

OSWER  
LIFE CYCLE MANAGEMENT  
GUIDANCE

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PART I

SUMMARY

LIFE CYCLE MANAGEMENT

## SUMMARY

### PART I

#### LIFE CYCLE MANAGEMENT

##### A. PURPOSE OF LCM

###### 1.0 Purpose

The purpose of this document is to provide guidance on the life cycle management (LCM) process for the development of automated information systems (AIS) in the Office of Solid Waste and Emergency Response (OSWER). The objective of LCM is to ensure that the development of each AIS is oriented to the mission of the organization and that each AIS continues to fulfill this role throughout its operational life span.

This document describes the decisions that are made during each phase of an AIS's life cycle. It describes the scope of LCM activity related to the size and complexity of the system. It explains the basis for the frequency of decision-making. In Parts II and III it explains the scope of the decision-making process for each AIS and the degree of formality required for documenting decisions.

###### 1.1 LCM Defined

LCM is a decision-making process. During the life of an AIS LCM is used to determine whether an AIS is actually needed, whether once operational it continues to meet the original needs, and whether the AIS should be changed to meet new needs or abandoned in favor of a new system.

For the purposes of implementation of this guidance, an AIS is defined as encompassing all of the hardware and software, people, documents, and resources combined to satisfy an need for information. The life cycle of a system spans the period in time from the first action to ~~identify~~ a system based on needs to the last action to shut down the ~~system~~.

## 1.2 Objectives of LCM

These are the major objectives for LCM.

-- To ensure that each AIS, as developed, addresses real needs for information.

-- To address the total cost of the AIS from start to finish and analyzes projected costs and benefits.

-- To provide a check against developing systems that may be more elaborate than needed, that fail to satisfy the need for information which created them in the first place, or that duplicate other systems already in existence.

-- To provide a means to close out systems that are no longer needed, which have been replaced by new systems, or that duplicate other information collection efforts in other organizations.

## 1.3 History of LCM

LCM is a discipline developed during the 1950's as part of the construction of large-scale software projects. By the 1970's LCM had achieved a place in the world of data processing as a well-defined planning and development tool. The growth of LCM as a philosophy, set of practices, and control mechanism came hand-in-hand with the growth in the size, complexity, and cost of computer-based information systems.

LCM is practiced today in the Federal government based on two parts of the Federal Information Processing Standards publications (FIPS PUBS) issued by the National Bureau of Standards, U.S. Department of Commerce. These are FIPS PUBS 38 and 64 which discuss software documentation issues. In 1986 the Office of Management and Budget emphasized the use of FIPS PUBS in its Circular A-130; "Information Resources Management."

## 1.4 Configuration Management

The development of an AIS is guided by the review of its status by a Configuration Management Board (CMB). OSWER guidance on Configuration Management (CM) describes the scope of work of the CMB in determining the frequency of life cycle management decisions, whether phases can be combined, and the degree of formality associated with the decision-making process. The chairman of the Steering Committee appoints the permanent members of each CMB. Each CMB supports the Project Administrator (PA) for each AIS by reviewing the documentation supporting LCM decisions.

At project initiation, the CMB reviews the PA's answers to the following questions;

- What must the system do?
- Who will use the system?
- How will the system operate?
- When will the system be ready?
- What will the system cost?

At the definition and design phase (Phase 3), the CMB reviews the PA's answers to a new round of questions based on the work accomplished in Phases 1 & 2. The major question around which issues are formed is how system parameters will be reviewed by the Steering Committee. In the system development phase the question to be answered is whether the different parts of the system produce the responses specified in the original design. Finally, in the operations and maintenance phase, the question to be answered is whether the parts of the system, taken together as a whole, produce the required responses within the constraints of time, dollars, and staffing.

## B. INFORMATION RESOURCE MANAGEMENT ROLES IN OSWER

### 2.0 Program Offices

Each program office in OSWER has a set of responsibilities for information resources management (IRM). These include the requirement to define its information needs, to monitor the effectiveness of each AIS supporting these needs, and to specify the requirements for each new AIS or changes to existing systems as these needs evolve over time. The primary point of contact in each program office is the Information Management Coordinator (IMC).

The IMC is an EPA employee, usually a line supervisor, who performs the technical oversight of his/her office's compliance with LCM guidance. AIS Project Administrators usually report to the IMC or work closely with the IMC regardless of organizational lines of authority. The IMC is ultimately responsible to the IM Steering Committee for its review of each AIS at each LCM decision point.

The Project Administrator (PA) is usually the project manager for an AIS or several AISs depending on program office priorities and staff assignments. The PA is responsible for day-to-day management of the AIS in terms of costs, schedules, staffing, and overall technical performance of the system.

### 2.1 OSWER Managers

Office Directors and Deputy Office Directors have IRM related responsibilities in the following areas.

- Policy and planning
- Communications
- Program Development
- Resource Management
- Supervision
- Evaluation

These responsibilities are detailed in the annual performance standards of SES managers in OSWER.

## C. SUMMARY OF LCM PHASES AND DECISIONS

### 3.0 Five Phases of LCM

There are five phases in the life cycle management process. The work to develop an AIS in each phase proceeds based on a go/no-go decision by the Steering Committee (SC) at the end of the previous phase. This decision-making process is the heart of LCM. The Steering Committee has the option to go straight ahead as planned, order modifications to the AIS, postpone, or cancel the project. The system decision paper presented to the SC by the PA is modified as a result of the decision.

Phase 1: The first phase begins when an OSWER program office develops a "mission element needs statement," or MENS, which describes the need for information. The MENS is submitted to the Steering Committee (SC) for a decision to proceed to Phase 2, but only after the MENS has been reviewed by the appropriate configuration management board.

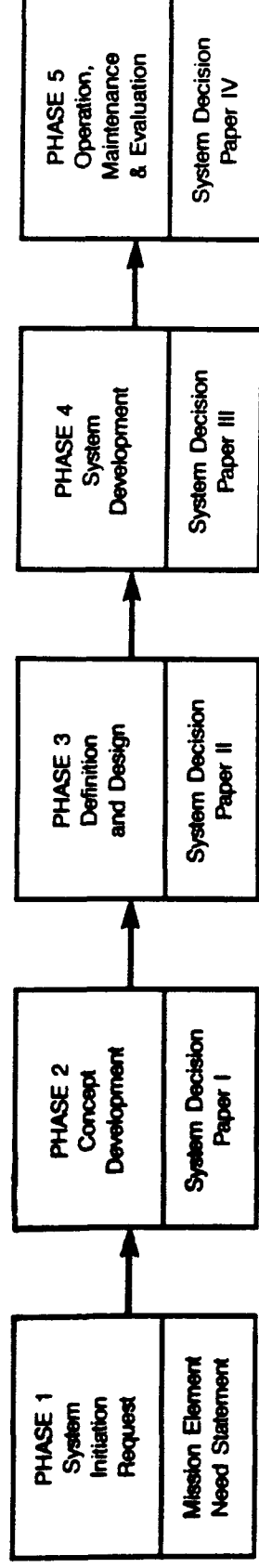
Phase 2: A concept of the AIS is developed that documents the solution identified to meet the information need described in the MENS in Phase 1. System Decision Paper I (SDP I) is the formal document transmitted to the Steering Committee after review by the Configuration Management Board. The Steering Committee gives a green light to proceed to Phase 3 or directs the Project Administrator to do additional work. The Steering Committee also has the option of halting further work because of considerations external to the system itself. These may be program issues within OSWER or EPA, or result from direction from central agencies like OMB or GSA.

Phase 3: The PA now proceeds with the definition and design of the AIS. SDP II is submitted to the CMB for review and to the SC for a decision. In SDP II the PA certifies that the design of the AIS will meet the need for information identified in the MENS. As in the previous phases, the SC has the action to make the go/no-go decision to the next ~~step~~ in the LCM process.

Phase 4: The PA develops the system. This includes coding, system testing, and development of operations and user documents. SDP III documents that the system functions as planned. The decision to be made by the SC at the end of Phase 4 is to put the AIS into operation in Phase 5.

