DEPARTMENT OF THE INTERIOR

MINERALS MANAGEMENT SERVICE MANUAL

TRANSMITTAL SHEET

Release No. 141 January 15, 1988

SUBJECT: Administrative Series
Part 376 Automated Data Processing
Chapter 10 ADP Application Systems
Life Cycle Management

EXPLANATION OF MATERIAL TRANSMITTED:

This chapter describes policy, responsibilities, and procedures for the management of the initiation, development, and operations/maintenance phases of new Minerals Management Service (MMS) major ADP application systems.

Director

FILING INSTRUCTIONS:

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	Part	Chapter	Pages	Release
None	376	10	1-196	141

OPR: Information Technology Branch
Information Resources Management Division
Office of Administration

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FORM MMS-

1. Purpose. This chapter describes policy, responsibilities, and procedures for the management of the initiation, development, and operations/maintenance phases of new Minerals Management Service (MMS) major ADP application systems.

2. Objective. To ensure all new major application systems comply with departmental Life Cycle Management (LCM) standards.

3. Authority. Departmental Manual (376 DM 10, Life Cycle Management of ADP Information Systems).

4. References.

A. ADP Review Council Charter, February 17, 1986 (Appendix 1).

B. "A Project Manager's Guide to Application System Life Cycle Management," Department of the Interior, August 1985 (Appendix 2).

C. Office of Management and Budget Circular Number A-130, December 12, 1985.

D. MMS Manual 380.2 and 380.2-H, Records Management.

5. Definitions.

A. Life Cycle Management. The process for administering a major ADP Application System from the identification of a need through its replacement or termination. This process emphasizes strengthening early decisions which shape its costs and utility.

B. A Major ADP Application System. An automated system exhibiting one or more of the characteristics listed below or requiring special ongoing ADP Review Council and MMS management attention:

(1) Directly affects the MMS's ability to meet a critical departmental or national mission;

(2) Involves a significant investment, including personnel costs, related to the development, operation, and/or maintenance phases. In this context, significant development, operating, or maintenance costs mean that the cost of initial development from conception up to implementation exceeds $1 million; the cost of operating and maintaining the system exceeds $500,000 annually; or the total life cycle cost exceeds $10 million;

(3) Directly affects national security, or the security and safety of financial resources, people, or other valuable property or assets;

(4) Directly affects the performance of shared Agency resources, such as central computer systems and communication networks; or

(5) Is a Departmentwide standard system.

C. Project Management Committee. Selected individuals having functional, financial, and technical expertise who act as advisory council to the appropriate program area Associate/Assistant Director on the status and progress of major application systems projects, and who approve expenditures of funds. The Committee also reviews the planning and management of application system project resources, and provides reports to the Program Area Associate/Assistant Director.

D. Project Manager of a Major Application System. Individual who coordinates all functions of project management, supervises the project team, and is held accountable for project performance.

E. Project Team. Individuals who perform the activities and produce the products required during an application systems development project.

6. Policy. It is the policy of the MMS that all major ADP application systems, as approved by the ADP Review Council, will comply with departmental LCM requirements.

7. Responsibility.

A. The Director approves or recommends to appropriate departmental levels, all requests for the initiation of new development or enhancement of major application systems.

B. ADP Review Council.

(1) Establishes and monitors major application system criteria.

(2) Recommends to the Director requests for the initiation of new development or enhancements of major application systems.

(3) Provides Bureau leadership and guidance during the life cycle of all major application systems.

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(4) Reviews the significant milestones, products, and system decision papers throughout the system's life cycle.

C. The Assistant and Associate Directors.

(1) Determine if an ADP project is a major application system, in accordance with departmental guidelines and ADP Review Council criteria; identify project needs; and submit a project request form to the ADP Review Council;

(2) Ensure that the LCM process is applied to all major ADP application system projects within their area of responsibility;

(3) Provide leadership and monitor progress of the specific major ADP application system project;

(4) Establish, as appropriate, ADP Project Management Committees and appoint the committee chairperson for each committee;

(5) Approve the appointment of the Project Manager for every major application system;

(6) Approve all significant milestone events and reports;

(7) Negotiate agreements to participate with other officials in jointly and mutually defining needs and developing applications which affect more than one program area; and

(8) Present all significant milestone report requirements to the ADP Review Council for review and approval.

D. Project Management Committees.

(1) Act as advisory council to the program area Associate Director and Project Manager throughout the system's life cycle;

(2) Assist the Project Manager in the development of the project plan and preliminary cost benefit analyses;

(3) Monitor project at regular intervals;

(4) Ensure that the project meets the review and reporting requirements of the departmental IRM Review Council and the MMS ADP Review Council; and

(5) Perform other functions of the Project Management Committee in conformance with 376 DM 10, Application Systems Life Cycle Management Departmental Manual Handbook.

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E. Program Area Functional Manager (Line Manager).

(1) Identifies mission needs and submits project request to the appropriate Assistant/Associate Director;

(2) Recommends proposed project manager to the Assistant/Associate Director and secures approval;

(3) Provides resources and guidance to the Project Manager during development of the work plan and mission analysis; and

(4) Monitors the entire application system's life cycle to ensure completion of major milestone events, issuance of required management reports, and consistency to and continuation of the system's mission.

F. Project Manager, Major Application Systems.

(1) Develops and recommends methodology to be used for project analysis and proceeds to implement approved methodology;

(2) Develops cost estimates and includes results in cost analyses;

(3) Assigns project tasks to project team;

(4) Establishes reporting process and documentation activities;

(5) Performs project analysis and assists the contracting officer in fulfilling the procurement requirements; and

(6) Performs other functions of Project Manager in conformance with the departmental guide, "A Project Manager's Guide to Application Systems Life Cycle Management."

8. Procedures. Procedures are contained in Appendix 2, "A Project Manager's Guide to Application Systems Life Cycle Management."

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Charter
ADP Review Council

1. Purpose.

This charter defines the purpose, scope, and responsibility of the ADP Review Council.

2. Scope.

This charter applies to the entire Bureau.

3. Authority.

A. 308 DM1.4, Committee Management

B. The ADP Review Council is established under the authority of the Director in conjunction with the Under Secretary's July 3, 1985, correspondence with the Office of Management and Budget.

4. Background.

Information systems support all major mission functions of the Minerals Management Service (MMS), and a significant portion of the resources of the MMS are spent on these systems. To ensure these resources are used wisely, a mechanism is needed to coordinate Bureauwide planning for ADP activities and to monitor the progress of these activities.

5. Responsibility.

Advise the Director on the conduct of ADP activities within the MMS so that current and future information systems support the goals and objectives of the Bureau.

A. Recommend ADP policies and standards for the Director's approval.

B. Initiate the preparation of an MMS ADP plan.

C. Recommend an MMS ADP plan for the Director's approval.

D. Review all ADP acquisitions and systems development requests that exceed $100,000.

(a) Requests from $100,000 to $249,999 require a written review by ADP Review Council members.

(b) Requests over $250,000 require an oral presentation made by the requestor(s) to the Council. The Council will respond in writing.

(c) Any ADP topic that member(s) believe to be significant, regardless of dollar value, can be brought to the Council for review.

E. Review the progress of Bureauwide ADP projects.

F. Direct special projects and studies concerning ADP activities.

6. Representation.

The Council will be comprised of the Assistant and Associate Directors, and the Assistant to the Director. The Chief of the Information Resources Management Division will be the Executive Director. The Chairman will be the Assistant Director for Administration.

7. Meetings.

A. At the end of each Council meeting, the next meeting date will be determined and agreed upon by the Council. If an ADP issue arises, an additional meeting may be called.

B. Council meetings will be called by the Chairman.

C. The Executive Director will prepare a proposed agenda prior to each meeting and prepare minutes.

D. Substitutes attending Council meetings are not voting members of the Council.

8. Reporting.

The Council will report to the Director.

9. Type of Organization.

Permanent. The charter will be reviewed annually.

10. Staff.

Provided to the Chairman by the Executive Director. Council members will use their own staff when necessary.

11. Subcommittees.

The Chairman may, with the consent of the Council members, appoint ad hoc task groups to conduct special projects, reviews, and studies.

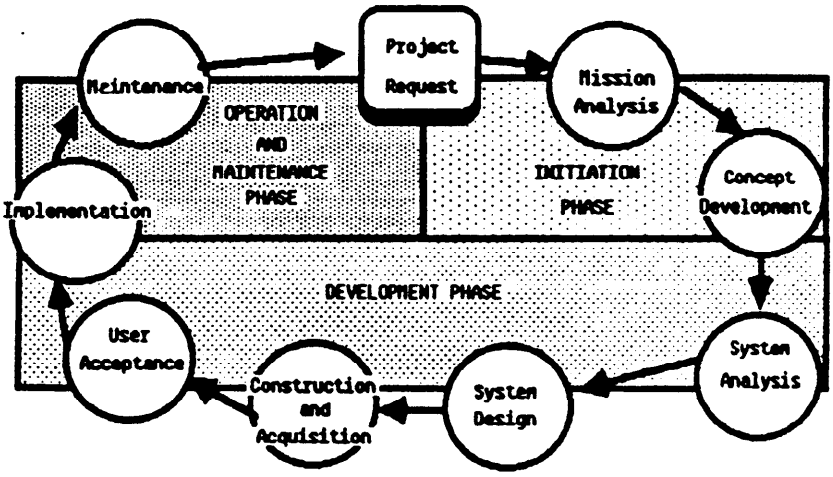
Concurred:

Director

2/17/86
(Date)

A PROJECT MANAGER'S GUIDE TO

APPLICATION SYSTEMS
LIFE CYCLE MANAGEMENT



DEPARTMENT OF THE INTERIOR

August 1985

A PROJECT MANAGER'S GUIDE TO

APPLICATION SYSTEMS

LIFE CYCLE MANAGEMENT

Office of the Secretary
United States Department of the Interior

A Project Manager's Guide to Application Systems Life Cycle Management

Foreword

Departmental Policy	Departmental Manual Chapter 376 DM 10 details policy concerning the life cycle management of ADP Information Systems, and is supplemented by a Handbook that addresses major application system life cycle management. These two documents are in the appendices of this Guide.
Purpose	This Guide provides detailed guidance for managing major application system development projects in the Department of the Interior.
Intended Users	The Guide will be used by managers of major application system development projects throughout the Department.
Use	A project manager should read the Guide carefully and adopt its approach to developing major applications. If it is necessary to deviate from the standards established by this Guide, the project manager should record the reason for the deviation.
Other Use	This Guide was designed with major applications in mind. While it will prove helpful to the managers of smaller, non-major applications, it should be applied rigorously only to applications that are major.
Term Definitions	To learn the definition of a major application and other terms used in this Guide, the reader should turn to Appendix 2 at the back of the Guide.
Questions	Any questions concerning the Guide should be directed to the Office of Information Resources Management, Division of Program Development in Washington; phone number (202) 343-4281.

A Project Manager's Guide to Application Systems Life Cycle Management

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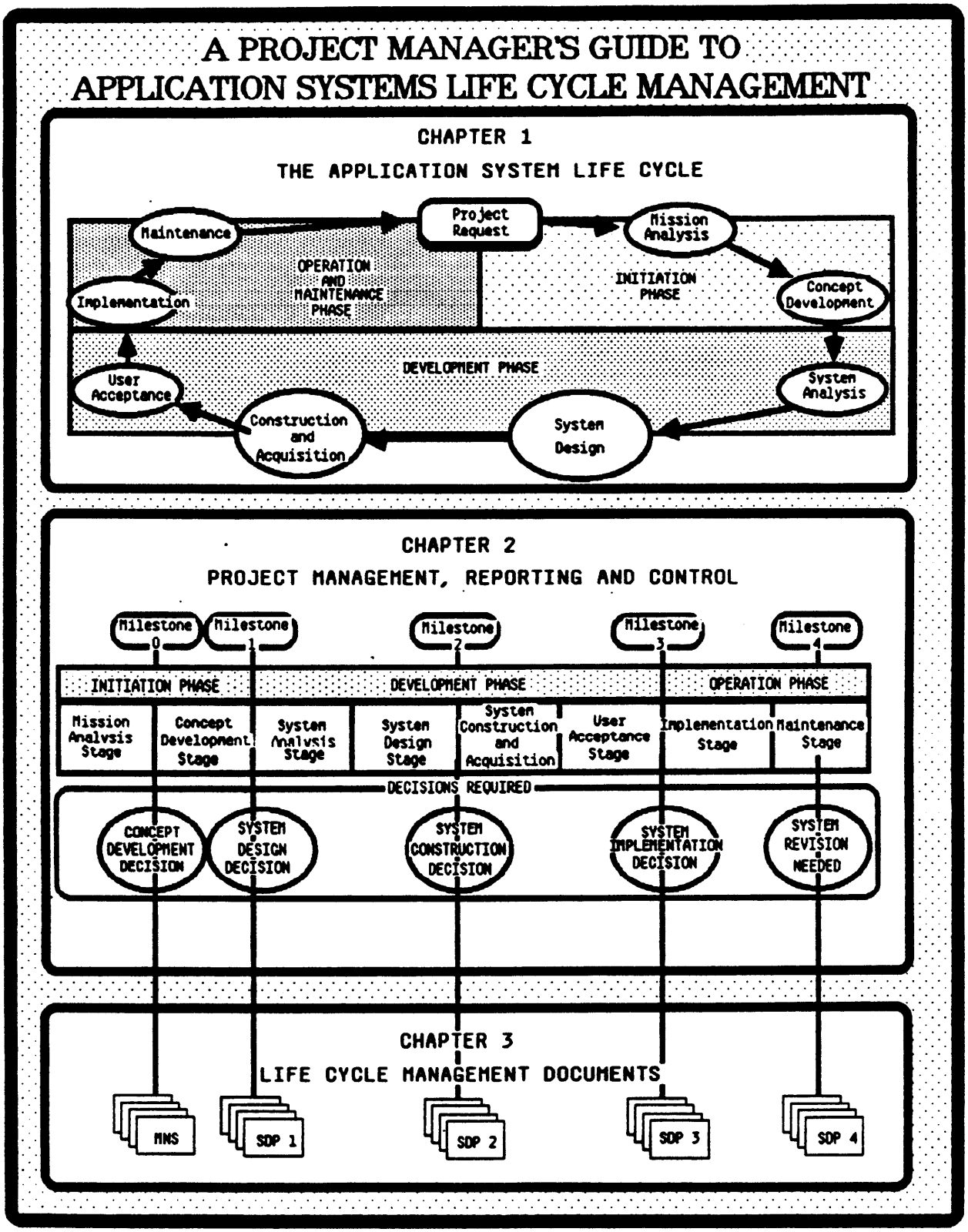
Departmental Manual Part 376 DM 10

