U.S. DEPARTMENT OF COMMERCE
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NISTIR 4413

National PDES Testbed
Report Series

Development Plan

Configuration Management Systems and Services

NATIONAL PDES TESTBED

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Development Plan

Configuration Management Systems and Services

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U.S. DEPARTMENT OF COMMERCE
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National Institute of Standards and Technology
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Preface

This document describes a plan to establish configuration management systems and services to serve the needs of both international and national efforts. The National PDES Testbed was established at the National Institute of Standards and Technology (NIST) in 1988 under the sponsorship of the U.S. Department of Defense Computer-aided Acquisition and Logistic Support (CALS) program. A major goal of the Testbed is to provide technical leadership in a national effort to implement a complete and useful specification for the exchange of product data. This specification must be designed to meet the needs of American industry and the CALS program.

The National PDES Testbed supports and actively participates in the international effort to develop the Standard for the Exchange of Product Model Data (STEP). The STEP development effort is lead by the International Organization for Standardization (ISO) TC184/SC4.

This plan describes one of several technical project threads that have been established for the National PDES Testbed. Other threads address such areas as:

- development of testing systems to validate the proposed standard,
- specification and testing of application protocols,
- construction of a prototype STEP-based manufacturing cell,
- establishment of a product data exchange network, and
- development of conformance testing systems.

The level of support provided for these technical threads and others will be determined by sponsor needs and a number of different priorities. As such, the development plan contained within this document outlines a reasonable schedule to accomplish the objectives of the thread. Changes in priorities and levels of support may either accelerate or delay the proposed schedule. This plan will be updated periodically to reflect technical changes in the project, current level of effort, and expected continued support.

Charles R. McLean
CALS PDES Project Manager
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Executive Summary

The process of developing an international standard involves the creation and management of thousands of documents and computer programs. Knowing which documents and computer programs are up to date, and which are obsolete, is critical to the development process. Configuration management provides the fundamental operational capability for tracking and maintaining versions of documents and software. This plan outlines the major functional areas, goals, and objectives of the configuration management functions to be performed by the Information Services Center (ISC) of the National PDES Testbed (NPT) at the National Institute of Standards and Technology (NIST). These services support the development of STEP, and will be undertaken in coordination with participating organizations.

The development of STEP is an enormous and very complex task. The STEP standard is divided into "Parts," pertaining to different technical areas. Standard development includes the writing of the Parts of the standard, the testing of the concepts put forth in the standard, the development of software to support that testing, and the subsequent revision of the Parts to make them technically correct and consistent with each other. The task is all the more complicated because of the many organizations involved. These include the IGES/PDES organization (IPO), PDES Inc., ISO (International Organization for Standardization), and the NPT.

One of the major categories of information to be configured is the developing STEP standard itself. Progressive versions of each Part of the STEP standard must be kept under configuration management. Read access must be provided to all interested parties, but write access must be strictly controlled to avoid conflicting versions and unintentional overwrites.

Software used in support of implementations of STEP must also be placed under revision control. As developers implement the proposed standard, they must be able to call upon known and tested software components which they may use as building blocks of their own modules. The software development process consists of an interlinked network of modules with many interdependencies. The configuration management system must keep track of these modules and their relationships.

As the central organization responsible for the maintenance of the many documents and software modules supporting STEP development, the ISC must be concerned with and prepared to handle configuration management issues. The systems available at the testbed must be capable of keeping track of versions that develop along different paths, and providing security so that revisions occur in a controlled manner.

1 Goals and Objectives

The primary goal of configuration management (CM) is to provide an orderly framework within which the development of the STEP standard can take place. In support of this goal, CM must provide coordination mechanisms for the organizations involved in STEP development, and must also provide certain basic CM functions.

There are four organizations involved in the development of STEP: ISO (International Organization for Standardization), IPO (IGES/PDES Organization), PDES, Inc., and the NPT (National PDES Testbed). These organizations have various types of information that must be maintained under CM, including documents, computer programs, and diagrams. Because of the geographic and organizational diversity of the project, a carefully coordinated CM system is needed.