Phase 5: This is the operations and maintenance phase of the AIS's life cycle. SDP IV documents the fact that the need for the AIS still exists and that the system continues to fulfill this need.

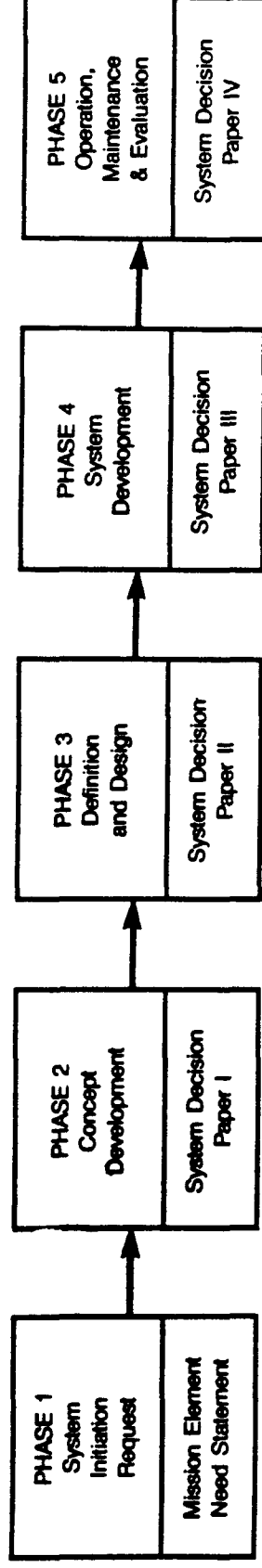
The following flow charts illustrate the LCM process for each phase, the questions to be resolved, the decisions to be made, and the information which is needed to make the decisions.



AT THE END OF EACH PHASE, THE STEERING COMMITTEE  
DECIDES UPON AND AUTHORIZES THE NEXT PHASE,  
ORDERS MODIFICATIONS TO THE AIS, OR DETERMINES THE  
NEED TO CANCEL THE PROJECT OR PHASE OUT THE AIS

THE SYSTEM DECISION PAPERS DOCUMENT THE REASONS  
FOR THOSE DECISIONS

OSWER AIS Life Cycle Decision Points



**MENS — An information need exists**

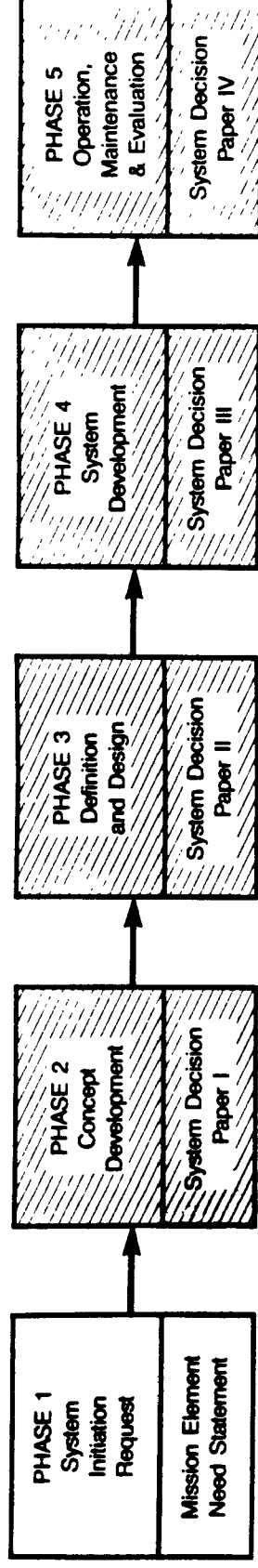
**SDP I — A solution has been identified**

**SDP II — The design will meet the need**

**SDP III — The system functions as planned**

**SDP IV — The need still exists, and the system still satisfies the need**

**Life Cycle Management Decisions**



### QUESTION TO BE RESOLVED:

What type of information system is needed to permit OSWER to fulfill current and projected mission requirements?

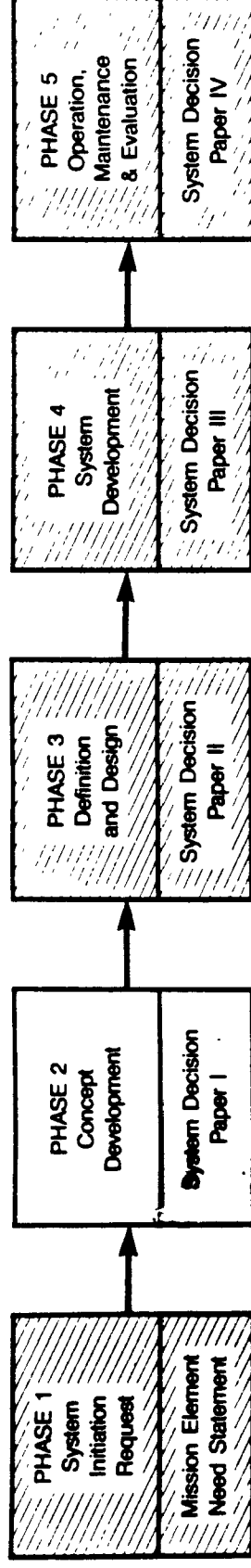
### DECISION:

Whether to commit funds to determine the most mission- and cost-effective solution among alternative solutions to the problem.

### INFORMATION NEEDED:

- Reason for need: New regulations or policy, changes in legislation, deficiency in present methods, etc.
- Whether an automated system is an answer.
- What benefits OSWER would gain.
- What the probable cost would be to acquire and operate the system.

OSWER AIS Life Cycle Management  
Decision Points Phase 1, MENS



### QUESTION TO BE RESOLVED:

- Has the need changed? (Reviewed at every phase.)
- Is it possible to design a cost effective system to meet the need?
- Which of the proposed alternative approaches is best?

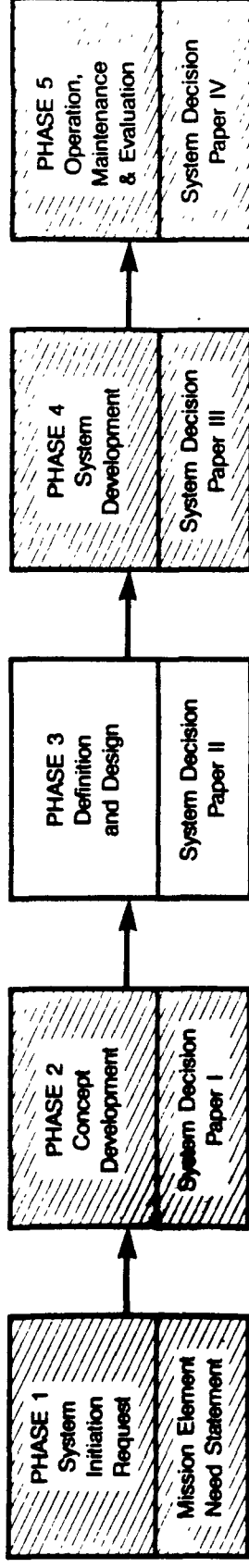
### DECISION:

Which solution to the mission need requirement should be chosen.

### INFORMATION NEEDED:

- Cost of alternatives over the total life of the system.
  - Acquisition: Hardware, software, training
  - Operations: Personnel, support
  - Maintenance
- Adequacy of alternatives to meet need.

OSWER AIS Life Cycle Decision  
Points — Phase 2, SDP I



### QUESTION TO BE RESOLVED:

- Has the need changed? (Reviewed at every phase.)
- Does the design meet current and projected needs?
- Can the AIS be acquired and implemented within budget?