Appendix 2

Application Systems Life Cycle Management Handbook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Mission Analysis Stage
Concept Development Stage
System Analysis Stage
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System Construction and Acquisition
User Acceptance Stage
Implementation Stage
Maintenance Stage
DECISIONS REQUIRED
CONCEPT DEVELOPMENT DECISION
SYSTEM DESIGN DECISION
SYSTEM CONSTRUCTION DECISION
SYSTEM IMPLEMENTATION DECISION
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MNS
SDP 1
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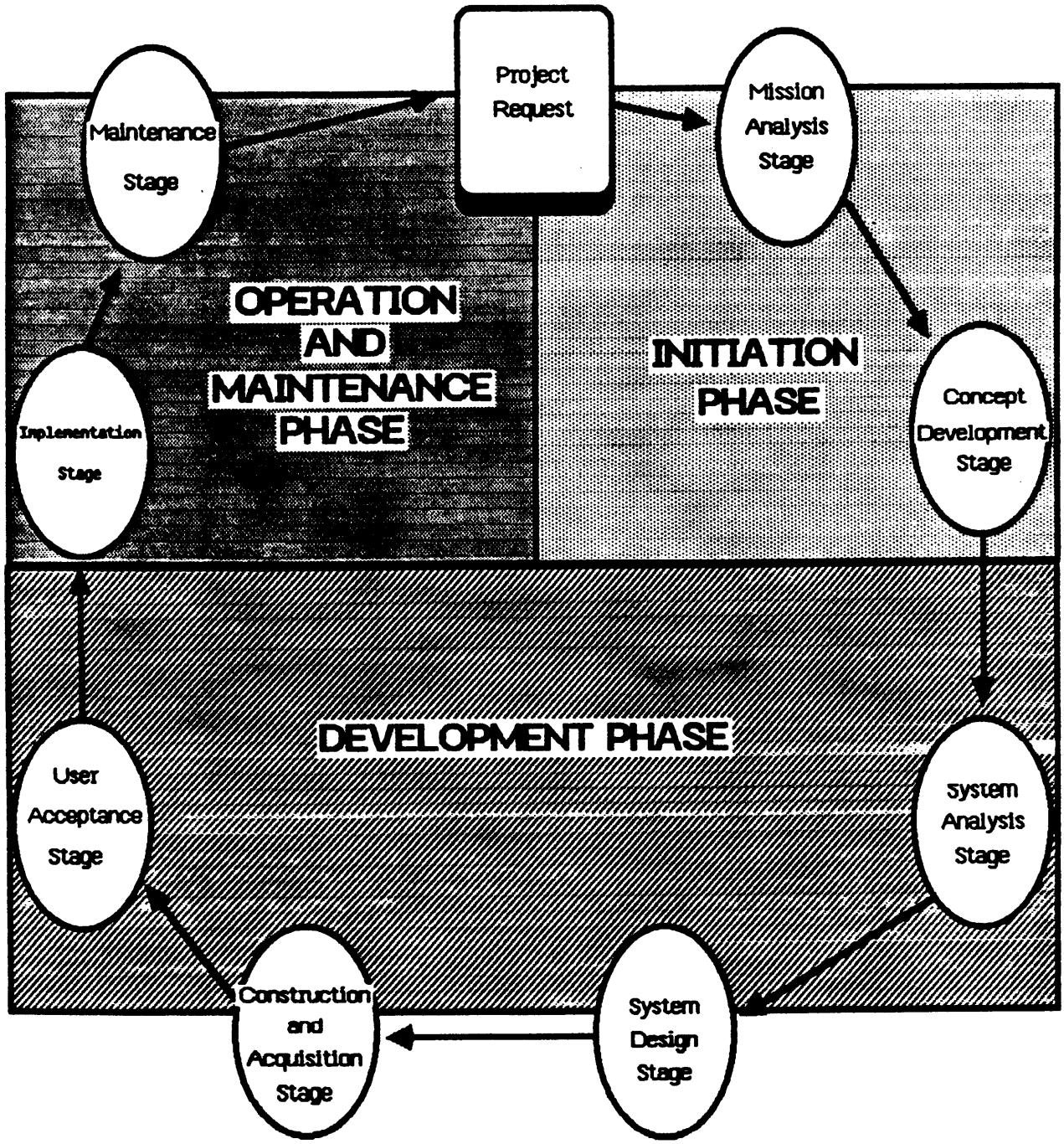
A Project Manager's Guide to Application Systems Life Cycle Management

CHAPTER 1

THE APPLICATION SYSTEM LIFE CYCLE

CHAPTER 1

DETAILS OF
THE APPLICATION SYSTEM LIFE CYCLE



The Application System Life Cycle
Chapter 1

1.1 Initiation Phase. The Initiation Phase is to perform those mission process analysis activities necessary to investigate the need for an application system development project, build a blueprint or plan for the application, and to decide whether to proceed with defining detailed requirements. Problems and opportunities are defined, mission requirements are analyzed, alternative solutions are identified, and the economic, technical and operational feasibility of alternatives is assessed.

Note: The project manager should keep in mind that detailed functional and data requirements are defined 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, a requirement will be identified and supported by a functional (administrative or programmatic) manager. 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

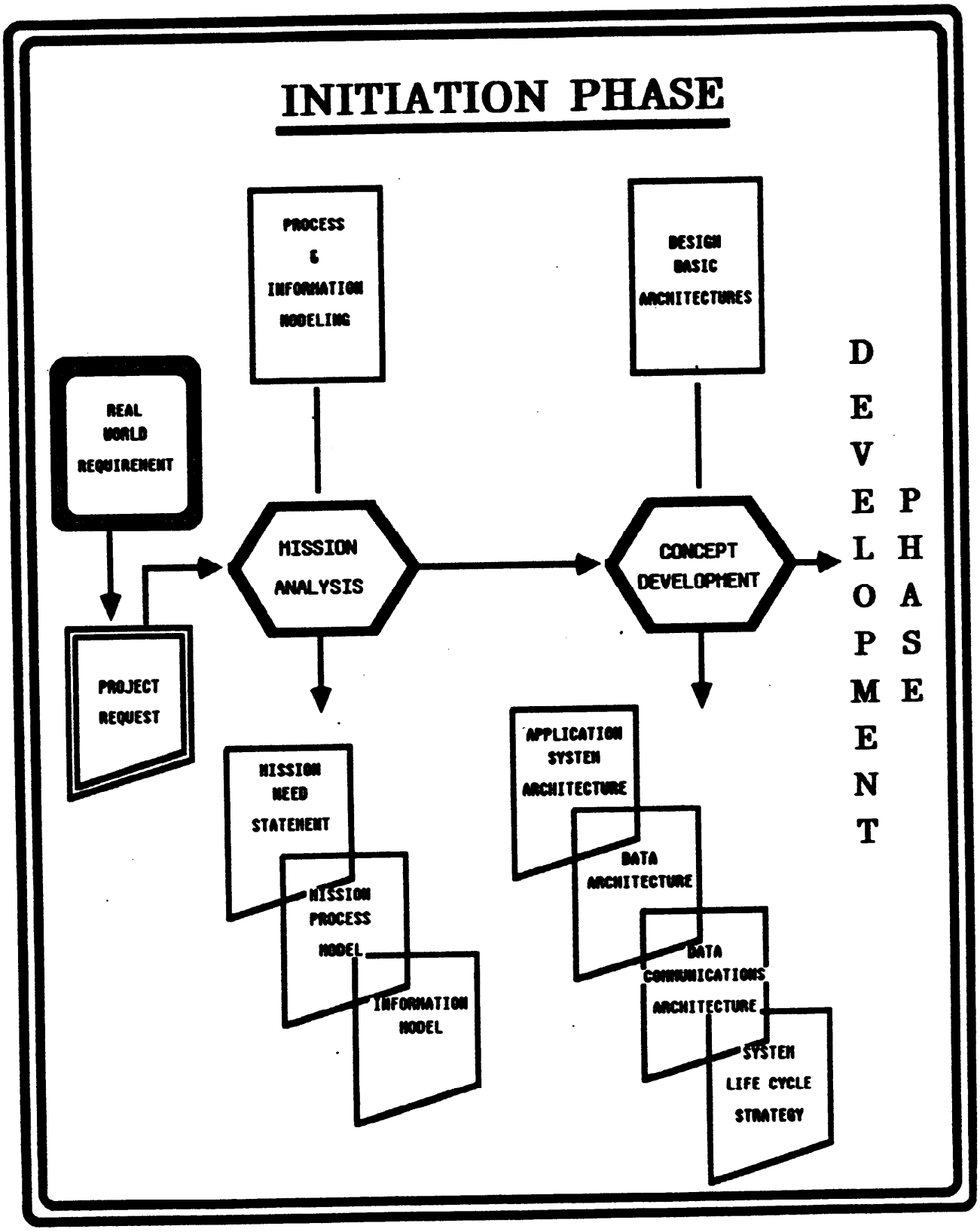
(3) Need Impact or Cost

(4) Mission(s) Impacted

(5) Organizational Units Impacted

(6) Location and Size of the Organizations Impacted

(7) Description of the Work to be Automated


INITIATION PHASE
PROCESS & INFORMATION MODELING
DESIGN BASIC ARCHITECTURES
REAL WORLD REQUIREMENT
MISSION ANALYSIS
CONCEPT DEVELOPMENT
DEVELOPMENT PHASE
PROJECT REQUEST
MISSION NEED STATEMENT
MISSION PROCESS MODEL
INFORMATION MODEL
APPLICATION SYSTEM ARCHITECTURE
DATA ARCHITECTURE
DATA COMMUNICATIONS ARCHITECTURE
SYSTEM LIFE CYCLE STRATEGY

The Application System Life Cycle
Chapter 1

B. Mission Analysis Stage. This stage is the first of two stages during the Initiation Phase.

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

(2) Objectives. This stage is intended to:

(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, so that if an automated system results it addresses only important mission needs; and

(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) Form a Project Management Committee, appoint an Application System Planning Project Manager, and form an Application System Planning Team.

(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: Project Management Committee approval of the MNS (pronounced "mens") is required before 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 Initiation Phase to be completed.

(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 the IRMRC.

(d) Project manager.

(i) Begins project file.

(ii) Selects methodology to be used for mission analysis. Business systems planning, strategic information planning, and strategic systems planning are methodologies appropriate for this work. If you are 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. Adaptation is reflected in a work plan.

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

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

(vi) Assembles resources for Initiation Phase.

(vii) Performs mission analysis. Includes determination of functional process and data requirements; and determination of operational and economic feasibility of automation. Management analysts, data analysts, and services of a systems analyst are usually required.

(viii) Performs A-76 analysis, and initiates 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 meet IRMRC review requirements.

(5) Project File Documentation.

(a) File maintenance. Materials prepared during the Mission Analysis Stage are placed in a project file. The approved MNS, Project Request, and all ASLC documentation materials are retained for audits, reference, substantiation, explanation, or clarification as part of the project file. This file will be maintained throughout the ASLC, and will be very large by the time the system is operational. The Project Manager is responsible for the orderly storage and cataloging of its contents.

The Application System Life Cycle
Chapter 1

(b) Documents. The following documents will be added to the file during this stage. Chapter 3 of this handbook contains information regarding the document's contents.

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

The Application System Life Cycle
Chapter 1

CONCEPT DEVELOPMENT STAGE RESPONSIBILITY MATRIX

Product/Document	Responsible Functional Manager	User Acceptor	Project Manager	Project Management Committee	ADP Manager
System Objectives	I	R	C	A	I
Application System Architecture		I	R		
Data Architecture		I	R		
Data Communications Architecture		I	R		
System Life Cycle Strategy		C	R		
System Milestone Dates		C	R		
System Life Cycle Resource Estimates		C	R		
Cost/Benefit Analysis (Revised)		C	R		
Mission Need Statement (Revised)	I	C	R	A	I
System Decision Paper 1	I	C	R	A	I

R = Responsible for Product Preparation
C = Concurrence Required
A = Approve
I = Informed (copy)

Exhibit 1-2

The Application System Life Cycle
Chapter 1

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. A general blueprint of the application is prepared in this stage. This blueprint or plan may divide an application into one or more modules, and will be used as the basis for the work of the Development Phase. The architectural planning that is done in this phase are mission, information and location-oriented, not technical ADP 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) Insure 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;

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

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

(f) Revise cost/benefit figures;

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

(h) Document and retain the agreements reached between participating organizations with respect to 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 seeing the activities of this phase are completed.

(ii) Assures that work planning and control is done by a tasking method, and 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 IRMRC.

(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, new members are added.

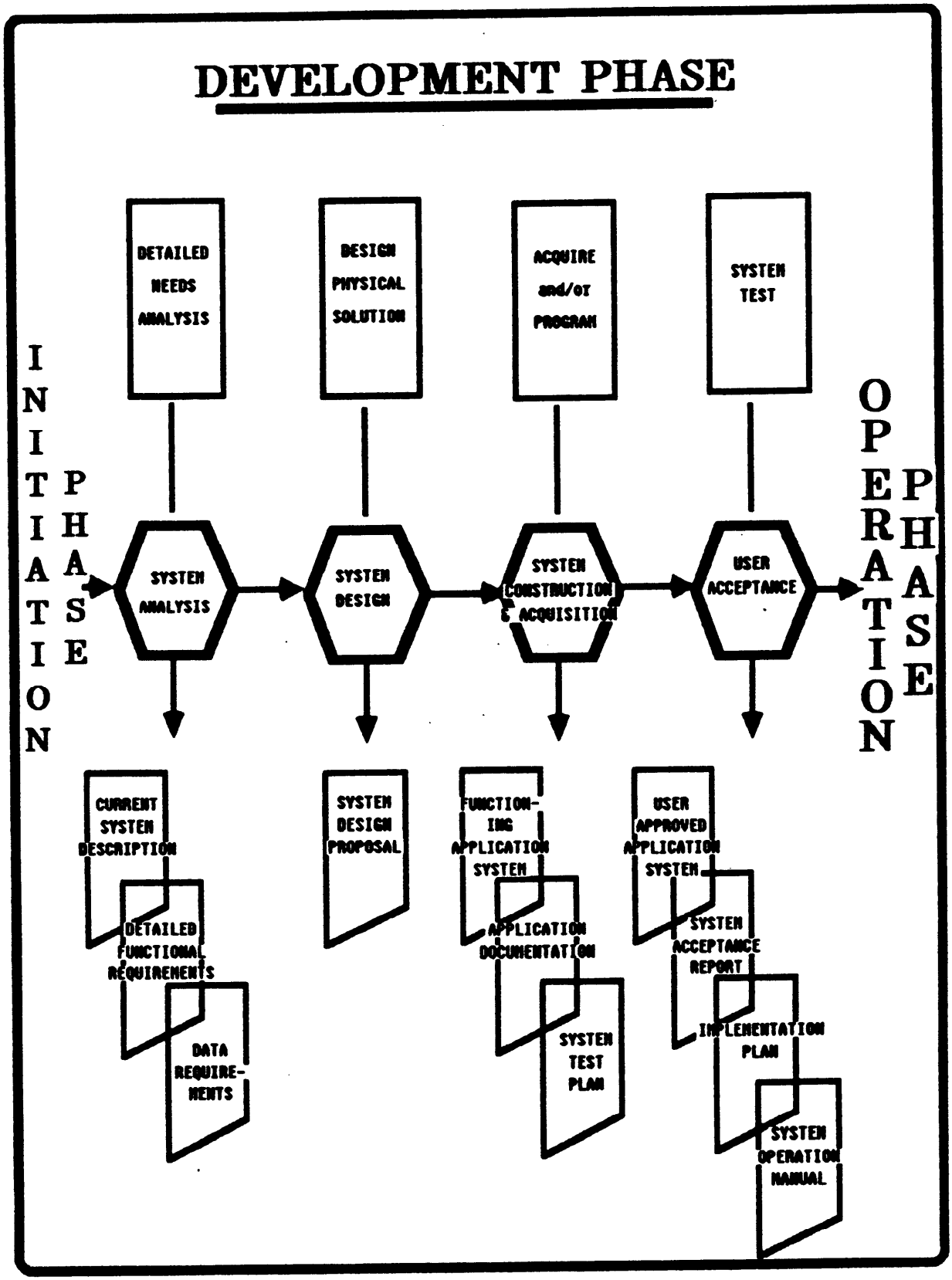
(iv) Obtains written documentation of all inter-organizational agreements required to support the project.

