MCA Part-II

Paper-XI: Software Engineering

Topic: Software Implementation

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Introduction

Implementation is a process of ensuring that the information system is operational. It involves –

- Constructing a new system from scratch
- Constructing a new system from the existing one.

Implementation allows the users to take over its operation for use and evaluation. It involves training the users to handle the system and plan for a smooth conversion. However, there are many issues related to software implementation or coding that need to be addressed. Many software errors are caused by poor implementation and testing that fails to detect implementation errors; therefore, guidelines and standards for writing clear and secure software have been developed. In addition, prior to the use of dynamic testing techniques, a manual and static review of the code is conducted to remove known vulnerabilities.

Major Tasks

The tasks described in this section are not site-specific, but generic or overall project tasks that are required to install hardware and software, prepare data, and verify the system. Include the following information for the description of each major task, if appropriate:

- What the task will accomplish
- Resources required to accomplish the task
- Key person(s) responsible for the task
- Criteria for successful completion of the task
- Examples of major tasks are the following:
- Providing overall planning and coordination for the implementation
- Providing appropriate training for personnel
- Ensuring that all manuals applicable to the implementation effort are available when needed
- Providing all needed technical assistance
- Scheduling any special computer processing required for the implementation
- Performing site surveys before implementation
- Ensuring that all prerequisites have been fulfilled before the implementation date
- Providing personnel for the implementation team
- Acquiring special hardware or software
- Performing data conversion before loading data into the system
- Preparing site facilities for implementation

A. Implementation Schedule

In this section, provide a schedule of activities to be accomplished during implementation.

Security

If appropriate for the system to be implemented, include an overview of the system security features and requirements during the implementation.

System Security Features

In this section, provide an overview and discussion of the security features that will be associated with the system when it is implemented. It should include the primary security features associated with the system hardware and software. Security and protection of sensitive bureau data and information should be discussed, if applicable. Reference the sections of previous deliverables that address system security issues, if appropriate.

Security During Implementation

This section addresses security issues specifically related to the implementation effort, if any. For example, if LAN servers or workstations will he installed at a site with sensitive data preloaded on non-removable hard disk drives, address how security would be provided for the data on

these devices during shipping, transport, and installation because theft of the devices could compromise the sensitive data.

B. IMPLEMENTATION SUPPORT

This section describes the support software, materials, equipment, and facilities required for the implementation, as well as the personnel requirements and training necessary for the implementation. The information provided in this section is not site-specific. If there arc additional support requirements not covered by the subsequent sections, others may be added as needed.

Hardware, Software, Facilities, and Materials

In this section, list support software, materials, equipment, and facilities required for the implementation, if any.

Hardware

This section provides a list of support equipment and includes all hardware used for testing time implementation. For example, if a client/server database is implemented on a LAN, a network monitor or "sniffer" might be used, along with test programs. to determine the performance of the database and LAN at high-utilization rates. If the equipment is site-specific, list it in Section 4, Implementation Requirements by Site.

Software

This section provides a list of software and databases required to support the implementation. Identify the software by name, code, or acronym. Identify which software is commercial off-the-shelf and which is State-specific. Identify any software used to facilitate the implementation process. If the software is site-specific, list it in Section 4.

Facilities

In this section, identify the physical facilities and accommodations required during implementation. Examples include physical workspace for assembling and testing hardware components, desk space for software installers, and classroom space for training the implementation stall. Specify the hours per day needed, number of days, and anticipated dates. If the facilities needed are site-specific, provide this information in Section 4, Implementation Requirements by Site.

Material

This section provides a list of required support materials, such as magnetic tapes and disk packs.

Personnel

This section describes personnel requirements and any known or proposed staffing requirements, if appropriate. Also describe the training, if any, to be provided for the implementation staff.

Personnel Requirements and Staffing

In this section, describe the number of personnel, length of time needed, types of skills, and skill levels for the staff required during the implementation period. If particular staff members have been selected or proposed for the implementation, identify them and their roles in the implementation.

Training of Implementation Staff

This section addresses the training, if any, necessary to prepare staff for implementing and maintaining the system; it does not address user training, which is the subject of the Training Plan. Describe the type and amount of training required for each of the following areas, if appropriate, for the system:

- System hardware/software installation
- System support
- System maintenance and modification

Present a training curriculum listing the courses that will be provided, a course sequence. and a proposed schedule. If appropriate, identify which courses particular types of staff should attend by job position description.

If training will be provided by one or more commercial vendors, identify them, the course name(s), and a brief description of the course content.

If the training will be provided by State staff, provide the course name(s) and an outline of the content of each course. Identify the resources, support materials, and proposed instructors required to teach the course(s).

Performance Monitoring

This section describes the performance monitoring tool and techniques and how it will be used to help decide if the implementation is successful.

