data base validation measures the data base technical capabilities against design specifications. By using the test data base or other validation data, it ensures the accuracy of the design specifications by verifying access and manipulation requirements. The validation includes:

(i) Data. List each data base, the access keys, and manipulation requirements (this can be extracted from the data base design).

(ii) Test results. Show the test design procedure for accessing the data base and validating the design requirements. Develop test or use program/system test data files. Summarize the test results.

(iii) Responsibility. Identify by name, organization, and function personnel who design, conduct, and review the test.

(iv) Action. List the deficiencies and recommendations.

(d) System test. The system test (acceptance testing) is the final evaluation before a system becomes operational. It allows the user to evaluate the acceptability of the system. Do not perform any development activities after the system test is approved. Before conducting the system test, complete the development test, hardware and software acceptance, and data base validation.

(i) Procedure. The software will be transferred to, and secured at, the production facility when the development organization believes their efforts complete, and system test can begin.

Ideally, an independent team conducts the system test, with development personnel available as advisors.

Evaluate the system according to the system test plan. This includes generating specified outputs (file dumps, reports, etc.). The user is responsible for verifying the output accuracy. System test activities include:

(ii) Test evaluation. Conduct the system test under the system test plan. Document all deficiencies and recommend solutions. Note system test plan changes and include the reasons and authorization.

(iii) Records. Maintain processing and output records. Include run sequence and time data to use in preparing the Data Processing Manual, and User and Operation Instructions.

(iv) Approvals. Obtain the approvals/ comments/recommendations as required by the System Test Plan.

(e) User acceptance. Design system test data to generate sequences and output values to compare with known results. The user makes these comparisons.

(i) Review materials. List the output from the system test and the user assigned to review it. Review materials required by the acceptance plan. Accept the results or recommend corrective action.

(ii) Time. Analyze the processing and job run time data, and the output, to determine time and sequence dependencies.

(iii) Test results. The test data was designed to generate values to be compared with manually determined values (or those generated by a previous process). These values provide calculation, manipulation, and processing accuracy as required by the functional requirements and program specifications. List all discrepancies, including layout formatting, titles, and spelling.

(iv) Approvals. Obtain the appropriate approvals for pass, fail or conditional acceptance, and a deficiency of items that will not prevent system implementation, but which must be corrected.

(2) Implementation Plan. This plan shows the implementation

steps and sequence to follow.

(a) Implementation strategy. Based on the acquisition strategy, the current system (if one exists), and the project plan, decide: if implementation will be phased; it parallel operations are necessary; if a conversion is necessary; and the best implementation method.

(b) Timing. Determine when to implement the system based on information such as new fiscal year, policy effective date, resource availability. Develop an implementation schedule.

(c) Responsibility. Identify responsibilities for activities such as site preparation and acceptance, initial procurement of ADP supplies, and implementation coordination.

(d) Affected organizations. Identify organizations affected by the implementation and notify them of their preparation responsibilities.

(e) Operations. Define operation functions; estimate and commit resources.

(3) Conversion Plan. The conversion plan shown the process for converting work done by the existing system to the new system.

(a) Existing functions. Identify the existing functions that will be converted to the new system.

(b) Processing. Show the present method of processing, the proposed changes, and the adjustments to the existing system.

(c) Changes to existing software. Identify the system and application software that will still be used, and the changes needed.

(d) Hardware and data communications. List hardware and data communications that will still be used and specify what effect the conversion will have.

(e) Files. Identify the files to be used and/or converted, and show retention or resubmission requirements based on iterative processing.

(f) Schedule. Identify conversion activities, establish a schedule, and list the participating and reviewing personnel by name and organization.

(g) Personnel. Show the number and type of personnel to be retrained or displaced by the conversion.

(4) User Training Plan. This plan describes how system users

will be trained to use the new system.

(a) Training plan scope and content. Identify the equipment, software, and procedural training needed for management, administration, development, user, and operation personnel.

(b) Personnel training requirements. Identify training needs and when the training should be conducted.

(c) Presentation methods. Specify if the training will be formal (classroom) or on-the-job, and if all similar training can be conducted at one time or if it must be phased.

(d) Training space and equipment. Determine the space required for training, any special training equipment, such as audio-visual, and any technical support equipment such as terminals.

