

Commonwealth of Virginia



Information Technology Resource Management Guideline

Model Standard for Maintenance and Enhancement Projects

Preface

PUBLICATION DESIGNATION

COV ITRM Guideline 91-5.

SUBJECT

Information systems maintenance and enhancement projects.

EFFECTIVE DATE

January 1, 1992.

AUTHORITY

Code of Virginia, § 2.1-563.31 (Powers and Duties of the Council on Information Management).

Code of Virginia, § 2.1-563.17 (Powers and Duties of the Department of Information Technology).

SCOPE

This Guideline is applicable to all state agencies and institutions of higher education (hereinafter collectively referred to as "state agencies") that are engaged in such functions as planning, managing, developing, purchasing and using information technology resources in the Commonwealth.

PURPOSE

To provide a model structured approach for managing maintenance and enhancement projects for existing information systems.

OBJECTIVES

The Commonwealth's Model Standard for Maintenance and Enhancement Projects Guideline will:

- Define a set of phases, tasks, activities and deliverables that are normally associated with maintenance and enhancement projects for existing state agency information systems;
- Identify a minimal set of tasks and activities that can be used to provide required deliverables;
- Provide a flexible set of phases, tasks, activities and deliverables that allow for variations in the size, scope and complexity of projects; and

- Provide a framework that can accommodate the use of various systems development methodologies, tools and techniques.

DEFINITIONS

Information Systems are the application programs and databases used by state government to carry out its responsibilities.

Systems Development refers to all actions, functions or activities performed by state agencies for the purpose of defining, acquiring, developing, enhancing, modifying, testing, or implementing information systems.

Maintenance refers to the necessary activities needed to maintain the functionality, efficiency and effectiveness of existing information systems without changing existing inputs, outputs or calculations.

Enhancement refers to those activities needed to create new, or change existing inputs, outputs or processing capabilities to enhance or improve an existing information system's usefulness and functionality.

Systems Development Methodology refers to a set of principles, practices and procedures which is used to define, develop, and implement information systems. A systems development methodology guides the sequence of working tasks, defines task prerequisites and results, and establishes key checkpoints. It may also identify the resources, tools and techniques to be used for a task or set of tasks.

Systems Development Tools and Techniques refer to specific strategies or standardized methods or procedures to guide the execution of one or more systems development tasks. Prototyping, joint applications design, structured analysis and design, information engineering, object-oriented design, reverse engineering, and structured programming are examples of systems development methods. Computer-aided software (or systems) engineering (CASE) products, fourth-generation languages, and data dictionaries are examples of automated tools and enabling

technologies that are used in conjunction with the methodologies.

GENERAL RESPONSIBILITIES

In accordance with the *Code of Virginia*, the following provisions apply:

The Council on Information Management (CIM)

Responsible for:

Directing the development and promulgation of policies, standards, and guidelines for managing information technology resources in the Commonwealth.

Advisory Committees

Responsible for:

Meeting, conferring with, and advising the Council in the development of the Commonwealth's policies, standards, and guidelines for managing information technology resources.

The Department of Information Technology (DIT)

Responsible for:

Providing administrative support to the Council and performing such other services as the Council may direct in the performance of its powers and duties. Support may include advising the Council in the development, interpretation, and dissemination of its policies, standards, and guidelines, and maintaining records thereon for the Council.

All State Agencies

Responsible for:

Cooperating with the Council in the performance of its powers and duties; and

Complying with the Council's policies, standards, and guidelines for managing information technology resources in the Commonwealth.

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SECTION 1

INTRODUCTION

BACKGROUND

In 1982, the MASD/DIT Standard 82-1 was issued and forwarded to all State agencies and institutions of higher education. This standard provided those persons responsible for evaluating, selecting, and developing Commonwealth data processing systems with specific criteria and a structured approach to assist them in developing and maintaining quality application systems.

When the MASD/DIT Standard 82-1 was issued, both data processing and systems development were oriented towards developing large complex application systems in centralized mainframe computer environments. Since 1982, the proliferation of minicomputers and microcomputers in state government, the type of applications being developed, the methodologies and technologies available to support applications development, and the availability of off-the-shelf software solutions have created the need to revise and update the systems development life cycle concepts presented in MASD/DIT Standard 82-1.

This guideline has been developed as a model standard that can be adopted by state agencies in whole or in part to address the maintenance and enhancement of existing information systems.

MAINTENANCE AND ENHANCEMENT PROJECT PHASES

This model standard uses a phased approach for defining and handling maintenance and enhancement requests, researching and defining problems and impacts and, as necessary, modifying existing information systems. This approach consists of four logical phases: Maintenance and Enhancement Requirements Definition; Analysis; Modifications; and Testing and Implementation.

SECTION 2

USING THE MODEL STANDARD FOR MAINTENANCE AND ENHANCEMENT PROJECTS

This standard identifies project deliverables and provides a structured approach of phases, tasks and activities that will be used to identify and define the need for maintenance and enhancement activities, analyze the existing information system or its environment, and document any required changes or recommendations. As required, the information system or its environment is changed, tested, approved by management, and implemented into the production environment. This model standard should normally be used to address routine or emergency maintenance activities and requests for minor enhancements for most existing information systems.