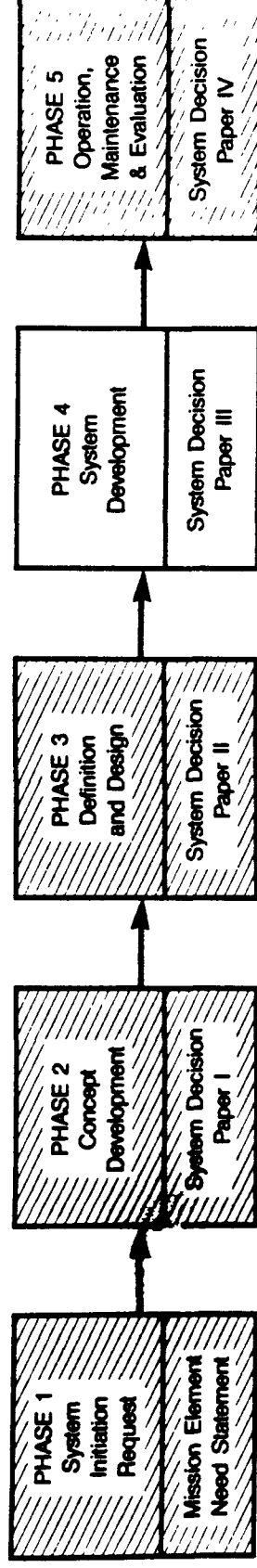
### DECISION:

Whether to expend OSWER funds to develop the AIS.

### INFORMATION NEEDED:

- Estimated cost to acquire and implement the AIS.
- Degree to which the AIS meets the functional needs.
- Confirmation that the AIS meets mission needs.

OSWER AIS Life Cycle Decision  
Points — Phase 3, SDP II



### QUESTION TO BE RESOLVED:

- Has the need changed? (Reviewed at every phase.)
- Does the AIS perform as designed?
- Is the cost of full implementation within budget?

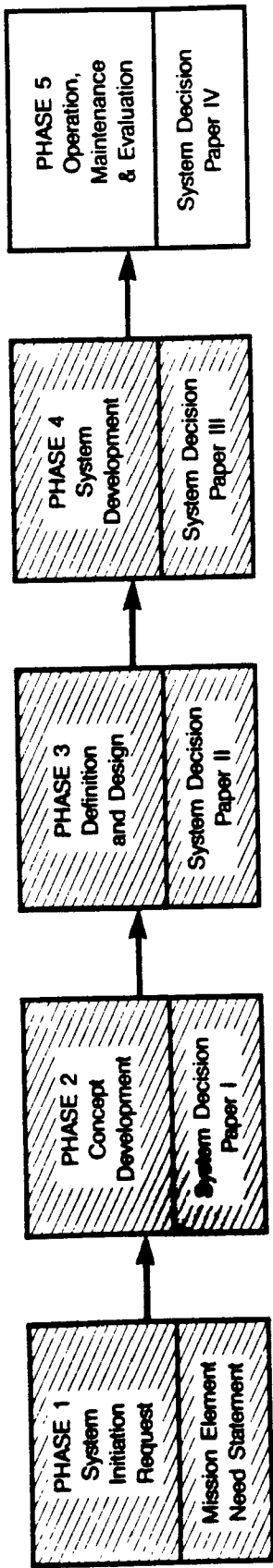
### DECISION:

Whether to implement the AIS as an OSWER standard.

### INFORMATION NEEDED:

- Firm cost for full system acquisition and implementation.
- Adequacy of operational system in meeting mission needs.
- System operability.

OSWER AIS Life Cycle Decision  
Points — Phase 4, SDP III



### QUESTION TO BE RESOLVED:

- Does the mission need still exist? (Reviewed at least annually.)
- Is the AIS still effective in meeting the need?
- Is the AIS still economical?

### DECISION:

Whether to continue the AIS as is for another year, modify it, replace it, or phase it out.

### INFORMATION NEEDED:

- AIS operating and maintenance history.
- Revised MENS.

OSWER AIS Life Cycle Decision  
Points — Phase 5, SDP IV

PART II

GUIDANCE

LIFE CYCLE MANAGEMENT

## PART II

### GUIDANCE

#### A. SCOPE OF LIFE CYCLE MANAGEMENT

##### 1.0 LCM Decisions

Life cycle management is a structured decision-making process used to develop automated information systems. The guidance in this section addresses the five phases of the process, the actions that are required of the AIS project administrator, and the documentation that is required to support decisions of the Steering Committee (SC).

The Steering Committee is composed of OSWER Office Directors and is chaired by the Deputy Assistant Administrator, OSWER. The chairman appoints the permanent members of each program's Configuration Management Board. Each AIS will be reviewed by the appropriate CMB prior to submission of the system decision paper to the Steering Committee. The CMB must review all relevant documents prepared by the Project Administrator and forward a recommendation to the Steering Committee on the pending decision.

Decision-making under the life cycle management process is not a substitute for ongoing project management functions such as budget, time, and staff allocations, tracking of expenditures, review of draft deliverables, etc. Decisions by the SC authorize further development or actions with regard to an AIS.

##### 1.1 Life Cycle Phases

Life cycle management decisions are made at least five times in the development span of an AIS. These decisions may or may not correspond to project development phases, although for the purposes of resource allocation for large projects, such a match is mandatory. The five phases of LCM are:

- Project Initiation (Mission Needs Analysis)
- Concept Development
- Definition and Design
- System Development
- Operational Evaluation

The CMB has the responsibility to recommend the extent to which the formal requirements of LCM will be applied to each AIS. The review by the CMB includes factors such as size, cost, complexity, and other project management considerations. The CMB may also recommend that some phases be combined to save time or to accommodate system development methodology such as rapid prototyping. However, every AIS will be subject to Phase 1, "Project Initiation." The PA will document how LCM phases are combined or are subordinate to each other.

## 1.2 LCM Roles

The primary participants in the LCM process are as follows:

-- Project Administrator: is the EPA employee directly managing the development of the AIS, usually with contractor support. The PA prepares the system decision papers for the Steering Committee. The papers are reviewed by the Information Management Coordinator (IMC) and the CMB.

-- Information Management Coordinator: the line supervisor in the OSWER program office responsible for all operational matters related to information resources in that office.

-- Configuration Management Board: the EPA employees with direct interest in the management and operation of the AIS under development. Members are appointed by the chairman of the Steering Committee.

-- Information Management Staff: the branch in the AA's immediate office with oversight and policy responsibilities for life cycle and configuration management. Members of this staff serve on program office CMBs.

-- Steering Committee: the convening of OSWER Office Directors as a policy making body for information resources management issues and for review of IRM plans, budgets, and system development decisions. The committee is chaired by the Deputy Assistant Administrator, OSWER.

## B. DETAILED EXPLANATION OF LCM PHASES

### Phase 1: Project Initiation

Action Items: Review and approval of the "Mission Element Needs Statement" (MENS)

PA Role: Prepare the MENS

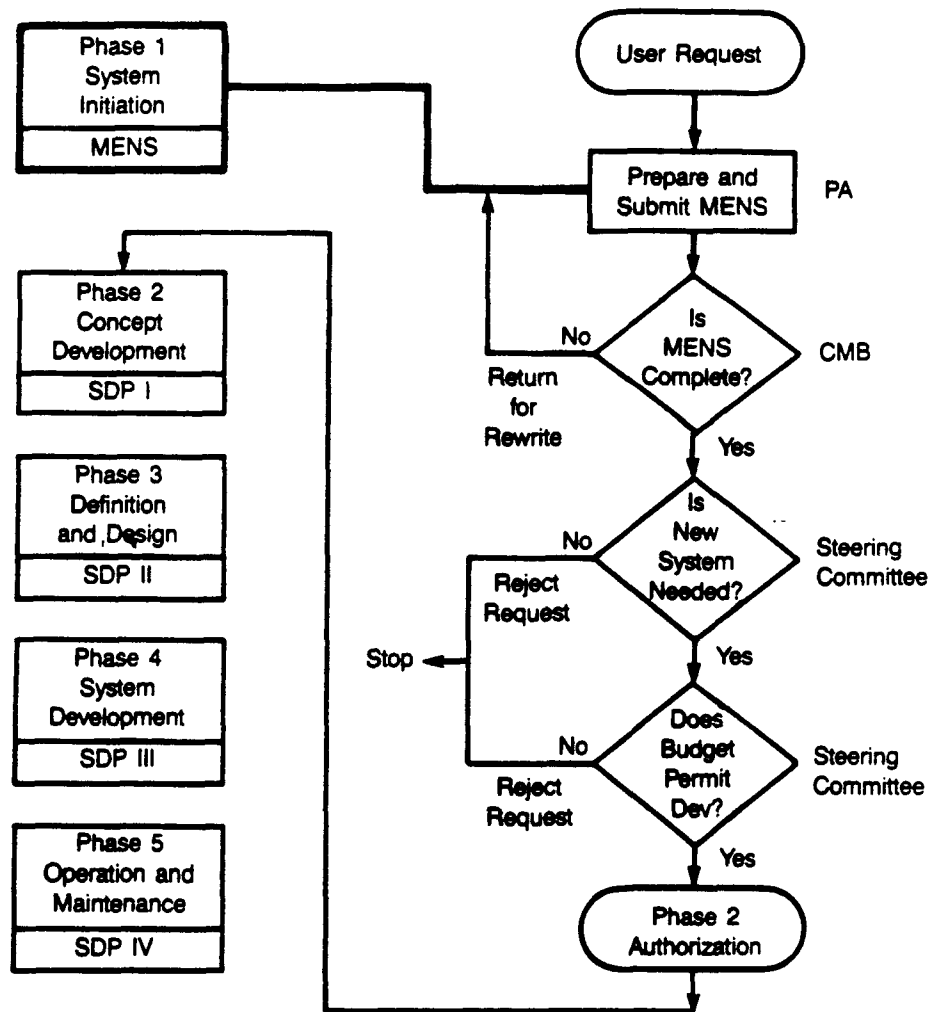
Note: A checklist of information topics to be covered at this stage is included in Part III of this guidance.