(5) Project File Documentation.

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

(b) Documents. The following documents will be added to the file during this stage. Chapter 3 of this handbook contains information regarding the document's contents.

- o System Objectives
- o System Architecture
- o Data Architecture
- o Data Communications Architecture
- 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


DEVELOPMENT PHASE
INITIATION PHASE
OPERATION PHASE
DETAILED NEEDS ANALYSIS
DESIGN PHYSICAL SOLUTION
ACQUIRE and/or PROGRAM
SYSTEM TEST
SYSTEM ANALYSIS
SYSTEM DESIGN
SYSTEM CONSTRUCTION & ACQUISITION
USER ACCEPTANCE
CURRENT SYSTEM DESCRIPTION
DETAILED FUNCTIONAL REQUIREMENTS
DATA REQUIRE-MENTS
SYSTEM DESIGN PROPOSAL
FUNCTION-ING APPLICATION SYSTEM
APPLICATION DOCUMENTATION
SYSTEM TEST PLAN
USER APPROVED APPLICATION SYSTEM
SYSTEM ACCEPTANCE REPORT
IMPLEMENTATION PLAN
SYSTEM OPERATION MANUAL

The Application System Life Cycle
Chapter 1

SYSTEM ANALYSIS STAGE
RESPONSIBILITY MATRIX

Product/Document	Responsible Functional Manager	User Acceptor	Project Manager	Project Management Committee	ADP Manager
Current System Description		C	R		
Detailed Functional Requirements		C	R		
Data Requirements		C	R		

R = Responsible for Product Preparation
C = Concurrence Required
A = Approve
I = Informed (copy)

Exhibit 1-3

The Application System Life Cycle
Chapter 1

1.2 Development Phase. There are 4 stages in Development Phase, the first being the detailed system analysis.

A. System Analysis Stage. This stage is the first stage in developing or acquiring application software. If a prototyping technique is used to define requirements, the activities listed here will be greatly changed, but the reporting documents will remain much the same.

(1) Purpose. System Analysis Stage is to identify and document a comprehensive analysis of requirements. During the analysis stage the functional requirements are defined in more detail; i.e., system input, functional tasks, and outputs. This process takes place at the functional level, in that the system is described in terms of the detailed functions or tasks to be performed, not in terms of computer programs, files and runstreams. The emphasis of this stage is on determining "what" tasks must be performed, 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; and

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

(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; and

(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.

(i) Analysis of the current system gaining a detailed understanding of the functions performed by the present manual or automated system. Review of information flows; identifying system outputs, interfaces, inputs, stored data, processes, controls, and backup/recovery/security procedures. Compiles a glossary of data definitions and stores them electronically in a data dictionary/directory. Services of a systems analyst and data administrator usually required.

(ii) Develop most of functional system specifications. Definition of system inputs; defines format, type, purpose, use, content, sequence, retention, validation criteria, security and other controls. Defines the "stored data" required by the system; determines the logical structure of the data by identifying entities, attributes and relationships between entities; defines privacy requirements, such as access controls and physical security requirements. Defines the process, both manual and automated, required to produce system outputs from "stored data" and inputs; documents processing logic using narrative descriptions, flow charts and/or decision tables. Defines system outputs; reports, CRT screens,

etc.; identifies format, content, purpose, use, volume, frequency and distribution controls. Services of a systems analyst and data administrator are usually required.

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

(iv) Updates work plan.

(v) Reviews and approves deliverables produced as a result of analysis phase.

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

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

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

(5) Project File Documentation.

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

(b) Documents. The following documents will be added to the file during this stage. Chapter 3 of this handbook contains information regarding the document's contents.

- o Current System Description
- o Detailed Functional Requirements
- o Data Requirements

The Application System Life Cycle
Chapter 1

System Design Stage
Responsibility Matrix

Product	Responsible Functional Manager	User Acceptor	Project Manager	ADP Manager	PMC
Design Proposal		C	R		
Life Cycle Strategy (Revised)		C	R		
Cost/Benefit Analysis (Revised)		C	R		
System Decision Paper 2	I	C	R	A	A

R = Responsible for Product Preparation
C = Concurrence Required
A = Approve
I - Informed (copy)

Exhibit 1-4

The Application System Life Cycle
Chapter 1

B. System Design Stage.

(1) Purpose. The second stage of application development follows System Analysis (or prototyping). Even if an application software package is acquired, much of the work in this staged is needed. Functional specifications are translated into system requirements for software packages, hardware and communications facilities and designs for computer programs, modules, data base(s), intermediate files, and manual controls and procedures. The application software solution is designed for the logical requirements determined in the analysis stage.

(2) Objectives.

(a) Design a system that meets the functional requirements, and

(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; and

(e) Document the design.

(4) Responsibilities.

(a) User acceptor.

(i) Participates in preparing mid-project review.

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

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

The Application System Life Cycle
Chapter 1

(b) Project manager. Directs the following activities.

(i) Development of overall systems design. Updates logical data base design; factors system into a series of subsystems and computer programs, as necessary; definition of purpose, inputs, processes, outputs and execution sequence for programs; definition of logical data base design and define control procedures for data base backup and recovery, file retention, data entry, security features, offline processing and data output. Services of systems analyst, senior programmer, data administrator and data base administrator are usually required.

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

(iii) Identifies edits and internal control requirements to ensure data integrity. Also ensures that an adequate audit trail and audit capability exists 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 testing to ensure that program performs in accordance with external specifications; integrated system testing to ensure that programs interface properly and that required functions are performed; and user acceptance testing to ensure that the user's formal criteria for acceptance are satisfied.

(v) Define internal structure of each program in sufficient detail to enable coding to take place. This step will be minimal if packaged software is being used.

(vi) Updates work plan.

(vii) Reviews and approves deliverables produced as a result of the design stage.

(viii) Prepares a mid-project review report.

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

(5) Project File Documentation.

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

(b) Documents. The following documents will be added to the file during this stage. Chapter 3 of this handbook contains information regarding the document's contents.

- o Design Proposal
- o Detailed Cost/Benefits Analysis
- o Revised Life Cycle Strategy
- o System Decision Paper 2

The Application System Life Cycle
Chapter 1

Construction and Acquisition Stage
Responsibility Matrix

Product	Responsible Functional Manager	User Acceptor	Project Manager	ADP Manager
System Test Plan	-	C	R	C
ADPE Specifications	-	I	R	C
Application Software Documentation	-	I	R	I
Control, Backup & Security Summary		A	R	I

R = Responsible for Product Preparation
C = Concurrence Required
A = Approve
I = Informed (copy)

Exhibit 1-5

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; and

(d) Document the acquisition and development activities.

(4) System Construction Responsibilities.

(a) Project manager. Directs the following activities.

(i) Establishes the techniques and conventions to be followed to promote consistency, uniformity and quality. Ensures that standards are followed.

(ii) Data structures creation and testing.

(iii) Programming and development testing.

(iv) Installation of software packages, security features and establishes communications network.

(v) Performance of technical and unit testing.

The Application System Life Cycle
Chapter 1

(vi) Production of operating instruction manuals.

(vii) System test planning.

(5) Project File Documentation.

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

(b) Documents. The following documents will be added to the file during this stage. Chapter 3 of this handbook contains information regarding the documents' contents.

- o ADPE Specifications
- o Application Software Documentation
- o System Test Plan
- o Control, Backup and Security Summary

The Application System Life Cycle
Chapter 1

User Acceptance Stage
Responsibility Matrix

Product/Document	Responsible Functional Manager	User Acceptor	Project Manager	Project Management Committee	ADP Manager
System Acceptance Report	I	C	R	I	I
Implementation Plan	-	C	R	-	C
Conversion Plan	-	C	R	-	C
User Training Plan	-	R	C	-	-
Post Implementation Review Plan	I	C	R	-	C
Data Processing Manual	-		R	-	C
User Manual	I	C	R	-	-
Operation Manual	-		R	-	C
System Decision Paper 3	I	C	R	A	C

R = Responsible for Product Preparation
C = Concurrence Required
A = Approve
I = Informed (copy)

Exhibit 1-6

The Application System Life Cycle
Chapter 1

D. User Acceptance Stage.

(1) Purpose. Prepare the system for implementation after it is tested thoroughly.

(2) Objectives

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

(b) Complete all required documentation that is not yet done.

(c) Assure future system changes are well managed and documented.

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

(3) Activities

(a) System test. Performed 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 indicates that the functions and data provided by the system meet the users requirements. The user area does not assume system stewardship at this time.

(c) Generate production initiation notice. Nofify 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 data. The notice will include:

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

(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. These procedures will be used after system acceptance. Software control procedures are used 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.

(e) Prepare user training material.

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

(i) Production simulation. Operations personnel, in addition to equipment and vendor software training, will be trained 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, including restart, recovery, and backup. Evaluate the system's capability, emphasizing actual and potential problems, and 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, special conditions, and 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 on the operation of the equipment, operating system, peripheral devices, and non-application software.

(4) Responsibilities.

(a) Project manager is responsible for assuring that all activities in this stage are completed before the system goes to Operation Stage, and that 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.

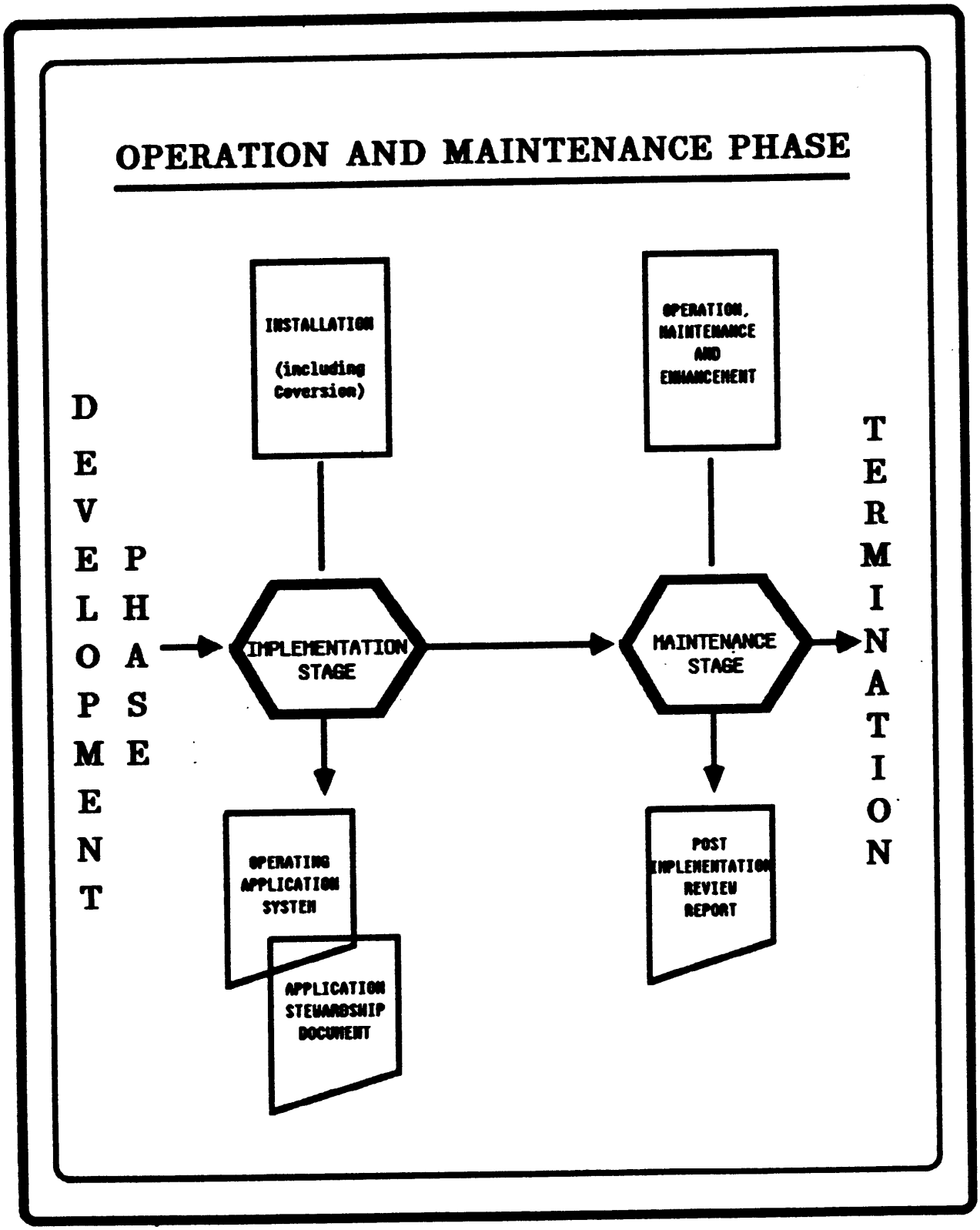
(5) Project File Documentation

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

The Application System Life Cycle
Chapter 1

(b) Documents. The following documents will be added to the file during this stage. Chapter 3 of this handbook contains information regarding the documents' contents.

- 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 Operations Manual
- o System Decision Paper 3


OPERATION AND MAINTENANCE PHASE
DEVELOPMENT PHASE
INSTALLATION
(including Coversion)
OPERATION, MAINTENANCE AND ENHANCEMENT
IMPLEMENTATION STAGE
MAINTENANCE STAGE
TERMINATION
OPERATING APPLICATION SYSTEM
APPLICATION STEWARDSHIP DOCUMENT
POST IMPLEMENTATION REVIEW REPORT

The Application System Life Cycle
Chapter 1

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 accordance with 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

The Application System Life Cycle
Chapter 1

Implementation Stage
Responsibility Matrix

Product/Document	Responsible Functional Manager	User Acceptor	Project Manager	Project Management Committee	ADP Manager	
Application Stewardship Document	A	C	R	A	I	-

R = Responsible for Product Preparation
C = Concurrence Required
A = Approve
I = Informed (coov)

Exhibit 1-7

maintainers.

(b) Project manager.

(i) Ensures that the system operators and maintainers are adequately prepared to perform their work on the system; and

(ii) Initiation of data conversion; and

(iii) Performing operations training; and

(iv) Assisting with user training; and

(v) Installation of the system; and

(vi) Corrects systems problems and documentation as required; and

(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. The following document will be added to the file.

o Application Stewardship Document (See Chapter 3)

The Application System Life Cycle
Chapter 1

Maintenance Stage
Responsibility Matrix

Product/Document	Responsible Functional Manager	User Acceptor	Project Management Committee	ADP Manager
Post Implementation Review Report	C	R	A	I
System Decision Paper 4	C	R	A	I

R = Responsible for Product Preparation
C = Concurrence Required
A = Approve
I = Informed (copy)

Exhibit 1-8

The Application System Life Cycle
Chapter 1

B. Maintenance Stage.

(1) Purpose. Keep the production system operating in accordance with 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; and

(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; and

(d) Maintain and modify the system as necessary, including

(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. 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. Materials prepared during the Maintenance Stage are placed in the project file. The Functional Manager is responsible for the orderly storage and cataloging of its contents.

(b) Documents. The following documents will be added to the file. See Chapter 3 for information about the documents contents.