Configuration Management Interface

This section describes the interactions required with the Configuration Management (CM) representative on CM-related issues, such as when software listings will be distributed, and how to confirm that libraries have been moved from the development to the production environment.

C. IMPLEMENTATION REQUIREMENTS BY SITE

This section describes specific implementation requirements and procedures. If these requirements and procedures differ by site, repeat these subsections for each site; if they are the same for each site, or if there is only one implementation site, use these subsections only once. The "X" in the subsection number should be replaced with a sequenced number beginning with I. Each subsection with the same value of "X" is associated with the same implementation site. If a complete set of subsections will be associated with each implementation site, then "X" is assigned a new value for each site.

Site Name or identification for Site X

This section provides the name of the specific site or sites to be discussed in the subsequent sections.

Site Requirements

This section defines the requirements that must he met for the orderly implementation of the system and describes the hardware, software, and site-specific facilities requirements for this area.

Any site requirements that do not fall into the following three categories and were not described in Section 3, Implementation Support, may be described in this section, or other subsections may be added following Facilities Requirements below:

- Hardware Requirements - Describe the site-specific hardware requirements necessary to support the implementation (such as. LAN hardware for a client/server database designed to run on a LAN).

- Software Requirements - Describe any software required to implement the system (such as, software specifically designed for automating the installation process).

- Data Requirements - Describe specific data preparation requirements and data that must be available for the system implementation. An example would be the assignment of individual IDs associated with data preparation.

- Facilities Requirements - Describe the site-specific physical facilities and accommodations required during the system implementation period. Some examples of this type of information are provided in Section *3.*

Site implementation Details

This section addresses the specifics of the implementation for this site. Include a description of the implementation team, schedule, procedures, and database and data updates. This section should also provide information on the following:

- Team--If an implementation team is required, describe its composition and the tasks to be performed at this site by each team member.

- Schedule--Provide a schedule of activities, including planning and preparation, to be accomplished during implementation at this site. Describe the required tasks in chronological order with the beginning and end dates of each task. If appropriate, charts and graphics may be used to present the schedule.

- Procedures--Provide a sequence of detailed procedures required to accomplish the specific hardware and software implementation at this site. If necessary, other documents may be referenced. If appropriate, include a step-by-step sequence of the detailed procedures. A checklist of the installation events may he provided to record the results of the process.

If the site operations startup is an important factor in the implementation, then address startup procedures in some detail. If the system will replace an already operating system, then address the startup and cutover processes in detail. If there is a period of parallel operations with an existing system, address the startup procedures that include technical and operations support during the

parallel cycle and the consistency of data within the databases of the two systems.

- **Database**--Describe the database environment where the software system and the database(s), if any, will be installed. Include a description of the different types of database and library environments (such as, production, test, and training databases).

- Include the host computer database operating procedures, database file and library naming conventions, database system generation parameters, and any other information needed to effectively establish the system database environment.

- Include database administration procedures for testing changes, if any, to the database management system before the system implementation.

- **Data Update**--If data update procedures are described in another document, such as the operations manual or conversion plan, that document may be referenced here. The following are examples of information to be included:

    - Control inputs
    - Operating instructions
    - Database data sources and inputs
    - Output reports
    - Restart and recovery procedures

i. Back-Off Plan

This section specifies when to make the go/no go decision and the factors to be included in making the decision. The plan then goes on to provide a detailed list of steps and actions required to restore the site to the original, pre-conversion condition,

ii. Post-Implementation Verification

This section describes the process for reviewing the implementation and deciding if it was successful. It describes how an action item list will be created to rectify any noted discrepancies. It also references the Back-Off Plan for instructions on

how to back-out the installation, if, as a result of the post-implementation verification, a no-go decision is made.

Software Implementation Challenges

There are some challenges faced by the development team while implementing the software. Some of them are mentioned below:

- **Code-reuse** - Programming interfaces of present-day languages are very sophisticated and are equipped huge library functions. Still, to bring the cost down of end product, the organization management prefers to re-use the code, which was created earlier for some other software. There are huge issues faced by programmers for compatibility checks and deciding how much code to re-use.

- **Version Management** - Every time a new software is issued to the customer, developers have to maintain version and configuration related documentation. This documentation needs to be highly accurate and available on time.

- **Target-Host** - The software program, which is being developed in the organization, needs to be designed for host machines at the customers end. But at times, it is impossible to design a software that works on the target machines.

Implementation method

Software implementation is a systematically structured approach to effectively integrate a software based service or component into the workflow of an organizational structure or an individual end-user. A product software implementation method is a blueprint to get users and/or organizations running with a specific software product.

The method is a set of rules and views to cope with the most common issues that occur when implementing a software product: business alignment from the organizational view and acceptance from human view.

7.6 Training

The personnel in the system must know in detail what their roles will be, how they can use the system, and what the system will or will not do. The success or failure of well designed and technically elegant systems can depend on the way they are operated and used.