(e) Funding. Identify training costs and prepare a budget to include instruction, materials, travel, etc.

(f) Training team. Identify the person(s) responsible for negotiating and administering training.

(5) Post Implementation Review Plan.

(a) Establish the time for the first post implementation review. Give the estimated system life and a schedule for the remaining post implementation reviews.

(b) Conduct a post implementation review within 6 to 12 months following system installation to ensure that the system functions as designed.

(c) Conduct subsequent reviews at 50 percent and 80 percent of the system's life, but at least every three years.

(6) Data Processing Manual. The Data Processing Manual (DPM) describes the system. For larger systems, the material will be in several volumes; however, all volumes will be in one centralized library. any omitted area must be justified. The DPM is the official system documentation, and must contain all changes and updates to the system. This includes specification changes, program listings, changes in processing times or sequences, data definition changes, and any information relevant to a thorough understanding of the system. The project leader decides the organization and format of the DPM. DPM will meet all applicable FIPS, Departmental and Agency standards. Substitute automated documentation in place of paper documentation if possible. The DPM will include at least the following:

(a) Equipment/software performance-specifications.

(b) Data communications performance specifications.

(c) Facility.

(d) System and subsystem specifications.

(e) Data base design.

(f) Detailed process design.

(g) Program specifications.

(h) Test data design.

(i) Data dictionary.

(j) Applications software listings.

(k) Run description - also used in the Operation Manual.

(l) Post implementation review plan.

(m) Software control procedures.

(7) User Manual. Because the requirements for systems vary, a single format is not required. The manual should present in narrative and chart form the following information (justify omitted areas):

(a) General information.

(i) Summary. Summarize the application and general mission functions of the system.

(ii) Environment. Identify the user organization and facility in which the software is installed and/or maintained.

(b) Application.

(i) Description. Describe when and how the software is used, and the unique support provided to the user organization. The description includes:

- Purpose of the software.
- Capabilities and operating improvements.

(ii) Operation. Compare the operating relationships of the functions with the organization that provides input to, and receives output from the software. Describe

security and privacy considerations. Include charts with input and output responsibility.

(iii) Equipment. Describe the equipment.

(iv) Structure. Show the structure of the software and describe the role of each component in the operation of the software.

(v) Performance. Provide:

- Quantitative information on inputs, response time, processing times, and error rates.
- Qualitative information about flexibility and reliability.

(vi) Data base. Describe data files referenced, supported, or kept current by the software. Include the purpose for each data file in the automated data dictionary/directory.

(vii) Inputs, processing, and outputs. Describe the inputs, the flow of data through the processing cycle, and the outputs. Include relationships among inputs or outputs by using the automated data dictionary/direc tory.

(c) Procedures and requirements. Provide initiation information and procedures for preparation of data and parameter inputs. The scope, quality, and logical arrangement of the information should enable the user to prepare inputs and understand outputs. Describe error, recovery, and file query procedures.

(i) Initiation. Describe step-by-step procedures to initiate processing.

(ii) Input. Define the requirements for preparing input data. Typical considerations are:

- Conditions (e.g., personnel transfer, out-of-stock).
- Frequency (e.g., periodically, randomly, as a function of an operational situation).
- Origin (e.g., personnel section, inventory control).
- Medium (e.g., keyboard, punched card, magnetic or paper tape).

- Restrictions (e.g., priority and security handling, limitations on files accessed by this type of transaction).
- Quality control (e.g., instructions for checking reasonableness of input data, action to take when data appears to be in error, documentation of errors).
- Disposition (e.g., instructions necessary for retention or release of all data files received, other recipients of the inputs).
- Format (e.g., input forms and instructions for preparation).

(iii) Output. Describe the output requirements. Typical considerations are:

- Use (by whom and for what purpose).
- Frequency (e.g., weekly, periodically, on demand).
- Variations (modifications that are available to the basic output).
- Destination (e.g., computer area, remote terminal).
- Medium (e.g., printout, CRT, type.
- Quality control (e.g., instructions for identification, reasonableness checks, editing and error correction).
- Disposition (e.g.,.instructions for retention, release, distribution, transmission, priority, and security handling).
- Format (e.g., output forms, layout, and instructions).