- o Post Implementation Review Report
- o System Decision Paper 4

(6) Other Documentation. The following documentation does not go in the project file, but is maintained during operation of the system.

(a) Operation and maintenance cost;

(b) Updates for the Departmentwide software inventory;

(c) Hardware performance;

(d) System software performance;

(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; and

(i) Operation manual documentation.

(7) Change Control.

(a) Applicability. All major application systems must use a change control process. The process and the changes made by it must be properly documented.

Changes must be made within the resources budgeted for the operation and maintenance of the system. The operation and maintenance resources requested and allocated are used only for the continued operation of the system and to keep it running as designed. Any major modifications, reconfigurations, or re-developments require an independent ASLC project. The activity must be conducted in accordance with 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. These emergency changes, however, are reviewed before they are made permanent.

(c) System access security. The application system software is to be secured from access except by the individuals assigned the responsibility for control of the production software. These individuals are responsible for ensuring that system and applications being installed in production libraries. The production system passwords will be restricted to a very few, and changed 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 application system software access. Development and testing will not be done with production programs and files, and only the personnel responsible for configuration management will install system changes. A clear, verifiable audit trail of all production library changes must be maintained.

(d) Version releases. If a large number of changes are needed, they are to be logically grouped, analyzed, made in a change library, and then tested in a system test environment. They are to be installed by a schedule, and all affected organizations are to know the changes being made in advance so that comments and adjustments can be made. The logically grouped changes will be assigned change version numbers.

(e) Unscheduled changes. When changes must be made for an emergency or to meet interface schedules, the immediacy or timing of these changes may prevent their being part of a version release. However, these changes should be documented separately and included in the system test of the next version release to ensure that they properly interface with the rest of the system. Emergency changes will be installed in a separate physical Library, and will not be moved into a production library until they have been system tested and accepted.

(8) The Post Implementation Review.

(a) General. An initial review audit will be conducted at a date agreed upon by the functional management and ADP management after the system is operational. Each system will be reviewed periodically to determine if functional requirements are being met 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 cost/benefits done earlier in light of this information.

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

(v) Insure that documentation is easily understood and facilitates system/program use, maintenance and auditing. Data documentation is to be automated and kept up-to-date.

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

(vii) Audit to see if the system is being operated in accordance with current system procedures.

(c) Post implementation review report. The post implementation review report should be an evaluation addressing each of the above areas and should be submitted to the Project Management Committee with an information copy to the Executive Director of the Information Resources Management Council.

(d) Corrective actions. Within 20 work days after the post implementation review, the team responsible for the application system maintenance will submit to the Project Management Committee a plan that addresses actions that will be taken to remedy any ADP related problems revealed by the review. It will include the time frames by which each problem will be corrected. Corrective actions will be taken based on a priority agreed upon by the user and ADP after the cost/benefit of the corrections have been identified.

C. Application Systems Changes and Termination.

(1) Application System Changes. Much of the Maintenance Stage involves a repetition (recycling) of prior ASLC phases and stages. The ADP and the Responsible Functional Manager must

determine which portions of the ASLC should be repeated in a particular instance. 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.

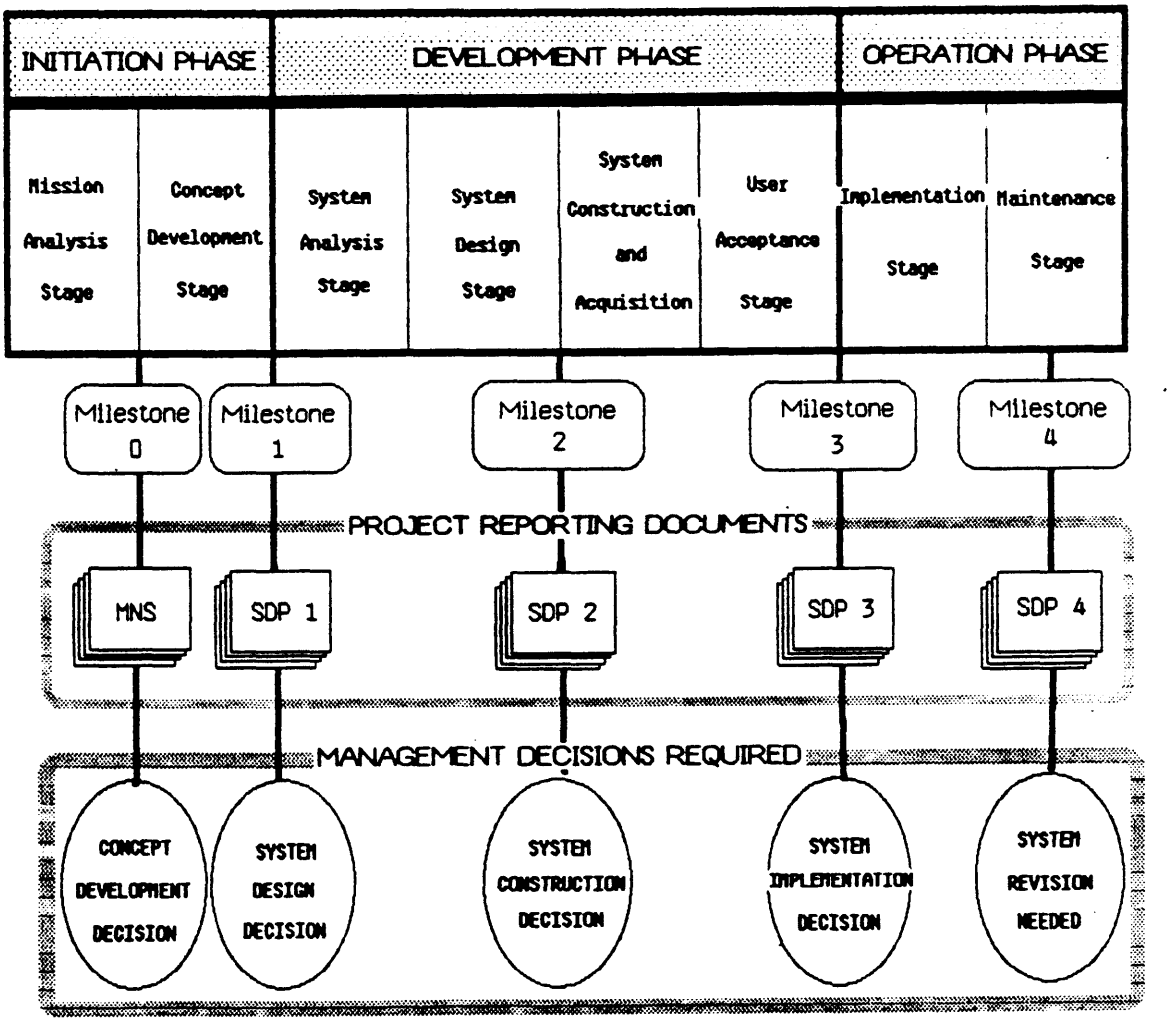
(c) Modification. From Initiation Phase through Implementation Stage.

(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 assure that all Project File information is cataloged and stored, so that it can be accessed in the future. The ADP Manager responsible for operating the application will assure that all technical documentation, program source code, job control language, and archived data files are retained pursuant to the written instructions of the Responsible Functional Manager. The technical information will be stored until written instructions are received from the Responsible Functional Manager.

CHAPTER 2

PROJECT MANAGEMENT, REPORTING AND CONTROL



Project Management, Reporting and Control
Chapter 2

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

A. Application Planning Team. This team will be formed to complete the activities listed as part of the Initiation Phase. Team members will be from the functional area sponsoring the automation project, since the work to be done in this phase focuses upon the functional area's business needs. A member of the functional area's management should be Project Manager for the planning team. This same person should be considered 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 should be 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. A project charter should be developed prior to the establishment of an application planning team. This charter serves as a written understanding between the Project Manager and the Project Management Committee. Another charter is prepared for the ADP development project. This charter is developed 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, the lines of authority and accountability are clearly identified. 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, it will be necessary to review the organization and determine as accurately as possible the specific skills and quantities of staff that will be needed and corresponding dates they should be on board 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 there. The recruitment effort should center on

acquiring staff from within the agency. Employees assigned to the project team should, at the minimum, be ensured of future placement in a comparable position and grade they held prior to their selection. If recruitment proves to be a problem, then staff may be recruited 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; i.e., it has 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, ensuring that written tasks exist for all work, and that measurement criteria exist that define what constitutes acceptable performance with respect to each task. Ideally, performance standards should be developed for each team member.

(4) Performance of 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 handbook.

D. Project Management Committee (PMC). The concept of a Project Management Committee stems from the need to secure executive management involvement, representing 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 and 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 will conduct milestone reviews of the project. The Project Management Committee may choose to exercise more rigorous control of the largest, most critical projects. The committee will be formed when the application planning team is formed, and will continue to have executive responsibility until the post-implementation review is completed. 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. The establishment of a User Acceptor is an organizational strategy for obtaining user participation. A User Acceptor is an individual appointed at the time a system development effort is initiated. The individual is to monitor and coordinate, from the user perspective, 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; and

(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. The establishment of 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, the schedule will be used 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 generally easier to make more accurate estimates of smaller work units, the bottom-up approaches are generally more accurate than the top-down. The most common bottom-up approaches are:

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

(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. This is strongly recommended for major application projects.

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

(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 to be performed should develop their own estimates and provide these estimates to the project manager. In this way they will feel a greater sense of responsibility for holding close to their estimates during execution.

(2) Project Tasking. Identifying the tasks to be performed by the team should be accomplished prior to attempting to estimate. Depending on the stage in the development process for which the estimate is being prepared, the identification of tasks may be accomplished by extraction and refinement of larger units of work. A definitive list of tasks to be estimated is a prerequisite to estimating the cost of a stage. 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. Once the tasks for a stage have been identified and documented, the amount of time for each task will be estimated. This job should be done 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 intitial staffing projections throughout the life cycle. Accurate estimates are most likely when the estimated time required to complete a specific task is reviewed with the person/s actually doing the work. As the project advances through the life cycle, this method of time estimate reviews is likely to result in increasingly accurate estimates. These reviews should be scheduled by the Project Manager as tasks are produced.

2.3 Project Reporting Requirements.

Both types of project teams, planning and ADP development, will provide reports to designated authorities at each of the project milestones. The Project Manager will keep a copy of all milestone reports and the decisions of responsible authorities, and assure 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) The MNS is the reporting document upon which the Milestone 0 decision is based. It identifies and defines:

- o A specific need within a mission area.
- o The relative priority of the need within the mission area.
- o The factor(s) causing the need.
- o The date when the need must be

addressed or new capability must be implemented.

- o The general magnitude of resources which the functional sponsor is required to invest to fill the need.
- o The effect upon mission performance if no action is taken.

(ii) A MNS is required for each projected major application system (AS).

(iii) The need identified in a MNS is defined as narrowly as possible using terms used in the functional areas with the need. Though the scope of the need identified in the MNS is narrowly defined, solutions to the problem are not specified. Alternative concepts and associated risks are evaluated during the Concept Development Phase prior to Milestone 1.

(c) Procedures.

(i) Preparer. The MNS should be prepared by the Application Planning Team's project manager. The MNS should be written in functional terms, without any attempt use ADP terms or to specify ADP solutions.

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

(iii) Approval. The MNS is approved by the Project Management Committee. The Project Management Committee will validate the need and certify the intent to provide program funding prior to each milestone decision. The Project Manager will coordinate review of the MNS by the IRMRC.

(iv) Duplication. The User Acceptor, responsible functional manager and the Project Management Committee should review the MNS to determine if other similar AS's are in existence which could satisfy the user's

requirements. A copy of each approved MNS will be forwarded to the IRMRC for their review.

(v) Priority. The responsible functional manager should specify 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) Cost/Benefit 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 prior to System Analysis Stage.

(1) Reporting Process. A system decision paper (SDP) will be prepared and reviewed 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. All changes will be approved by the Project Management Committee along with the recertification of intent to program funds and revalidation of 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. SDP1 is a management summary of the project, as well as a decision paper for

Milestone 1 decisions. It references each of the detailed documents prepared and clearly defines management issues and recommends solutions. Conflicting viewpoints are summarized and documented. Documentation of management decisions occurring during the course of the project life should be kept with SDP1 in the project file.

(c) Procedures. SDP1 is prepared, coordinated, and submitted by the Project Manager 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 so that questions and/or concerns can be resolved prior to 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 SDP 1.

(a) System architecture.

(b) Cost/benefit analysis.

(c) Life cycle strategy.

(d) Data communications architecture.

(e) Data architecture.

(f) Revised MNS.

Project Management, Reporting and Control
Chapter 2

C. Milestone 2 Reporting. Milestone 2 occurs after the System Design Stage and before the System Construction and Acquisition Stage. The ADP project team is responsible for meeting these reporting requirements.

(1) Reporting Process. SDP2 will be prepared and reviewed with the Project Management Committee. The continued validity of the MNS which was the basis for initiating the project will be addressed 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. All changes will be approved by Project Management Committee, along with the recertification of intent to program funds and revalidation of 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, re-entering the life cycle process beginning with the mission analysis/project initiation must be considered.

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

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

(b) Procedures. SDP2 is prepared, coordinated, and submitted by the Project Manager 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 so that questions and/or concerns can be resolved prior to the formal review.

(ii) Updating. When updating prior SDPs, if changes have not occurred under certain entries, 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) Cost/benefit 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 project team is responsible for meeting these reporting requirements.

(1) Reporting Process. A system decision paper will be prepared and reviewed with the Project Management Committee. The MNS should be reviewed to assure its continued validity, and the results of this review recorded in the "Overview" section of the SDP. The committee will decide 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 that they can decide whether or not to proceed with system implementation.

(b) Procedures. SDP3 is prepared, coordinated, and submitted by the Project Manager 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 so that questions and/or concerns can be resolved prior to the formal review.

(ii) Updating. When updating SDPs, if changes have not occurred under

certain entries, submit the prior SDP and mark "no change as of ____."

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

(iv) Length.

- o 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) Cost/benefit 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. A system decision paper will be prepared and reviewed with the Project Management Committee. A post-implementation review will be conducted, and the results reported at the same time.

(2) System Decision Paper 4 Preparation.

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

(b) Procedures. SDP4 is prepared, coordinated, and submitted by the User Acceptor 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 so that questions and/or concerns can be resolved prior to the formal review cycle.

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

(iii) Briefing. The User Acceptor will brief 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 is an important contributor 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 will review the reports of the Project Manager at each milestone and make 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 to be used by the PMC. See Section 2.2.D of this chapter for more information about the PMC.

B. IRMRC. This departmental executive committee has been

convened by the Under Secretary. Composed of the Under Secretary and representatives of the Bureaus, 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 considered, the IRMRC Executive Director (Director, PIR) will be advised in writing by the responsible functional manager. The Executive Director will inform the functional manager of the reporting requirements of the IRMRC.

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 intended as a guide to help Project Managers and others prepare for milestone review activities. The checklist is not all inclusive; it lists typical criteria that have been applied in the past and that 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) Existing constraints that affect the ability of the agency to meet the mission need have been clearly identified and described.

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

(5) The schedule proposed is achievable.

(6) A proven mission analysis methodology is being used.

B. Milestone 1.

(1) The mission need is reaffirmed to be essential.

(2) A Project Manager has been appointed and chartered, and necessary staffing approved.

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

(4) The functional objectives have been prioritized.

(5) The general mission functional requirements, including security requirements, have been developed and validated.

(6) The reasonable alternatives were considered.