The initiation of an AIS is the responsibility of the project manager. The need for the AIS can be prompted by any number of factors such as new legislation, changes to regulations, or the growth of a program putting additional demands on systems that involve manual processing of data. The need for an AIS does not stem from the simple fact of available, unused computer capability. Further, the need does not define the system and capacity does not drive design.

The question to be answered in Phase 1 is whether OSWER resources should be committed to resolving the problem identified by the information need. The PA addresses this question and supplies his proposed solution in the documents submitted to the SC -- the "Mission Element Needs Statement" and proposed project plan.

The PA must submit the MENS to the Configuration Management Board for review before it is submitted to the Steering Committee. The role of the CMB is to ensure that the MENS is complete. If not, it is returned to the PA for a rewrite.

The decision to be made by the SC in Phase 1 is whether a new system is needed. If not, the request for the AIS is rejected. If the answer is yes, the next question is whether the budget will allow further development. If the answer to the budget question is yes, the SC gives the green light to work on Phase 2, "Concept Development."



## System Initiation

## Phase 2: Concept Development

### Action Items:

1. Approve recommendations in System Decision Paper I.
2. Formal acceptance of proposed project management plan.
3. Review and approval of system requirements documentation.

### PA Role:

1. Prepare the MENS.
2. Prepare the project management plan.
3. Prepare the feasibility study.

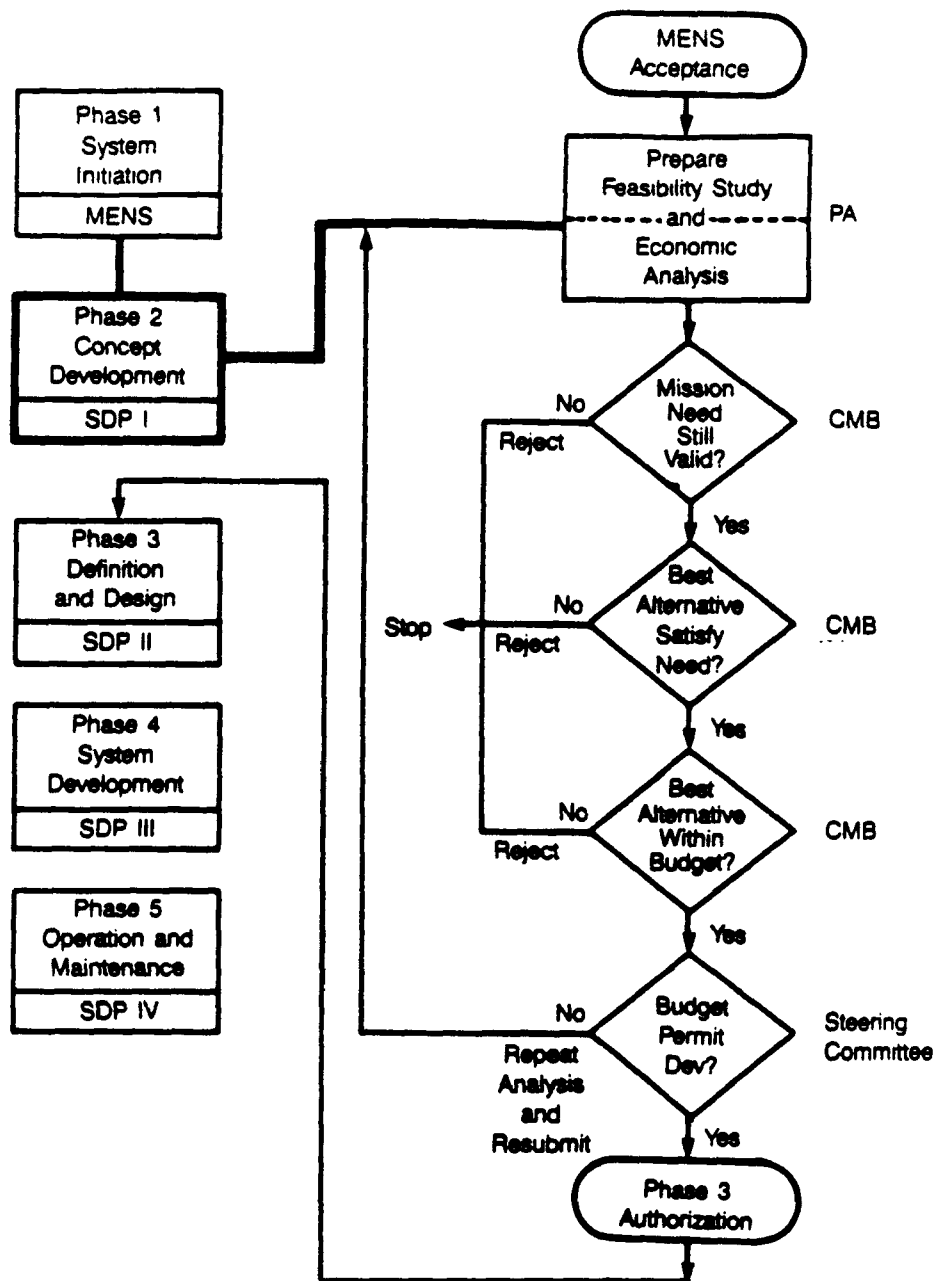
Note: A checklist of information topics to be covered at this stage is included in Part III of this guidance.

In Phase 2 the PA must prepare a "Feasibility Study" and an "Economic Analysis" to support further development of the AIS. The PA must analyze all the appropriate cost factors as part of the justification to the SC that further work on the AIS is cost-effective. These studies are incorporated into "System Decision Paper I" which is reviewed by the CMB prior to submittal to the SC.

Questions that must be addressed by the CMB include:

- Is the mission need for the AIS still valid?
- Does the best alternative available satisfy the need?
- Is the best alternative viable within OSWER's budget?

These are questions that the Steering Committee will ask and it is the responsibility of the CMB to make a recommendation to the SC on each issue. If the SC accepts a recommendation to proceed, it gives the PA authorization to proceed to Phase 3, "Definition and Design."



Concept Development Phase Flow

### Phase 3: Definition and Design

#### Action Items:

1. Approve recommendations in System Decision Paper II.
2. Accept Configuration Management Plan.
3. Review and approve test plans, technical and user documentation, and training plan.
4. Structured walk through the system.

