

NCSX

Data Management Plan

NCSX-PLAN-DMP-01

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NCSX DATA MANAGEMENT PLAN

Record of Revisions

Revision	Date	Description of Changes
0	5/9/2003	Initial issue
1	2/3/04	Revised to incorporate observations 8a-8e concerning handling and storage of legacy drawings per PPPL Audit # 0308 and NCSX Audit #0314. <u>Also incorporated NCSX team review comments. Changes to Revision 0 underlined.</u>

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Data Management Plan

1 INTRODUCTION

1.1 Purpose

The purpose of this Data Management Plan (DMP) is to describe the process by which documents for the National Compact Stellarator Experiment (NCSX) Project will be stored and managed. The vast majority of project documents will be created, stored, and be accessible electronically. In instances where the electronic storage of project documents is not practical (e.g., supplier submittals, Work Planning Forms, Job Hazard Analyses, etc.), hard copies will be provided to the PPPL Operations Center for storage. Where feasible, the cover page, first page, or other identifying sample of the hard copy will be scanned and stored electronically with the appropriate annotation made in the electronic file as to the source repository. A specific NCSX Operations Center Web site has been developed to catalogue what is stored in the Operations Center and its location within the Operations Center.

Electronic data will be stored in nine sites – six Web sites accessible through the Internet, two sites on the PPPL File Transfer Protocol (FTP) server, and an Oracle database that can be accessed using Pro/INTRALINK software from Parametric Technologies Corporation (PTC), the maker of Pro/Engineer software. A listing of the nine sites and their customers, custodians, document types, and access restrictions is provided in Table 1.1-1. The custodians are the personnel solely responsible for the content and maintenance of the data storage site (web or FTP server) and there is only one custodian (plus the single “back-up” person identified as the designee in case of absence of the custodian) per storage site. In instances where there are controlled documents involved (e.g., the Engineering Web, the Pro/INTRALINK database, etc.), the custodian also becomes the electronic document manager.

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Table 1.1-1 Sites for Data Storage and Retrieval

Storage Location	Documents	Customer	Custodian	Access
Project Web	General project information, external design review data, physics meeting records, PAC meeting records, publications, and the project directory	General public, project participants	Project Manager*	Global
Procurement Web	All documentation required for potential suppliers to develop proposals	Suppliers	PPPL Procurement	Global
Manufacturing Web	All project documentation required for suppliers with awarded contracts to execute their scope of work	Suppliers	Engineering Manager*	Global
Engineering Web	All other project documentation including cost and schedule information, design criteria, internal design review data, engineering and project meeting minutes, memoranda, analysis reports, controlled documents not otherwise posted, and work plans	Project participants	Engineering Manager*	Project
Operations Center	Catalog of all hard copy documents stored in the <u>Operations Center</u>	Project participants	<u>Operations Center Supervisor</u>	Project
Pro/INTRALINK Database	CAD drawings and models for project use	Project participants	Design Integration Manager	Project (INTRALINK software required)
PPPL Drafting Center	<u>Hard copy legacy drawings.</u>	Project participants	<u>PPPL Drafting Supervisor</u>	Project
Project FTP Server	Large data files primarily used in physics analyses	Physics and engineering analysts	Engineering Manager*	Global
Supplier FTP Server	CAD drawings and models for use by suppliers	Suppliers	Design Integration Manager	Global
* Or designee				

Table 1.1-1 above identifies specific custodians by position. The specific storage site custodian may, at his or her discretion delegate read-write authority to portions of the site to others. This should be limited, however, to ensure proper configuration control. For example, the Engineering Manager is designated the custodian for the Engineering Web Page, but he has delegated responsibility for certain portions of the Engineering Web Page to the Systems Engineering Support Manager (e.g., electronic signatures, plans and procedures, interfaces, and the WBS). Likewise, the Engineering Manager is also designated the custodian of the Manufacturing Web Page. However, since it is critical to maintain the proper configuration control connections between the subcontracts and the data posted on the Manufacturing Web Page, responsibility for maintaining the individual sections of the Manufacturing Web Site will be delegated to the individual subcontract technical managers. These technical representatives are most familiar with the status of their respective subcontracts and are therefore responsible for ensuring that the

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subcontracts and data posted on the Manufacturing Web Site are entirely self-consistent. NCSX Procedure NCSX-PROC-006 outlines the requirements and processes the subcontract technical representative must go through to ensure consistency between the subcontract and the technical documentation being used by the subcontractor. Vendor-related information posted on either the Supplier FTP or NCSX Manufacturing Web sites will contain the appropriate disclaimer statements relative to use of this information as per the samples shown in NCSX Procedure NCSX-PROC-006.

In addition, there are several databases, files, or drawings that are not readily available for general public or project access. These include:

- The cost and schedule database. All source cost and schedule data is maintained in the Primavera Project Planner (P3) database. This is a restricted site that reflects all input data from the project relative to the cost and schedule baselines. The P3 database is controlled and maintained by the NCSX Project Control Manager. Cost and schedule charts and tables from this database is forwarded to and posted on the NCSX Engineering Web.
- The Non-Conformance Report (NCR) database. NCRs are the responsibility of QA. QA has a database that is used to generate and track these NCRs. The signed copies, maintained by QA in paper format, are the official records of the NCR system. The QA RAP/NCR database provides for tracking and a less formal backup of the paper records. Copies of approved NCRs are available in pdf format from QA., however, the output files are also available to project personnel upon request.
- The Job Hazard Analysis (JHA) forms are maintained and filed by the PPPL Industrial Safety Office. Copies are available to project personnel upon request.
- Operations Center – although an electronic record/catalogue of what is stored in the Operations Center will be maintained on the Operations Center web page, the actual physical copy records (e.g., vendor submittals, WP documentation, Job Hazard Analyses, field procedures, etc.) will be stored in the Operations Center. The Operations Center Supervisor is responsible for maintaining an accurate log on the Operations Center web site, however, the responsibility for providing material to the Operations Center remains with the cognizant engineer, Procurement Technical Representative, or WBS Manager as appropriate.
- Legacy Drawings – notwithstanding the PPPL transition from hard copy to electronic drawings, there exist a large number of legacy vellum and other hard copy medium drawings that document legacy equipment and systems. NCSX will make significant use of legacy equipment and systems. These drawings shall retain their original numbers and be maintained in the PPPL Drafting Center. The PPPL Drafting Supervisor shall maintain control of these hard copy drawings.