The CM system must provide certain basic services to its users. The CM system must keep track of the progressing versions of documents and software modules, and their relationships and interdependencies. Each of the participating organizations must be able to query the system for status updates, view and copy all the latest materials, and contribute updated versions of their own work. CM provides a structure which allows update access only to authorized individuals, and ensures that only one user can change an item at a time, so that conflicting versions do not arise. CM also provides a historical log of the development of each document and software module. Certain information, such as the date and time each item is accessed, user name, and type of access granted, is kept by the computerized system. Other information, such as comments explaining the reasons for changes, must be provided by the users. The incorporation of such a structure to the standards development process must be accomplished with maximum efficiency, yet with minimal imposition on the users.

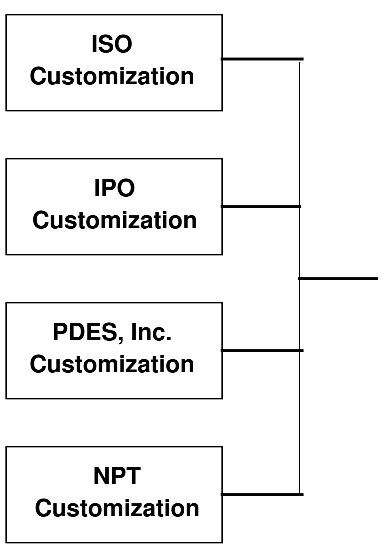
Before obtaining software to implement a CM system, the requirements of each organization need to be understood. The CM system must be based on the defined procedures of each organization, be that a document approval process or a software testing and integration process. The ISC will work with each organization to define CM procedures, and will then develop systems which address each organizations' requirements. This will result in an orderly mechanism to develop and identify both documents and software.

2 Configuration Management Overview

The ISC will provide configuration management services to four organizations: the International Organization for Standardization (ISO), PDES, Inc., the IGES/PDES Organization (IPO), and the National PDES Testbed (NPT).

Two categories of information will be controlled: 1) documents, and 2) software. In the future, product models, which include some graphical presentations, may also be configured. Some user groups have both documents and software modules that need to be configured; others have only documents, or only software.

FIGURE 1. **Functional View of the Configuration Management System**



Implementing a successful and productive configuration management service requires an understanding of the development processes. These include document approval processed and software testing and integration procedures. The configuration management staff of the ISC will work closely with each of the four user organizations in defining requirements. The first step of this process involves learning how the organizations are now handling document and software updates, and what problems they are encountering. A careful analysis of the user environment against good configuration management practices should yield a more productive set of procedures. The agreed-upon procedures can then be further facilitated by incorporating them into a computerized CM system. This will increase reliability and improve communications.

