NOvA Project
Configuration Management

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Fermilab
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Overview

• DOE O 413.3 Contractor Requirements
• Configuration Management (CM) Processes & Principles
• NOvA’s Configuration Management Program (CMP)
• Summary
9. A configuration management process must be established that controls changes to the physical configuration of project facilities, structures, systems, and components in compliance with ANSI/EIA-649, *National Consensus Standard for Configuration Management*. This process must also ensure that the configuration is in agreement with the performance objectives in the technical baseline.
Purpose & Benefits of CM

- Product attributes are defined
- Product configuration is documented and a known basis for making changes is established.
- Products are labeled and correlated with their associated requirements, design and product information.
- Proposed changes are identified and evaluated for impact prior to making change decisions.
- Change activity is managed using a defined process.
- Configuration information captured during the product …<life cycle> is organized for retrieval of key information and relationships, as needed.
- Actual product configuration is verified against the required attributes. Incorporation of changes to the product is verified and recorded throughout the product life.
Configuration Management Processes:

- CM Planning & Management
- Configuration Identification
- Configuration Change Management
- Configuration Status Accounting (CSA)
- Configuration Verification & Audit
- CM of Digital Data
EIA-649

Provides fifty CM principles and stipulates:

“Configuration management practices should be applied selectively, and to a degree commensurate with the product application environment.”

EIA-649 recommends a general methodology for selecting which principles are appropriate; however, any method that considers the product characteristics, environment, and life cycle may be performed.
NOvA’s CM Practices

“We have tailored the degree of rigor employed based on the functions and importance of each system or component.”
NOvA’s CM Practices

- CMP documents how the project addressed the applicable principles.

<table>
<thead>
<tr>
<th>No.</th>
<th>Principle</th>
<th>How it is Addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Plan CM processes for the context and environment in which they are to be performed and manage in accordance with the planning: assign responsibilities; train personnel; measure performance; and assess measurements/trends to effect process improvements.</td>
<td>In the CMP</td>
</tr>
<tr>
<td>2.</td>
<td>To determine the specific CM value adding functions and levels of emphasis for a particular product, identify the context and environment in which CM is to be implemented</td>
<td>In the CMP</td>
</tr>
<tr>
<td>3.</td>
<td>A configuration management plan describes how configuration management is accomplished and how consistency between the product definition, the product's configuration, and the configuration management records is achieved and maintained throughout the applicable phases of the product's life cycle.</td>
<td>In the CMP</td>
</tr>
<tr>
<td>4.</td>
<td>Prepare procedures to define how each configuration management process will be accomplished.</td>
<td>Figure 3 (Flowchart)</td>
</tr>
<tr>
<td>5.</td>
<td>Conduct training so that all responsible individuals understand their roles and responsibilities and the procedures for implementing configuration management processes.</td>
<td>Regular meetings with L2 Managers</td>
</tr>
<tr>
<td>6.</td>
<td>Assess the effectiveness of CM plan implementation and performance of the configuration management discipline with defined metrics (performance indicators).</td>
<td>PM Responsibilities</td>
</tr>
<tr>
<td>7.</td>
<td>Performing configuration management includes responsibility for the configuration management performance of subordinate activities (e.g., subcontractors, suppliers).</td>
<td>L2 and L3 Manager responsibilities</td>
</tr>
<tr>
<td>8.</td>
<td>Configuration identification is the basis from which the configuration of products are defined and verified; products and documents are labeled; changes are managed; and accountability is maintained.</td>
<td>PMP Change Control</td>
</tr>
</tbody>
</table>
NOvA’s CMP

“Describes configuration management (CM) responsibilities and processes that support the design and implementation of the NOvA detector.” (NOvA.doc.131)

- The CMP is not yet final and has some overlap with other project documents
  - Project Execution Plan
  - Project Management Plan
  - NOvA Risk Management Plan
Purpose

Ensure that:

- Baselines are defined and documented
- Documentation is identified, released and controlled
- A Configuration Control Board (CCB) is established and functions according to CMP guidelines
- Changes to the baseline are evaluated and controlled
- Approved configuration changes are implemented and tracked
- Configuration status accounting is accomplished
Main Goal