As a general rule, all documents will only appear on one storage site and links may be established to gain access to that document from other storage sites for convenience. The one major exception to this rule involves documents intended for supplier use. With respect to suppliers, the “approved” documents are those specifically referenced in the contracts with them. The Procurement Web, Manufacturing Web and Supplier FTP storage sites are the sole source of access and information by suppliers. However, it

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should be noted that duplicate files are also maintained as part of the project files on both the Engineering and Pro/INTRALINK storage sites. It is also conceivable, that a later version of the particular document and/or drawing or model will be available on the project-only access sites than on the supplier-access sites until such time that the respective contracts are modified to reflect the latest information. The project-only access sites (e.g., Engineering Web, Pro/INTRALINK database, Project FTP server, etc.) will always contain the latest master versions of the respective documents.

From a project management perspective, there are three NCSX project baselines – technical, cost, and schedule. These three baselines are fully integrated since they are derived from the same configuration. The combination of technical, cost, and schedule baselines forms the basis for project work authorization and management. While this DMP will primarily focus on the management and retrieval of documentation that describes the physical and functional configuration of the Project's technical baseline, it will also address the storage and retrieval of non-technical, but controlled documentation such as project plans and procedures.

1.2 Applicable Documents

This Data Management Plan (DMP) draws on the documents listed below. Documents referenced are the latest issues of the:

NCSX Documents

- Project Execution Plan (NCSX-PLAN-PEP)
- Systems Engineering Management Plan (NCSX-PLAN-SEMP)
- Work Breakdown Structure (WBS) Dictionary (NCSX-WBS)
- Quality Assurance Plan (NCSX-PLAN-QAP)
- Document and Records Plan (NCSX-PLAN-DOC)
- Configuration Management Plan (NCSX-PLAN-CMP)
- Interface Control Management Plan (NCSX-PLAN-ICMP)
- NCSX Procedure on Electronic Signatures (NCSX-PROC-005)
- NCSX Procedure on Maintaining the Manufacturing Web Site and the Supplier FTP Server (NCSX-PROC-006)

The NCSX Project is committed to following all applicable PPPL plans and procedures unless specifically modified by NCSX- specific plans and procedures.

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2 MANAGING THE TECHNICAL DOCUMENTATION

2.1 Definition of Technical Documentation

The NCSX technical documentation describes the physical and functional configuration of the Project's technical baseline. This includes models and drawings, whether created in Pro/Engineer or in other project-approved drawing software packages, technical specifications, statements of work, Interface Control Documents (ICDs), the impact of Non Conformance Reports (NCRs) on drawings, hardware, cost, and schedules, etc. In addition, there are other technical supporting documentation, such as memoranda and analyses that are not under configuration control, but nonetheless describe the basis for the controlled technical documentation.

NCSX will primarily utilize three sites for managing controlled technical information. These are the Pro/INTRALINK database, the Engineering Web, and the Drafting Center hard copy legacy drawings. The Pro/INTRALINK database is the repository for the storage and retrieval of the all NCSX models and drawings, whether approved and controlled or in a "work-in-progress" status. All other technical documentation (e.g., specifications, analyses, technical memoranda, etc.) is contained on the Engineering Web. However, as indicated in Section 1.1 above, other specific PPPL technical documentation pertaining to NCSX such as Non-Conformance Reports (NCRs), Work Planning (WP) forms, and Job Hazard Analysis (JHA) forms may or may not be stored in an electronic format and are controlled and maintained by separate PPPL entities. There are other specific sites (e.g., Manufacturing Web, PPPL FTP Server, Supplier FTP Server, and the Procurement Web) that may include duplicate copies of the controlled documentation for specific use and purpose, but the Pro/INTRALINK database and the Engineering Web are the primary sites for technical information. As necessary, links to the other supporting sites may be established to facilitate use and access. NCSX will make significant use of legacy PPPL equipment and systems. The legacy drawings are primarily only maintained in hard copy format. These drawings will be maintained by the PPPL Drafting Supervisor in the PPPL Drafting Center.

It is conceivable over the lifetime of the NCSX Project that electronic software advances may make the current standards of Microsoft Office and Pro/E and/or AutoCAD obsolete. This may necessitate converting project files to a format compatible with the new standards. This will require development and implementation of a specific conversion plan.

2.2 Control and Management of Model and Drawing Records

2.2.1 Overview

2.2.1.1 Electronic Models and Drawings

The vast majority of NCSX models and drawings will exist in electronic form. The project's drawing software package standards are Pro/Engineer (2D or 3D) for mechanical systems and AutoCAD drawings for electrical systems. Mechanical models and drawings of the test cell, ancillary equipment and services will be generated using Pro/Engineer as the first choice system in order to facilitate the building of assemblies

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and to establish a single, unified database defining the NCSX facility. Electrical drawings (2D) will be generated using AutoCAD or Pro/Engineer (if appropriate) or other Project-approved software package. The Engineering Manager may, on an exception basis, approve the use of other drawing software packages, but the project's Pro/Engineer model will then have to be modified to accurately define the component envelope and placed in the full Pro/Engineer assembly model. Models and drawings will be managed using the Pro/INTRALINK software from PTC. The central core of the Pro/INTRALINK data management system is a central database called the *Commonspace* (or server). The *Commonspace* is the collection point for all design activities and is accessible to all users. Non-ProE models and drawings will be treated as individual objects (like Word or other software-generated documents) by INTRALINK and cannot be automatically updated as can models and drawings generated in ProE.