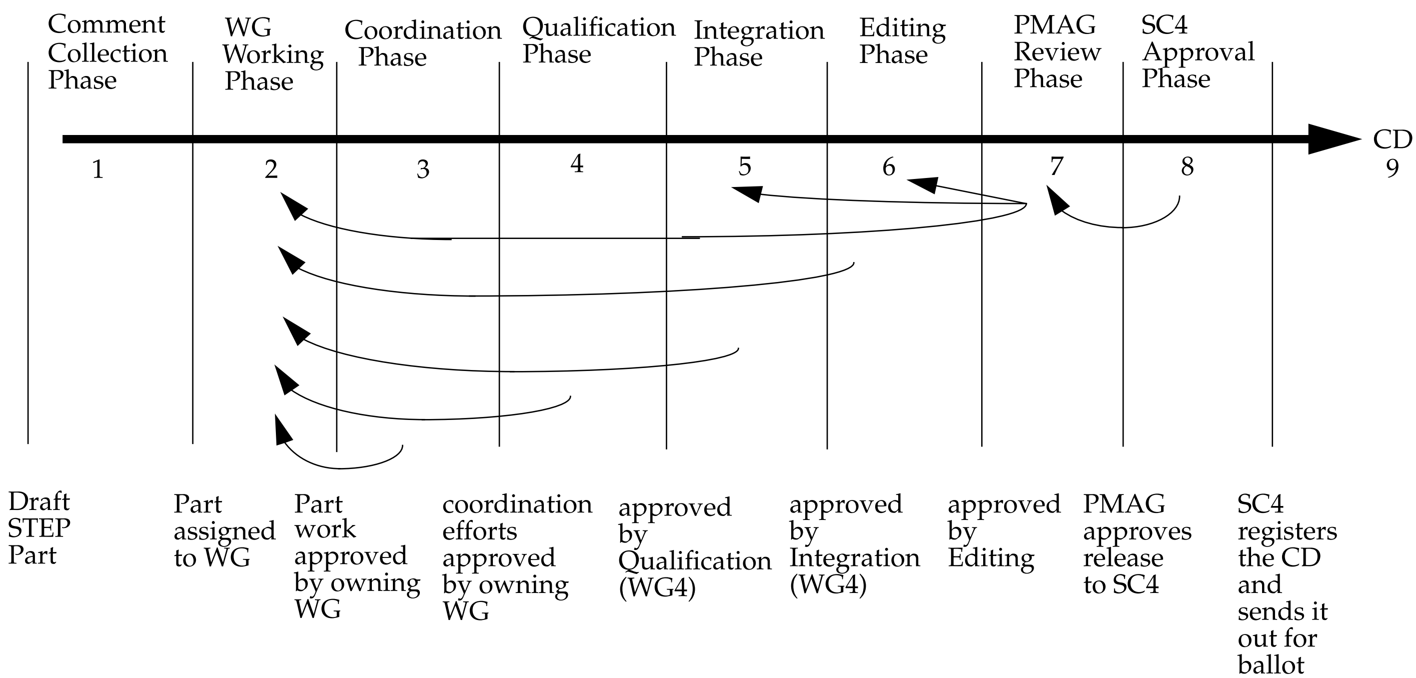
Procedural Issues

Aside from the technical systems and interfaces which must be in place to configure documents, there must also be a set of procedures in place to send the documents through the approval process.

The work undertaken by all of these organizations is intertwined at many levels. Managerial and technical issues cross organizational boundaries, and clear interfaces with explicit communication mechanisms must be identified. Each organization must define its own procedures. Yet, each must communicate with the others and provide input and/or feedback to the others. Since the end goal of the STEP development process is a formal international standard, the ISO procedures for the management of the STEP documents themselves will be implemented first. This will provide a model of services to be implemented for the other organizations.

The illustration below highlights the current proposal to ISO for its approval process for STEP documents. Key points are the fact that there is a distinct event that must take place to promote each document into the next phase, and the requirement that only the owning WG may actually make changes to a Part (reviewers make suggestions separately, but do not have update access to the actual Part). This illustration serves as an example of the type of requirements analysis that must be done for the other user groups as well. Definitions for terms and acronyms used can be found in the glossary at the end of this plan.

FIGURE 2. **STEP Documents Configuration Management Flow (proposed)**



Notes: a. Each numbered Phase represents one to many versions of a STEP Part (including all of its Part files) that are stored on-line under the configuration management system.

b. Each vertical bar represents the action necessary to promote the Part from one phase to the next.

c. During each phase, the Part files may be checked in and out many times; however, the promotion points (vertical bars) pertain to the entire Part, and require appropriate signature authority.

d. At any time during the life cycle of a Part, that Part may be returned to the owning WG for re-work (e.g. if it is not approved by the Editing Committee.)

Technical Issues

The technical challenges involved in the development of a good CM system include ease of use, reliability, security, and remote access.

The CM system must be easy to learn and easy to use. It should use terminology and interface methods that are familiar to the users. Using the CM system should be made preferable to not using it.