The following definitions, symbols and terminology are used throughout this standard:

- **Phase** - means a distinct logical stage in the maintenance and enhancement process.
- **Task** - means a logical group of like work within a given phase.
- **Activity** - means a specified logical unit of work within a task. Activities should be defined in small enough increments of work to estimate the resources required to accomplish the activity, and to allow for the measurement of progress for scheduling and reporting on the project. Mandatory activities within a task are preceded by **Activities must include**. Optional activities within a task are preceded by **Activities could include**.
- **Deliverable** - means a resulting product from the activities of one or more tasks that can be stored in electronic or paper form or a combination of the two.
- **Mandatory** - This symbol is used to indicate a task that must be performed or a deliverable that must be developed for all projects.
- **Conditional Mandatory** - This symbol is used to indicate a task or deliverable that is usually considered mandatory for all projects. However, these tasks and deliverables are not applicable to all projects all of the time.

FOR EXAMPLE: A purchased software package may not require the development of application program specifications or the corresponding generation of application program code.

The phases and tasks in this standard have been sequentially numbered and the tasks are annotated in bold typeface. The phases within this standard can be logically combined and the tasks can be performed in any logical order that provides the required deliverables and approvals. Descriptive information is provided with each task, including activities and/or examples of potential activities. The project manager has the discretion to include additional tasks and activities not specified in this standard and to use appropriate systems development methodologies, tools and techniques that will satisfy the intent of a given task. The project manager may substitute tasks and activities within the context of this standard as long as the appropriate mandatory deliverables are developed and approved, and the mandatory approvals to proceed are obtained. The number and level of tasks and activities

needed to plan, manage and control a given project will be determined by the project manager and will be commensurate with his/her understanding of the size, scope, and complexity of the project.

In addition to the mandatory tasks and activities for each phase, there are optional tasks and activities which may, at the option of the project manager, be included in some projects and excluded from other projects, depending upon the size, scope and complexity of a given project. Failure to include one or more of the optional tasks or activities for any given phase does not constitute failure to comply with this standard.

At a minimum, all change or revision documentation must be developed in sufficient detail so that the desired changes can be accomplished. Change documentation should be equivalent to or better than existing documentation in content, format, style and completeness.

The specific means for project management on a given project must be documented by the project manager. As appropriate, these means should address such things as managing a project team, conducting user and project team meetings, and reviewing and as needed revising project plans.

Appendix A contains sample forms that could be used in conjunction with this model standard.

PHASE 1: MAINTENANCE AND MODIFICATION REQUIREMENTS DEFINITION

After an information system is placed in a production mode, occasions will arise when additional work will be needed in order to ensure that the application system continues to meet the functional and informational requirements of the system's users. This phase covers the tasks, activities and deliverables necessary to log, define and assign responsibility for the requests to perform this additional work.

Regardless of the size, scope, complexity, nature, origin or criticality of the maintenance or enhancement activity, it must first be identified and defined. This phase serves as the point of entry for all maintenance and enhancement requests and provides for the following:

Mandatory **DELIVERABLES**

- Emergency or Routine Request
- Requests Log
- Request Definition with Project Plan

Conditional
Mandatory **D ELIVERABLES**

- Routine Maintenance/Enhancement Schedule

**Task
Number**

Tasks/Activities

1.10 Mandatory **INITIATE REQUEST**

This task is used to start the formal process to request the performance of emergency maintenance or routine maintenance/enhancement activities on one or more existing information systems or application programs. Internal agency procedures will be used for handling this task, including identifying the responsible party that will serve as the focal point for these activities for existing systems.

Activities could include, but are not limited to:

- Identifying and defining the emergency problem or need for service.
- Submitting the request or reporting the emergency problem to the appropriate responsible party.

Deliverable: *EMERGENCY OR ROUTINE REQUEST*

1.20 Mandatory **EVALUATE AND FINALIZE INITIAL REQUEST REQUIREMENTS**

This task will be used by the responsible party to log all requests; initially evaluate, refine and finalize emergency and routine requests; and assign responsibility for resolution or planning purposes.

Activities could include, but are not limited to:

- Logging the receipt of the emergency problem or service request.

- Collecting additional information or documentation needed to define the emergency problem or service request.
- Determining priority and assigning responsibility for emergency problems.

Deliverable: ***REQUESTS LOG***

1.30 *Mandatory* **DEFINE SCOPE FOR ROUTINE REQUESTS**

This task will be used to define the scope of routine requests. The primary purpose of this task is to define the request in sufficient detail so that it can be included in the planned or scheduled maintenance and enhancement activities of the agency.

Activities could include, but are not limited to:

- Defining the request's objectives and goals, including problems to be solved, general requirements, and anticipated general benefits.
- Defining the request's scope, including functions to be examined, the reasons for the project, and anticipated functional units which may be affected.
- Defining the request's constraints, assumptions, and mandates including budgetary, time, resource, and legislative factors.
- Developing an initial project plan with tasks, activities and deliverables, including estimates of the costs and resources required to complete the request.