#### PA Role:

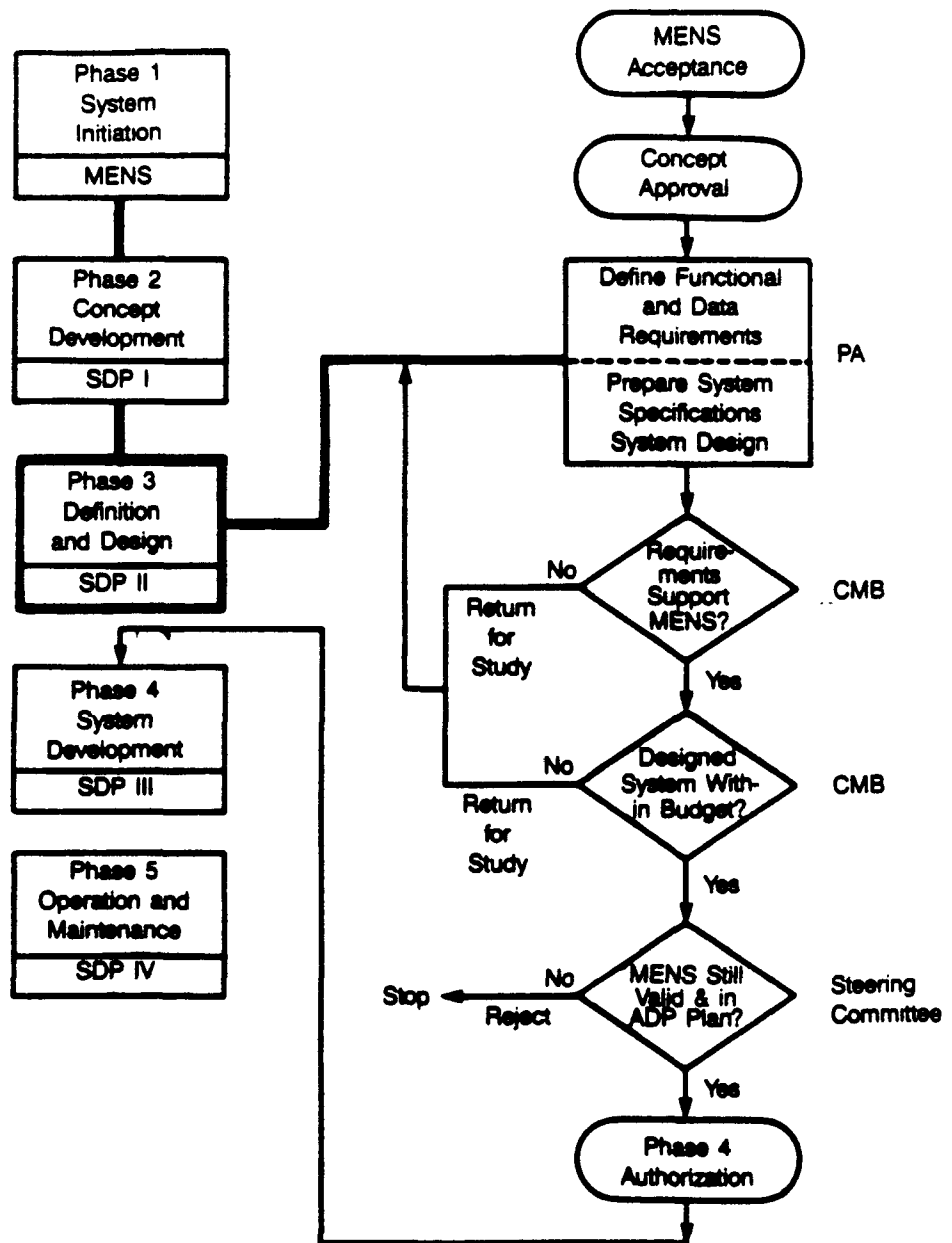
1. Prepare system design documentation.
2. Update the MENS.
3. Update the project management plan.
4. Prepare System Decision Paper II.

Note: A checklist of information topics to be covered at this stage is included in Part III of this guidance.

In Phases 1 and 2, the SC approved a specific concept to resolve a mission need. In Phase 3 the PA must identify the detailed functional and data requirements of the AIS. He or she must document the specifications of the AIS needed to meet these requirements. This includes testing the AIS to prove it will meet the design specifications. The analyses conducted in Phase 2 may eliminate the need for Phase 3 for smaller systems. However, the PA still must inform the SC of this approach and obtain their concurrence.

In Phase 3, the AIS has progressed beyond strategic plans and has entered a phase in which the CMB must make informed judgements as to whether the AIS will perform as intended by the PA. The CMB reviews the PA's work by asking the following questions:

- Do the functional and data requirements, as defined, support the MENS?
- Do the system specifications and design follow the functional and data requirements? Are they consistent?
- Is the system, as designed, still cost-effective and within the budget approved by the SC?



## Definition and Design Phase

If the CMB agrees that the answer to these questions is affirmative, it will forward its recommendation for action to the Steering Committee. The SC reviews SDP II. If it decides to accept the recommendations of the CMB and the PA, it authorizes continuation of work in Phase 4, "System Development."

#### Phase 4: System Development

##### Action Items:

1. Approve recommendations in System Decision Paper III.
2. Certify that the system meets user needs.

##### PA Role:

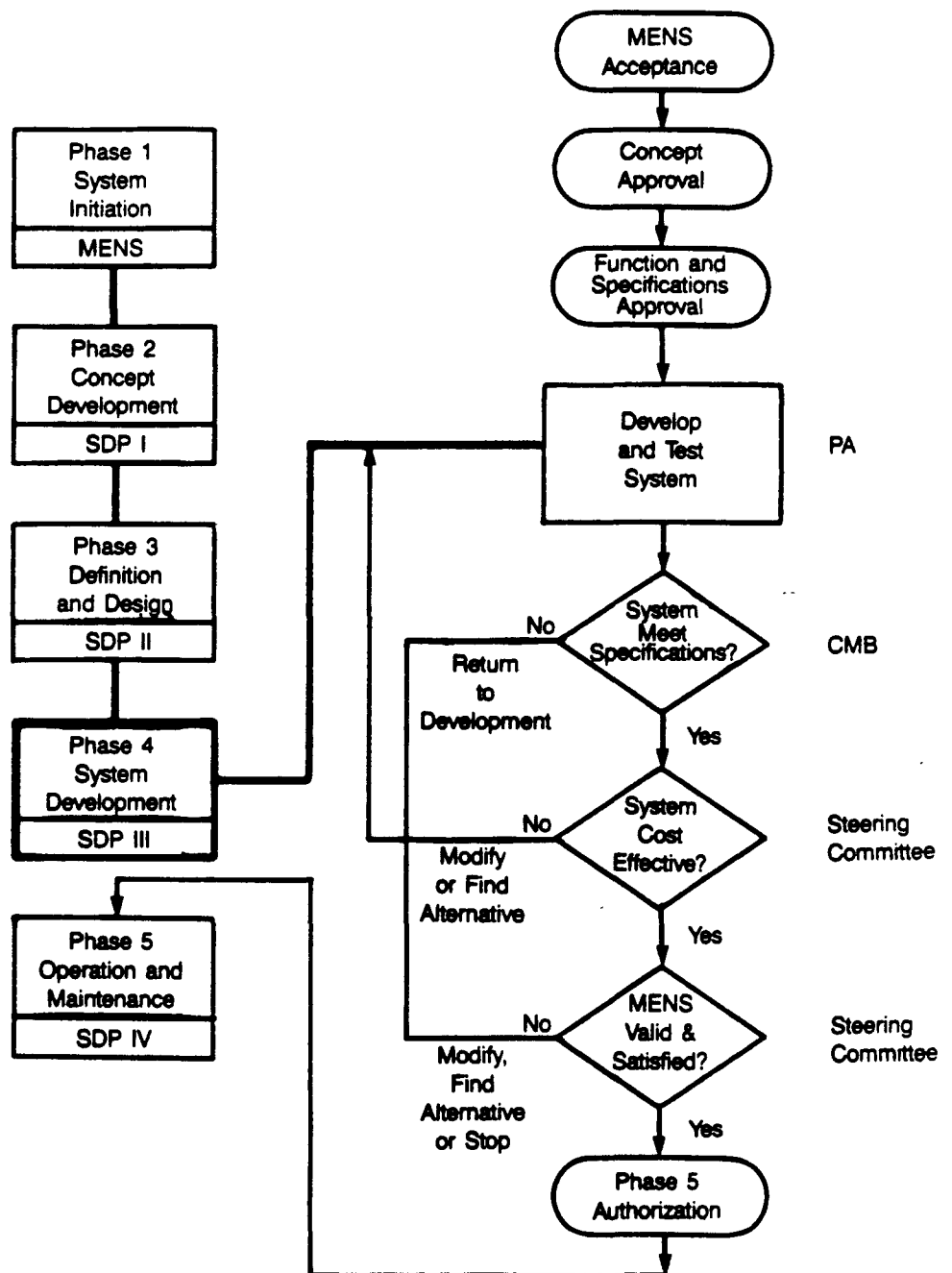
1. Review user comments and evaluations.
2. Update the MENS.
3. Update the project management plan.
4. Prepare System Decision Paper III.