It is important that the CM system clearly identify the documents and software modules under its control. The system must be reliable both in terms of on-line availability and in terms of accuracy of document and computer program storage and retrieval.

The CM system will provide certain access restrictions, but it is important to note that it will not provide a full-blown security system. Read and write access may be defined by the users on an item by item basis. Furthermore, promotion points (raising the status of a document or program to the next level) will require proper approval, as defined within the context of each organization.

Users of the CM systems are distributed all over the world. Access for users throughout the U.S. and Europe must be considered. Mechanisms must be put into place which meets these users needs. In addition, the cost of usage must be minimal as we are dealing primarily with a collection of volunteer technical experts.

Our solution at the present time is to provide electronic mail (e-mail) access as well as direct modem access. E-mail is a low cost access mechanism which can be enhanced by the use of an "archive server." Users would send e-mail messages to the NPT archive server.The archive server can interpret commands, sent in the mail messages, and interface with the CM system to carry out those commands. The archive server can then send responses or entire files back to the user via e-mail.

Direct modem access can also be installed. To use direct modem access, remote users would simply dial in to the NIST modem pool, and be able to submit commands directly to the configuration management system as if they were local users. File transfers or simple information requests can be accomplished with either e-mail or modem access method.

How will the Configuration Management System be Used?

1. Management of Documents for ISO

The following paragraphs illustrate how the configuration management system will function with the archive server in the context of an ISO committee.

> The development of STEP is taking place within ISO under the auspices of TC184/SC4. This large and geographically diverse organization contains many individuals responsible for the progression of documents. The STEP standard is divided into Parts, and each Part may contain many documents. Each document is assigned ownership, and only the document owner may make changes to that document, although other reviewers may suggest changes.
>
> In the configuration management system, any user can read any document, and the comments submitted against it. However, only the document owner can check out a document for update purposes.
>
> First, a document owner sends an electronic mail request to the NPT archive server to view all the comments against the document, and to check out the latest copy of the document for read-only purposes. The archive server reads its mail, and interfaces with the configuration management system to fulfill the request. The archive server then mails the result back to the requestor. The document owner decides on the necessary changes to the document, based on the comments, and on general technical coherence. Then, to check out the document for update purposes, the document owner would send an electronic mail request to the NPT archive server. When the document owner has finished editing the document, he or she sends another electronic mail message back to the archive server, to check in the revised document. If desired, a command may also be submitted to the archive server to send copies of the new document version to all members of the committee. This electronic mail mechanism is also used to obtain feedback from other committee members, such as voting to decide if a Part is ready to progress to the phase in the configuration management flow (see Figure 2).

2. Management of Software for Developers

The following paragraphs illustrate the use of a revision control system in software development:

> The NPT builds many software tools, which are used in various stages of product model testing. For instance, the STEP database schemas are described in an language called EXPRESS. Each EXPRESS file is compiled into an EXPRESS Working Form, using a compiler built in the Testbed. To populate a particular database schema with the data for a specific manufactured part, another tool must be used. A third tool is used to edit the resulting STEP file.

It is important that the software tools used are consistent with each other. If a particular tool is being worked on by a developer, then it must be tested in a known environment. The configuration management system is responsible for providing distinct environments for model testing as well as for tool development. In addition, during the development process, the CM system stores the progressing versions of each tool, and defines matched sets of the tools. The developers can then easily identify existing matched sets, and define new sets as they are tested.

3 Development Plan

The configuration management systems and services provided by the ISC are simply services for four organizations. All the tasks and functions described in the development plan below are aimed at meeting functional requirements of these four organizations. Configuration management is, a difficult problem because it reflects organizational procedures and processes as much as it is deals with technical problems.