(7) The projected resource investment for the selected alternatives has been estimated and is consistent with the stated constraints.

(8) Use of available and existing automated systems has been adequately considered.

(9) System consolidation considerations have been adequately treated in the planning.

(10) Standardization and interoperability requirements have been adequately considered.

(11) Risks and problem areas have been identified and adequately treated in the planning.

(12) Strategies to facilitate the transition from the current functional system, whether automated or not, to any of the alternative systems to be explored have been described.

(13) A life cycle strategy has been completed.

(14) Areas involving new technology, unstable requirements, and fund availability have been identified and assessed.

(15) A cost/benefit analysis has been prepared.

(16) System, data and data communications architectures have been prepared.

C. Milestone 2.

(1) The mission need is reaffirmed.

(2) The functional system design has been validated and the baseline for the functional system has been established.

(3) The data base design has been validated and documented in a data dictionary/directory system.

(4) Specifications for hardware, software, firmware,

and data base have been developed.

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

(6) Risk analysis to reflect that total system development has been reassessed.

(7) The cost/benefit analysis has been updated.

(8) Acquisition plans to obtain the required ADPE and other resources are finalized.

(9) Planned computer resources will 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) Trade-off between hardware, software, firmware and manual procedures have been made.

(13) If parallel development efforts will be used, control mechanisms are established.

(14) Contractor versus Government development issues have been resolved.

(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 elements of the project and supports the achievement of project goals and objectives.

(21) Interfaces with other systems have been adequately identified and defined.

D. Milestone 3.

(1) The mission need is reaffirmed.

(2) Computer programs and data bases have been fully developed, documented and tested.

(3) Standardization and interoperability requirements have been satisfied.

(4) System support documentation has been developed. 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) Change control procedures for use after implementation are complete, 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) The cost benefit analysis has been updated.

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

(11) Trade-offs have been made to balance cost, schedule and performance effectively.

(12) The acquisition strategy has been updated and is being executed.

(13) The end products of development are controlled as

configured items.

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

(15) Issues concerning delivery, quality assurance and facilities are identified and satisfactorily resolved.

(16) The project management structure and plan are sound and adequately supported.

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

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

(19) Maintenance support facilities are ready for operation.

(20) Plans for anticipated system improvements have been established.

(21) ADPE acquisition is on schedule.

E. Milestone 4.

(1) The mission need is reaffirmed.

(2) All changes to the system are accounted for in the change control system, and computer program and data documentation are being kept up-to-date.

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

(4) The Cost/Benefit Analysis is updated.

(5) System is essential to the function supported.

(6) The system's operation is adequately funded.

(7) System security measures are effective.

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

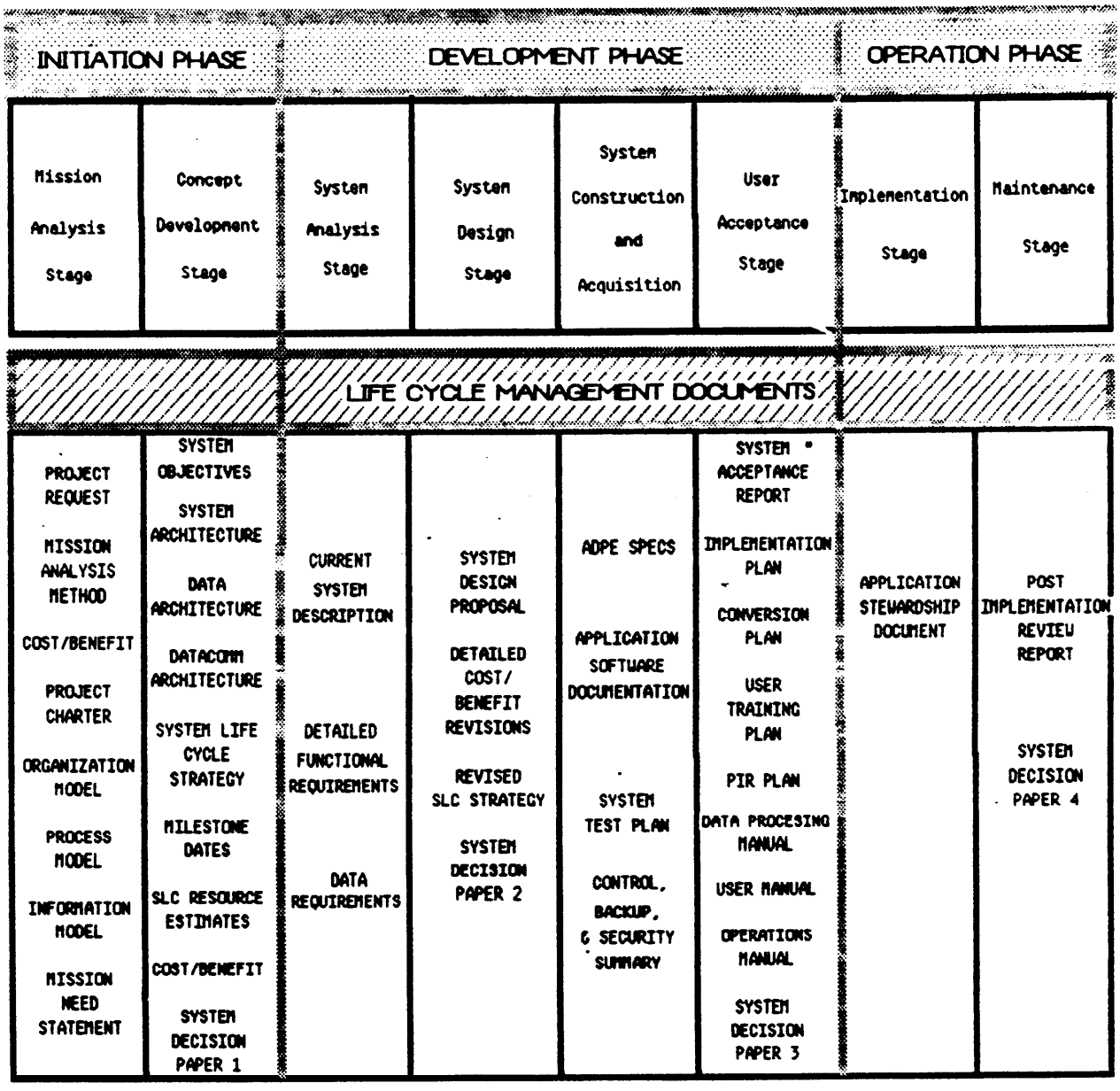
(9) ADPE is not saturated, or plans for eliminating saturations have been developed.

(10) The Application Stewardship Document has been signed by the responsible functional manager, 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.

CHAPTER 3

APPLICATION SYSTEMS LIFE CYCLE MANAGEMENT DOCUMENTS



* SYSTEM ACCEPTANCE REFERS TO FUNCTIONALITY AND DATA ACCEPTABILITY, NOT SYSTEM STEWARDSHIP.

Application Systems Life Cycle Management Documents
Chapter 3

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. These documents are marked with an asterisk (*) below. **Documents without an asterisk beside them should be produced with the prescribed title and information.**

A. Initiation Phase Documents.

Project Request
Mission Analysis Methodology
Cost/Benefit Analysis
Project Charter
Organization Model
Mission Process Model
Information Model
Mission Need Statement
* System Objectives
* Application System Architecture
* Data Architecture
* Data Communications Architecture
System Life Cycle Strategy
System Milestone Dates
System Life Cycle Resources Estimates
Revised Cost/Benefit Analysis
Revised Mission Need Statement
System Decision Paper 1

B. Development Phase Documents

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

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System Decision Paper 3

C. **Operation and Maintenance Phase Documents.**

Application Stewardship Document
Post Implementation Review Report
System Decision Paper 4

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3.1 Initiation Phase Documents.

A. Initiation Stage Documents.

(1) **Project Request**. This document is prepared by the functional manager who is initiating the request for an automated system. 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) **Cost/Benefit Analysis**. The initial cost/benefit analysis is a valuable tool when deciding whether the costs of Concept Development Stage are justified. Since it is limited to quantifiables, it should not be over-emphasized in developing a recommendation at this stage.

(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. Intangible benefits must be evaluated 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.

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(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 to be considered;

(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; and

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(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; and

(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 a broad area is described, the application system may be divided 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 how data should be organized for maximum accessibility to mission processes. A well done 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 your preferred life cycle strategy. It will describe what data is needed at each location to be 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 Circulars 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; and

(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 the strategy should be pursued 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, identifiable alternatives must be evaluated. 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 they can be met and incorporated 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) **Cost/Benefit**. Revise the figures done 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 the 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 and show the rationale for their rejection or tell how they were resolved.

(j) Approvals. Identify what guidance is needed from the responsible authorities and what specific approvals are being requested relative to the SDP. Express in terms consistent with permission to proceed to the next milestone and AS development /modification/revision approval, ADP equipement 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. A data dictionary/directory containing the data in the current system will be created. 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; personnel responsibility; backup, restart and recovery capability; calculations and manipulations; and equipment used. Provide processing and/or hierarchical charts. Describe both manual and those 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 so. 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. This information should be derived from the objectives listed during concept development stage.

(b) System functional description. Identify and briefly describe each major functional entity that is 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. All I/O requirements must be sufficiently defined 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, I/O requirements are developed 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 functinal 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 about which data will be 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 will constitute "official records."

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(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 still 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 it may be recognized, without a detailed evaluation, that some proposals are not feasible. 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.

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(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 of functional separations.

(ix) Sensitivity. Ability of the system to respond to changes in volume, interface, workload mix, 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 required changes to current equipment.

(iii) Software. Describe new software requirements and needed 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, and if contract support is used, the contract award is recommended. 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 the design proposal is approved, 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.

- o 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 why each alternative was rejected.

(2) **Detailed Cost/Benefit Analysis.** The detailed cost/benefit 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 system.

- 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.

- 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.

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

- o 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).

- o 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.

- o 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.

- o Maintenance and lease of ADP equipment. The savings for on going lease and/or maintenance contracts for ADP equipment.
- o Communications maintenance. The savings on rental, lease or maintenance of data communications equipment, services, and facilities.
- o 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; and
- 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 cost. 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.

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(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.

Intangible benefits must also be evaluated to decide whether the proposed system should be developed.

(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 which must be performed in order to reach each milestone in the system life. Include identification of organizational and individual responsibilities for the tasks or portions of them.

(d) Resource requirements. Estimate the resources required to perform each task. The resource utilization should be auditable at the milestone level and 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. An automated scheduling system should be used.

(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 them.

(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 cost/benefit 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 the Interior 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 and briefly synopsize your course of action if the selected alternative fails.

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(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 is 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 cost/benefit 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 tell how they were resolved.

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 test, 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 test that are not part of the system being tested.

(ii) Software. Identify the software that is 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 to be used, 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, and 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; and

(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 test.

(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. Acceptance planning will be based on satisfaction of functional and data requirements. Specific files and values will be determined when the test data design is completed. The detailed validation process can be finalized when the system specifications are complete. 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. Results of all on-line transaction types and batch runs will be validated.

(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,

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(xi) Data access methods and procedures;

(xii) Backup/recovery;

(xiii) Downtime tolerances;

(xiv) Maintenance response time and contingencies; and

(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; and

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(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 it to be used by auditors, system maintenance staff and functional managers.

(b) System and subsystem specifications. Divide the tasks into separate entities to facilitate preparing programing 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 entitites 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 they are to be 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 that are a result

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.

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(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. The input and output record layouts, file names and definitions, program names, and processing algorithms will be coordinated 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 programer should need no additional information to develop the code.

(i) Identification. Give the program name and project for which it will be used. Give the language to be 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; and
- Transmission.

o Validation. Describe the data validation requirements imposed on the program.

o Timing. Describe the timing requirements imposed on the program, such as:

- Response time;
- Update processing time;
- Data transfer and transmission time; and
- 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; and
- 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); and
- 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.

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- 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; and
  - Security and privacy conditions.
- o Program logic. Describe the program logic. The flow should be presented in graphic form (hierarchical logic charts, Chapin charts, flowcharts, decision logic tables, etc.),

and 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; and
  - 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.

Test data for each program and a comprehensive test data base are required. Program test data may be furnished by the user, developed by the programer, or extracted from the system test data library, depending upon which is most practical. The user should design and create system test data. The items listed should be addressed 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 that was 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, a data dictionary will be prepared. 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 is 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.

Application Systems Life Cycle Management Documents
Chapter 3

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 is 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 the test is performed. 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, separate acceptance reports should be used 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.

- o 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. Tests for stress and efficiency should be made 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 is 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. It also, by using the test data base or other validation data, 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. Test data may be developed or program/system test data files may be used. 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. No development activities are to be performed after the system test is approved. Before the system test is conducted the development test, hardware and software acceptance, and data base validation must be completed.

(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, the system test is to be conducted by an independent team 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; this will be used 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. System test data is designed to generate sequences and output values to be compared 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. Materials required by the acceptance plan will be reviewed and accepted, or correction action recommended.

(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. All discrepancies are to be listed, 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 be followed.

(a) Implementation strategy. Based on the acquisition strategy, the current system (if one exists), and the project plan, decide: if implementation will be phased; if 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 shows 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 to it.

(d) Hardware and data communications. List hardware and data communications that will

still be used and specify what effect the conversion will have on it.

(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 types 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 postimplementation reviews.

(b) A post implementation review will be conducted within 6 to 12 months following system installation to ensure that the system functions as designed.

(c) Subsequent reviews will be conducted 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 organization and format of the DPM will be decided by the project leader, and will meet all applicable FIPS, Departmental and Bureau standards. The substitution of automated documentation in place of paper documentation is encouraged. The DPM will included 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;

(j) Applications software listings;

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

(l) Post implementation review plan; and

(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:

- o Purpose of the software;
- o Capabilities and operating improvements; and

(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:

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

(vi) Data base. Describe data files that are 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/directory.

(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:

- o Conditions (e.g., personnel transfer, out-of-stock);

- o Frequency (e.g., periodically, randomly, as a function of an operational situation);
- o Origin (e.g., personnel section, inventory control);
- o Medium (e.g., keyboard, punched card, magnetic or paper tape);
- o Restrictions (e.g., priority and security handling, limitations on files that may be accessed by this type of transaction);
- o Quality control (e.g., instructions for checking reasonableness of input data, action to be taken when data appears to be in error, documentation of errors);
- o Disposition (e.g., instructions necessary for retention or release of all data files received, other recipients of the inputs); and
- o Format (e.g., input forms and instructions for preparation).

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

- o Use (by whom and for what purpose);
- o Frequency (e.g., weekly, periodically, on demand);
- o Variations (modifications that are available to the basic output);
- o Destination (e.g., computer area, remote terminal);
- o Medium (e.g., printout, CRT, type, cards);

- o Quality control (e.g., instructions for identification, reasonableness checks, editing and error correction);
- o Disposition (e.g., instructions for retention, release, distribution, transmission, priority, and security handling); and
- o 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.

Application Systems Life Cycle Management Documents
Chapter 3

(b) Overview.

(i) Software organization. Provide a diagram of the inputs, outputs, data files, and sequency 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 volumns, types, and input media.

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

- o Control inputs. List the run stream control statements.
- o 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.

o Input/output files. Provide information for files created or updated by the run, such as:

- File name or label;
- Recording medium;
- Retention schedule; and
- Disposition of file.

o Output reports. For each output report provide information such as:

- Report identification;
- Medium;
- Volume of report;
- Number of copies; and
- Distribution.

o 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; and
- 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; and

(ii) Procedures for turnover to maintenance programers.

