TOTAL SYSTEM DEVELOPMENT

IMPLEMENTATION GUIDELINES

1. GENERAL

1.01 During the Implementation Phase, the system is constructed and tested according to detail design specifications.

1.02 Whenever this section is reissued, the reason(s) for reissue will be included in this paragraph.

1.03 This section is a guideline. It provides expanded information in support of the concepts of total system development specified in Section 007-220-300*, Total System Development—Milestones.

1.04 In the Implementation Phase, manual procedures are developed, documented, and tested for processing, support, and administrative positions

*Check Divisional Index 007 for availability.

and for user functions. Program code is prepared and tested. Data bases are developed and populated to create a test environment. Training and orientation materials are prepared. After testing of individual system components is completed, system testing is initiated. Verification testing assures the logic and flow within the personnel and computer subsystems separately. In system validation testing, the entire system is tested by subsystem or operational mode to confirm total system logic, processing, interfaces, outputs, recoverability, and controls. As a final step in the phase, the initial service agreements for the system must be developed, stating specific functional responsibilities for the operational system and the system performance levels that will be provided.

1.05 In addition to the great number of activities going on within the project, there will be a variety of support activities that must also be coordinated during the phase. Creation of a proper test environment may involve a testing group, hardware/ software installation and support, data base administration, network administration, computer center personnel, building/facility engineers, vendors, users, etc. Contract negotiation may still be underway. Changes to interfacing systems will have to be coordinated with the overall project work plan. While the primary responsibility for assuring the completion of such support activities rests with the Project Manager, the entire project team will likely be involved in their accomplishment. Therefore, effective planning, scheduling, and control is critical to the successful completion of this phase of development.

1.06 By the end of the Implementation Phase, all deliverable documentation should be completed. Listed below are some of the types of packages that may be required for system conversion and operation.

(a) System Administration Guide

(b) User Guide

(c) Installation Planning Guide

(d) System Operations Guide

(e) Performance Test Requirements

(f) Training Administration Guide

(g) System Operations Guide

(h) Data Base Administration Guide

(i) System Release Description

(j) System Index

(k) System Maintenance Guide

(l) Work Module Instructions

(m) System Control and Examination Guide.

See Section 007-230-210, System Deliverable Documentation, for additional information.

2. PROCEDURAL DOCUMENTATION

2.01 Procedural information is developed for the manual work designed as prescribed by the detail design specifications. Regardless of the documentation vehicle, the developer should consider these factors in procedures preparation:

(a) Desired reading level for the product

(b) Experience and training of the user of the product

(c) Use of standard and uncomplicated terminology; use of Data Dictionary definitions, when available

(d) Method of use on the job.

2.02 For most types of manual data processing procedures, instructions are most effective if they contain short, specific action statements describing what is to be done. Decision-making steps should always occur as early as possible so unnecessary processing is avoided. Charts and decision tables may be used to aid in decision making or to provide information necessary to complete the activity. Exhibits of media to be processed should be provided whenever necessary to clarify the text of the instructions. If a performance aid is to be used to support the procedure, reference and instructions for use should be provided.

2.03 Each procedure should be tested to assure correctness, logical flow, and understandability. It will usually save time to perform a logical walkthrough of the procedure with project personnel or user representatives. Major problems, such as confusing or incomplete instructions, poor instruction sequence, or the need for more supporting information, exhibits, or aids will usually be identified promptly.

2.04 Depending upon the scope, complexity, or criticality of the procedure, it may be necessary to do formal testing with personnel who match the actual work force. The amount of testing, number of tests and people, will vary for each procedure. For example, a new complex procedure that will be performed by large numbers of people will require more testing than a minor change to an existing procedure. All data handling steps should be tested, using each type of media to be processed by the procedure. When invalid or erroneous inputs are possible under operational conditions, these media should also be tested to determine if instructions for error identification and disposition are adequate. Once the basic logic of the procedure is verified, other performance criteria such as accuracy rate and speed can be measured. If there is an interface with equipment or computer functions, testing of the total operation must be accomplished before procedures are finalized.

3. PROGRAM CODING

3.01 Using the program specification, the programmer must develop the final detailed logic for the program. To provide for modularity and ease of maintenance, the program should be designed to result in small, independent segments of code. Further, the code itself should be structured to optimize the utilization of computer resources.

3.02 There are currently a number of accepted ways to develop code, depending upon the language used and the design methodology employed. However, regardless of method, the code itself should be easily interpreted, via comments, structure, etc, and should conform to the common language and naming conventions standards in effect. Standard condition codes and restart procedures should also be used. Any messages to be issued by the program should clearly define both the situation and the action required.

3.03 Each instruction in the program must be tested. If a top-down approach is utilized, control statements are tested first, with other segments of code added as testing proceeds. All transactions to be processed by the program must be tested and the output verified. Control functions and parameters must also be checked, as well as restart procedures. Once the program logic has been completely tested, optimization techniques should be used, if available, to improve program efficiency.

4. COMPUTER SUBSYSTEM (CSS) DOCUMENTATION

4.01 The primary CSS operational document is the System Operations Guide. The information necessary to operate the system or to execute the jobs should be provided. The guide must provide instructions for normal processing, procedures for quality control of output, and remedial action (if necessary), and for job restart and recovery.

4.02 In addition to the System Operations Guide, instructions or information may also be required for:

(a) Data Center Supervision

(b) Data Base Administration

(c) Network Control

(d) CSS-Type Support Work Modules (key-entry, keypunch, micrographics, etc).

4.03 The data center supervisor should receive the following information on the total computer processing function:

- Computer jobs and their flow, dependencies, schedules, and priorities

- Input and output media

- Resource and performance requirements

- Recovery procedures

- Control and performance measurement procedures

- Any other information the supervisor will require in order to effectively manage and control the computer portion of the system.