The Pro/INTRALINK system summarized in this DMP, and described in greater detail in the Pro/INTRALINK Users Guide (PPPL ES-DRFT-002), achieves two critical objectives. First, the Pro/INTRALINK system serves as the NCSX Project's primary electronic file system for controlled and in process models and drawings. As necessary, appropriate links to supporting technical documentation that is stored on other web sites will be made. All approved and controlled models and drawings will be maintained in this database such that the Pro/INTRALINK database will be the repository for project personnel to access the latest controlled and approved models and drawings. However, to maintain the integrity of these files, only a limited number of personnel will be provided "write" access to modify these controlled files. The Pro/INTRALINK Users Guide (PPPL-ES-DRFT-002) provides greater detail on the specific "write" and "read-only" access.

The Pro/INTRALINK database of CAD models and drawings represents the physical attributes of the NCSX technical baseline. The NCSX Project's design configuration is progressively described in greater detail as it proceeds through the design process. As such, so-called "developmental baselines" will evolve as the design progresses. Drawings and models developed using either Pro/Engineer or AUTOCAD are maintained in a separate developmental area of the Pro/INTRALINK database to permit ready access and interaction during the design evolution process. A great deal of flexibility exists when models and drawings are in this developmental state.

Figure 2.2-1 illustrates the communication between the Pro/INTRALINK *Commonspace* (or server) and Workspace databases contained on individual user computers.

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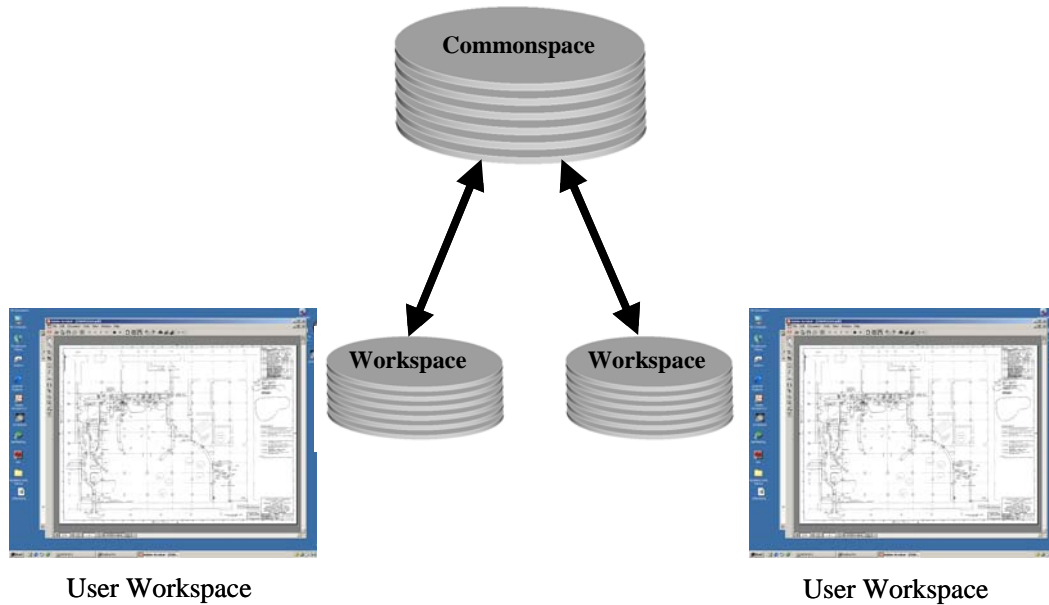


Figure 2.2-1 Pro/INTRALINK Communications

CAD models and drawings (both those in a developmental stage as well as those under configuration control) will be stored in a folder structure within the *Commonspace*. The NCSX *Commonspace* folder format follows the project defined Work Breakdown Structure (WBS) and is illustrated in Figure 2.2-2. Each folder will have subfolders that expand the WBS to the second and third level WBS level.