Note: A checklist of information topics to be covered at this stage is included in Part III of this guidance.

By the end of Phase 4 a great deal of work will have been completed. The MENS was accepted in Phase 1. The system concept was accepted in Phase 2. In Phase 3 the PA developed and gained approval for the system design. In this phase the PA develops and tests the system. This is where programmers do their work, where the system is "debugged," and where users pass on the question of whether the system as developed will meet the needs identified in the MENS.

But it is not only the users who must pass on the question of whether the AIS meets the needs identified in the MENS. SDP III must be prepared by the PA for consideration by the CMB and approval by the SC. It must address the question of whether the AIS meets the original and detailed requirements laid down in Phases 1, 2, and 3. SDP III addresses the issue of whether the AIS is still cost-effective.

The CMB has a major role at this point. It must review the detailed technical documentation, the results of system tests, user comments, and other project reports which indicate whether the AIS is acceptable for use in OSWER. The CMB makes a recommendation to the SC based on these reviews. Ordinarily, the SC will not review the documents read by the CMB. However, the PA should be prepared to brief the SC on any aspect of the AIS should questions arise.



## System Development Phase

Questions that must be addressed in SDP III include:

- Does the system, as programmed, meet specifications?
- Is the system cost-effective?
- Is the MENS still valid and are the needs in it still satisfied by the system?

If the SC accepts the recommendations in SDP III, the PA gets the green light to put the system into operation. At least once a year after operations have begun, the PA will review the status of the AIS to determine whether it should continue to be an OSWER system. This work is done in Phase 5.

#### Phase 5: Operation and Maintenance

##### Action Items:

1. Approve recommendations in System Decision Paper IV.
2. Certify that the system continues to meets user needs.

##### PA Role:

1. Review user comments and evaluations.
2. Update the MENS.
3. Update the project management plan.
4. Prepare System Decision Paper IV.

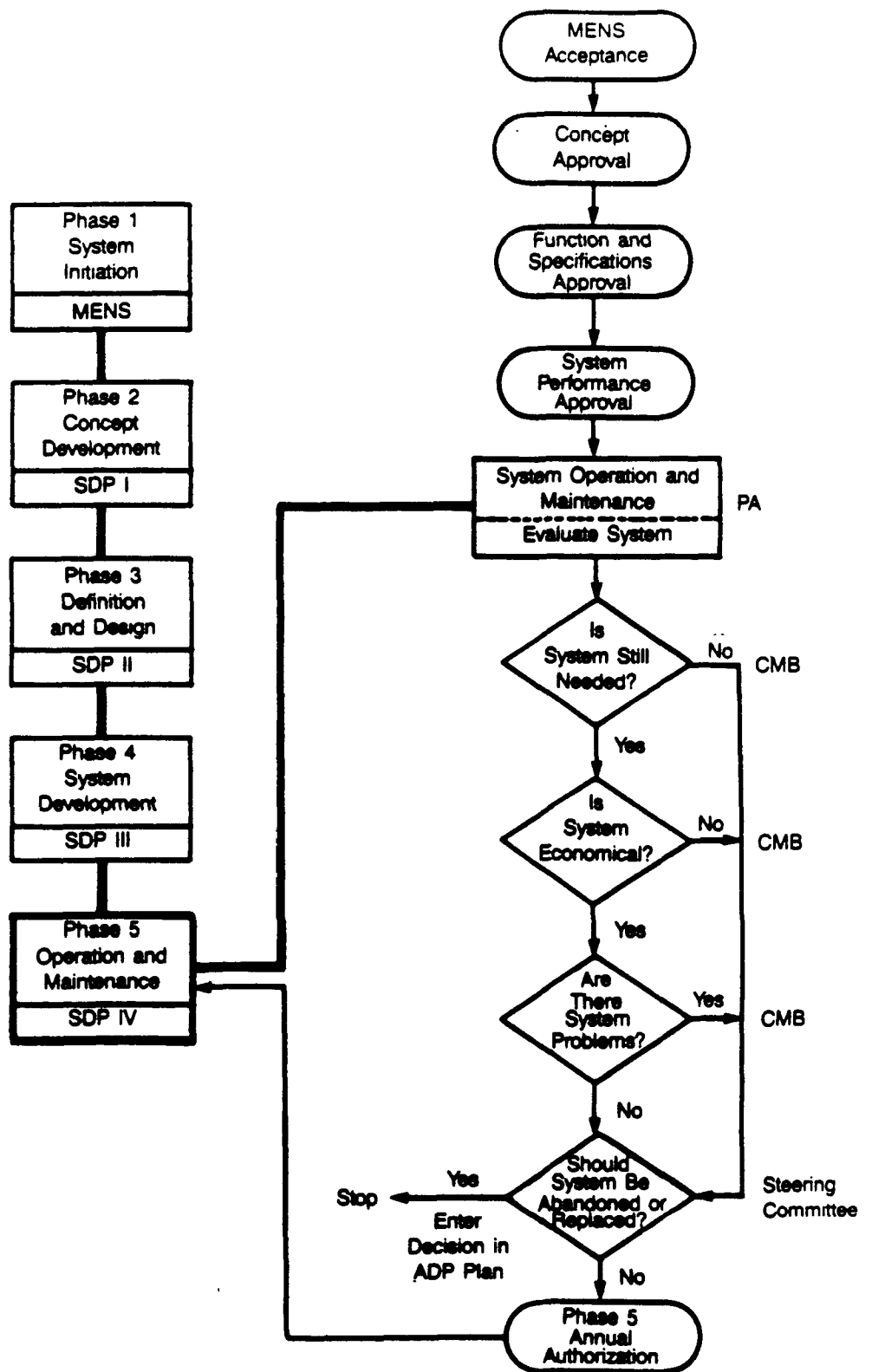
Note: A checklist of information topics to be covered at this stage is included in Part III of this guidance.

A CMB is responsible for oversight of each operational AIS in OSWER. It is also responsible for advising the SC of the continued need for and satisfactory operation of each AIS. If changes are proposed for the system, the PA and CMB work together to prepare SDP IV. This decision document addresses the issues of AIS retention, phasing it out, modification, or replacement. In addition, SDP IV addresses technical and budgetary considerations. The CMB bases its review on the knowledge gained thorough change control activities under configuration management practices over the overational life of the system.

Questions that must be addressed in SDP IV include:

- Is the system still needed?
- Is the system economical?
- Are there system problems?
- Should the system be abandoned or replaced?

Enhancements to existing systems are subject to LCM control and review by the CMB. These changes require approval by the SC. Major enhancements, such as the acquisition of new software or equipment, may require recycling of the entire LCM process.



## Operation and Maintenance Phase

### C. LCM DECISION FREQUENCY

The PA may categorize the proposed AIS in terms of complexity and criticality for the purpose of requesting a reduction in the number of mandatory LCM decisions. In terms of LCM decision frequency, there are three levels. Depending on the level determined, the PA may request limited relief from the normal frequency of LCM decisions. However, the Steering Committee makes all final determinations. The levels of decision frequency are:

Level 1: The PA may request relief from all decision points except the MENS and SDP IV.

Level 2: The PA may request relief from SDP I and SDP III.

Level 3: All LCM decision points and documents apply.

