

# Introduction

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Phil Lindquist  
LIGO Project Controls Manager

# Previous Experience

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- 1986-Present

CEBAF Project Services Manager/Deputy  
Project Manager

Responsible for Implementing and  
operating project cost, schedule,  
technical performance measurement  
systems

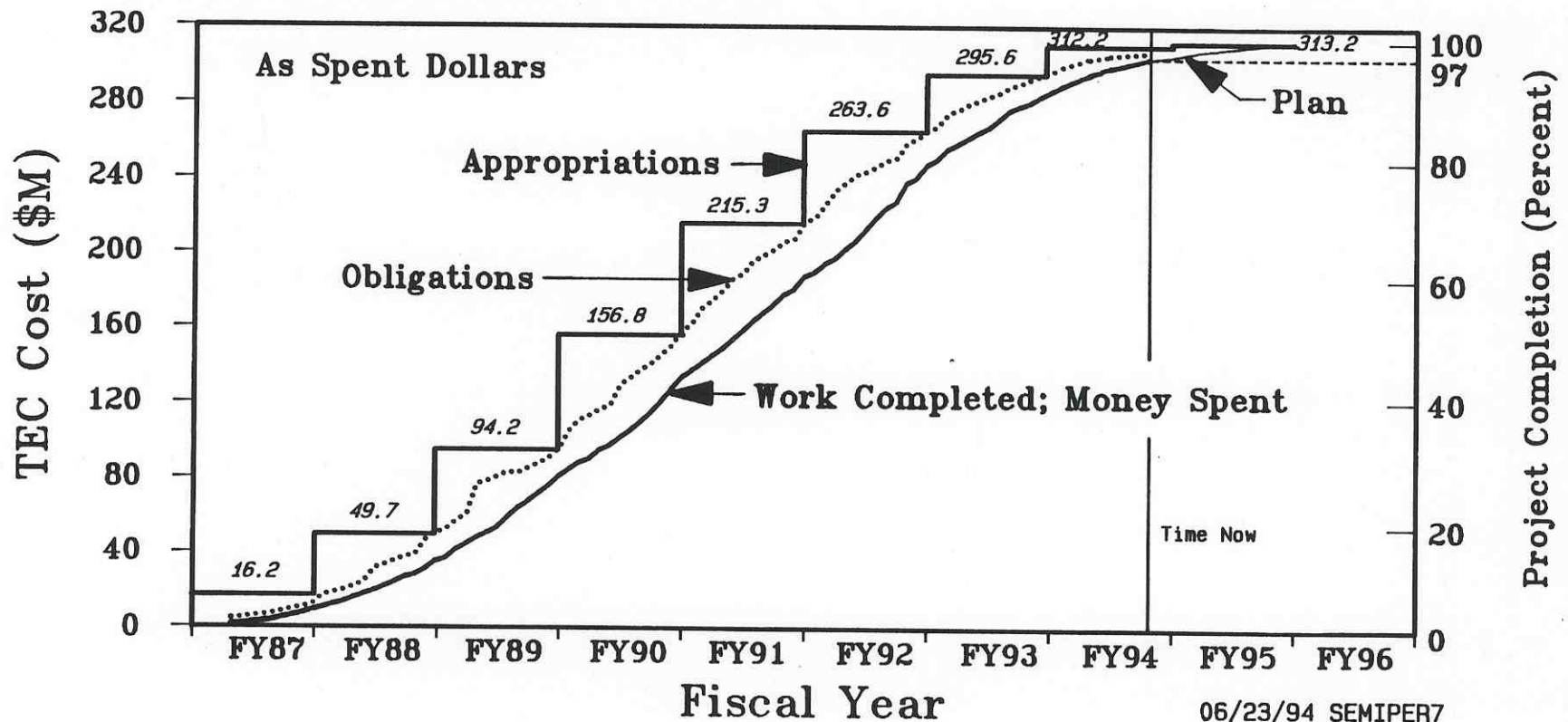
# CEBAF

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- CW recirculating electron accelerator based on superconducting radio frequency cavity technology
  - » 4 GeV
  - » 200 microamps
  - » high quality beam
- Experimental Equipment for three end stations