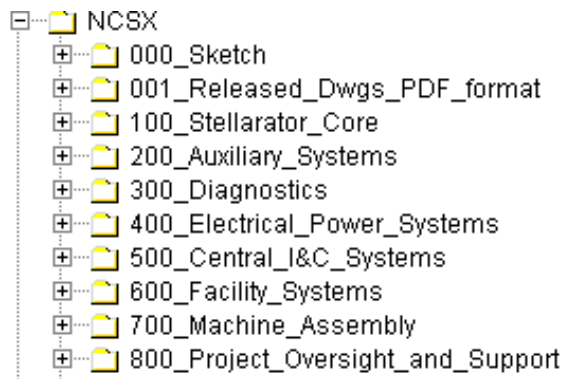
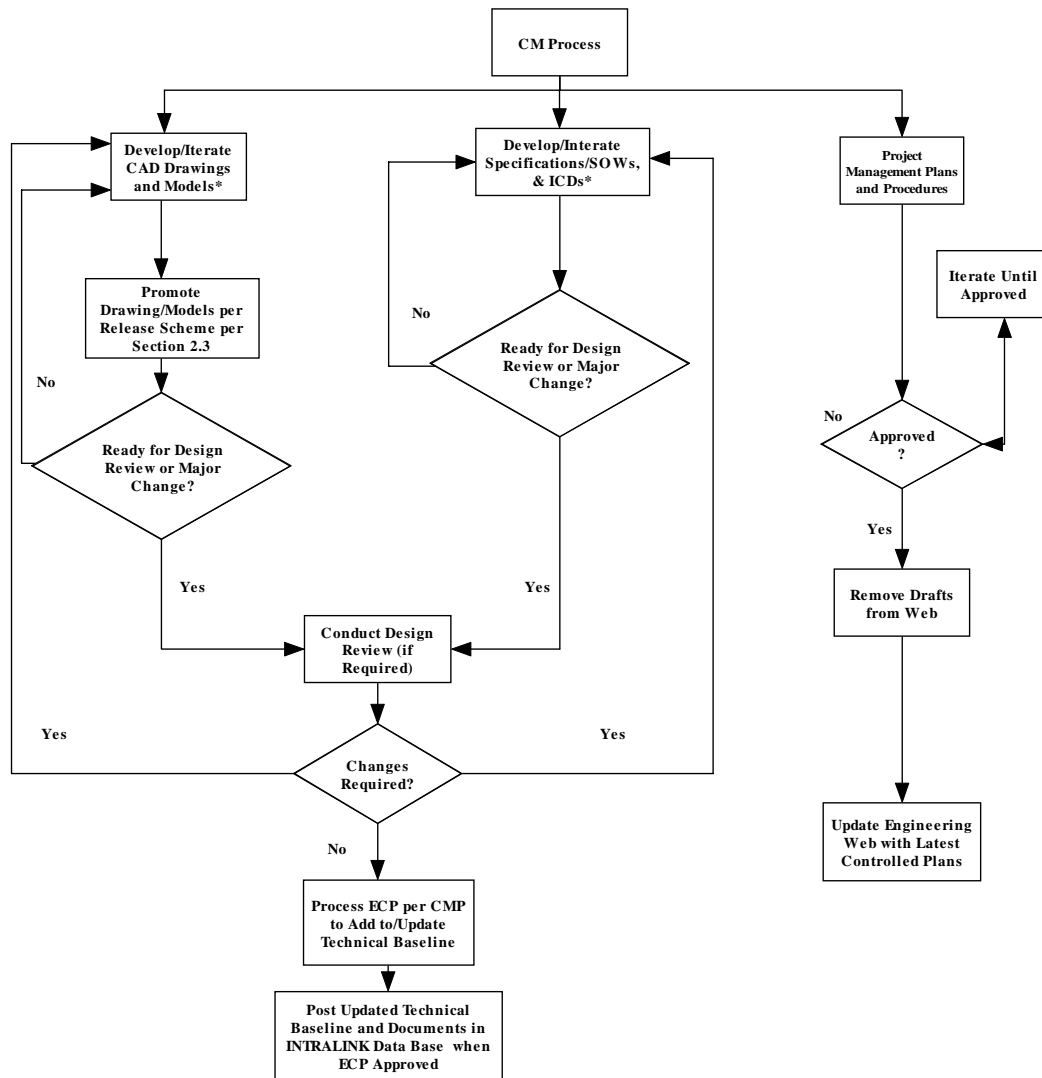


Figure 2.2-2 NCSX Commonsense Folders

The Pro/INTRALINK Data Management System is closely linked to the NCSX Configuration Management Program. In the developmental stage of the design, Pro/INTRALINK provides a flexible environment to iterate the drawings and models that represent the evolving nature of the technical baseline. A broader discussion of the

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drawing release process is contained in the Pro/INTRALINK Users Manual. Once a drawing or model is placed under configuration control, the process for changing drawings and models that define the physical and functional configuration of the technical baseline is then controlled by the configuration control processes outlined in the NCSX Configuration Management Plan (CMP). The relationship between the Pro/INTRALINK data management system and Configuration Management (CM) is illustrated in Figure 2.2-3.



* Includes impact of NCRs

Figure 2.2-3 NCSX Data Management Process

2.2.1.2 Legacy Drawings

The NCSX Project will utilize a significant amount of PPPL legacy equipment and systems. The drawings are primarily only available in a hard copy vellum or other

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physical medium. They will be maintained in this format and be utilized by NCSX, maintaining the original numbering system. Several important cautions must be observed when utilizing these drawings:

- As part of the preparations of C-Site to accommodate the NCSX device, a significant amount of demolition and modifications to existing PPPL systems and infrastructure was accomplished. Prior to utilizing existing legacy drawings, the WBS Manager must first assure that the current legacy drawings accurately reflect the current as-built status of those systems. If not accurate, the decision needs to be made as to whether or not to modify existing legacy hard copy drawings or to create new drawings in an electronic format.
- Prior to discarding legacy hard copy drawings for legacy systems removed or modified in preparation for the NCSX, knowledgeable personnel from the NCSX Project and the PPPL Engineering Department need to review the drawings to determine their disposition and/or the need to modify existing drawings or to create new drawings for use on NCSX.

2.2.2 CAD Drawing Systems

The NCSX configuration management provides for a precise identification of technical, cost, and schedule baselines to establish the bases for performance measurement as well as tracking changes to those baselines. The Pro/INTRALINK database establishes the framework to document the technical baseline attributes described and documented in CAD models and drawings, specifications, and other controlled technical documentation.

A standardized drawing numbering scheme has been established for the NCSX Project. Specific guidance is provided in the Pro/INTRALINK Users Guide (ES-DRFT-002), however, in general the NCSX drawing numbers will take a form that follows the NCSX WBS structure.

Assigning drawing numbers will be the responsibility of the WBS manager in charge of a WBS design activity. The design process established in using Pro/INTRALINK requires the engineer or designer working in a design area to “lock” the models and drawings being worked on so that other users cannot inadvertently make changes to the design as it is being developed. Using the WBS drawing tree structure and Pro/INTRALINK, an engineer or designer can go into the database *Commonspace* and take the next available number within the NCSX folder he is working in when a drawing is started (saving the part to *Commonspace* as the design progresses), or a temporary name can be used while developing the drawing on the *Workspace*. However, when the drawing is saved and returned to the *Commonspace*, the next available version will be assigned in the *Commonspace*. Reserving a block of numbers is discouraged since the only way that a block could be taken is by assigning “dummy” part or component numbers. Pro/INTRALINK allows one and only one name within the database so there can be no duplications.