Deliverable: ***REQUEST DEFINITION WITH PROJECT PLAN***

1.40 **SCHEDULE ROUTINE REQUESTS**

The task will be used to plan and schedule routine maintenance and enhancement activities. Maintenance and modification schedules should provide for sufficient formality and distribution to inform users of restrictions or potential adverse impacts on the availability or use of an application information system or program.

Activities could include, but are not limited to:

- Assigning routine requests to responsible staff.
- Formalizing or documenting required user involvement and commitments as needed for all appropriate requests on the maintenance and enhancement schedule.
- Preparing and distributing a maintenance and enhancement schedule, as appropriate.

Deliverable: ***ROUTINE MAINTENANCE/ENHANCEMENT SCHEDULE***

PHASE 2: ANALYSIS

This phase covers the tasks, activities and resulting deliverables that will be used to research, analyze, identify problems, develop plans and document or recommend the correct course of action to resolve a routine or emergency request.

The amount of research and analysis for any given request can vary greatly. This phase is flexible enough to handle all requests for analysis for a specified information system and recognizes that the analysis may include the users domain; the applications programs, files and databases; and the operating environment in which it resides. Given the wide variety of conditions and requests that may need to be addressed in this phase, most of the tasks and deliverables are optional and should be applied where applicable by the project manager.

This phase provides for the following:

Mandatory DELIVERABLES

- Analysis Evaluation Documentation
- Written Approvals of the Deliverables

Optional DELIVERABLES

- Evaluation Plan
- Documented Evaluation Findings
- Recommended Revisions to Data Dictionary
- Recommended Revisions to File Structures/Databases
- Recommended Revisions to User Interfaces
- Recommended Revisions to Systems Interfaces
- Recommended Revisions to Application Program Specifications
- Recommended Revisions to Back-up and Recovery Specifications
- Recommended Revisions to Information Security Documentation
- Recommended Revisions to User Documentation
- Recommended Revisions to Operations Documentation
- Unit, System and Integrated Systems Test Plan
- Written approval to Proceed With the Recommended Course of Action

**Task
Number**

Tasks/Activities

2.10

PREPARE FOR SYSTEMS REVIEWS

This task will be used as needed to research and develop an evaluation plan for partial or complete information systems reviews or evaluations. These reviews or evaluations may be conducted to resolve a particular complaint (slow response times, etc.) or as planned periodic reviews to evaluate the continued effectiveness of a particular information system. The plan should include what (inputs, outputs, files, databases, user procedures, etc.) is to be evaluated, how it will be evaluated, when it will be evaluated, and who will perform the evaluation. Agency management will identify the individual, functional unit, or project team that will be responsible for each evaluation.

Activities could include, but are not limited to:

- Researching and identifying specific databases, files, forms, reports, inquiries, etc. and their corresponding application programs that will be included in the evaluation.
- Preparing an evaluation task list and schedule.
- Preparing the time and cost estimates needed to conduct the evaluation, including identifying the personnel recommended to perform or participate in the evaluation.
- Preparing a list of any special considerations, schedule changes or unique measurement tools and/or criteria that are applicable to the evaluation.

Deliverable: ***EVALUATION PLAN***

2.20

CONDUCT SCHEDULED SYSTEMS REVIEWS

This task is used as needed to evaluate the efficiency and effectiveness of parts or all of an information system as specified in the evaluation plan. This evaluation should include an overall assessment of the information system's capability to meet the users requirements and expectations.

Activities could include, but are not limited to:

- Executing the evaluation plan.
- Identifying major strong points.
- Identifying major and minor deficiencies.
- Identifying potential enhancements or recommendations that could correct any identified deficiencies.

Deliverable: ***DOCUMENTED EVALUATION FINDINGS***

2.30

RESEARCH AND DOCUMENT ANY NEEDED CHANGES TO THE DATA DICTIONARY

This task will be used as needed to research and document any recommended changes or additions required for the data dictionary.

Activities could include, but are not limited to:

- Identifying new required data elements.
- Preparing definitions for or identifying corrections to information for a data element for such things as: format, content, size, values, structure, edit criteria, and purpose.
- Preparing information on or identifying corrections to information for a data element for such things as: maintenance responsibilities, update responsibilities, and access limitations.
- Identifying new relationships or documenting corrections to defined relationships between data elements.

Deliverable: ***RECOMMENDED REVISIONS DOCUMENTATION***

2.40 RESEARCH AND DOCUMENT ANY NEEDED CHANGES TO FILE STRUCTURES OR DATABASES

This task will be used as needed to research, identify and document required changes to file structures or databases or to identify needed maintenance activities associated with an information system's file structures or databases. For example, this task could be used to identify and document that slow on-line response times are caused by the physical design of one or more existing file structures or databases.

Activities could include, but are not limited to:

- Researching and evaluating database designs, data content and space requirements.
- Researching and evaluating physical file organizations, data content and space requirements.
- Researching and evaluating dependencies, interfaces and timing requirements.
- Documenting any recommended revisions or recommended courses of action.