Providing CM services to the various organizations will require significant resources and interaction with the management structure of each organization. It is important to note the backdrop against which the processes of CM will occur. All of the organizations have and some still are undergoing various forms of internal reorganization. While everyone recognizes the importance of CM, clear statements as to the exact form that CM is to take are not easy to locate. The tasks are large and sometimes illdefined, and the structure within which each of them must function is fluid. CM can provide some structure and serve as a focal point to aid in the management and technical development of tasks for each organization. CM is as much a definition and breakdown of organizational procedures as it is technical systems development.

In light of this background there are a number of common elements when looked at from the point of view of the two broad domains of document and software CM. An additional third domain, information models, must also be configured but is not being handled at this time by the various organizations.

4 Approach for Implementing the CMS

The tasks to be accomplished in complete implementation of the CMS can be viewed in five stages. 1) Development and implementation of an interim CM system to meet immediate need; 2) Planning, background research and requirements analysis; 3) Design, development and implementation of a core CM system; 4) Customization of core CM system for each of four organizations; 5)Integration, production and training. The approach to be taken in accomplishing these five stages of the project is outlined below.

Due to the pressing needs of the user organizations, an interim configuration management system will be put into place to support the work already in progress. This interim system will provide adequate functionality to create baseline documents and software releases, including basic functions of checking in and checking out documents and software modules. Brief user instructions for dial-in access and use of the system will be provided in the Interim CM Procedure Guide, a deliverable called forth in the Configuration Management Systems and Services Development Plan.

As soon as the interim system is functional, the ISC will commence a thorough requirements analysis and design effort towards the development of a more functional and flexible long term system. This will require careful coordination with each user organization. To this end, the ISC has requested that each of the four user organizations appoint a configuration manager. The person in this role will serve two important functions: first, as a single contact point for the NIST ISC manager, so that the NIST configuration management effort can get a unified view of requirements from each organization, and second, as their own organization's administrator and enforcer of the configuration management policies, once they are defined. NIST is also dependent on receiving the configuration items from each organization in order to place them under CM. The management of each of the four organizations must establish their own requirements and make a determination as to the items which need configuration management.

Implementing a successful and productive configuration management service requires an understanding of the development processes. These include document approval processes and software testing and integration procedures. The configuration management staff of the ISC will work closely with each of the four user organizations in defining requirements. The first step of this activity involves learning how the organizations are now handling document and software updates, and what problems they are encountering. A careful analysis of the user environment against good configuration management practices should yield a more productive set of procedures. The agreed-upon procedures can then be further facilitated by incorporating them into a computerized CM system. This will increase reliability and improve communications.

The agreed upon CM decisions should be documented by both NIST and the appropriate user organization.

When the ISC has collected the set of requirements from each organization, formal requirements analysis will begin. Most importantly, the requirements common to all organizations will be distilled into a “core system.” This core system will provide the basic configuration management services to all user organizations in such a way that it can easily be customized and expanded later on to accommodate needs of each organization which may be unique. This system will build upon the basic check in, check out, and access capabilities. It will also integrate the functionality of the Document Tracking System (DTS), the Ballot Manager (BM). The core system will become the CM baseline, which can then be customized to meet specific needs of the four user organizations. The formal requirements analysis, and the functionality of the core system, will be documented in the Comprehensive Requirements Document, defined in the Configuration Management Systems and Services Development Plan.

Based on the core system requirements as defined in the Comprehensive Requirements Document, NIST will design a system that meets those requirements. The design will describe the technical implementation plan for the core system.The formal systems design will be presented in the Configuration Management System Design Document, as defined in the Configuration Management Systems and Services Development Plan.

The core configuration management system will then be implemented according to that design, and tested against the requirements as defined in the Comprehensive Requirements Document. The implementation itself may involve customization of commercially available software, and/or writing new software for the project’s specific configuration management needs. Once the core system has proved itself to be able to provide the basic configuration management functions as defined in Section 1 (Goals and Objectives) of this paper, connectivity must be provided to allow remote users access to the system. The Technical Issues section of this paper provides more information about the connectivity task.