# ON COST

- Construction cost (TEC) (1987 - 1995) \$313 M
  - 97% complete; 98% obligated
- Total Project Cost (TPC) (1984 - 1995) \$514 M
- Total Federal funds to build and equip Laboratory \$551 M
- Virginia, foreign, user contributions ~\$70 M



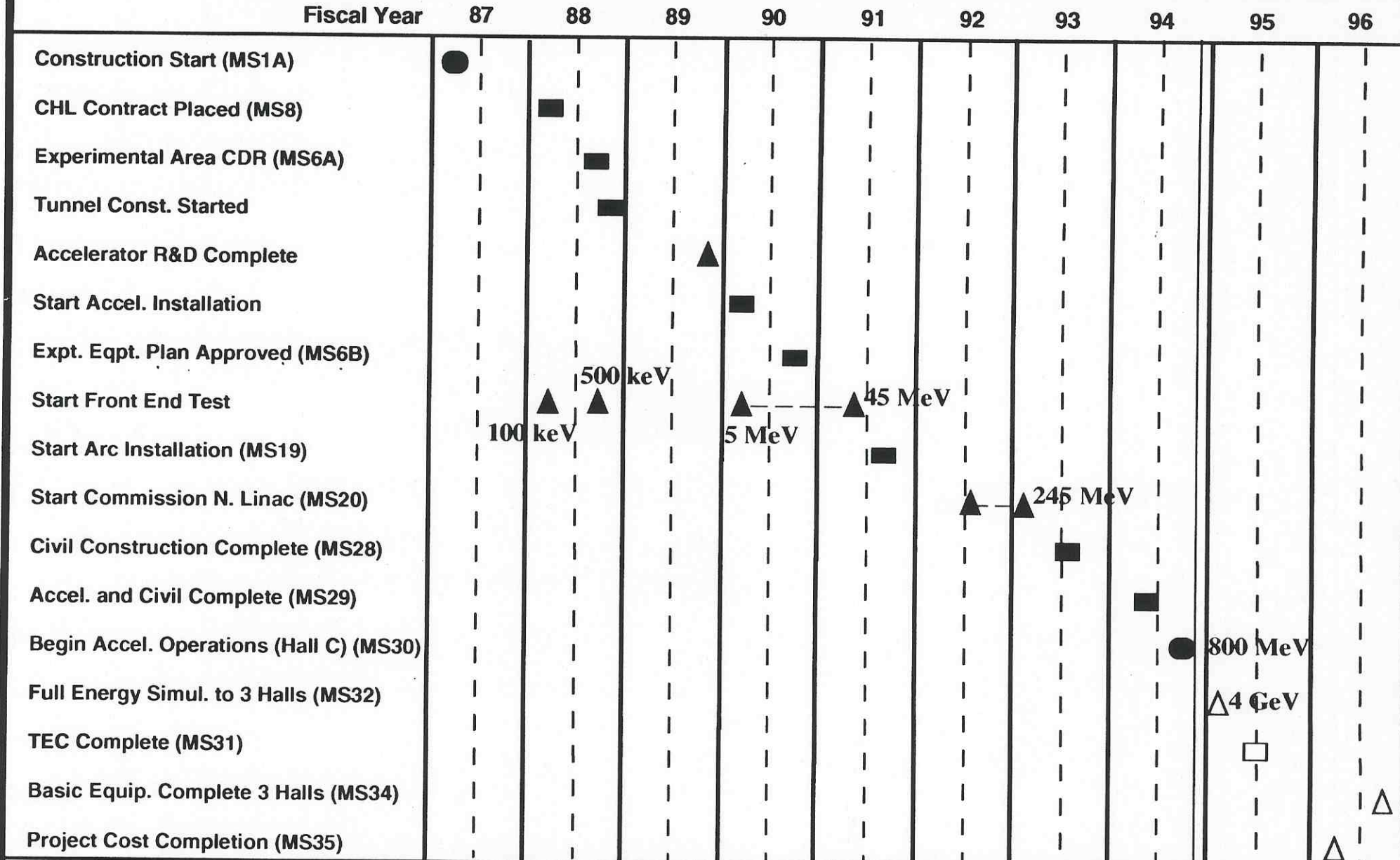
**CEBAF**

The Continuous Electron Beam Accelerator Facility

[Talks] Summer Science Series

30 June 1994

# MAJOR MILESTONES



▲ Operations Milestone Complete      □ Construction Milestone Complete      ○ Acquisition Executive Milestone Complete