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The Pro/INTRALINK Users Guide (PPPL ES-DRFT-002) contains specific drawing numbering scheme formats. Generally, there will be several categories:

- Sketch Numbers – used in the very early developmental stage before a concept evolves
- Concept Numbers – once a concept evolves, this marks the conceptual design stage of development
- Regular Drawing Numbers – assigned once the concept leaves the conceptual design phase and culminates in the fabrication release
- Prototype Numbers – prototypes are not typically expected to represent the first production unit and so prototype numbers will be assigned to every prototype drawing. If the prototype is then determined that it will be the first production unit, the drawing will be converted to a regular drawing in accordance with the procedures contained in the Pro/INTRALINK Users Guide. Prototype drawings are denoted by a “P” at the end of the drawing number.
- As-Built Numbers – only used if a physical change to the overall model is necessitated by a physical change to a component is approved by a NCR and will impact an existing or new interface. Use of the “AB” symbol maintains a clear pedigree/connection to the original model.

2.2.3 Drawing Control Process

At any time in the design evolution process, there may exist a series of developmental baselines representing various design studies and evolution. Within the Pro/INTRALINK environment, a defined set of “release” levels are available for a drawing or model to progress through from development to fabrication. For the NCSX Project, six release levels have been defined and are illustrated in Table 2.2-1. The NCSX “release” scheme provides a great deal of flexibility in dealing with design assessments and “release” promotions during the design review process. As with those models and drawings that represent the established technical baseline, a unique name and numbering scheme must be utilized for each of these developmental baselines. When a model or drawing is in this developmental status, a number of operations can be performed: create, view, modify, move to a different folder location, rename, check out objects to workspace and interrogate. Baseline parameters can be set as: read only; read and add; read, add and delete.

Work in Progress
Conceptual Design (CD)
Preliminary Design (PD)
<i>Prototype (P)</i>
Final Design (FD)
Fabrication

Table 2.2-1 NCSX Drawing/Model Release Levels

It is not necessary that an object pass through each release level. As a general rule, each of the “standard” release levels supporting the design process and evolution (e.g., Conceptual Design, Preliminary Design, and Final Design) is accomplished in

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preparation for a design review. In preparation for a Conceptual Design, Preliminary Design, or Final Design Review, the set of applicable drawings will be promoted to the appropriate level consistent with the upcoming design review. If a drawing is impacted by comments/CHITs received at the design review, it will be demoted back to “work in Progress” status until such time that the comments/CHITs have been satisfactorily resolved. Once a drawing has successfully completed a Design Review and all comments have been incorporated, it will again be promoted to the appropriate design level and this level of promotion will be frozen, forming part of the technical baseline that will not be changed. As the drawing is modified in preparation for the next design review, it will be demoted back to a “Work in Progress” status until such time that it is ready for the next design review. - This same process applies to promotion to higher-level release levels such as Final Design and Fabrication. Figure 2.2-4 provides flow chart of the drawing release process.

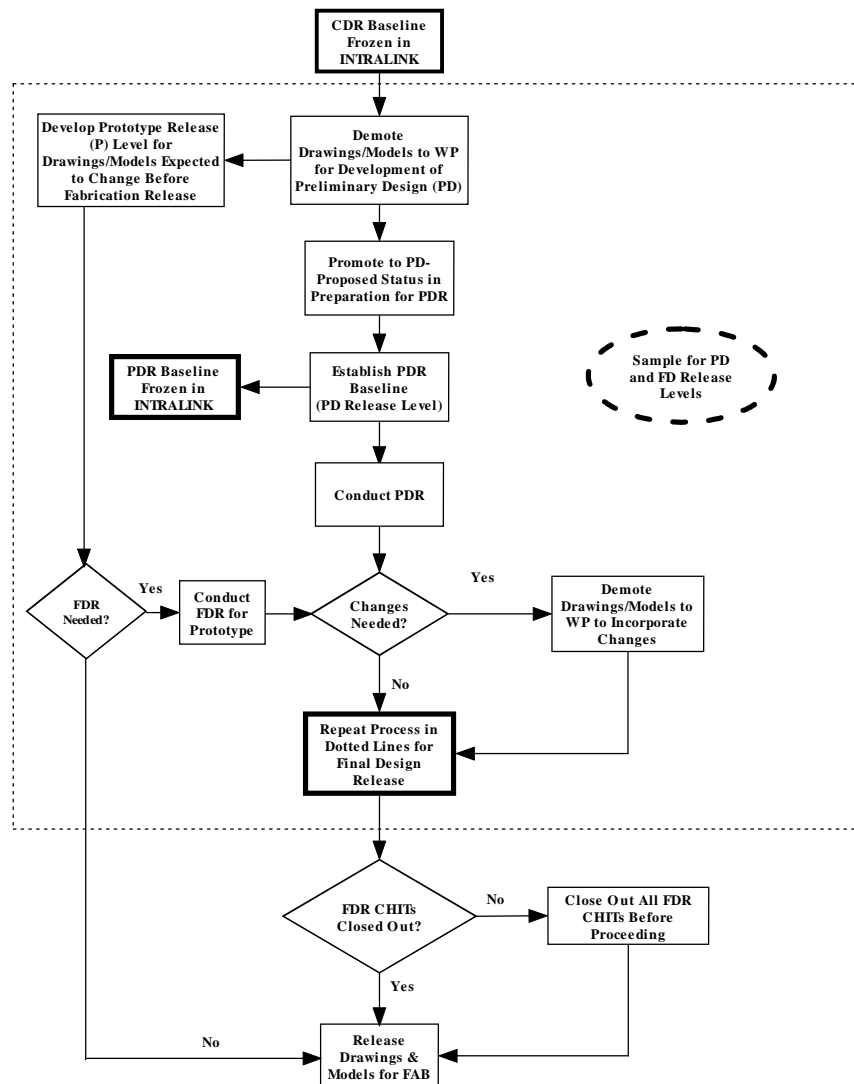


Figure 2.2-4 NCSX Drawing Release Flow Chart

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When a drawing or model is proposed for promotion, this will trigger a review process that will eventually culminate in the processing of an Engineering Change Proposal (ECP) that will eventually result in the updating of the technical, cost, and schedule baselines. Promotion of a drawing or model from Final Design Release to Release for Fabrication will invoke a new rigor of checking and design. Figure 2.2-5 displays the promotion sequence.