Deliverable: *RECOMMENDED REVISIONS DOCUMENTATION*

2.50 RESEARCH AND DOCUMENT ANY NEEDED CHANGES TO USER INTERFACES

This task will be used as needed to research, identify and document required changes to existing user interfaces (screens, forms, reports, etc.) or to identify and document the need for new user interfaces.

Activities could include, but are not limited to:

- Researching, evaluating and identifying any additions or needed changes to:
 - input source documents and/or forms;
 - output documents and/or forms;
 - input screens that are used to add, modify or delete information;
 - output inquiry, help, or menu screens;
 - output reports; and
 - other types of user interactions such as voice, LCD display, optical character, touch-tone or debit card usage.
- Preparing recommended revisions documentation.

Deliverable: *RECOMMENDED REVISIONS DOCUMENTATION*

2.60 RESEARCH AND DOCUMENT ANY NEEDED CHANGES TO SYSTEM INTERFACES

This task will be used as needed to research, identify and document required additions or changes to interfaces with other existing or planned systems.

Activities could include, but are not limited to:

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- Researching, evaluating and identifying any additions or needed changes to:
 - messages, flags and communication formats needed for inter-system communication;
 - file interchange formats and interfaces, including timing considerations;
 - input screens that are needed to add, modify or delete inter-system interface information; and
 - protocols needed to interact with other systems.
 - Preparing recommended revisions documentation.

Deliverable: *RECOMMENDED REVISIONS DOCUMENTATION*

2.70

RESEARCH AND DOCUMENT ANY NEEDED CHANGES TO APPLICATION PROGRAM SPECIFICATIONS DOCUMENTATION

This task will be used as needed to research, identify and document required changes to existing application program specification documentation.

Activities could include, but are not limited to:

- Researching, evaluating and identifying any needed additions or changes to:
 - specifications that support on-line transaction processing;
 - specifications that support batch reporting, extracting or updating processes;
 - specifications that support interfaces with other systems;
 - specifications that support ad hoc, decision support, and forms generation requirements; and
 - specifications that support other types of user interfaces or interactions.
- Preparing recommended revisions documentation.

Deliverable: *RECOMMENDED REVISIONS DOCUMENTATION*

2.80 RESEARCH AND DOCUMENT ANY NEEDED CHANGES TO BACK-UP & RECOVERY SPECIFICATIONS DOCUMENTATION OR PROCEDURES

This task will be used as needed to research, identify and document required changes or additions to existing back-up and recovery specifications. Changes or additions could include such things as data backup, frequency of backups, retention requirements, and appropriate data recovery procedures.

Activities could include, but are not limited to:

- Researching, evaluating and identifying any needed changes or additions to specifications concerning automated data backup, frequency of such backups, and retention requirements.
- Researching, evaluating and identifying any needed changes or additions to the retention requirements for source documents or system output reports or forms.
- Researching, evaluating and identifying any needed changes or additions to information system recovery requirements, documentation or procedures.
- Preparing recommended revisions documentation.

Deliverable: ***RECOMMENDED REVISIONS DOCUMENTATION***

2.90 RESEARCH AND DOCUMENT ANY NEEDED CHANGES TO INFORMATION SECURITY DOCUMENTATION OR PROCEDURES

This task will be used as needed to research, identify and document required changes or additions to existing security requirements, specifications and procedures. Any recommended changes or additions must meet the Commonwealth's ITRM Information Security Policy, Standards and Guidelines and the agency's corresponding ITRM Security Program.

Activities could include, but are not limited to:

- Researching, evaluating and identifying any needed changes or additions to existing security and confidentiality requirements.
- Researching, evaluating and identifying any needed changes or additions to existing security specifications.
- Researching, evaluating and identifying any needed changes or additions to security procedures.
- Preparing recommended revisions documentation.

Deliverable: ***RECOMMENDED REVISIONS DOCUMENTATION***

2.100 RESEARCH AND DOCUMENT ANY NEEDED CHANGES TO USER DOCUMENTATION

This task will be used as needed to research, identify and document required changes or additions to user documentation. This should include any additional information needed to train and support user personnel during implementation of any recommended changes.

Activities could include, but are not limited to:

- Researching, evaluating and identifying any needed changes or additions to user instruction documentation.
- Preparing training support materials to implement the changes.
- Preparing recommended revisions documentation.

Deliverable: ***RECOMMENDED REVISIONS DOCUMENTATION***

2.110 RESEARCH AND DOCUMENT ANY NEEDED CHANGES TO OPERATIONS DOCUMENTATION

This task will be used as needed to research, identify and document required changes or additions to operations documentation. This should include any additional information needed to train and support operations personnel during implementation of any recommended changes.

Activities could include, but are not limited to:

- Researching, evaluating and identifying any needed changes or additions to operations documentation.
- Preparing training support materials to implement the changes.
- Preparing recommended revisions documentation.