(iv) Error and recovery. List error codes and the recovery procedures.

(v) File query. Give instructions for initiation, preparation, and processing of a query. Describe the query capabilities, forms, commands used, and control instructions.

If the software is queried through a terminal, provide instructions for terminal operators. Describe terminal setup or

connect procedures, data or parameter input procedures, and control instructions. Reference related materials describing query capabilities, languages, installation conventions and procedures, and program aids.

(8) Operations Manual. Because the requirements for systems vary, a single format is not required. The document, however, should present, in narrative and chart form, the following information (justify omitted areas):

(a) General information.

(i) Summary. Summarize the general functions of the software.

(ii) Environment. Identify the system owner, developer, user, and the computer facility where the system is installed.

(b) Overview.

(i) Software organization. Provide a diagram of the inputs, outputs, data files, and sequence of operations for the software. Runs may be grouped by periods of time cycles, by organizational level where performed, or by other logical groupings.

(ii) Program inventory. Identify each program by title, number, and mnemonic reference.

(iii) File inventory. Identify each file that is referenced, created, or updated. Include the title, mnemonic reference, storage medium, and storage requirement.

(c) Description of runs.

(i) Run inventory. List the runs possible and summarize their purposes. Show the programs executed during each run and identify options that must be determined prior to the run.

(ii) Run Progression. Describe the progression from one run to another. Show program and cycle run times and variations caused by data volumes, types, and input media.

(iii) Run description. Organize the information for each run into a presentation which includes;

- Control inputs. List the run stream control statements.

- Operating information. Provide operating information such as:
  - Run identification.
  - Operating requirements.
  - Initiation method, such as on request, at predetermined time, etc.
  - Estimated run time and turnaround time.
  - Operator commands and messages and Contacts for problems with the run.
- Input/output files. Provide information for files created or updated by the run, such as:
  - File name or label.
  - Recording medium.
  - Retention schedule.
  - Disposition of file.
- Output reports. For each output report provide information such as:
  - Report identification.
  - Medium.
  - Volume of report.
  - Number of copies.
  - Distribution.
- Reproduced output reports. For those reports that are computer generated and then reproduced by other means, provide information such as:
  - Report identification.
  - Reproduction technique.
  - Dimensions of paper or other medium.
  - Binding method.

- Distribution.

o Restart/recovery procedures. Describe procedures to restart the run or recover from a failure.

(d) Nonroutine procedures. Provide information about emergency or nonroutine operations, such as:

(i) Switch over to a backup system.

(ii) Procedures for turnover to maintenance programmers.

(e) Remote operations. Describe the procedures for running the programs through remote terminals.

(9) System Decision Paper 3.

Note: If changes in the project scope are significant, consider re-entering the life cycle process beginning with mission analysis/project initiation. Otherwise update the previous SDP overview statement and discuss overall progress since the last milestone.

(a) Alternatives. Based on experience during this phase, evaluate whether the selected alternative remains the best course of action or whether to make changes. Summarize any changes made to functional requirements or system design. Present significant changes in costs, benefits, savings, and risks from previous milestones; Provide an updated benefit cost analysis from your project file as an appendix.

(b) Schedule of events. Summarize major events and actions accomplished in the previous phase and projected for the next phase to include estimated start and completion dates. Highlight changes made since Milestone 2. Compare current and previous schedules and explain any overall schedule slippages greater than 20 percent.

(c) Resources. Summarize resources expended to date, resources needed for the next phase, and projected resources needed for the remainder of the system's life. Compare current cost estimates, funded and unfunded, with previous estimates and explain any increases greater than 20 percent. As an appendix, provide a copy of the updated budget exhibits from your project file.

(d) Acquisition strategy. Discuss the status of project acquisitions.

(e) Configuration management. Summarize the

accomplishments in establishing a configuration management plan for this project, including planned changes to the configuration for the implementation and maintenance stages.

(f) Logistics.

(i) Maintenance. Discuss the status of maintenance arrangements for ADP and data communications equipment and software.

(ii) Personnel. Discuss the status of personnel required to operate, maintain, and use this system.

(iii) Facilities. Discuss the status offacility preparation for this project.