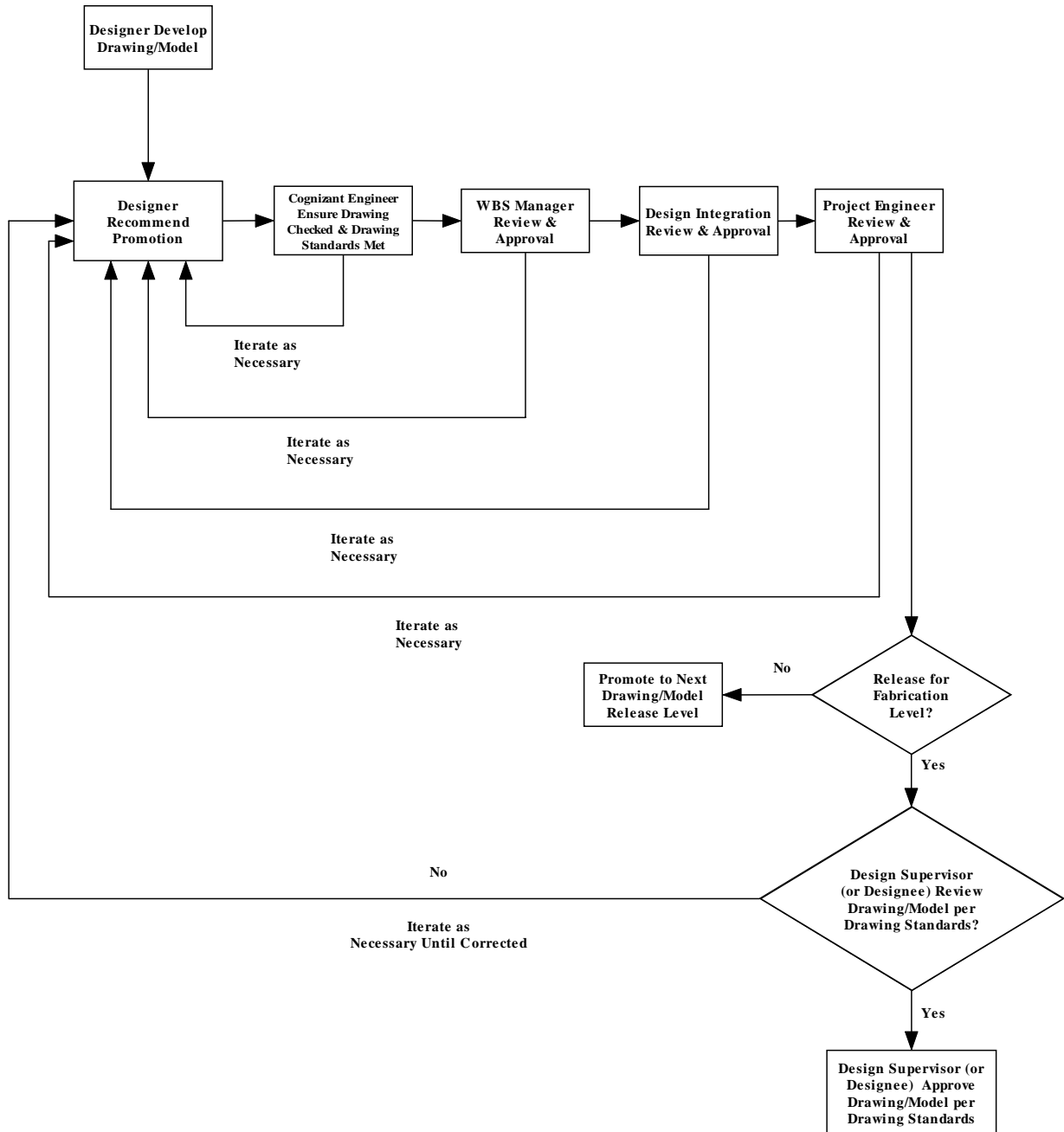


Figure 2.2-5 Drawing Promotion Process

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The exception to this “standard” sequence addresses those drawings that are used for the development of prototypes. Prototype drawings are only used whenever it is anticipated that the design concept is not close to final and that changes are likely. If, however, the prototype is anticipated to represent the first production unit, then prototypes will also follow this sequence.

Each Pro/INTRALINK folder will have a predefined set of release procedures that identifies who can approve an object to allow it to pass to the next release level. The WBS Manager or Cognizant Engineer directly involved with the component design process will determine when a model or drawing should be proposed for promotion and whether the full release scheme should be followed or if a subgroup for the WBS section under his/her responsibility will suffice. The NCSX project release procedure starts with the designer (or drafter) promoting the object followed by sequential approvals made by the Cognizant Engineer, the responsible WBS manager, Design Integration manager and finally the responsible Project Engineer.

For Pro/Engineer drawings, the Pro/INTRALINK database automatically records the revision number (only for Fabrication Release level drawings and models), the release level (e.g., CD, PD, FD, etc.), and version number (for each release level, each subsequent update version is sequenced up one number, starting with 1). Adobe Acrobat electronic signature procedures (as outlined in NCSX-PROC-005) provide secure password protected signatures that will be used to document at the Fabrication Release level. Until a drawing or model reaches the Fabrication Release level, approvals/concurrences in proposed promotion of the releases level are obtained using the Request to Promote (RTP) forms outlined in the Pro/INTRALINK Users Guide (PPPL ES-DRFT-002).

Promoting a model or drawing to the next higher release level does not, by itself, result in a change to the technical baseline; only an ECP can do that. Release promotion will coincide closely with the preparations for a design review (e.g., preliminary design review/PDR or final design review/FDR). Changes to a model or drawing may be proposed at any time deemed appropriate by the Cognizant WBS Manager, but the release level will not normally be changed (as a proposed release level) until a design review is scheduled. The “baseline” release level is not frozen until such time that the results from the design review are fully incorporated..

