

# Central Controls and Computing

## WBS58

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*WBS5 Work Package Manager*

# Agenda

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- Introduction
- Requirements and Interfaces
- Cost and schedule
- Risks and mitigation
- Responses to past review recommendations

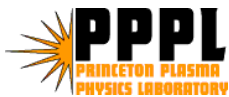
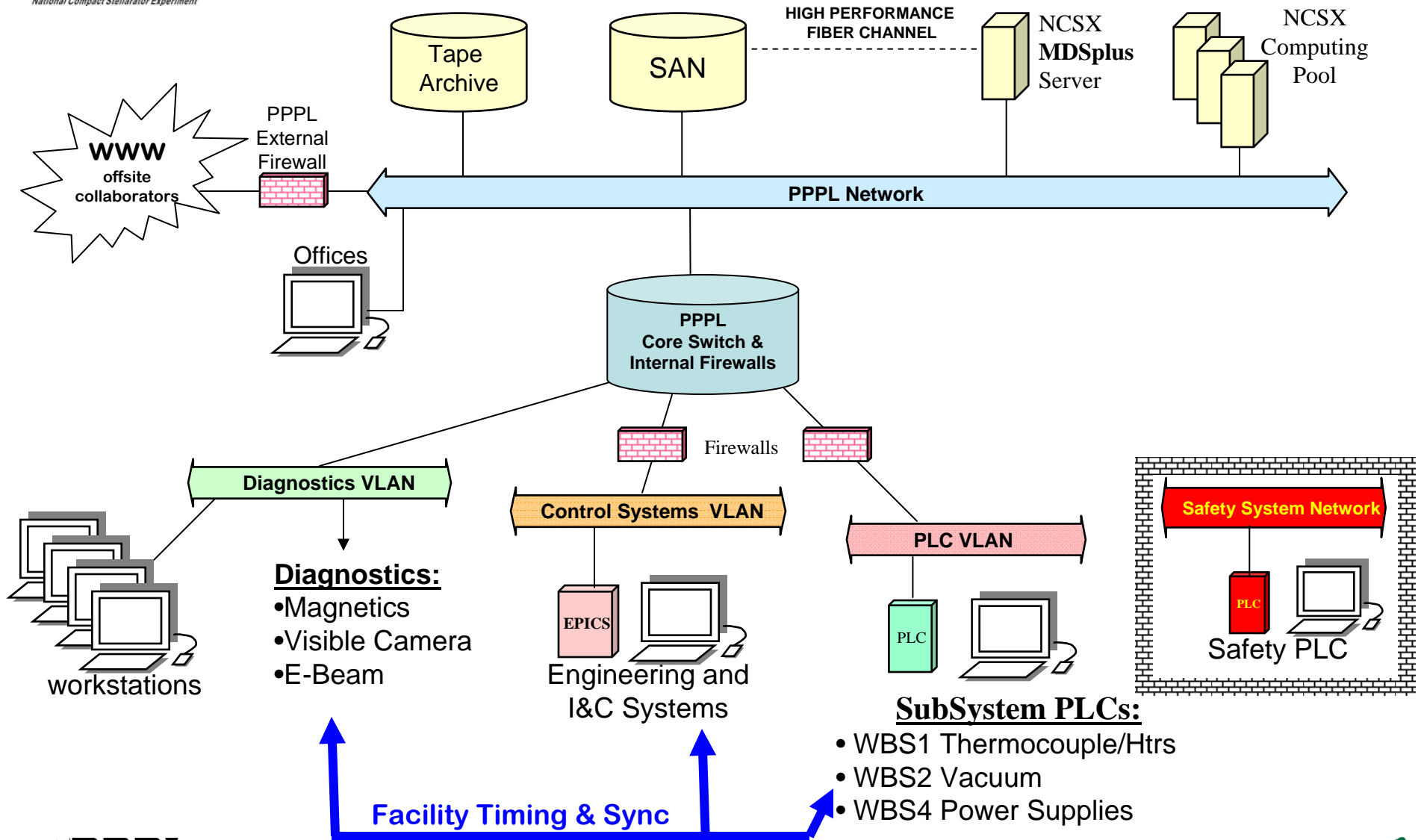
# Introduction



Central Controls and Computing will provide the equipment and services to support: 1) integrated and remote control; 2) data acquisition, analysis, and storage; 3) facility timing and synchronization; 4) central safety and interlocks.