- Prevent unauthorized or uncontrolled physical hardware changes to equipment, changes to controlled documents, and changes to controlled software.
  - Integrates existing CM control systems
  - Augments where needed
Key elements of NOvA CMP

Configuration Identification

- Online Access to NOvA Project Team
- Baseline Documents
- Proposed Change
- Change Approval

Configuration Status Accounting

- CI Selection
- Online Access for Status Reporting and Real-Time Inquiries
- Configuration Audits
- Change Verification
- Configuration Verification

Configuration Change Control
Scope and Applicability

- **Scope** - All work performed as part of the NOvA Project
  - Design, testing, integration, and assembly of components
  - Provides guidance on CM activities for all subsystem teams, collaborations, and subcontractors

- **Applicability**
  - Hardware and software components
  - Related design documents
  - Specifications
  - Drawings
  - Procedures
  - Management documents and other support documents
  - Encompasses the lifecycle of the Project
CM Tools

- NOvA docDB
  - Tracks versions of documents and retains history
- Deltek OpenPlan™ and Cobra™
  - Project scheduling and reporting tools
  - Controls and tracks changes to the cost/schedule baseline
- I-DEAS
  - Technical Drawing control system
# Change Control Thresholds & Responsibilities

<table>
<thead>
<tr>
<th>Category</th>
<th>Fermilab Associate Director (Level 3)</th>
<th>NOvA Project Manager (Level 4)</th>
<th>Subproject Manager (Level 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Technical</strong></td>
<td>Major technical changes that are significant departures from the technical baseline. Changes that affect ES&amp;H requirements or impact accelerator systems. Out-of-scope changes to upgrade physics capabilities.</td>
<td>Related technical changes to multiple subprojects that do not diminish performance.</td>
<td>Minor technical changes to a single subproject that does not diminish performance.</td>
</tr>
<tr>
<td><strong>Schedule</strong></td>
<td>Any change that results in the delay of a Level 3 Director’s milestone.</td>
<td>Any change that results in the delay of a Level 4 milestone by more than one month.</td>
<td>Any change that results in the delay of a Level 5 milestone by more than one month.</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>Increase in the cost of a single item by more than $200K. Increase in the Project base cost exceeding $500K during the previous 12 months.</td>
<td>Increase in the cost of a single item by more than $50K.</td>
<td>Increase in the cost of a single item by less than $10K.</td>
</tr>
</tbody>
</table>
Document Identification and Control

Existing Design or Technical Documents (CI's) → Fermilab Document Control System

Change Request → Document Change Notice

Configuration Items Data List (CIDL) containing Document Identifier, version number, manager, etc.

Controlled by Project Manager

Existing Design or Technical Documents (CI's) → Collaborating Institutions Document Control System

Tracking Link Between Documents and CIDL
Configuration Management Flowchart
Change Request (CR)

June 30, 2006

Suzanne Pasek
## Document Change Notice (DCN)

<table>
<thead>
<tr>
<th>Change Title</th>
<th>Originator:</th>
<th>Email:</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBS:</td>
<td>Document, System or Component:</td>
<td></td>
</tr>
<tr>
<td>CCB ACTION</td>
<td>DATE:</td>
<td>Hardware Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Software Change</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Record Change Only</td>
</tr>
<tr>
<td>CHANGE DESCRIPTION (FROM/TO):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serial or ID#'s of affected systems or components</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reason for Change</td>
<td></td>
<td></td>
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<tr>
<td>Acknowledgements/Completed Actions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Originator</td>
<td>Document Manager</td>
<td></td>
</tr>
<tr>
<td>Level 2 Manager</td>
<td>CIDL Update Complete</td>
<td></td>
</tr>
<tr>
<td>Relevant Project Engineer</td>
<td>Other (specify)</td>
<td></td>
</tr>
</tbody>
</table>
Summary

• Define items requiring CM based on selection methodology
• Select tools, techniques, & methods for CM
• Document processes, procedures & performance measurements
• Define responsibilities and provide training
• Implement plan