To determine the level of the AIS, the PA should consult the Attributes Chart, which follows this section. For any AIS with attributes listed under Level 1 only (with no attributes falling in Level 2 or Level 3), the PA may request classification as Level 1. Professional judgment and experience are required for systems with Level 2 attributes. The ambiguous columns of level 3 are for Steering Committee use in determining supporting documentation requirements; AISs in Level 3 are subject to all LCM decision.

Estimation of the AIS level by the PA at project initiation is preliminary only. Final determination will be made at the end of Phase 1 when more is known about the characteristics of the AIS. Most of the attributes, except for those specifically ADP-related, are evident at project initiation. Classification usually can be made at that time.

In requesting decision reduction, the PA should make a copy of the Attributes Chart and draw vertical lines to the right of each applicable attribute. These vertical lines will constitute an AIS profile that will expedite the Steering Committee's determination of the permissible level for the AIS. (Visually, the profile is clearer if horizontal lines connect the vertical delineators.)

# AIS ATTRIBUTES

CRITERIA	RANGE FOR LEVEL 2			RANGE FOR LEVEL 3		
	LEVEL 1					
1. Originality required	None - reprogram on different equipment	Minimum - more stringent requirements	Limited - new interfaces	Considerable - apply existing state of art to environment	Extensive - requires advance in state of the art	
2. Degree of generality	Highly restricted. Single purpose	Restricted - parameterized for a range of capacities	Limited flexibility. Allow some change in format	Multi-purpose. Flexible format. Range of subjects	Very flexible - able to handle a broad range of subject matter on different equipment	
3. Span of operation	Local or utility program	OSMER Division	Multi-division	OSMER Office	OSMER-wide or EPA-wide	
4. Change in scope and objective	None	Infrequent	Occasional	Frequent	Continuous	
5. Equipment complexity	Single machine Routine processing	Single machine. Routine processing. Extended peripheral system	Central Processor. Standard peripheral system	Central Processor. Advanced programming. Complex peripheral system	Master control system. Central processor auto input/output and display equipment	
6. Personnel assigned	1-2	3-5	5-10	10-15	16 and over	
7. Developmental cost	To 100K	100-500K	500K-1MM	1MM-2MM	Over 2MM	
8. Criticality	Data processing	Routine operations	Mandated	Legislated	Mission Critical	
9. Development Process	Prototype or Fourth Generation Language; no new data base	Prototype or Fourth Generation language; new data base	Prototype and high level language	Prototype and high level language	Prototype and high level language	
10. Concurrent hardware and software development	None	Limited	Moderate	Extensive	Exhaustive	

Note: Each criterion is to be independently considered.

# AIS CATEGORIES AND RELATIONSHIP TO LCM

AIS LEVEL	<u>OR</u>	SCOPE	<u>OR</u>	COST	<u>OR</u>	SECURITY/ SENSITIVITY	<u>THEN</u>	MINIMUM L.C.M DECISIONS
3 - Major new systems and major modifications to existing systems		AIS supports a national program, crosses multiple organizations, or exceeds cost threshold		Exceeds \$2 million in estimated development or operational costs		Highly critical security and/or privacy requirements; mission critical		All, full project documentation
3 - New systems and modifications to existing systems of a lesser impact than Level 3 but with one or more Level 3 attributes		AIS supports a local, regional, or national program, but functions within or in support of a single office, has limited public visibility		Exceeds \$1 million, in development or operational costs		Routine security and/or privacy requirements		All, documentation may be negotiated
2 - New systems and modifications to existing systems of a lesser impact than Category 2		AIS supports a single office, has no public visibility		Exceeds \$100 thousand, but less than \$1 million in development or operational costs		Minimal or no security and/or privacy requirements		MENS, BDP-II, BDP-IV; documentation may be negotiated for lower Level 2 AIS
1 - Minor systems, utilities, one-time applications		Limited organizational impact		Does not exceed \$100 thousand, in development or operational costs (for modifications, estimate only the modification costs)		No security or privacy requirements		MENS, BDP-IV

## LCM PHASES AND DECISIONS

LIFE CYCLE PHASE	PURPOSE	DECISION (STEERING COMMITTEE)	CERTIFICATION (LMC)
1. Mission Analysis and Project Initiation	Set forth "NEED" for AIS in the form of a Mission Element Needs Statement (MENS) and obtain approval to proceed.	Whether mission "NEED" is a proper subject for further AIS analysis, development, or acquisition	That the mission, "NEED", and budget authority are as presented
2. Concept Development	Determine scope of requirements to meet the "NEED", including analysis of alternative solutions and economic analysis	Whether the number of LCM decisions for this AIS should be reduced by combining or eliminating phases  Which alternative best satisfies mission need most cost effectively  That the alternative chosen is in conformance with AIS plans	That the feasibility study is valid  That the cost and benefit analyses are accurate  That funds are available for the alternative chosen
3. Definition and Design	Specify the functional and data requirements of the selected alternative to meet the "NEED"	Whether the project management plan will accomplish the project objectives and satisfy LCM requirements  Whether functional and data requirements support the mission need, are excessive, or are inadequate  Whether the requirements are adequate to support detailed design and serve as a configuration baseline	That the functional and data requirements satisfy the user population's needs in accomplishing the mission objective  That funding is adequate for the projected cost of the AIS as designed and over the AIS life cycle

# LCM PHASES AND DECISIONS

LIFE CYCLE  
PHASE

PURPOSE

DECISION  
(STEERING COMMITTEE)

CERTIFICATION  
(LMC)

## 4. System Development

Prepare all automated and manual processes and procedures and test (validate) their functionality in satisfactorily meeting the "NEDS"

Whether identified future needs for expansion can be accommodated

That documentation, planned training, and walkthrough of the design demonstrate operability and maintainability of the system

Whether the AIS design can be developed and tested to meet its specifications

Whether the projected costs for the AIS are reasonable over its life cycle

Whether the AIS as developed is in conformance with its specifications

Whether the AIS satisfies mission needs

Whether Phase I should be re-initiated to consider revision of mission requirements and needs

Whether system is ready for implementation, including acceptance testing and certification

Whether minor discrepancies must be corrected prior to implementation

Whether the documentation properly supports the AIS

Whether the AIS, including training, is operable

That funding remains adequate for the AIS life cycle

# LCM PHASES AND DECISIONS

LIFE CYCLE PHASE	PURPOSE	DECISION (STEERING COMMITTEE)	CERTIFICATION (LMC)
Evaluation, Testing and Implementation	Demonstrate the satisfactory performance of the AIS, its readiness for implementation, and place it into production	Whether the AIS, including training is fully satisfactory in the user environment and meets mission needs	That deficiencies have been corrected
5. Operational Evaluation (at least annually)	At least annually, evaluate the AIS to determine that it continues to meet the original "NEED" and whether that "NEED" has changed, become greater or less, or no longer exists	Whether the AIS should be implemented fully or partially Whether the mission need continues to exist Whether changes in policy, procedures, or practices make the AIS no longer adequate or appropriate Whether operation of the AIS should continue Whether the AIS should be modified	That AIS life cycle funding is identified in Program budgets That adequate funding remains
	Run the AIS so long as it meets the "NEED," perform periodic control audits, identify and implement enhancements and finally, declare the AIS obsolete and terminate it, or replace it by commencing a new Initiation Phase.		

PART III

DOCUMENTATION REQUIREMENTS

FOR

SYSTEM DECISION PAPERS

## PART III

### DOCUMENTATION REQUIREMENTS FOR SYSTEM DECISION PAPERS

#### A. Application of LCM

##### 1.0 General

Within OSWER all AIS systems, whether existing or planned, will be subjected to LCM control.

##### 1.1 New Systems

An AIS includes hardware, software, and secondary equipment, along with the facilities and operations required to support them, designed to satisfy a functional OSWER need. OSWER offices will develop and implement all new systems under LCM control whether the systems require additional equipment or not. In general, applications that make use of existing data bases without change to data input will be considered modifications rather than new systems. In each instance, the decision will be made by the Steering Committee after receiving recommendations from the CMB.

##### 1.2 Degree of Formality

Project Administrators will follow all provisions of Phase I of LCM control for each AIS. The decision to proceed to the next phase is determined by the Steering Committee. For minor changes to existing AISs, the CMB will determine if the change is subject to LCM. For minor AISs for which the need is readily apparent, a brief transmittal memorandum may suffice for project initiation and be acceptable as the MENS, at the discretion of the Steering Committee.