Deliverable: ***RECOMMENDED REVISIONS DOCUMENTATION***

2.120 DEVELOP UNIT, SYSTEM AND INTEGRATED SYSTEMS TEST PLAN

This task will be used as needed to develop a test plan that will meet all testing requirements for unit, systems and integrated systems testing purposes for a request. For routine requests associated with the upgrading of hardware or operating systems software, the identification of application programs and information systems that must be tested and the corresponding development of appropriate test plans may be the only task that needs to be accomplished in this phase. The test plan must address all the testing requirements needed by the developer to ensure that the system or application program(s) will perform as specified. This plan must also address all requirements for user acceptance testing.

Activities could include, but are not limited to:

- Developing a unit test plan for each impacted application program identified during research and analysis, including:
 - defining the levels of testing to be performed and the sources and types of test data required;

- preparing a unit testing schedule which identifies needed equipment and the personnel responsible for the testing; and
- preparing documentation that defines the anticipated and critical test results.
- Developing a systems test plan for each impacted information system identified during research and analysis, including:
 - defining the levels of testing to be performed and the sources and types of test data required;
 - preparing the testing schedule which identifies the application programs to be tested, the needed equipment and the personnel responsible for the testing; and
 - preparing documentation that defines the anticipated and critical test results.
- Developing an integrated systems test plan as needed, including:
 - defining the levels of testing to be performed and the sources and types of test data required;
 - preparing the testing schedule which identifies the application programs to be tested, other information systems applications programs to be tested, the needed equipment and the personnel responsible for the testing; and
 - preparing documentation that defines the anticipated and critical test results.

Deliverable: UNIT, SYSTEM & INTEGRATED SYSTEMS TEST PLAN

2.130 Mandatory

COMPLETE ANALYSIS EVALUATION DOCUMENTATION

This task is used to prepare the analysis evaluation documentation and to obtain any necessary approvals to proceed with the recommended course of action. The analysis evaluation documentation includes the recommendations, and the results of the research, analysis or evaluation work performed for a specific emergency or routine request.

Activities could include, but are not limited to:

- Preparing a summary of the identified changes that must be accomplished to meet the requirements defined in the request.
- Preparing any recommendations deemed necessary.
- Reviewing and as needed revising the project plan's tasks, activities, deliverables and estimates to support the identified changes and recommendations.
- Submitting documentation and obtaining any necessary approvals to proceed.

Given the nature and timing of emergency requests, it may be necessary to fix a problem and restore the program or information system to a production mode prior to receiving formal approval as required in this task. Deliverables and approvals associated with emergency requests will be completed at the earliest possible time.

The results of the analysis and the scope of the recommendations in the analysis evaluation report may indicate the need to establish a separate development or enhancement project.

Deliverable: ANALYSIS EVALUATION DOCUMENTATION

Deliverable: *WRITTEN APPROVALS*

PHASE 3: MODIFICATION

This phase covers the tasks, activities and deliverables normally associated with the physical modification and enhancement of an existing information system. Work performed in this phase will be based on the documentation and recommendations in the *Analysis Evaluation Documentation*. Recommended maintenance or enhancements could range from compiling and testing all applications programs in an information system to accommodate a software upgrade, to fixing a latent error in a single program, or correcting and distributing users or operations instructions revisions. Changes must be documented appropriately.

Depending on the work performed, one or more of the optional deliverables should be applicable outputs of this phase. This phase provides for the following:

Optional DELIVERABLES

- Revised Data Dictionary
- Revised Physical Files and/or Databases
- Application Programs Source Code
- Application Programs Executable Code
- Tested Application Programs Executable Code with Documented Test Results
- Revised User Instructions Documentation
- Revised Operations Instructions Documentation
- Training Plan
- Pre-production Verification Criteria and Plan
- Pre-production Verification Data

Task Number

Tasks/Activities

3.10

MODIFY THE DATA DICTIONARY

This task will be used as needed to make any required changes to the data dictionary.

Activities could include, but are not limited to:

- Adding new data elements.
- Entering corrections or changes to information for a data element for such things as: format, content, size, values, structure, edit criteria, and purpose.
- Entering corrections or changes to information for a data element for such things as: maintenance responsibilities, update responsibilities, and access limitations.
- Entering corrections or changes to define relationships between data elements.

Deliverable: *REVISED DATA DICTIONARY*

3.20 MODIFY INFORMATION TECHNOLOGY ENVIRONMENT

This task is used as needed to change the operating environment (hardware, operating systems, database management systems, etc.). Changes to the environment must be subjected to acceptance testing.

Activities could include, but are not limited to:

- Coordinating the installation of new information technology resources.
- Designing acceptance test criteria.

3.30 TEST INFORMATION TECHNOLOGY ENVIRONMENT

This task is used as needed to subject the agency's revised operating environment to acceptance testing.

Activities could include, but are not limited to:

- Generating the test data and performing the acceptance testing.
- Verifying the suitability, completeness and accuracy of the information technology environment.

3.40 GENERATE PHYSICAL FILE STRUCTURES

This task will be used as needed to create new physical file structure(s) or to change existing/purchased file structures.

Activities could include, but are not limited to:

- Changing database designs and generating physical databases.
- Creating new or changing existing system files or tables.