The developing standard itself will be one of the principal items controlled in the core system. Any user will be able to read and obtain copies of the documents; however, only individuals authorized by ISO TC184/SC4 may place new versions into the system. Security access restrictions for all items in the system must be defined by the users of those items.

Work on the CM System User’s Guide will begin when the core system is complete. The initial version will describe the use of the core system only, and will be distributed to the users for their immediate use and review. This document will undergo ongoing review and revision as the system evolves, and customized features are added. The final version of the CM System User’s Guide will be delivered after the integrated system is complete.

After the core system is completely tested and operational, the ISC will begin working with each of the user organizations on defining customization requirements. Since the end goal of the STEP development process is a formal international standard, the ISO procedures for the management of the STEP documents themselves will be implemented first. This will provide a model of services to be implemented for the other organizations. Following the ISO customization, the ISC will customize systems for the NPT, PDES, Inc., and IPO, as described in the CM Plan [Ressler1]. NIST will produce a User’s Guide for each organization, describing how to best use the system to meet their development needs.

After the customization work is complete, the ISC will review the entire system design and ensure that, now that there are customized portions, the system as a whole still functions in a consistent and useful manner. The final CM System User's Guide will reflect the integrated system.

Finally, as each system comes on-line, appropriate documentation and training will be provided to the users.The ISC will provide further training as necessary, in addition to providing the Users' Guides. This may be necessary for any complex customized functions, or for users who are new to configuration management procedures

The ISC will demonstrate the final integrated system via a formal demonstration package. The demonstration package will be developed after the system is complete. It will serve to demonstrate the functionality of the final system to the users and the program sponsors.

Summary

In order for the CMS to aid the development process, it must be viewed and implemented as practical, convenient tools, not impediments. Early user involvement, including participation in requirements definition and review of user's guides, is intended to produce as useful a system as possible.

FIGURE 3. **.Overall High Level Schedule**

FIGURE 4. **Work Breakdown Structure**

CMS0 Prepare Technical Development Plan

This document meets this deliverable.

CMS1 Prepare Configuration Management Concepts Document

Provide background materials and an overall approach for the support activities for CM. The Configuration Management Concepts Document will establish the configuration management concepts to be applied in support of the STEP development effort. It will define the basic functions of configuration management, describe the characteristics of a good CM system, and explain the particular configuration management needs of the STEP project.

CMS2 Develop Interim Configuration Management Capability

Provide an interim configuration management capability including central storage and public access to documents and software modules. Provide brief user instructions for remote access and use of the system.

CMS2.1 Develop STEP On-Line Information Service

Provide a Bulletin Board System and anonymous ftp access to a single set of STEP Parts, Toolkit Software, and PDES, Inc. documents on-line. Provide a user's guide to the on-line service.

CMS2.2 Provide Email Access

Provide automated responses to electronic mail requests for the information in the on-line system. Provide a user's guide to this service.

CMS2.3 Develop Software CM procedures

Develop a set of procedures to support the configuration management of PDES software, and document in the PDES Software CM Procedures Document. Procedures will include instructions for both software developers and software users (PDES, Inc. STEP testing teams).

CMS2.4 Automate Support for Software CM Procedures

Develop a set of automated tools to monitor various aspects of the software CM environment, in order to minimize reliance on user compliance to manual procedures.

CMS2.5 Expand STEP On-Line Information Service

Continue to incorporate new materials as received, enhance information about those materials (such as keeping the history of each STEP Part in a file on-line) and enhance the service by adding such features as sending a monthly status report automatically through electronic mail, and the capability of downloading the index of files in the system.

CMS3 Maintain STEP On-Line Information Service

Provide user support for BBS, anonymous ftp, and Email access, including answering questions, putting additional items on-line, and basic administrative functions.

CMS4 Investigate CM System Options

Investigate the possible use of portions, combinations or adaptations of existing CM systems, including commercially available systems, government-owned software, and public domain systems. The investigation shall include whether such systems meet the project requirements (as specified in the Configuration Management Comprehensive Requirements Document), whether they are available in the needed time frame, and whether they can be aquired within the constraints of the project budget.