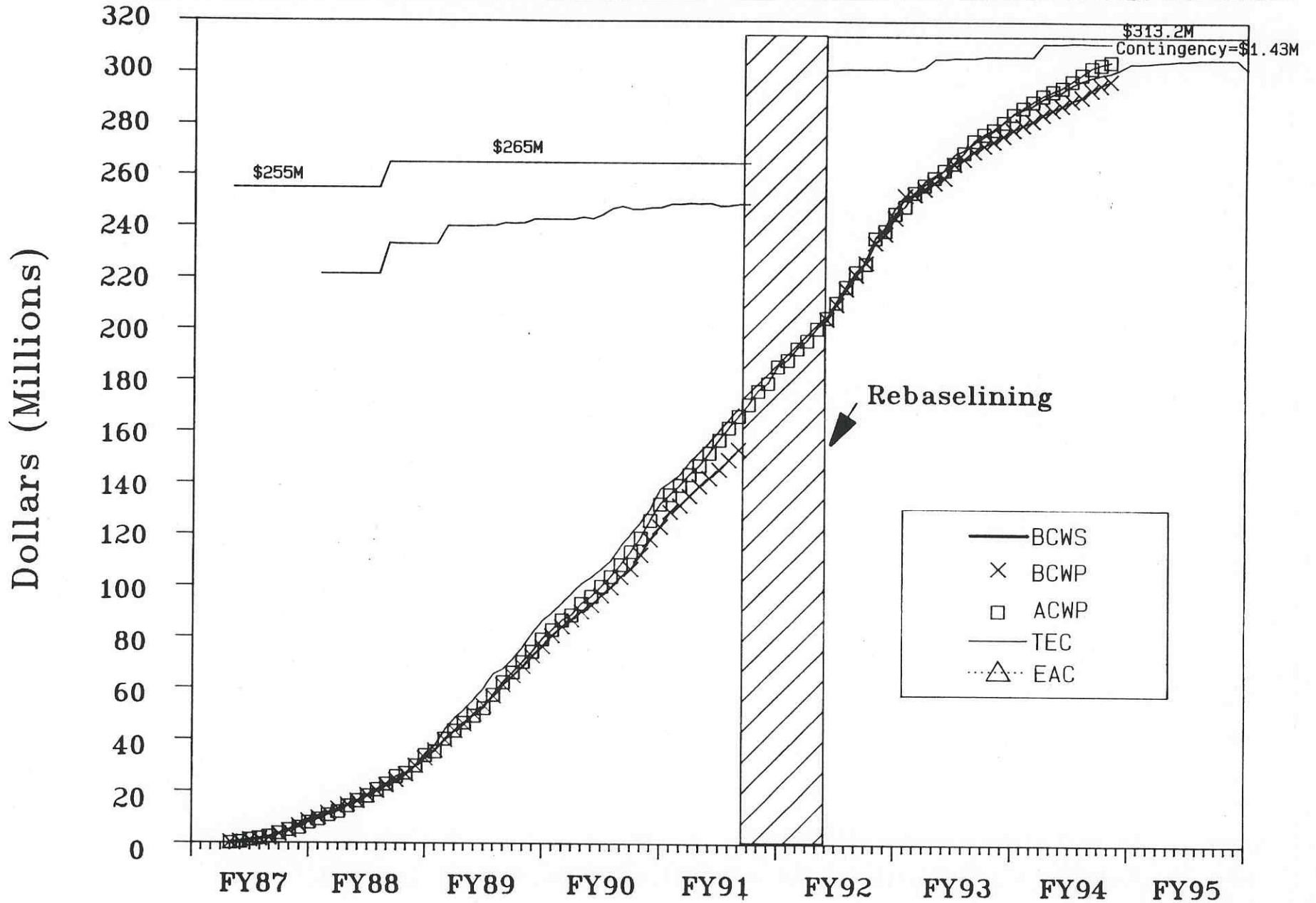
The Continuous Electron Beam Accelerator Facility