The purpose of design reviews is to assess key aspects of the NCSX design at appropriate times in the design. Configuration Items (CIs) represent the lowest level of control under configuration management and may be a single physical or functional item or collection of items that will satisfy a final end point or deliverable. CIs will come under configuration control at different stages in the life of NCSX as some designs proceed at a faster pace than do others. The design review package will include at a minimum the following:

- Updated models and drawings that have been proposed for promotion to release level consistent with the level of the design review.
- Other updated technical documentation represented by specifications and ICDs.

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- Updated technical documentation, at the level appropriate for the systems/CIs being reviewed and the level of the design review. The primary purpose of this documentation is to address the current level of design and its basis at the particular snapshot in time. A secondary purpose of this technical documentation is to provide an historical record of the project's baseline design at established stages (e.g., preliminary design, final design, etc.) in the project life cycle.
- Updated cost and schedule documentation that is consistent with the updated technical documentation.
- An ECP that summarizes all the proposed changes to the technical, cost, and schedule baseline documentation. This ECP will assist the reviewers in understanding all the impacts of the proposed changes, but the ECP will not be approved until after the design review and the incorporation of comments/recommendations impacting the current level of technical, cost, and schedule documentation.

Drawings will be placed as Adobe pdf files in the NCSX Design_Review_ftp subdirectory (ftp://ftp.pppl.gov/pub/ncsx/Design_Review_Matrl/), under a directory named for the particular Design Review. The Design Integration Manager will set up the appropriate directory. It is the responsibility of the WBS manager (or designated cognizant engineer) to inform all reviewers when drawings are placed in the Design_Review_ftp site and supply them with all other documents as outlined above. The WBS manager (or designated cognizant engineer) will also inform those individuals who are responsible for approving drawings within Pro/INTRALINK that two weeks after the drawings are placed in the Design_Review_ftp subdirectory, a request-to-promote will be issued, activating Pro/INTRALINK to send emails (intermittently) to all approvers until approval action is taken.

At the completion of the design review, it is likely that additional iterations will be needed to the released models and drawings. Only when the recommended modifications from the design review are incorporated and the models and drawings re-promoted to the appropriate release level and the cost and schedule documentation updated will the ECP be updated, processed, and be ready for approval. Only when the ECP is approved in accordance with the CMP, will the technical, cost, and schedule baselines be updated and the released model and drawings stored as an approved update to the project baselines.

As production procurement packages are assembled, models and drawings will be released to the Fabrication level and assigned a Revision 0 status. Only at this level will revisions be tracked. Pro/INTRALINK version numbers will be used to track early stages in the release process. They will identify baselines, design milestones and the status of the object. As such version numbers need to be maintained for documentation purposes. The Pro/INTRALINK system administrator will not purge version numbers in any of the NCSX folders without consent of the NCSX Project Design Integration group.

When a drawing (or model) is ready to be released for fabrication the responsible designer/drafter/engineer shall make an Adobe PDF file for obtaining signatures. The

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Adobe PDF file will be routed for signatures following the sign-off procedure for the WBS group for which the drawing was released. At a minimum, a drawing release sign-off procedure will call for signatures by the drawing originator, a drawing checker and the cognizant engineer. The approved drawing signatures will be electronically added to the PDF file using the Adobe signing process outlined in NCSX Procedure NCSX-PROC-005. After the cognizant engineer signs he will send the Adobe PDF file to the PPPL Drafting supervisor. The Drafting supervisor will add his signature to the PDF drawing (indicating that PPPL drawing standards are met), add the stamp “Released for Fabrication/Installation”, and enter the drawing in the Released Drawing folder in Pro/INTRALINK (001_Released_Dwgs_PDF_Format). Write access to this area will be restricted to the Drafting Supervisor and his designees. Release drawings developed at ORNL will be sent to the PPPL Drafting supervisor for placement in the NCSX released drawing folder.

The electronic CAD version of the release drawing will be stored in Pro/INTRALINK in the appropriate subfolder based on the WBS level where it originated. The electronic CAD version will have a unique numbering scheme consisting of the revision number (only when issued as an approved Fabrication Release level), the release level, and the version number.

2.2.4 Model and Drawing Storage

All CAD models and drawings, and the native CAD data files, will be stored in *Commonspace* within the governing WBS folder under which the data was developed. All models and drawings that describe the approved technical baseline will be stored in the approved technical baseline folder in a PDF format. Models and drawings in a developmental baseline status will also be stored in a PDF format as each release level is achieved. The released drawing folder will have restricted write access with an unrestricted read access.

2.2.5 Changing Models and Drawings

Until a drawing or model is approved and released for fabrication, the revision level (e.g., Revision 0) will not be advanced. Rather, in accordance with Section 2.3 above, only the version number will be advanced. The same degree of discipline will be applied when promoting and/or demoting drawings and models to ensure that the latest released version is available on the Pro/INTRALINK *Commonspace* database. Changes to approved and released fabrication drawings will be made in a manner that follows the NCSX Configuration Management Plan (CMP).

2.3 Other Technical Documents

2.3.1 General

Technical project documents identified as controlled documents (e.g., specifications, ICDs, etc.) and not designated as QA-related records such as NCRs, will reside in a web-based environment as they are being developed, existing as drafts for project review and mark-up. QA-related records such as NCRs will be maintained in the QA/NCR database and are only available in a pdf format. Once the documents are approved a PDF file form (with the signature either electronically recorded or scanned

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in<, these documents will be stored on the Engineering Web page http://ncsx.pppl.gov/NCSX_Engineering/ . WBS-specific procurement and process specifications, including duplicate statements of work (to those maintained in the PPPL Procurement files), assembly procedures and testing procedures, will be stored in the parent WBS folder. Other technical documents that support the controlled technical documents will be maintained on the appropriate web page and links established to the Engineering Web page http://ncsx.pppl.gov/NCSX_Engineering/ .