CMS4.1 Prepare Requirements Summary Report

Prepare a report explaining the unique aspects of CM requirements for the STEP project. This report will be used in evaluating existing CM systems and their interfaces.

CMS4.2 Investigate Commercial CM Packages

Investigate commercially available CM and data management packages against the criteria listed in the Requirements Summary Report, and produce a report of the results.

CMS4.3 Investigate Government-owned Software

Investigate the feasibility of using software already owned by the U.S. Government commissioned for other projects, against the criteria listed in the Requirements Summary Report, and produce a report of the results.

CMS4.4 Investigate Public Software Modules

Investigate software packages available through the public domain against the criteria listed in the Requirements Summary Report, and produce a report of the results.

CMS5 Develop Core Configuration Management System

Develop a core configuration management system which addresses the basic configuration management functions common to all the user groups. This system will build upon the basic check in, check out, and access capabilities. The core system will become the CM baseline, which can then be customized to meet specific needs of the four user organizations.

CMS5.1 Prepare Comprehensive Requirements Document

Prepare a Comprehensive Requirements Document which addresses the CM needs of all four user groups. The four organizations to be serviced, ISO, IPO, PDES Inc., and the STC, have certain required functions in common. This activity involves determining existing procedures, if any, of the four user groups, interviewing each organization's Configuration Manager for their requirements, compiling and organizing the requirements, and agreeing on system requirements with each user group. The requirements will then be compared and analyzed. Common requirements will become the basis of the core system. User-specific requirements will be implemented during the customization phase.

CMS5.2 Prepare CM System Design Document

Prepare a CM System Design Document which will describe the technical implementation plan for the core system. The CM System Design Document will be based on and traceable to the Comprehensive Requirements Document.

CMS5.3 Implement Core CM System

Write and/or adapt software to meet the needs outlined in the Requirements Document. The implementation will follow the system design put forth in the Design Document. This portion of the implementation will provide basic CM functions with local access only.

CMS5.4 Establish Communications Services

Write and test the software necessary to link the locally implemented core system with the outside world.

CMS6 Testing and Porting

Test the functionality and portability of the Core CM System against the requirements in the Comprehensive Requirements Document. Produce Test Report.

CMS7 Customize Configuration Management System

Install and set up the core system for each user group. Write and test any software necessary to implement user-specific requirements. Provide documentation of these services..

CMS7.1 Implement ISO CM System

Customize the core system for ISO, and add any features which are needed specifically by that organization. ISO features pertain only to document management.

CMS7.2 Implement NPT CM System

Customize the core system for the NPT, and add any features which are needed specifically by that organization. This system will deal only with software modules.

CMS7.3 Implement PDES, Inc. CM System

Customize the core system for PDES, Inc., and add any features which are needed specifically by that organization. This system will involve mostly software, but also some documents.

CMS7.4 Implement IPO CM System

Customize the core system for IPO, and add any features which are needed specifically by that organization. This system will include document tracking, and may also involve management of information models at some point in the future.

CMS7.5 Integrate CM Systems

Ensure that the customized versions are functioning consistently, and fulfill requirements specified in the Comprehensive Requirements document in addition to the user-specific requirements.

CMS8 Demonstrate CM System

Provide a demonstration of the final product. After the customized systems have been integrated, the ISC will demonstrate that the final configuration management system meets the needs outlined in the Comprehensive Requirements Document.

CMS9 Provide User Training

The ISC will provide further training as necessary, in addition to providing the Users' Guides. This training may be necessary for any complex customized functions, or for users who are new to configuration management procedures.