(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, re-entering the life cycle process beginning with mission analysis/project initiation must be considered. 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 changes should be made. Summarize any changes made to functional requirements or system design. Significant changes in costs, benefits, savings, and risks from previous milestones should be presented. Provide an updated cost/benefit 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) Aquisition 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 of facility 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 may 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 their rejection or how they were resolved.

(r) Approvals. Identify what guidance is 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. The person responsible for system stewardship will be identified in this document, as will the system's

custodian.

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) Cost-benefit 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. The system should also be evaluated 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.

A PROJECT MANAGER'S GUIDE TO APPLICATION

SYSTEMS LIFE CYCLE MANAGEMENT

APPENDIX 1

DEPARTMENTAL MANUAL PART 376 DM 10

DEPARTMENT OF THE INTERIOR

DEPARTMENTAL MANUAL

10.1 Purpose. This chapter defines policies and responsibilities for the Life Cycle Management (LCM) of major ADP information system projects in the Department of the Interior.

10.2 General.

A. The constantly increasing complexity of ADP information systems with corresponding increases in resource expenditures requires the establishment of standards to ensure that major ADP information systems are developed, acquired, evaluated and operated in an efficient manner, within prescribed budget and schedule constraints, and are responsive to mission requirements.

B. Accordingly, the LCM process has been established to ensure that adequate management and control mechanisms are followed during major ADP information system projects.

10.3 Scope. This chapter applies to all bureaus and offices in the Department of the Interior. It also applies to commercial contractors, universities, other government agencies, etc. who provide information system support services to the Department.

10.4 Definitions.

A. ADP Information System. An organized combination of human resources, ADP equipment, software, and established methods and procedures designed to collect, process and/or communicate data or information for the purposes of supporting management, administration, or other organization mission or program requirements.

B. Major ADP Information System. An automated system that requires special continuing management attention because of its extreme importance to an agency mission; its high development, operation or maintenance costs; or its significant impact on administration of agency programs, finances, property, or other resources. A more precise definition can be found in Appendix 1.

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C. Life Cycle Management (LCM). The process for administering an ADP information system from the identification of a need through its replacement or termination. This process emphasizes strengthening early decisions which shape the system's cost and utility.

D. ADP Information System Life Cycle. The time span between the establishment of a need for a system and the end of its operational use. Overall, the system life cycle is divided into a discrete number of phases with formal milestones placed between and during each phase.

E. Phase. A distinct interval in the life cycle of an ADP information system, characterized by the type of activity performed and the specific end products produced. System life cycle phases and activities are described in Appendix 2.

10.5 Objectives. The objectives of ADP system LCM in the Department are to:

A. Provide a structured mechanism for managing and controlling major ADP information system projects.

B. Ensure proper and responsive communications among system users, managers, Departmental senior management, and data processing and IRM personnel.

C. Ensure direct management accountability and responsibility for the performance and effective control of major ADP information system projects.

D. Provide close and continued management involvement in all phases of major ADP information system projects.

E. Ensure that proper project management and reporting practices are employed during the conduct of major ADP information system projects.

10.6 Policy.

A. All Department of the Interior organizations will utilize a life cycle management approach to planning, developing, acquiring and using ADP information systems.

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B. Major ADP information system projects and their goals and priorities shall be clearly defined in the Department's ADP and Telecommunications Five Year Acquisition Plan, as described in 306 DM 4.

10.7 Responsibilities.

A. Information Resources Management Review Council (IRMRC). The IRMRC has responsibility for:

(1) Recommending to the Under Secretary bureau/office requests for initiation of new development or upgrades of major ADP information systems.

(2) Providing Departmental leadership and guidance during the life cycle of all major ADP information system projects.

(3) Reviewing the most significant milestone events and products during the life cycle of major ADP information system projects.

B. Office of Information Resources Management (PIR). The Director, PIR, has responsibility for:

(1) Developing and maintaining Departmental policy and Departmental LCM Handbooks establishing the minimum acceptable LCM standards applicable to major ADP information system projects.

(2) Exercising oversight concerning LCM policy implementation in bureaus and offices.

(3) Submitting to the IRMRC, bureau/office requests for major ADP information system projects, together with recommended alternatives and/or decisions.

(4) Interpreting Federal and Departmental policies relating to LCM.

(5) Coordinating the development and implementation of Departmentwide ADP information systems.

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C. Assistant Secretaries. Each Assistant Secretary is responsible for:

(1) Ensuring that the LCM concept and requirements described in this chapter and in the Departmental LCM Handbooks, such as the Application Systems Life Cycle Management Handbook, are applied to all major ADP information system projects.

(2) Ensuring that major ADP information system projects and their goals and priorities are clearly defined in the Department's ADP and Telecommunications Five Year Acquisition Plan, as described in 306 DM 4.

D. Heads of Bureaus. Heads of bureaus are responsible for:

(1) Ensuring that the LCM process is applied to all major ADP system projects within their respective bureaus.

(2) Designating officials within user organizations to be responsible for management and control of specific major ADP information system projects.

(3) Applying the LCM process to all ADP system projects to the maximum extent practical.

10.8 Authority.

A. Office of Management and Budget Circulars (A-11, A-76, A-94, A-123, and A-127).

B. Federal Acquisition Regulations (FAR).

C. Federal Information Resources Management Regulations (FIRMR).

D. Federal Information Processing Standards Publications (FIPS PUB 38, 64 and FIPS PUB 101).

E. 44 U.S.C. chapters 21, 29, 31 and 33 (Records Management).

F. Departmental Manual 306 DM 4, 365 DM 1, 375 DM, 380 DM 1 and 403 DM .

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10.9 LCM Handbooks.

A. The LCM Handbooks (Departmental Manual Handbooks), one of which is the Application Systems LCM Handbook, contain recommended procedures for implementing the LCM process. Copies are available through the normal source of supply used to obtain Departmental Manual Releases.

B. The Director, Office of Information Resources Management, issues, amends, or revises the Departmental LCM Handbooks.

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Major ADP Information System - Definition

An automated system exhibiting one or more of the characteristics listed below and requiring special on-going Departmental management attention:

1. Directly affects the agency's ability to meet a critical agency or national mission.

2. Involves a significant investment including personnel costs, relating to development, operation and/or maintenance. In this context, high development, operating or maintenance cost means either: (1) the cost of initial development from conception up to implementation exceeds $1 million dollars, or (2) the cost of operating and maintaining the system in any year exceeds $500,000, or (3) total life cycle costs exceed $10 million dollars.

3. Directly affects national security, or the security and safety of financial resources, people, or other valuable property or assets.

4. Directly affects the performance of shared agency resources, such as central computer systems and communication networks.

5. Is a Departmentwide standard system.

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Information Systems Life Cycle

There are three phases in the systems life cycle:

1. Initiation Phase

   During the initiation phase, a preliminary determination of mission needs is performed and prospective strategies for meeting these needs are identified.

2. Development Phase

   During the development phase, the system's functional requirements are specified, the system is designed to meet the specifications, and constructed/acquired and tested.

3. Operation Phase

   During the operation phase, the system is implemented, maintained, evaluated, and modified as additional requirements arise.

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A PROJECT MANAGER'S GUIDE TO APPLICATION

SYSTEMS LIFE CYCLE MANAGEMENT

APPENDIX 2

UNITED STATES

DEPARTMENT OF THE INTERIOR

APPLICATION SYSTEMS LIFE CYCLE MANAGEMENT DEPARTMENTAL MANUAL HANDBOOK

(376 DM 10)

OFFICE OF THE SECRETARY

Washington, D.C. 20240

DEPARTMENT OF THE INTERIOR

DEPARTMENTAL MANUAL

APPLICATION SYSTEMS LIFE CYCLE MANAGEMENT HANDBOOK
(376 DM 10)

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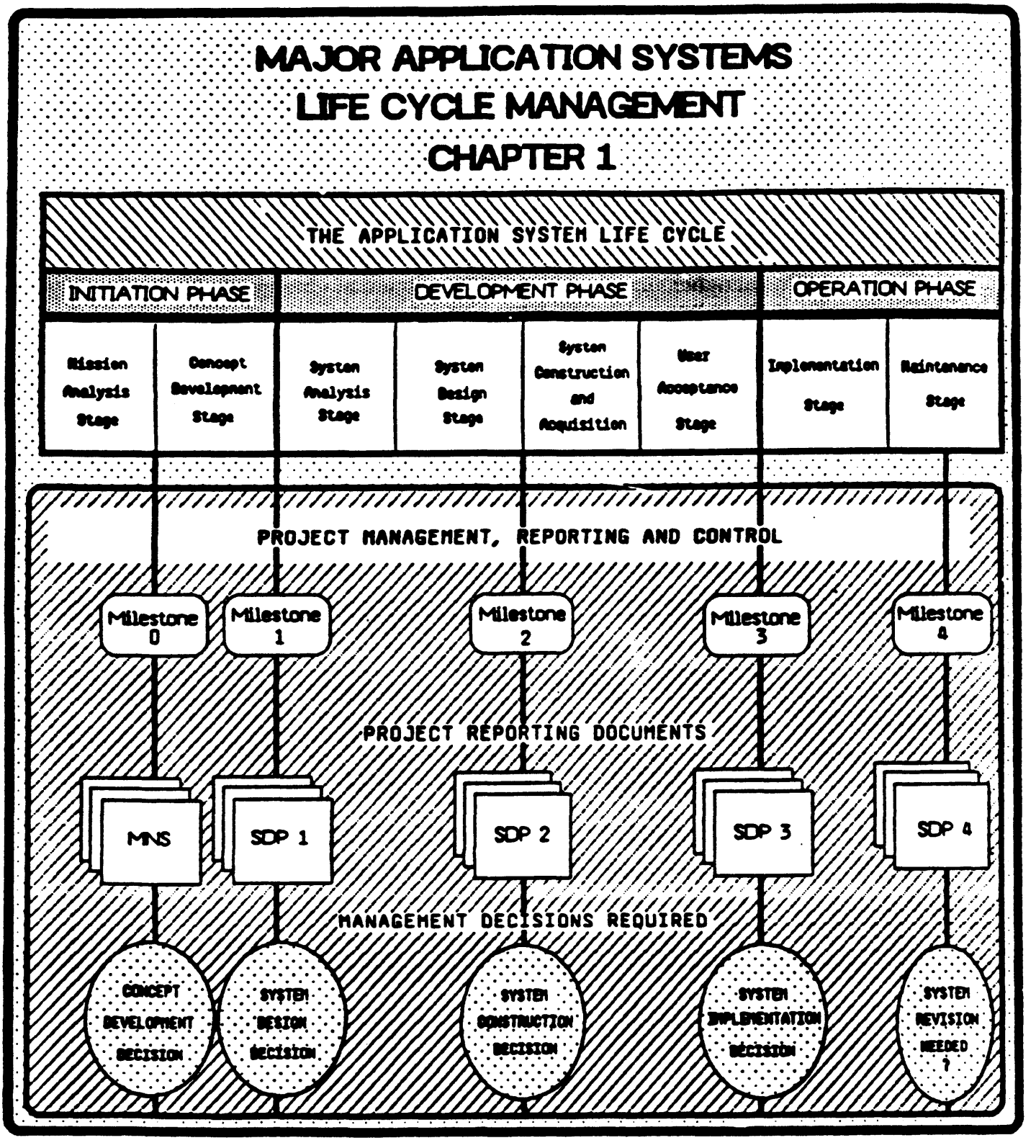

MNS = Mission Need Statement

SDP = System Decision Paper

Exhibit 1-1

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1.1 Purpose. This Application Systems Life Cycle Management Handbook describes the Department's management process for the design, development, implementation, and operation of new major application systems.

1.2 Objectives. This handbook has six objectives.

A. Establish a framework for managing the life of major application systems.

B. Establish control mechanisms to ensure that application systems are developed, acquired, evaluated, and operated in an effective manner and at the lowest total overall costs.

C. Ensure that an application system (AS) is responsive to user needs by requiring user participation in and approval of all phases of the life cycle.

D. Identify individual roles and responsibilities throughout the life cycle and ensure management accountability for the success or failure of application system actions.

E. Provide visibility of all resource requirements related to an application system for its entire life cycle.

F. Avoid the development of unneeded systems by ensuring mission analysis is done before a major ADP development project is authorized.

1.3 Applicability. The standards set out in this handbook apply to all major application systems development, acquisition and major enhancements in the Department of the Interior. These standards are not intended to be applied retroactively to applications already under development. A major application system can be identified by answering the following questions in a yes-or-no manner with regard to the application system project that is being considered:

A. Does the proposed system directly affect the Department's ability to meet a critical Departmental, national or international mission?

B. Will the total cost of identifying requirements and developing the application software required to bring the system into operation equal or exceed $1 million?

The cost thresholds detailed in this paragraph assume that all relevant costs of defining mission needs, and developing or acquiring the application software have been included. Relevant costs include direct and allocated costs for hardware, software, labor (in-house or contract), and charges for

computer processing time during initiation and development. The costs incurred to operate a system, for example new hardware or a new data base management system, will be allocated to system life cycle costs (see C) and not allocated as development costs.

C. Will total life cycle costs, including the cost of operating the system exceed $10 million? Will the annual cost of operating and maintaining the system exceed $500,000?

D. Will the system affect national security?

E. Will the system directly affect the security and safety of substantial financial resources, people, or other valuable assets?

F. Does the system support a major mission whose function is multi-bureau in its scope as is, for instance, the PAY/PERS system?

G. Does the system directly affect the ability of the Department to perform a mission designated by the President, Congress, Office of Management and Budget, or the Secretary as being of particular importance?

If the answer to any of these questions is "yes", then the application system is major and the standards in this handbook apply.

1.4 Responsibility

A. Assistant Secretaries. Each Assistant Secretary is responsible for:

(1) Ensuring that the LCM concept and requirements described in this Application Systems Life Cycle Management Handbook, are applied to all major ADP information system projects.

(2) Ensuring that major ADP information system projects and their goals and priorities are clearly defined in the Department's ADP and Telecommunications Five Year Acquisition Plan, as described in 306 DM 4.

B. Heads of Bureaus. Heads of bureaus are responsible for:

(1) Ensuring that the LCM process is applied to all major ADP system projects within their respective bureaus.

(2) Designating officials within user organizations to be responsible for management and control of specific major ADP information system projects.

(3) Applying the LCM process to all ADP system projects to be maximum extent practical.

C. Program and Administrative Managers. Program and administrative managers who request the development of ADP information systems are responsible for:

(1) Ensuring that major information system projects they request are included in the Department's ADP and Telecommunications Five Year Acquisition Plan.

(2) Ensuring that the LCM concepts and requirements described in this handbook are applied to major ADP information system projects they request.

1.5. Importance of Documentation. Complete, accurate and usable documentation of the application systems covered by this handbook is essential. Historically, ADP professionals have considered requirements, computer program and data documentation to be by-products of the development process. Because this handbook applies to major, critically important, application systems, documentation of these systems requirements, computer programs and data are important deliverables of the development process. No major application system will be implemented without this documentation. The documentation will be used for system maintenance, impact of change analysis, management review and control, system conversion, and audits.

1.6 Application Systems Life Cycle Management.

A. Definition. Application Systems Life Cycle Management is the process of administering an application system over its entire life cycle. The life cycle itself is the time span between the establishment of a need for a system and the end of its operational use. The life cycle is divided into discrete, or separate, phases with formal milestones established as points for management control.