##### 1.3 Private and Local Systems

It is the policy of OSWER that private and local systems (either hardware or software) be discouraged. Such systems cause maintenance and compatability problems, compete for resources with approved general systems, result in incompatible data bases, and prevent comparability of output among programs and systems.

##### 1.4 Use of Existing Software

The burden of proof that no existing Government-owned or off-the-shelf software exists to satisfy a mission need, or that no existing OSWER or EPA system is able to meet the need, rests with the sponsor of an AIS. The Steering Committee will closely examine the following against existing software and systems:

- o Data base management systems and report writers.
- o Tracking systems.
- o Project and program management systems.
- o Budgeting, account, and spread sheet systems.

- o Personnel accounting systems.
- o Mailing list systems.

### 1.5 Pilot Development

OSWER encourages pilot development of major systems, even though they may not require major hardware acquisition, as a prudent measure to ensure satisfactory system performance.

### 1.6 Prototyping

OSWER accepts prototyping as a method for system development if it can be demonstrated that such an approach is likely to be cost-effective and can ensure satisfaction of mission needs. All prototype projects must include a proven and workable method for generating required system documentation, including fully commented source code; there must be a plan for guaranteeing maintainability; and ensuring total traceability of all data elements. Use of an approved data element dictionary is mandatory.

### 1.7 Hardware/Software Tradeoffs

Even though hardware is relatively less expensive than software in most systems, OSWER discourages excessive hardware over-capacity, and the Steering Committee will closely examine all hardware acquisitions.

### 1.8 Test Data Bases

To provide a basis for Steering Committee decisions, test data bases shall be designed to "stress" the system at maximum input, output, and capacity limits and to demonstrate the ability of the system to recover from error conditions and failure modes. Concurrent processing of live data may be utilized if it satisfies these other conditions of the test data base.

### 1.9 Privacy and Security

Privacy and security provisions will be demonstrated to the CMB prior to operation of any system using live data and shall be specifically reported to the Steering Committee.

### 2.0 Individual Projects

OSWER will control subsidiary AIS task orders that occur within the overall life cycle of a new or existing major AIS. In addition, the PA will subject these subsidiary task orders to review as part of the continuing LCM process. This situation arises primarily when changes, modification, and enhancements to an AIS are developed as individual projects. The situation may result from parallel

development or acquisition projects. Further, the Steering Committee may designate a group of related small projects as a single AIS for LCM purposes.

The Information Management Staff will identify the relationship of each subsidiary task order to the mission need and objective of new or existing major AISs. The Steering Committee will examine this relationship during reviews of both the AIS task order and the major AIS.

### 3.0 LCM Supporting Documentation

The Steering Committee will determine the number of decisions to be made over the life of an AIS. The Project Administrator will propose an LCM review schedule as part of his project management plan.

LCM documentation must be submitted to the CMB in advance of scheduled reviews, and allowance must be made in the project management plan for the LCM decision process at the end of each phase. The Director, IMS, will provide technical oversight and direction of the review schedule.

OSWER policy states that the documentation guidance of FIPS PUBS 38 and 64 will be followed for all AIS development. Copies of FIPS PUBS 38 and 64, and of instruction manuals implementing this guidance are available on loan from the Information Management Staff.

#### 4.0 System Decision Paper Information Requirements

##### SYSTEM DECISION PAPER I SUMMARY, GENERAL

YES NO N/A

The mission need is reaffirmed to be essential.

A Project Administrator has been appointed and necessary staffing approved.

The alternative system design concepts adequately reflect a broad segment of the technology base and provide an acceptable competitive environment.

The functional objectives have been prioritized.

The general functional requirements, including security requirements, have been developed and validated.

The alternatives considered satisfy the mission element need.

The projected resource investment for the selected alternative has been estimated and is consistent with the stated constraints.

Preliminary plans adequately describe concepts for training, logistical support, organizational relationships, post-implementation support, and operation of an automated system.

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

The acquisition strategy effectively integrates the technical and management elements of the project and supports the achievement of project goals and objectives.

LCM policies have been adequately treated in the planning.

Standardization and operational requirements have been adequately considered.

Risk and obscure areas have been identified and adequately treated in the planning.

Strategies have been conceived to facilitate the transition of the current functional system to any of the alternative systems to be explored.

Configuration management has been established for control of functional requirements.

SYSTEM DECISION PAPER I SUMMARY, GENERAL

YES NO N/A

Interfaces with other systems that have been adequately identified and defined.

An Economic Analysis has been prepared.

No existing EPA or other Federal AIS is known that will meet the requirements of the MENS.

SYSTEM DECISION PAPER I SUMMARY  
FUNCTIONAL AND DATA REQUIREMENTS

YES NO N/A Input Analysis

Is similar data collected only once by the same unit?

Are input forms consolidated to serve multiple purposes?

Are the controls adequate?

Are duplicate data types and elements eliminated?

Is the timing or response time adequate?

Is the flow between units smooth?

Do all conditions seem to be anticipated by all units?

Are the described actions adequate?

File Analysis

Can the files be grouped by a commonality of needed currency?

Can the files be grouped by a commonality of content and structure?

Are major divisions of the files fully mechanized?

Output Analysis

Can the reports be grouped by their content?

Have duplicative reports that are the same except for sequence or a few minor fields been eliminated?

YES NO N/A

Are the same reports, produced in different phases of the same process, eliminated?

Are reports eliminated or combined where possible?

Are the frequencies justified for management of the process?

Are the controls duplicated or common to various reports?

#### Procedure Analysis

Do the functions and data satisfy the original stated request or objective of the project?

Is all of the required data to accomplish the objective present?

Do new files have to be created or new processes established to accomplish the objective?

#### Performance Analysis

Is the system well used?

Do the controls delay the system so that the reports are not timely?

Is the present organization sufficient to handle the new system based on:

Location?

Specialized personnel?

Assignment of responsibility?

## SYSTEM DECISION PAPER II SUMMARY

YES NO N/A

The mission need is reaffirmed.

The functional system design has been revalidated and the baseline for the functional system has been established.

Specifications for hardware, software, and data base have been developed.

Plans for logistics support, security and privacy protection, training, operational test and evaluation, configuration management, organizational relationships, development, acquisition, and post-implementation support have been updated.

Risk analysis has been performed reflecting total system development.

The Economic Analysis has been updated.

Configuration management for the total system has been established.

Acquisition plans to obtain the required ADP equipment and other resources are finalized.

Planned computer resources will meet stated operational needs.

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

Interface and operational requirements can be met.

Trade-offs between hardware, software and manual procedures have been made.

If parallel development efforts are to be used, appropriate control mechanisms will be designed.

Contractor versus Government development issues have been resolved.

Planning for preparation of test and evaluation is adequate.

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

YES NO N/A

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

No existing Federal AIS could satisfy the requirement.

SYSTEM DECISION PAPER III SUMMARY

YES NO N/A

The mission need is reaffirmed.

Computer programs and data bases have been fully developed.

Standardization and operational requirements have been satisfied.

System support documentation has been developed. (This includes maintenance manuals, user manuals, and operation manuals.)

Unit and system(s) level test and evaluation results support a decision to proceed with development of operational capabilities.

The results of a functional configuration audit, the physical configuration audit, and a product verification review have been evaluated; all support products (e.g., users, operations and maintenance manuals) have been reviewed.

An intensive internal review has confirmed that the developed system satisfies the design and functional requirements.

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

The Economic Analysis has been updated.

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

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

The acquisition strategy has been updated and is being executed.

The end products of development are controlled as configured items.

Planning supports the acquisition strategy and provides flexibility for delivery dates and quantities when options are used.

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

YES NO N/A

The project management structure and plan are sound and adequately supported.

Planning for implementation is adequate including staffing and training, documentation, operational considerations, security and privacy, and integration with existing operational systems.

System deficiencies revealed in testing have been satisfactorily resolved.

Support facilities are ready.

Plans for anticipated system improvements have been established.

ADP equipment acquisition is on schedule.

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