5 Resources

5.1 Staff

a) Information Services Center Manager

The individual in this position is responsible for the overall structure and planning of the ISC. This includes participation in testbed planning and center "marketing" to help obtain the resources necessary to accomplish the center's mission. It also includes technical participation and review of the design and implementation of the developing configuration management system. Smooth operational procedures and the dissemination of appropriate documentation for those procedures will be a continuing maintenance activity.

b) Configuration Management Systems Analyst

The systems analyst is responsible for analyzing the requirements, developing procedures in conjunction with user groups, and designing and implementing the system (with the support of those listed below).

c) Network Engineer

This person will provide design support to the systems analyst, and implementation support to the programmers.

d) Software Engineer

This individual will provide analysis, design and implementation support, under the direction of the systems analyst.

e) Support Programmer

The support programmer will implement requirements established by the configuration management systems analyst. This individual will provide the interface to the archive server and write utility scripts to simplify usage of the systems.

f) Configuration Management Administrator

This individual is responsible for insuring the integrity of indexes to documents on the various systems. This includes input to the document tracking systems and synchronization of the archive server indices with the contents of data accessible by the archive server.

g) Configuration Management Specialist

This individual will provide support to the systems analyst during the requirements analysis effort. This includes defining procedures in conjunction with the user groups, recommending procedural solutions, and evaluating available CM software packages.

h) Other Personnel

Support secretarial staff will be necessary to meet requests for physical documents and media. Division resources for global systems will provide support for network interface and systems integration issues.

5.2 Hardware

VAX cluster; will be used to store the anticipated large quantities of data and many versions of that data.

6 SUN workstations, 2 Decstations; will be used for software development by both NIST and PDES, Inc. staff.

5.3 Software

RCS source code configuration control software

Archive server

Expect; for writing scripts to take the place of human interaction with the computer

Licenses for commercial software products, as deemed necessary for configuration management support.

5.4 Travel

The ISC Manager and the CM Systems Analyst will need to be present at meetings of the various user groups which relate to configuration management. The CM Systems Analyst will serve as the NIST representative to the IPO’s Configuration Control Board (CCB).

5.5 Training

The CM Systems Analyst, the Software Engineer, and the Support Programmer may require training on the hardware platform, operating systems, and/or software tools chosen for the project.

5.6 Document and Demonstration Development

The development of supporting documentation, demonstration packages, and user training materials may require additional staff support and the use of special software packages.

6 Glossary

The following are definitions of terms used in this paper:

Archive Server: Generically speaking, an archive server interprets and executes commands. As used here, the archive server will read e-mail from remote CM users, interface with the CM system and/or the local file system to fulfill the request, and send the response back to the user via e-mail.

Ballot Management: The process of logging and collating the ballot comments against a particular ballot. This includes producing managerial summary reports.

Comment Database: A database of ballot comments sent along with the ballots. These comments shall become the basis for changes to the configured STEP documents.

Configuration Management System: The software which enables users to access files on a version by version basis in a controlled manner.

Document: An item in either electronic or paper form.

E-mail: Electronic Mail

Hard Copy: A paper form of a printable electronic form.

PDES, Inc.: A consortium of international companies involved in the development of the STEP standard.

Acronyms

APC:	Application Prototype Center
BBS:	Bulletin Board System
BPR:	Block Point Release (a software configuration management term)
CALS:	Computer-aided Acquisition and Logistic Support
CCB:	Configuration Control Board (a PDES, Inc. organizational unit)
CD:	Committee Draft (formerly DP - Draft Proposal)
DP:	Draft Proposal (now called CD - Committee Draft)
DTS:	Document Tracking System
IPO:	IGES/PDES Organization
ISC:	Information Services Center of the NPT
ISO:	International Organization for Standardization
NPT:	National PDES Testbed
PDES:	Product Data Exchange using STEP

PMAG: Project Management Advisory Group (an organizational unit of ISO TC184/SC4)

SG: SubGroup

SIB: Systems Integration Board (a PDES, Inc. organizational unit)

STC: Standards Testing Center of the NPT

STEP: Standard for The Exchange of Product Model Data

WG: Working Group