B. Handbook Structure. This handbook has four chapters.

(1) You are currently reading Chapter 1. It provides an overview of Application Systems Life Cycle Management, and includes definitions and management responsibilities.

(2) Chapter 2 contains a description of the life cycle of major application systems, and the activities to be performed during each stage of the life cycle.

(3) Standards for Project Management, Reporting and Control are described in Chapter 3.

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(4) Chapter 4 lists the minimum deliverable documents that the Department requires during the life cycle of a major application system. Details concerning the management of major application systems in the Department of the Interior are given in a technical document entitled, "A Project Manager's Guide to Application Systems Life Cycle Management." To obtain a copy of this document, contact the Director, Office of Information Resources Management.

1.7 Definitions of Terms. This section contains definitions of terms and acronyms used to describe Application Systems Life Cycle Management.
ADPE. Automatic Data Processing Equipment.

ADP Information System. An organized combination of human resources, ADP equipment, software, and established methods and procedures designed to collect, process and/or communicate data or information for the purposes of supporting management, administration, or other organization mission or program requirements.

ADP Information System Application. See application system.

Application System. An information system composed of one or more units of software supported by ADPE and automating work methods and procedures to collect, store, process and disseminate information to support specific agency missions.

Application Systems Life Cycle. The time span between the establishment of a need for a system and the end of its operational use. Overall, the system life cycle is divided into a number of discrete phases with formal milestones placed between and during each phase.

AS. Application System.

ASLC. Application System Life Cycle.

Automated Data Processing Equipment. Equipment used to execute computer program instructions, provide input to those instructions, or carry output from them. Included would be computer processing devices, data storage devices, data terminals, data communications equipment, and printing devices.

Concept Development Stage. The second stage in the life cycle of a major application system. In this stage blueprints (plans) are developed for the functions, data and data communications needed to fulfill the mission needs. These blueprints provide guidance and structure to the work done when the system enters the Development Phase.

Custodian. A person who guards, protects, operates and maintains an

application system in accordance with a service level agreement with the steward of the application system. The custodian of an application system is the ADP manager with line responsibility for providing timely and cost-effective computing resources and system maintenance services. People who perform maintenance programming are carrying-out custodial functions.

Development Phase. The second phase in the life cycle of major information systems, and major application systems. Development Phase includes the specification of functional and data requirements, construction and acquisition of required software and hardware, and testing for technical and user acceptability of the new system.

Implementation Stage. The first stage in the Operation Phase of a system. During Implementation Stage the application system is turned over to the system maintenance staff (custodians) by the ADP development team, and operation begins.

Information Technology. Such technical resources as hardware and software, telecommunications, micrographics, reprographics, office information systems equipment, and other automation used to address problems in information handling, use, processing, storage, and management.

Initiation Phase. The first phase in the life cycle of a major information system. When an application system is being described this phase results in the mission need being described and analyzed. Then, a blueprint is developed for the development or acquisition of software to meet the mission need.

Interoperability. A state where two application programs can use common communications media to exchange information easily and precisely without apparent regard to configuration or equipment manufacturer.

Life Cycle Management. The process for administering an ADP Information System from the identification of a need through its replacement or termination. This process emphasizes strengthening early decisions which shape its costs and utility.

Maintenance Stage. The second stage in the Operation and Maintenance Phase of a system's life cycle. During this stage the application's operational effectiveness is maintained by maintenance staff (custodians). Requirements for system modifications are forwarded from the responsible functional area (stewards).

Major ADP Information System. An automated system that requires special, continuing management attention because of its extreme importance to an agency mission; its high development, operation or maintenance costs; or its significant impact on administration of agency programs, finances, property,

or other resources.

Major Application System. An application system which, because of its importance to the Department requires special, on-going management attention. This importance is a result of the scope or importance of the missions being supported, the impact of the system on the financial, property or personnel resources of the Department, or the cost of the system.

Milestone 0. The first point in time during the life of an application system project that reporting is required to implement management control of the project. This milestone occurs after the activities of Mission Analysis Stage are complete, and before Concept Development Stage begins. If the project manager recommends proceeding to the next stage of the project, the project management committee decides whether or not to authorize the Concept Development Stage.

Milestone 1. The second point in time during the life of an application system project that reporting is required to implement management control of the project. This milestone occurs after the activities of Concept Development Stage are complete, and before Development Phase begins. If the project manager recommends proceeding to the next phase of the project, the project management committee decides whether or not to authorize the development of the proposed system, and the Assistant Secretary reviews the recommendation before system development begins.

Milestone 2. The third point in time during the life of an application system project that reporting is required to implement management control of the project. This milestone occurs after the activities of System Design Stage are complete, and before System Construction and Acquisition Stage begins. If the project manager recommends proceeding to the next stage of the project, the project management committee decides whether or not to authorize the acquisition and/or construction of the system that has been designed.

Milestone 3. The fourth point in time during the life of an application system project that reporting is required to implement management control of the project. This milestone occurs after the activities of User Acceptance Stage are complete, and before Implementation Stage begins. If the project manager recommends implementation of the system, the project management committee decides whether or not to authorize the implementation.

Milestone 4. The fifth point in time during the life of an application system project that reporting is required to implement management control of the project. This milestone occurs after the system is in operation. The responsible functional manager recommends whether or not changes need to be made to the application system now in operation, and presents a report

reviewing the degree to which the operational system meets the goals outlined in the Initiation Phase. If revisions are recommended, the project management committee will decide whether or not to authorize their implementation.

Mission Analysis Stage. The first stage in the life cycle of a major application system. Mission Analysis Stage includes the description of mission needs for information and information processing.

MNS. Pronounced "mens". The Mission Need Statement document is prepared by the application planning team during the Mission Analysis Stage. It contains information describing the need for additional information and information processing in the workplace.

Operation and Maintenance Phase. The third phase in the life cycle of major information systems, and major application systems. This phase begins with the implementation of the system and continues as the system is operated to support the mission needs outlined in the Initiation Phase.

Phase. A distinct interval in the life cycle of an ADP information system, characterized by the type of activity performed and the specific end products produced.

Project. A planned undertaking that includes a number of activities to solve problems and produce results for an organization.

Project Charter. A written understanding between the Project Manager and the Project Management Committee. This charter is developed specifically for each major application system project. It sets forth the scope, objectives, activities, team organization, responsibilities, and the general methods of operation. The lines of authority and accountability are clearly identified.

Project Manager. Individual responsible for coordinating all functions of project management and held accountable for project performance.

Project Management Committee. Selected individuals having functional, financial, and technical expertise who oversee the status and progress of AS projects, and approve expenditures of funds. They also oversee planning and management of AS project resources, and provide reports to the IRMRC as required.

Project Team. Individuals assigned responsibilities for performing the activities and producing the products required during an application system development project. Major application systems will have two distinct Project Teams; one during the Initiation Phase, and a second team during the Development Phase.

SDP 1. System Decision Paper 1 contains an overview of the application plan. It is prepared by the application planning team at the end of the Initiation Phase to support a go/no go decision regarding starting the Development Phase.

SDP 2. System Decision Paper 2 contains an overview of the detailed design of the proposed application system. Hardware, software, and communications options are discussed and an approach is recommended. This document is prepared by the ADP development team at the end of the System Design Stage to support a decision on whether to construct the proposed system.

SDP 3. System Decision Paper 3 contains a summary of the constructed application system and plans for implementing the system. It is prepared by the ADP development team at the end of the User Acceptance Stage to support a go/no go decision regarding system implementation.

SDP 4. System Decision Paper 4 contains an overview of the effectiveness of the application system that is in operation. It is prepared during the Maintenance Stage by the functional manager with responsibility for the mission area being served by the application system. The document supports a decision regarding whether or not additional investment is needed to bring the system into conformance with its planned goals.

Stage. A specific part of a phase in the life cycle of a major application system. Each stage exists to provide specific deliverables in the life of the system.

Steward. One who oversees the adequacy of an application system's support of workplace functions. The steward's role includes management accountability for the system's cost justification, the prioritizing of requests for its alteration, and assisting the custodian in establishing a scheduled date to implement a system change requested by the steward. Good management practice dictates that the steward of a system never be its custodian, if the system is a major application system. Professional ADP staff should perform custodial functions for major systems.

System Analysis Stage. This stage of an application system's life cycle is the first stage of the Development Phase. Detailed functional and data requirements are described and documented. These requirements may be identified by formal, structured analysis techniques, or by prototyping techniques.

System Design Stage. The second stage of the Development Phase in the system life cycle. System Design Stage includes the detailed design of software and data bases to support the application.

System Construction and Acquisition Stage. The third stage of the Development Phase of a system's life cycle. In this stage the application system is actually constructed. Programming occurs, and proprietary application software packages (if required) are modified to meet functional and data requirements.

User Acceptance Stage. The final stage in a system's Development Phase. A full system test of the application is completed to determine if the system's functioning and data are acceptable to the system's users. If the system is acceptable to the user, a recommendation for implementation of the system follows.

User Acceptor. An individual appointed at the time a system development effort is initiated. The individual is to monitor and coordinate, from the user perspective, those system development projects in a user area. The User Acceptor should be considered for the role of Project Manager during the application planning team's tenure. The User Acceptor interacts with the Project Manager in a "customer-contractor" relationship during the ADP project team's tenure.

THE APPLICATION SYSTEM LIFE CYCLE
CHAPTER 2

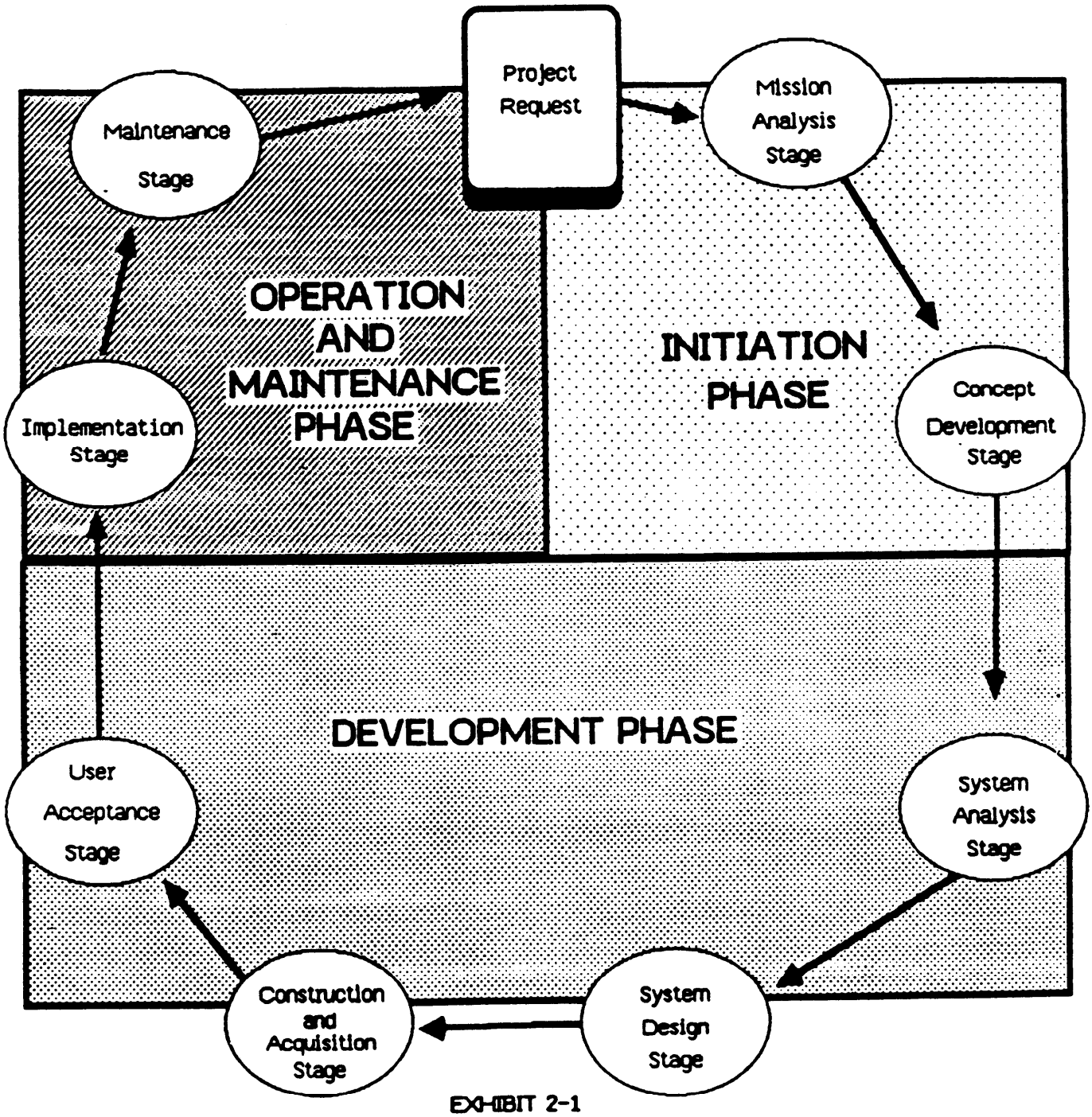

EXHIBIT 2-1

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2.1. Purpose. The Application System Life Cycle (ASLC) identifies the phases in the life of an application system (see Exhibit 2-1) and describes work done in the phases.

2.2 Objectives of ASLC.

A. Establish a framework for managing the life of major applications systems;

B. Provide guidelines for the activities during a system's life;

C. Identify minimum applications systems documentation requirements;

D. Establish products that can be checked during the life cycle; and

E. Define system development responsibilities.

2.3 Background.

A. The Need for Standards. Information systems managers generally admit that system development projects often are not completed on time, do not meet user requirements and are not completed within budget. Most failures are the result of not understanding that building major systems requires a consistent management approach for structuring and controlling the process. The Application Systems Life Cycle Management Handbook is such a standard.

B. ASLC as the Solution. The ASLC is the set of standards for initiating, designing, installing, and maintaining applications systems. It provides a common framework for managing the system development and maintenance process in order to improve communications among diverse interest groups, facilitate control of the process, and specify the contents of deliverables. The ASLC addresses all types of major application systems development work.

2.4 Responsibilities.

A. Offices and bureaus will manage all major application systems during the Development Phase, and provide maintenance expertise in the Operation Phase.

B. Functional program and administrative management must administer major applications during the Initiation Phase, and retain management oversight responsibilities during the Development and Operation Phase.

C. A Project Management Committee provides executive management throughout a major application's life cycle.

D. The Office of Information Resources Management prepares standards for major application systems management.

2.5 Project Request. The ASLC begins when someone identifies that a deficiency exists which inhibits an Interior agency from effectively and efficiently meeting its mission. Anyone can initiate an ASLC by notifying a responsible functional (programmatic or administrative) manager, and the process of initiating a project begins with the preparation of a project request.

2.6 ASLC Phases. There are three life cycle phases in the ASLC.

A. Initiation Phase

(1) Purpose. In this phase the mission need is analyzed to ensure that a system is needed, and to provide clear direction for later phases. A blueprint for the application is constructed.

(2) Description. Develop an idea for a potential application system. State mission tasks and identify deficiencies. Perform a mission analysis to determine the required functions and data, and to obtain enough data to decide if the automation idea should be pursued into the Development Phase. Outline the application concept, and provide cost and benefit estimates. Management participation in the Initiation Phase is very high, since determining if there is a need that justifies a system is a management question. The Assistant Secretary's approval of the recommended concept is required before the Development Phase begins.