4.04 For on-line and/or data base systems, it may be necessary to provide operating instructions for the data base administration and network control functions. For the data administrator, procedures should be provided for establishing data bases, performance monitoring and tuning, and data base reorganization and recovery. For network control, procedures should be given for network operation and reconfiguration, performance monitoring, trouble resolution, recovery, etc.

4.05 The CSS support positions may require special instructions, forms, performance aids, etc. However, the procedures or materials that are developed must be compatible with the general requirements of that specific work unit.

4.06 The procedures contained in the CSS documentation must be tested, either logically or operationally (or both), before they are turned over for inclusion in integration or system testing.

5. ADMINISTRATIVE, USER, AND TRAINING MATERIALS

5.01 In addition to the procedures and documentation required to support the basic data processing functions of the system, both manual and mechanized, deliverables will usually be required to describe the administrative and user functions of the system.

5.02 Each operational system will have a system administrator, who has overall responsibility for the operation and performance of the system. The administrator must coordinate both the user and information systems operations; system schedules, recovery, and performance; and system change requirements. Therefore, the system administrator should have the following guidelines and information to understand and effectively manage the total system:

(a) Basic processing functions and organizations responsible

(b) System input and output descriptions

(c) Performance criteria and performance monitoring procedures

(d) System controls procedures

(e) Recovery procedures

(f) Technical support functions required

(g) Maintenance control procedures

(h) Trouble reporting procedures.

5.03 The supervisory personnel responsible for manual work activities may need specific system information in order to properly administer their work functions. The supervisory information may contain the following, as appropriate:

(a) General description of work modules and procedures in work unit, position documentation may be referenced for details

(b) Description or samples of input and output media and their schedules

(c) Recovery and control procedures

(d) Trouble reporting and system change request procedures

(e) Work module training requirements or instructions for on-the-job training

(f) Work module performance requirements and method of measurement

(g) Organizational, staffing, and personnel considerations for work modules.

The supervisor should also be aware of any operating agreements that impact the work unit.

5.04 System users must be provided guidelines on the interpretation and use of system outputs and preparation/submission of inputs for which they are responsible. The contents of a user guide may include a general description of the system and a description and sample of each output and each input provided by the user. The exact contents will vary depending upon the system/user interface and the nature of the user community. It may be desirable to provide several packages, each aimed at a specific audience, eg, department, work level, etc.

5.05 All training requirements should have been identified during the design phases and the course objectives, content and medium specified. The actual course materials must now be developed. These materials may take many forms:

(a) Student text

(b) Performance aids

(c) Audio/visual media (slides, video tape, audio recordings, Vu-Graphs, and associated scripts)

(d) Cathode-Ray Tube (CRT) display or computer-aided instruction material

(e) Handouts

(f) References or vendor materials

(g) Exercises and quizzes

(h) Test media

(i) Presenter/instructor information.

The material for each training package, whether training is formal or informal, should be organized into the most effective instructional sequence (chapter, section, unit, topic, etc); specific instructions for presentation of the material should be provided. The package should be tested with a trial audience before the materials are made available for actual use.

6. SYSTEM VERIFICATION AND VALIDATION TESTING

6.01 Based on the test plans developed during the Detail Design Phase, complete the development of test cases for all levels of testing (unit, integration, and system). The requirements for each test can be consolidated to develop an overall test schedule, test data base requirements, and resource requirements.

6.02 Tests shall be perform for each test case detailed in the unit, integration, and system test plans. Return test results shall be compared with expected results to allow problem identification.

6.03 Testing procedures may have to be developed to control:

(a) Test library and data bases

(b) Test execution

(c) Test evaluation

(d) Problem identification and resolution

(e) Test reports.

The larger the system or project, the more complex the testing environment, and greater the need for close coordination of the testing effort.

7. DRAFT SERVICE AGREEMENTS

7.01 The draft service agreement represents the various commitments that have been made in order to assure the operational integrity of the system. While the project manager may serve as a catalyst in their creation, the agreements themselves must be negotiated by the organizations that will have direct responsibility for system operation and support: user, application line functions, computer center, technical support, maintenance groups, training organizations, etc.

7.02 Responsibilities for each processing function must be identified and work volumes and schedules must be established. Computer, network, and equipment utilization, availability, and performance levels must be set and agreed to. Billing and/or charge-back arrangement must be approved.

7.03 The final, ie, operational, service agreement, developed by each operational entity and its users after system conversion, is a contract among all parties involved in system operation. The specific terms of the contract (schedules, performance levels, functional responsibilities, etc), are capable of renegotiation as the system's environment changes. Modifications to the system itself, to user requirements, or to the hardware/software environments may necessitate a change to the service agreement. The introduction of new systems, the reorganization of corporate functions, etc, may also require changes to the service agreement.

8. END-OF-PHASE ACTIVITIES

8.01 With the successful completion of system validation testing and the negotiation of the draft service agreement, the system should be ready for conversion.

8.02 Prior to conversion, it will be necessary to review conversion activities and schedules with parties and organizations that were affected and to obtain any required authorizations or approvals to proceed.

8.03 For central developers, the final trial agreement must be prepared and negotiated with the trial company or companies. The conditions and responsibilities for the trial must be specified, and the criteria for completion of the trial established.

9. REFERENCES

9.01 The following sections will provide additional information relevant to the Implementation Phase:

SECTION	TITLE
007-200-310	Functional Roles in a Systems Environment
007-208-310	Project Management
007-220-300*	Total System Development — Milestones
007-227-310	Developmental Documentation Specifications
007-230-210	System Deliverable Documentation
007-233-300*	Testing Recommendations for Information Systems
007-505-320	Guidelines to Provide Service Agreements

* Check Divisional Index 007 for availability.