Deliverable: *PHYSICAL FILES AND/OR DATABASES*

3.50 GENERATE APPLICATION PROGRAMS

This task will be used as needed to create new application programs, modify existing application programs, or to customize/modify purchased software and generate the corresponding executable code. The amount of effort required to generate application programs is dependent on the number and complexity of programs to be created or changed and the availability, selection and use of systems development methodologies, tools and techniques. Depending on the systems development methodologies, tools and techniques used, application source code may also be an appropriate deliverable for this task.

Activities could include, but are not limited to:

- Completing application programs specification documentation.
- Developing new or modified application programs code.
- Generating machine executable code.

Deliverable: *APPLICATION PROGRAMS SOURCE CODE*

Deliverable: ***APPLICATION PROGRAMS EXECUTABLE CODE***

3.60 PERFORM UNIT APPLICATION PROGRAM TESTING

This task will be used to test each new or changed application program for accuracy, completeness and reasonableness to ensure that it performs in accordance with the specifications and requirements. There are four (4) steps to this task: preparing for the test; conducting the test; measuring the results of the test; and, as required, modifying the program and performing another test iteration. User acceptance testing must be accomplished as a test iteration of this task or as part of the separate task provided for in the next phase.

Activities could include, but are not limited to:

- Preparing for the test as indicated and scheduled on the Unit, System and Integrated Systems Test Plan including:
 - verifying the availability of interfacing files, programs, and support software; and
 - preparing test data which checks normal conditions, error conditions, recovery capabilities, security factors, and timing requirements.
- Conducting the test by executing each program according to its unit test plan.
- Measuring and evaluating the test results including:
 - verifying that each application program performs as specified; and
 - obtaining appropriate approvals for task completion.
- Modifying the program and its corresponding user/operations documentation and performing the necessary retests to verify that all identified problems or errors have been resolved.

Deliverable: ***TESTED APPLICATION PROGRAMS EXECUTABLE CODE WITH DOCUMENTED TEST RESULTS AND APPROPRIATE USER APPROVALS***

3.70 MODIFY USER DOCUMENTATION

This task will be used as needed to finalize changes or additions to the user instructions documentation.

Activities could include, but are not limited to:

- Developing, updating and/or finalizing the content and format of changed user instructions. Change examples include such things as:
 - revised sign on or off procedures;
 - revised or new transaction codes;
 - revised or new sample documents, forms, reports, or screens;
 - revised data input edit criteria; and
 - revised or new procedures for handling error or failure conditions.

Deliverable: ***USER INSTRUCTIONS DOCUMENTATION***

3.80 MODIFY OPERATIONS DOCUMENTATION

This task will be used as needed to finalize changes or additions to the operations instructions documentation.

Activities could include, but are not limited to:

- Developing, updating and/or finalizing the content and format of changed operations instructions. Change examples include such things as:
 - revised or new run instructions;
 - revised or new procedures for error codes and corrections;
 - revised or new work flows, including sample output reports with the appropriate distribution lists; and
 - revised or new back-up and recovery instructions.

Deliverable: *OPERATIONS INSTRUCTIONS DOCUMENTATION*

3.90 DEVELOP TRAINING PLAN

This task will be used as needed to identify additional training requirements and to develop a corresponding training plan.

Activities could include, but are not limited to:

- Determining training requirements including:
 - who must be trained (management, users, operations and maintenance staff);
 - what type of training is needed for each group;
 - the contents of the training for each group;
 - where the training will take place;
 - what equipment and facilities will be required; and
 - who will conduct the training.
- Preparing a user training plan that includes tasks, schedules, controls, responsible personnel and personnel to be trained.

Deliverable: *TRAINING PLAN*

3.100 DEVELOP PRE-PRODUCTION VERIFICATION CRITERIA AND PLAN

This task will be used as needed to develop verification criteria and a plan to ensure that all programs, files and databases have been established in the production environment properly.

Activities could include, but are not limited to:

- Identifying and documenting the specific functions that must be verified. Examples include such things as:
 - on-line transactions codes must be properly registered and executable; and

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- add, retrieve, modify and delete actions should be verified for all record types in the system's file structures.
 - Identifying the sources and types of data that are needed to verify the specific functions.
 - Defining and developing the verification data.
 - Developing the verification plan.

Deliverable: *PRE-PRODUCTION VERIFICATION CRITERIA & PLAN*

Deliverable: *PRE-PRODUCTION VERIFICATION DATA*

PHASE 4: TESTING AND IMPLEMENTATION

This phase covers the tasks, activities and deliverables associated with the testing and implementation of all or parts of an information system(s) as a result of changes to the information system(s) or its operating environment. Necessary systems and integrated systems testing, and a pre-production verification process are performed to ensure that the information system performs as specified prior to placing it into a production mode.

The results of the testing in this phase, the degree of change to an information system(s) or its operating environment may indicate the need to perform an overall information systems review. If such a review is desirable, a routine request should be developed and submitted for planning and scheduling purposes.