(3) Stages. There are two stages in this phase.

- o Mission Analysis
- o Concept Development

B. Development Phase.

(1) Purpose. In this phase the application system is constructed, tested, and documented. Detailed requirements definition occurs early in this phase.

(2) Description. Define the functional requirements in enough detail to determine system and software specifications. Then, identify the data requirements, establish performance criteria and determine interfaces to other systems. Follow the National Archives and Records Administration standards for records creation, documentation and disposal.

Working with in-house or contract staff create a definitive design proposal for development, or a prototype for experimentation. Also, prepare a detailed cost/benefit analysis for the new design. During system

construction acquire and install the hardware, data communications and proprietary software needed. The application software is developed and undergoes unit and technical testing before system acceptance testing takes place.

System (user acceptance) test is performed to determine if the system's functionality and data are acceptable to the user. The users of each type of documentation will sign-off on the documentation when they find the documentation prepared by the project team is adequate. The project team corrects any deficiencies found in the documentation. User training material is finalized, and operation instructions are prepared.

(3) Stages. Development Phase has four stages.

- o System Analysis (prototyping may be substituted)
- o System Design
- o Construction and Acquisition
- o User Acceptance

C. Operation and Maintenance Phase.

(1) Purpose. In this phase the system is brought into operation to fulfill the requirements for which it was constructed.

(2) Description. Operate the system to accomplish the production objectives for which it was designed. Run, change, or repair the system as necessary. Prepare resource utilization and efficiency reports and conduct periodic post implementation reviews to ensure that the system still efficiently meets requirements.

(3) Stages. Operation and Maintenance Phase has two stages.

- o Implementation
- o Maintenance

2.7 Use of Standards. Use this Application Systems Life Cycle Management Handbook when developing major applications systems in addition to the Federal Information Processing Standards (FIPS PUB) Guidelines, numbers 38 and 64. ADP audits are to be conducted to ensure compliance.

2.8 Document Retention. The Project Manager retains all documentation required as a part of ASLC in a Project File. A copy of these documents is turned-over to the functional manager (steward) who is accountable for the application system. The documents are important records, and will be archived after an application system is discarded or replaced.

Data in systems containing records created and maintained in electronic and magnetic media will be retrievable, protected from unauthorized disclosure, and disposed of only in compliance with approved records disposal schedules. See 44 U.S.C. Chapter 33.

PROJECT MANAGEMENT, REPORTING AND CONTROL

CHAPTER 3

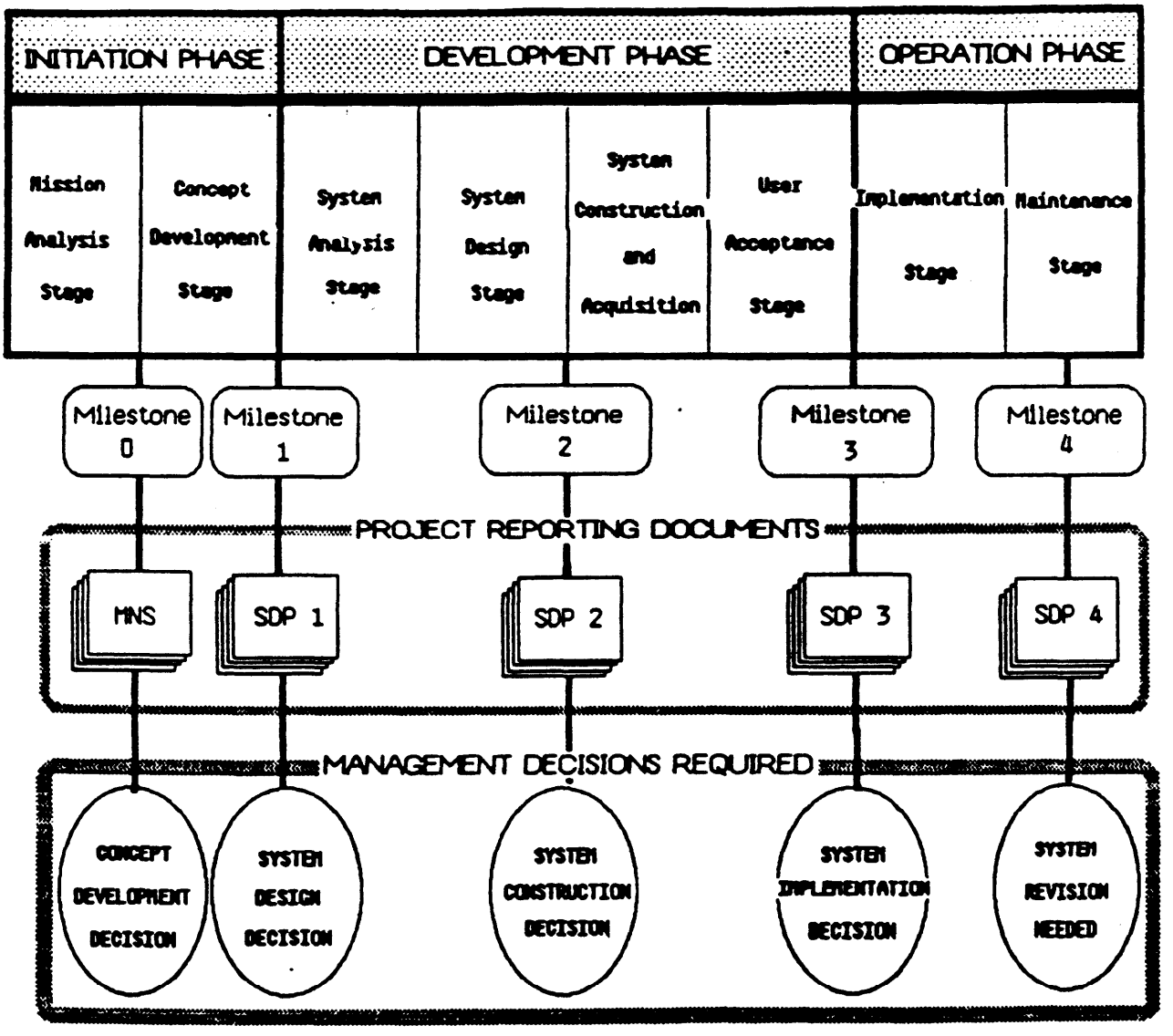

EXHIBIT 3-1

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3.1 Purpose. This chapter establishes minimum standards for project management and reporting when a major application system is being developed. These standards only apply to application systems that are deemed to be "major" under the guidelines of this handbook. See 306 DM 3 or bureau standards for project management standards applicable to systems not covered by this directive.

3.2 Objectives.

A. Ensure the projects for developing major application systems have standards that recognize the unique characteristics of major systems;

B. Coordinate project management with the Application System Life Cycle (Chapter 2); and

C. Ensure adequate management control and review mechanisms exist when major application systems are developed, so that system costs and benefits are thoroughly documented and reviewed by management.

3.3 Applicability. This standard applies to all work which leads to the implementation of a major application system as defined in paragraph 1.3 of this handbook.

3.4 Components. The three major components of project management, reporting and control are the organization and management of the project, the management controls placed upon the project, and the reporting required to enforce the management controls.

A. Project organization and management will require that project teams be formed to perform the life cycle activities mentioned in Chapter 2 of this handbook. Because of the size and importance of major applications, two distinct project teams will be involved in a major application system's life cycle.

(1) Application Planning Team. This team will be formed to complete the activities listed as part of the Initiation Phase. Team members will be from the functional area sponsoring the automation project, since the work to be done in this phase focuses upon the functional area's work needs.

(2) ADP Development Team. This team will build upon the work of the application planning team, and complete the activities that form the Development Phase. Someone experienced in project management should be Project Manager of this team.

B. Management controls include the handbook you are now reading, and the structures it mandates to provide management oversight of the application system as it progresses through its life cycle. There are two

bodies that directly review and exercise management oversight of the application development and acquisition process.

(1) Project Management Committee (PMC). The PMC will review the reports of the Project Manager at each milestone and make a go/no go decision with regard to the next stage of the life cycle. The PMC should require the Project Manager to report progress periodically between milestones.

(2) IRMRC. This Departmental executive committee has been convened by the Under Secretary. Composed of the Under Secretary and representatives of the bureaus, this group reviews the progress of major application system projects. The Project Manager is responsible for meeting the reporting required by the IRMRC.

C. Major application system projects will report their progress at predetermined milestones in the life cycle. Management's explicit approval is needed at each milestone before the project can proceed beyond that milestone. Rigorous enforcement of these reporting requirements by management authorities will mitigate the chances of a major application system failure late in the system life cycle. This will allow applications that are "off-track" to be corrected before they become major problems. Reporting is required to the Project Management Committee at each of the following milestones.

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

(2) Milestone 1. Milestone 1 occurs after the Concept Development Stage and prior to the System Analysis Stage. The Application Planning Team is responsible for meeting these reporting requirements.

(3) Milestone 2. Milestone 2 occurs after the System Design Stage and before the System Construction and Acquisition Stage. The ADP project team is responsible for meeting these reporting requirements.

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

(5) Milestone 4. Milestone 4 occurs after the AS has been put in operation. The functional manager is responsible for meeting these reporting requirements.

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Chapter 3 Project Management, Reporting and Control	3.5

3.5 Details. Detailed information regarding Project Management, Reporting and Control can be obtained by contacting the Office of Information Resources Management and requesting a copy of "A Project Manager's Guide to Application Systems Life Cycle Management."

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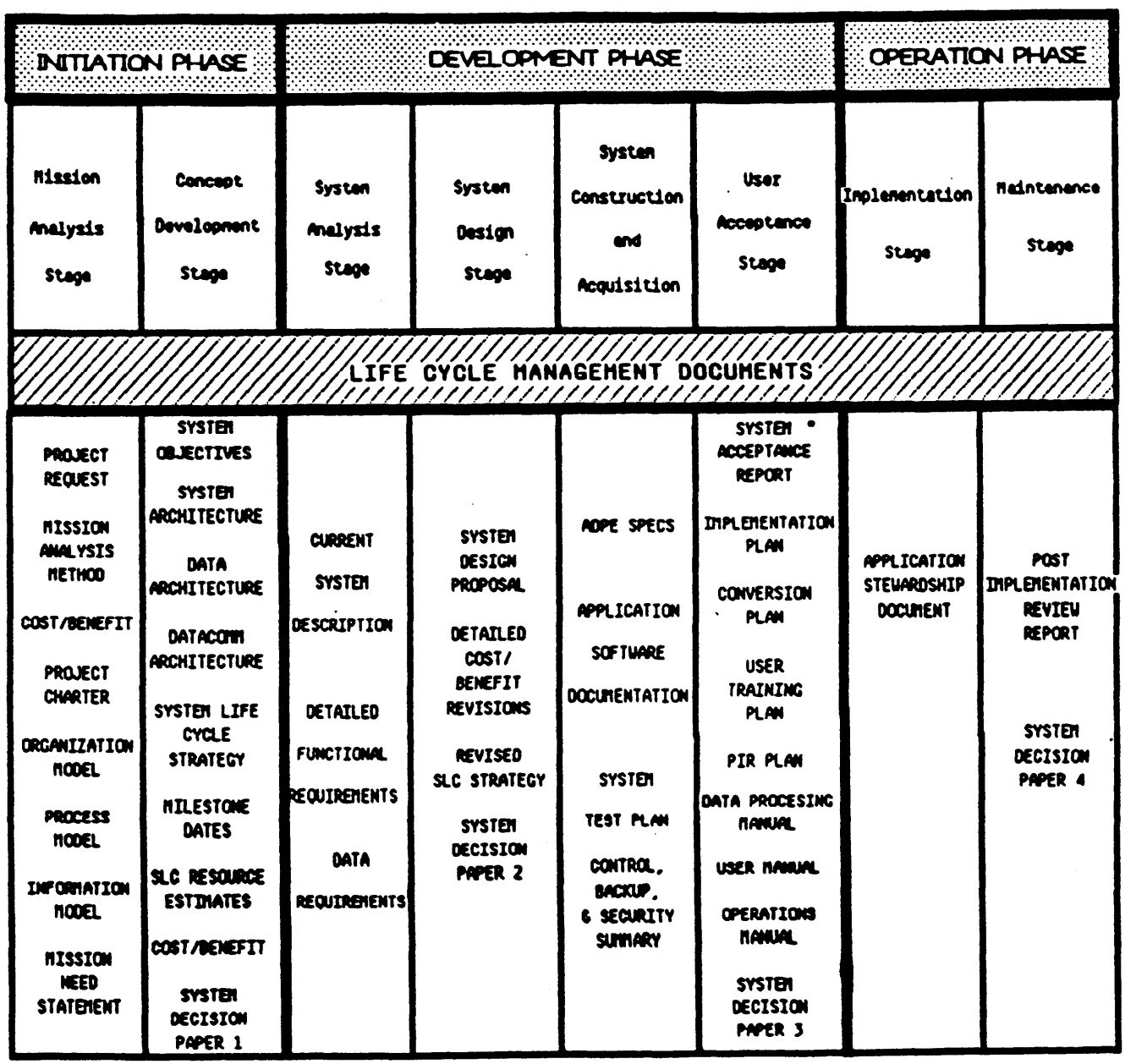
APPLICATION SYSTEMS LIFE CYCLE MANAGEMENT DOCUMENTS

CHAPTER 4



* SYSTEM ACCEPTANCE REFERS TO FUNCTIONALITY AND DATA ACCEPTABILITY, NOT SYSTEM STEWARDSHIP.

EXHIBIT 4-1

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4.1 Purpose. This chapter lists the documents required during the life cycle of a major application system. The documents are presented chronologically. While additional documents will, in all likelihood, be required by individual projects, this chapter lists the minimum documents required for project documentation, reporting and control. Please note that all documents marked with an asterisk (*) need not be prepared exactly as outlined. Project managers should be prepared to justify why a particular document was not produced, as will be the case, for example, if a prototyping methodology is used to replace the System Analysis Stage. The substance required by these documents will be required, but variations will be approved on a case-by-case basis. Documents not marked with an asterisk will be required for all projects.

4.2 Initiation Phase Documents.

Project Request
Mission Analysis Methodology
Cost/Benefit Analysis
Project Charter
Organization Model
Mission Process Model
Information Model
Mission Need Statement
* System Objectives
* System Architecture
* Data Architecture
* Data Communications Architecture
System Life Cycle Strategy
System Milestone Dates
System Life Cycle Resources Estimates
Revised Cost/Benefit Analysis
Revised Mission Need Statement
System Decision Paper 1

4.3 Development Phase Documents.

* Current System Description
* Detailed Functional Requirements
* Data Requirements
Design Proposal
Detailed Cost/Benefits Analysis
Revised Life Cycle Strategy
System Decision Paper 2
* ADPE Specifications
* Application Software Documentation
System Test Plan
System Acceptance Report
Implementation Plan

* Conversion Plan
* User Training Plan
Post Implementation Review Plan
* Data Processing Manual
* User Manual
Control, Backup and Security Summary
* Operations Manual
System Decision Paper 3

4.4 Operation and Maintenance Phase Documents.

Application Stewardship Document
Post Implementation Review Report
System Decision Paper 4

4.5 Details. Detailed descriptions of the contents of each document can be obtained by contacting the Office of Information Resources Management and requesting a copy of "A Project Manager's Guide to Application Systems Life Cycle Management."

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