(g) Training. Summarize the status of technical and functional personnel training for this project.

(h) Transition. Update the transition strategy from Milestone 2.

(i) Security. Discuss actions taken to accommodate security requirements.

(j) Privacy. Discuss actions taken to comply with the Privacy Act.

(k) Software. Discuss actions accomplished since the last milestone. Provide an overview diagram which shows the relationship of all major application programs in the AS. Provide the status of each program. Identify costs expended to date versus costs projected for future phases.

(l) Data communications. Discuss steps taken to accommodate data communications requirements.

(m) ADP equipment configuration. Provide an updated copy of the ADP equipment configuration.

(n) Supporting documentation. Provide an updated list of all supporting documentation, including system documentation.

(o) Test and evaluation. Synopsize the results of testing and evaluation for this project. Include the user acceptor's certification that the designed system is adequate.

(p) Problem areas. Identify problem areas to date or projected problem areas that say impact accomplishment of objectives. Examples include inadequate resources, milestone slippages, contractual difficulties, etc.

(q) Conflicting viewpoints. Based on up-front coordination with the user acceptor, data communications authority, and project management committee, summarize any conflicting viewpoints and show the rationale for rejection or resolution.

(r) Approvals. Identify guidance needed from project management committee and what specific approvals are requested relative to this SDP. Express in terms consistent with permission to proceed to the next milestone. Explain the impact if the SDP is disapproved.

3.3 Operation and Maintenance Phase Documents.

A.
Implementation Stage Documents.

(1) Application Stewardship Document. This is a one page document in which the responsible functional manager relieves the project manager of stewardship responsibilities for the application system. Custodianship will pass to the ADP manager responsible for system maintenance. Identify the person responsible for system stewardship and the system's custodian in this document.

B.
Maintenance Stage Documents.

(1) Post Implementation Review (PIR) Report.

(a) Plan. The PIR will ensure the application software meets the criteria documented in the post implementation review plan during the User Acceptance Stage of the Development Phase.

(b) Minimum requirements. All PIR reports will review the application system's actual operating performance versus its planned Performance in the following areas:

(1) Mission support.

(2) System scope.

(3) Functional requirements.

(4) Change control.

(5) Auditability.

(6) Operation cost.

(7) Benefits.

(8) Security.

(9) Controls.

(10) System inputs.

(11) System outputs.

(12) Processing accuracy.

(13) Data base integrity.

(14) Documentation.

(15) System management.

(16) Risk analysis.

(17) Disaster recovery backup.

(18) Benefit cost analysis.

(2) System Decision Paper 4.

(a) Overview. Update the previous overview statement and discuss overall progress since last milestone. This information constitutes a post implementation review.

(b) Evaluation. Summarize the results of the system effectiveness evaluation and corrective action needed. Evaluate the system in light of new technological advances.

(c) Schedule of Events. Summarize the events accomplished during the previous phase and those projected. Highlight changes made since the last milestone. Compare current and previous schedules and explain any overall schedule slippages greater than 20 percent.

(d) Resources. Summarize resources expended to date and resources needed for the remainder of the System's life. Compare current cost estimates, funded and unfunded, with previous estimates and explain any increases greater than 20 percent. As an appendix, provide a copy of the updated budget exhibits from your project file.

(e) Acquisition Strategy. Discuss the adequacy of the previous acquisition strategy, whether other acquisitions are required and what preparations are being made for future acquisitions.

(f) Configuration Management. Summarize operational

procedures for controlling system changes, including ADP and data communications equipment, systems software, and applications software.

(g) Logistics. Discuss adequacy of previous logistic support requirements and whether any changes are required.

(h) Training. Summarize the status and adequacy of technical and functional personnel training for this project.

(i) ADP Equipment Configuration. Provide an updated copy of the ADP equipment configuration.

(j) Supporting Documentation. Provide an updated list of all supporting documentation, including system documentation.

(k) Recommended actions. Detail corrective actions that need to be taken to bring the system into conformance with requirements, and detail costs and implementation schedules.

(l) Approvals. Identify what direction is needed from project management committee and what specific approvals are required relative to the SDP. The decision at this point will be whether or not to leave the application system in operation, and what changes to authorize to the operating application system. Explain the impact if SDP is disapproved.