This phase provides for the following:

Mandatory **DELIVERABLES**

- Documented Pre-Production Verification Results
- User Acceptance Test Documentation and Approvals
- Written Approval to Implement Changed System or Environment
- Production Information System(s)
- Written Implementation Complete Approvals

Conditional
Mandatory **DELIVERABLES**

- Tested Information System with Documented Test Results
- Tested Integrated Information System with Documented Test Results
- Pre-production Verification Documentation
- Documented Pre-production Verification Results

**Task
Number**

Tasks/Activities

4.10 Conditional
Mandatory **PERFORM SYSTEM LEVEL TESTING**

This task will be used as needed to perform all system level testing identified as necessary in the Unit, System and Integrated Systems Test Plan. Application programs are tested as a group for accuracy, completeness and reasonableness to ensure that they perform in accordance with the specifications and requirements. There are four (4) steps to this task: preparing for the test; conducting the test; measuring the results of the test; and, as required, modifying the programs and performing another test iteration. User acceptance testing must be accomplished as a test iteration of this task or as part of the separate task provided for in this phase.

Activities could include, but are not limited to:

- Preparing for the test as indicated and scheduled on the Unit, System and Integrated Systems Test Plan including:

-
-
- verifying the availability of interfacing files, programs and support software; and
 - preparing test data which checks such things as;
 - normal conditions,
 - error conditions,
 - recovery capabilities,
 - security factors,
 - timing requirements, and
 - user and operations instructions documentation.
 - Conducting the test by executing all application programs according to the test plan.
 - Measuring and evaluating the test results including:
 - verifying that each application program performs as specified; and
 - obtaining appropriate approvals for task completion.
 - Modifying each program and its corresponding user/operations documentation as needed and performing the necessary retests to verify that all identified problems or errors have been resolved.

Deliverable: **TESTED INFORMATION SYSTEM WITH DOCUMENTED TEST RESULTS AND APPROPRIATE USER APPROVALS**

4.20

Conditional
Mandatory

PERFORM SYSTEM INTEGRATED TESTING

This task will be used as needed to perform all integrated system level testing identified as necessary in the Unit, System and Integrated Systems Test Plan. The application programs are tested to verify that they perform as specified with other information systems. There are four (4) steps to this task: preparing for the test; conducting the test; measuring the results of the test; and, as required, modifying the programs and performing another test iteration. User acceptance testing must be accomplished as a test iteration of this task or as part of the separate task provided for in this phase.

Activities could include, but are not limited to:

- Preparing for the test as indicated and scheduled in the Unit, System and Integrated Systems Test Plan including:
 - verifying the availability of interfacing files, programs and support software; and
 - preparing test data which checks such things as;
 - normal conditions,
 - error conditions,
 - recovery capabilities,

-
-
- security factors,
 - timing requirements,
 - user and operations instructions documentation,
 - input data from other information systems is accurate and can be processed correctly,
 - output data from the new, modified or purchased application programs can be created, accepted and processed correctly by other information systems, and
 - procedures and timing considerations effecting interfaces with other information systems are complete and correct.
- Conducting the test by executing all application programs according to the test plan.
 - Measuring and evaluating the test results including:
 - verifying that each application program performs as specified; and
 - obtaining appropriate approvals for task completion.
 - Modifying each program and its corresponding user/operations documentation as needed and performing the necessary retests to verify that all identified problems or errors have been resolved.

Deliverable: ***TESTED INTEGRATED INFORMATION SYSTEM WITH
DOCUMENTED TEST RESULTS AND APPROPRIATE USER
APPROVALS***

4.30 CONDUCT USER ACCEPTANCE TESTING

This task can be used as needed to conduct user acceptance testing as specified in the Unit, System and Integrated Systems Test Plan. User acceptance testing must be accomplished using this task or as test iterations during the unit, system and/or integrated systems testing tasks.

Activities could include, but are not limited to:

- Preparing for the test as indicated and scheduled on the Unit, System and Integrated Systems Test Plan including:
 - verifying the availability of interfacing files, programs and support software; and
 - preparing test data which checks such things as;
 - normal conditions,
 - error conditions,
 - recovery capabilities,
 - security factors,
 - timing requirements, and
 - user and operations instructions documentation.

- input data from other information systems is accurate and can be processed correctly,
 - output data from the new, modified or purchased application programs can be created, accepted and processed correctly by other information systems, and
 - procedures and timing considerations effecting interfaces with other information systems are complete and correct.
- Conducting the test by executing all application programs according to the test plan.
 - Measuring and evaluating the test results including:
 - verifying that each application program performs as specified; and
 - documenting all variances from expectations in programs or user instructions documentation.

Deliverable: *USER ACCEPTANCE TEST DOCUMENTATION AND APPROVALS*

4.40 *Mandatory*

OBTAIN APPROPRIATE APPROVALS TO IMPLEMENT THE DELIVERABLES INTO THE PRODUCTION ENVIRONMENT

This task requires agency approvals of the deliverables and the approval to proceed with this project.