- **Network and Fiber Optic Infrastructure (WBS 51)**
- **Central Instrumentation and Control (WBS 52)**
- **Data Acquisition and Facility Computing (WBS 53)**
- **Facility Timing and Synchronization (WBS 54)**
- **Real-Time Plasma and Power Supply Control (WBS 55)**
- **Central Safety and Interlock System (WBS 56)**
- **Management and Integration (WBS 58)**

# NCSX Computing Overview



SC Project Review of NCSX, April 8-10, 2008

P. Sichta - page 4



# Requirements



- An *NCSX System Design Description* (SDD) was written in 2003, before CD-2. The primary elements of that design remain intact.
- My current estimate is derived from the SDD, ongoing technical discussions and design reviews, and recent experience with similar systems on NSTX.
- A **WBS5 System Requirements Document** (SRD, BSPEC) will be reviewed and approved prior to the *Preliminary Design Review* for each WBS5 element.
- Design Complexity & Maturity
  - Many of the technologies for WBS5/NCSX are currently in use on NSTX, so complexity is low for our experienced staff.
  - The *current workscope* has completed neither **Preliminary** nor **Final design**, so the maturity is medium.

# CD-4 Interface List



WBS51 Network & Fiber Optic	WBS1 Thermocouple/Heater Local I&C WBS2 Vacuum/Fueling Systems WBS3 Diagnostics WBS4 Power Systems
WBS52 Central I&C	WBS1 Thermocouple/Heater Local I&C WBS2 Vacuum/Fueling Systems WBS4 Power Systems
WBS53 Data Acquisition and Management	WBS1 Thermocouple Local I&C WBS2 Vacuum/Fueling Systems WBS3 Diagnostics WBS4 Power Systems
WBS54 Timing & Synchronization	WBS3 Diagnostics WBS4 Power Systems
WBS55 Real-Time Control	WBS2 Vacuum/Fueling Systems WBS4 Power Supply Control
WBS56 Central Safety and Interlocks	<b>Access Control:</b> WBS4 Power System Areas, WBS7 Test Cell. <b>SubSystem Interlocks:</b> WBS4 Power Systems. <b>NCSX (Global) E-Stop.</b>

# Basis of Estimate



- Labor:
  - referenced actual engineering hours from FY97-99 for the NSTX first plasma.
  - experience with similar activities for NSTX.
  - ‘expert’ estimates (e.g. Erik Perry).
- M&S
  - recent purchase of parts for NSTX and other lab infrastructure projects.
  - catalog prices.
  - includes spares and service contracts.
  - selective use of NSTX equipment.

# WBS5 Aggregate Cost

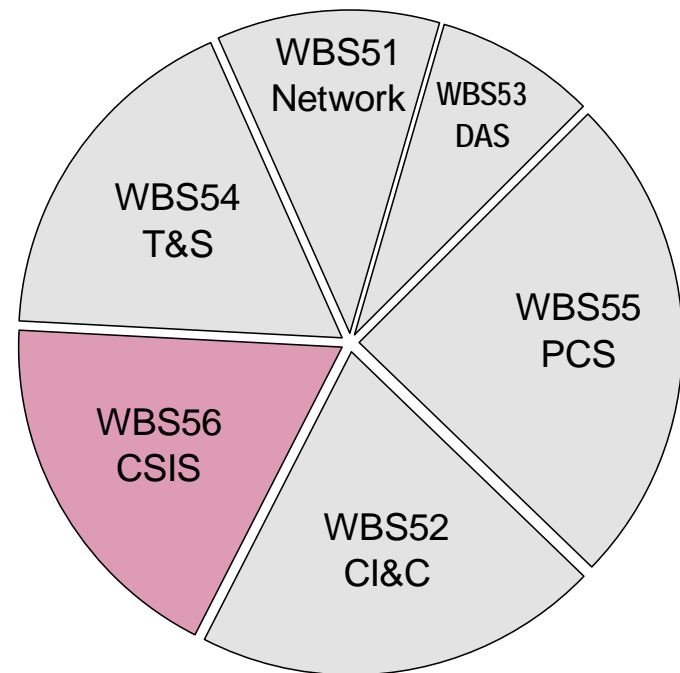


Reference *WAFs* for labor and M&S detail for WBS51-58.