2.3.2 Specifications

Specifications are requirements documents. As described in the Systems Engineering Management Plan (NCSX-PLAN-SEMP), specifications may fall into two categories; “design-to” or “build-to” specifications. The SEMP also defines 5 types of specifications with different purposes. If the specification is specific to a single WBS element (e.g., procurement or process specification), the specification will be stored in the parent WBS folder on the Engineering Web page http://ncsx.pppl.gov/NCSX_Engineering/ . However, if the specification is non-WBS-specific, then it is stored in the Project Oversight and Support folder. Samples of some specifications that will be developed for the NCSX Project include the following:

- NCSX General Requirement Document (NCSX-ASPEC-GRD)
- NCSX Vacuum Materials List
- NCSX Structural and Cryogenic Design Criteria Document
- NCSX Grounding Specification for Personnel and Equipment Safety
- NCSX Development Specifications (“design to” or BSPECs)
- NCSX Product/Procurement Specifications (“build to” or CSPECs)
- NCSX Process Specifications (Assembly and Testing Procedures)

2.3.3 Interface Control Documents (ICDs)

Interface definitions between two WBS system components will be defined in an Interface Control Document (ICD). The Interface Control Management Plan (NCSX-PLAN-ICMP) provides the process details for identifying, numbering, and managing interfaces between separate WBS elements with separate WBS Managers (primary interfaces) and those interfaces entirely within a single WBS element or between two WBS elements, but with the same WBS Manager (secondary interface).

An interface may define a written agreement between WBS systems or define a physical boundary, mating surface geometry or attachment details that exist between two adjoining WBS components. An Interface Control Document folder will be set up in Pro/INTRALINK that will contain two subfolders. One subfolder will contain PDF files of ICD’s and the other will contain CAD drawing files (if a drawing format exists). For Pro/Engineer users, the ICD parts and/or assemblies whether described in models or drawings or by simple written agreement will remain in their respective WBS folders. One WBS system manager will take the responsibility of generating the ICD. The number placed on the ICD will be a number generated by the generating WBS group. No special number is assigned if the ICD is defined with a drawing. The originating WBS group takes the next available number in its drawing number sequence. After the ICD is completed, a PDF file will be generated and routed to both interfacing WBS managers

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and the cognizant Project Engineer(s) for approval. Once an ICD represented by a model or drawing is approved, a Pro/INTRALINK version will be created in order to save the release level and version number. The drawing or model that is created will clearly identify the ICD number. The Pro/INTRALINK database will reflect a description of the ICD in the name description.

2.3.4 Non Conformance Reports (NCRs)

Should a part and/or component be received that is out of the specification guidelines, the NCSX Project will process a Non Conformance Report (NCR) in accordance with PPPL QA-005. Each NCR file will be assigned a unique number that relates it to the impacted project and component/drawing (and eventually the WBS) and will be stored in subfolder to the same folder as the impacted drawing or model. It should be noted that NCRs, in themselves, are not under configuration control, rather the resulting impacts of the NCR on drawings, hardware, cost, and schedule are what is controlled by the Configuration Control processes outlined in the CMP.

2.3.5 Supporting Design Documentation

2.3.5.1 Memoranda and Calculations/Analyses

Memoranda and calculations/analyses will be stored on the appropriate web site (e.g., the Engineering Web Page http://ncsx.pppl.gov/NCSX_Engineering/ for memoranda and the FTP server for large data calculation/analysis files). These documents will be stored on these servers by the initiating author.

2.3.5.2 E-mails

In the electronic age, many design basis decisions and supporting technical bases are documented in e-mails. The e-mails related to specific design decisions and/or supporting technical bases will be stored in a separate set of electronic files. Appropriate e-mails will be forwarded to the Systems Engineering Administrator for filing by the initiating author.

3 MANAGING OTHER PROJECT DOCUMENTATION

3.1 Cost and Schedule Documentation

The cost and schedule baselines will reside on the Primavera Project Planner (P3) database maintained by the NCSX Project Control Manager. PDF files of the most recent cost and schedule baselines will be posted on the Engineering Web Page http://ncsx.pppl.gov/NCSX_Engineering/ when the technical, cost, and schedule baselines are updated. As indicated in this DMP and the Configuration Management Plan (CMP), the technical, cost, and schedule baselines can only be changed by an ECP once the initial set of baselines is established at the start of preliminary design.

3.2 Plans and Procedures

The NCSX Project Execution Plan ((NCSX-PLAN-PEP) identifies the list of project-specific plans to be developed and controlled under configuration control. These will be

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prepared and approved in accordance with the review and approval hierarchy specified in the NCSX Document and Records Plan (NCSX-PLAN-DOC). Proposed changes or drafts to new plans will be maintained on the NCSX Engineering Web Page http://ncsx.pppl.gov/NCSX_Engineering/ until such time that they are approved and placed under configuration control. Once that happens, they will be placed in the Engineering Web as part of the controlled project files. Since the project plans cut across all WBS elements, these are stored in the Project Oversight and Support folder.

3.3 Miscellaneous Documents

3.3.1.1 WBS Dictionary

The NCSX Work Breakdown Structure (WBS) Dictionary (NCSX-WBS) is also a controlled document that is under configuration control. The WBS Dictionary is stored on the NCSX Engineering Web page http://ncsx.pppl.gov/NCSX_Engineering/.

3.3.1.2 Procurement Documentation

The PPPL Procurement Department is responsible for maintaining all records related to procurements. Notwithstanding this, appropriate copies of Statements of Work and other procurement-related technical documentation will also be maintained in either the Pro/INTRALINK database for drawings or the NCSX Engineering Web page http://ncsx.pppl.gov/NCSX_Engineering/.

3.3.1.3 Training Records

Specific individual on-site personnel training records will be maintained by the PPPL Human Resources Department.