Activities must include, but are not limited to:

- Presenting all appropriate deliverables for approval.
- Obtaining approval to proceed. This is the agency's formal approval to allocate funds and resources to implement the accepted deliverables into the production environment.

Deliverable: *WRITTEN APPROVALS*

4.50 *Conditional
Mandatory*

PREPARE FOR PRODUCTION

This task will be used as needed to make the final preparations for releasing the revised application system for production use.

Activities could include, but are not limited to:

- Installing and testing any necessary equipment including:
 - coordinating the installation of all required equipment; and
 - coordinating and/or conducting tests of the equipment to verify fault-free operation.
- Implementing any new or revised user organization changes and procedures.
- Training users and operations staff.
- Establishing a production implementation date.
- Establishing a backout strategy.

- Loading the applicable application programs, files and databases into the production environment in preparation for conducting pre-production verifications.

Deliverable: ***PRE-PRODUCTION VERIFICATION DOCUMENTATION***

4.60 *Conditional*
Mandatory **PERFORM PRE-PRODUCTION VERIFICATIONS**

This task will be used as needed to perform all necessary verifications as specified in the pre-production verification plan.

Activities could include, but are not limited to:

- Executing the pre-production verification plan.
- Verifying systems operations and outputs are as specified and as anticipated.
- Reviewing and verifying all pre-production verification results to ensure that the final supporting documentation is complete and that the accepted revised information system is ready to be released for production use. Documentation reviewed during this activity should include such things as:
 - the pre-production check-list;
 - user guides;
 - operations documentation; and
 - information systems documentation.

Deliverable: ***DOCUMENTED PRE-PRODUCTION VERIFICATION RESULTS***

4.70 *Mandatory* **RELEASE SYSTEM FOR PRODUCTION USE**

This task will be used to implement the final procedures and the applicable deliverables into the agency's production environment.

Activities could include, but are not limited to:

- Implementing any new or revised security procedures.
- Establishing a new or revised production schedule.
- Establishing a new or revised reports distribution schedule.
- Implementing new or revised back-up and recovery procedures.
- Establishing new or revised point-of-contact for problem determination and resolution.

Deliverable: ***REVISED PRODUCTION INFORMATION SYSTEM***

4.80 **PERFORM PHASED IMPLEMENTATION**

This task is used as needed to schedule any activities required for the phased implementation of the accepted deliverables.

Activities could include, but are not limited to:

- Installing and testing equipment, as scheduled. Examples of activities include:

-
-
- coordinating the installation of all required equipment; and
 - coordinating and/or conducting tests of the equipment to verify fault-free operation.
 - Implementing new user organization changes and procedures.
 - Training users and operations staff, as scheduled.
 - Loading any needed data into the new or modified files and/or databases, as scheduled.

4.90 *Mandatory* **OBTAIN SIGN-OFF TO CLOSE THE REQUEST.**

This task is used to obtain management's concurrence and approval that all tasks, activities and deliverables associated with an emergency or routine request have been completed.

Activities must include, but are not limited to:

- Presenting all appropriate deliverables for approval.
- Obtaining final approvals on successful implementation.

Deliverable: *WRITTEN IMPLEMENTATION COMPLETE APPROVALS*

INFORMATION SYSTEMS MAINTENANCE AND ENHANCEMENT REQUEST



Assigned Request #

Requestor Identification

Requestor _____ Phone # _____

Organization _____

Date _____ Time _____

Information System/Subsystem _____

Type of Request

Emergency Maintenance

Routine Maintenance

Routine Enhancement

Request Reason

Program failure - Program ID _____

Operations Hardware/Software Change

Impact Analysis for user change or new function

User/Operations Instructions Problem

Hardware/Software/Telecommunications Problem

Information System Review

Other (describe) _____

Request Description

Description of problem, change or need for service _____

Desired Required Completion Date of Request _____

Responsible Project Manager

Request Received Date _____ Project Manager _____

Assigned to _____

Assigned to Date/Time _____ Required Completion Date _____

Analysis Evaluation Report Due _____

Estimated Resource Requirements (hours) _____

State Agency Approvals

Approvals for Routine, Planned or Scheduled Maintenance Requests

- Management Steering Committee Approvals
- IS Committee Approvals
- User Committee Approvals
- Priority

Appendix A - Sample Forms
 INFORMATION SYSTEMS MAINTENANCE AND ENHANCEMENTS REQUEST

Analysis Evaluation Report

Completed by _____ Completed Date _____ Completed on an Emergency Basis
 Time _____

Analysis results - _____

Additional information attached

Recommended Course of Action

Action Required Major Enhancement or Modification Other (explain) _____
 Minor Enhancement or Modification _____
 User or Operations Instructions Change _____
 Additional Training _____
 Extensive Testing _____
 Minor Testing _____

Corrective actions description and recommendations - _____

Additional information attached

State Agency Approvals

Approval to implement corrections or recommendations As a Maintenance/Enhancement Project
 Large-Scope Project
 Small-Scope Project

Authorized by _____
 Authorized Date _____

Testing Completed Date _____

End User Accepted by _____ Date _____

Authorized for Production Use by _____ Date _____

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