Time Now

Viewgraphs3

# COST PLAN AND PERFORMANCE

# CEBAF



# CEBAF Management Systems

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- DOE Review November 1989
- Based on WBS
  - » Detailed schedules (OPENPLAN)
  - » Cost estimates (Cost Sheet)
  - » Budget Baseline (Planning Sheets)
  - » Earned Value
  - » Actual Costs (from Financial Systems)
  - » Funds Control (Commitments tracked by Financial Systems)
  - » Change Control (Change Log)

# LIGO Project Management Control System

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- Purpose: to provide the best functional management systems for planning and monitoring the health of the construction project



# Approach

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- Use Standard Project Management Approach
  - Work Breakdown Structure
  - Cost Estimate
  - Performance Baseline
  - Actual Cost and Commitments Monitoring
  - Schedule Variances
  - Cost Performance Reporting (Cost Schedule Status Report)
  - Schedules
  - Tracking of Accomplishment
  - Cost Variances
- Keep it simple
  - » minimize resources required to maintain
- Implement in stages
  - » get essential systems up and running first
  - » provide time to review and adjust
  - » provide documentation and training

# Proposed Process

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- Revise Work Breakdown Structure (already covered)
- Develop New Cost Estimating (already covered)
- Identify Report Requirements
- Select Applications Software
- Develop Detailed Schedules
- Establish Performance Measurement Baseline
  - » Based on Work Breakdown Structure
  - » Detailed cost estimates tied to detailed schedules
  - » Resources time-phased for comparison with accomplishment and actual costs
  - » Earned value related to cost accrual (vs. commitments)
- Implement Change Control
- Documentation and Training

# LIGO PMCS Development Schedule

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- Restructure LIGO WBS June 9, 1994 Complete
- Develop Cost Estimating Methodology June 9, 1994 Complete
- Prepare New WBS Dictionary July 11, 1994 Complete
- Prepare New Estimate Sept 23, 1994 Complete
- Identify Report Requirements Sept 23, 1994 Oct 30
- Evaluate/Purchase PMCS Software Nov 21, 1994 Nov 30
- Develop Scheduling Methodology Sept 30, 1994 Oct 30
- Develop Detailed System Schedules Dec 30, 1994
- Integrate System Schedules Jan 20, 1995
- Reconcile with Major Milestones Feb 10, 1995
- Load Schedules using Cost Estimate Mar 15, 1995
- Establish budget baseline April 1, 1995
- Prepare PMCS Documentation April 1, 1995
- NSF Baseline Review April 28, 1995

# Other LIGO Activities

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- Subcontract Management
  - » Prepare and facilitate documentation
  - » Analyze cost and schedule data
  - » Monitor subcontract status
- Configuration Management
  - » Configuration Management Plan
  - » LIGO Documentation Control Center
  - » Change Control
  - » Configuration Accounting and Verification

# Other LIGO Activities (cont.)

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- Configuration Management Plan
  - » Describe processes for coordinating changes, ensuring technical, cost, schedule impact considered
- LIGO Documentation Control Center
  - » Approved documentation used to define physical and functional requirements
    - Requirements
    - Specifications
    - Interface Control Documents
    - Cost and Schedule Documentation
    - Performance Measurement Baseline

# Other LIGO Activities (cont.)

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- Change Control
  - » Receive Change Request from cognizant manager
  - » Present to Integration Meeting
  - » Take Revision Package to Change Control Board (Technical Board)
  - » Issue Notice of Revision
- Configuration Accounting and Verification
  - » Maintain current list of baseline documentation
  - » Maintain status of changes
  - » Track configuration