Training Systems Operators

Systems operators must be trained properly such that they can handle all possible operations, both routine and extraordinary. The operators should be trained in what common malfunctions may occur, how to recognize them, and what steps to take when they come.

Training involves creating troubleshooting lists to identify possible problems and remedies for them, as well as the names and telephone numbers of individuals to contact when unexpected or unusual problems arise.

Training also involves familiarization with run procedures, which involves working through the sequence of activities needed to use a new system.

User Training

- End-user training is an important part of the computer-based information system development, which must be provided to employees to enable them to do their own problem solving.
- User training involves how to operate the equipment, troubleshooting the system problem, determining whether a problem that arose is caused by the equipment or software.
- Most user training deals with the operation of the system itself. The training courses must be designed to help the user with fast mobilization for the organization.

Training Guidelines

- Establishing measurable objectives
- Using appropriate training methods
- Selecting suitable training sites
- Employing understandable training materials

Training Methods

Instructor-led training

It involves both trainers and trainees, who have to meet at the same time, but not necessarily at the same place. The training session could be one-on-one or collaborative. It is of two types –

Virtual Classroom

In this training, trainers must meet the trainees at the same time, but are not required to be at the same place. The primary tools used here are: video conferencing, text based Internet relay chat tools, or virtual reality packages, etc.

Normal Classroom

The trainers must meet the trainees at the same time and at the same place. They primary tools used here are blackboard, overhead projectors, LCD projector, etc.

Self-Paced Training

It involves both trainers and trainees, who do not need to meet at the same place or at the same time. The trainees learn the skills themselves by accessing the courses at their own convenience. It is of two types –

Multimedia Training

In this training, courses are presented in multimedia format and stored on CD-ROM. It minimizes the cost in developing an in-house training course without assistance from external programmers.

Web-based Training

In this training, courses are often presented in hyper media format and developed to support internet and intranet. It provides just–in-time training for end users and allow organization to tailor training requirements.

Conversion Method

It is a process of migrating from the old system to the new one. It provides understandable and structured approach to improve the communication between management and project team.

Conversion Plan

It contains description of all the activities that must occur during implementation of the new system and put it into operation. It anticipates possible problems and solutions to deal with them.

It includes the following activities –

- Name all files for conversions.
- Identifying the data requirements to develop new files during conversion.
- Listing all the new documents and procedures that are required.
- Identifying the controls to be used in each activity.
- Identifying the responsibility of person for each activity.
- Verifying conversion schedules.

Conversion Methods

The four methods of conversion are –

- Parallel Conversion
- Direct Cutover Conversion
- Pilot Approach
- Phase-In Method

Method	Description	Advantages	Disadvantages
Parallel Conversion	Old and new systems are used simultaneously.	Provides fallback when new system fails. Offers greatest security and ultimately testing of new system.	Causes cost overruns. New system may not get fair trail.
Direct Cutover Conversion	New system is implemented and old system is replaced completely.	Forces users to make new system work Immediate benefit from new methods and control.	No fall back if problems arise with new system Requires most careful planning

Pilot Approach	Supports phased approach that gradually implement system across all users	Allows training and installation without unnecessary use of resources. Avoid large contingencies from risk management.	A long term phasein causes a problem of whether conversion goes well or not.
Phase-In Method	Working version of system implemented in one part of organization based on feedback, it is installed throughout the organization all alone or stage by stage.	Provides experience and line test before implementation When preferred new system involves new technology or drastic changes in performance.	Gives impression that old system is erroneous and it is not reliable.

File Conversion

It is a process of converting one file format into another. For example, file in WordPerfect format can be converted into Microsoft Word.

For successful conversion, a conversion plan is required, which includes –

- Knowledge of the target system and understanding of the present system
- Teamwork
- Automated methods, testing and parallel operations
- Continuous support for correcting problems
- Updating systems/user documentation, etc

Many popular applications support opening and saving to other file formats of the same type. For example, Microsoft Word can open and save files in many other word processing formats.

Post-Implementation Evaluation Review (PIER)

PIER is a tool or standard approach for evaluating the outcome of the project and determine whether the project is producing the expected benefits to the processes, products or services. It enables the user to verify that the project or system has achieved its desired outcome within specified time period and planned cost.

PIER ensures that the project has met its goals by evaluating the development and management processes of the project.

Objectives of PIER

The objectives of having a PIER are as follows –

- To determine the success of a project against the projected costs, benefits, and timelines.
- To identify the opportunities to add additional value to the project.
- To determine strengths and weaknesses of the project for future reference and appropriate action.
- To make recommendations on the future of the project by refining cost estimating techniques.

The following staff members should be included in the review process –

- Project team and Management
- User staff
- Strategic Management Staff
- External users