[http://ncsx.pppl.gov/Rebaseline/Rebaseline\\_index.htm](http://ncsx.pppl.gov/Rebaseline/Rebaseline_index.htm)

WBS5 ETC = \$ 2.1 M

Softwr/Elec Engineering: **3.6 years**  
Elec/Mech/Draft Tech: **3.1 years**  
'Materials & Services': **\$ 432 K**



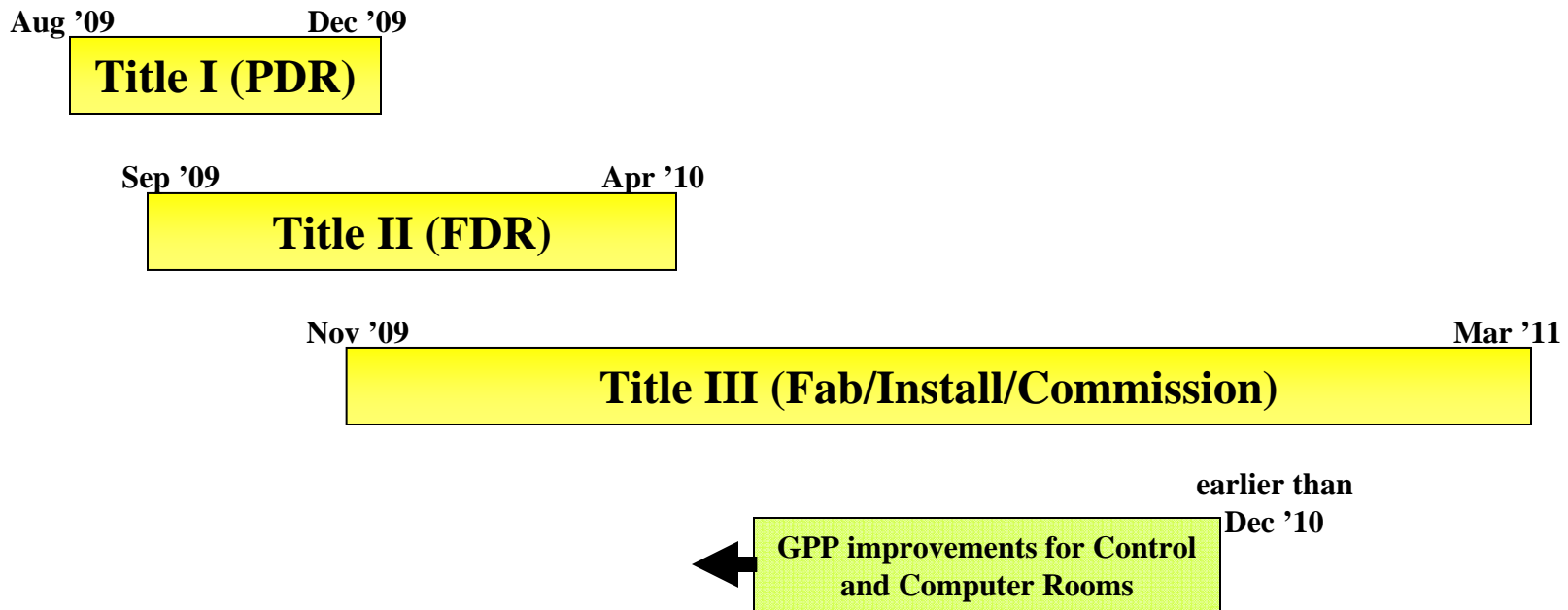


# WBS51–WBS56 Aggregate Schedule



Reference *Resource Loaded Schedule* pages 53-56  
for schedule detail for WBS51 – WBS58.

[http://ncsx.pppl.gov/Reviews/FY08/BCP\\_2008/Docs/NCSX\\_RLS0403.pdf](http://ncsx.pppl.gov/Reviews/FY08/BCP_2008/Docs/NCSX_RLS0403.pdf)

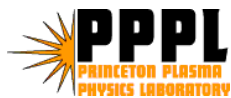


# Schedule (58)



Activity ID	MILE-STONE LEVEL	Activity Description	Duration (work days)	SHIFTS	Forecast Start	Forecast Finish	Total Float	Cost to Complete from 2/1/08	Fiscal Year					
									FY08	FY09	FY10	FY11	FY12	FY13
<b>58 - Central I&amp;C management and Integration</b>														
<b>Job: 5801 - Central I&amp;C Integr&amp; Oversight-SICHTA</b>														
R58-20		WBS58 -FY08 Management & Integration LOE	250*		01OCT07A	30SEP08	1,521	14,454.84	ec/em=160					
R58-30		WBS58 -FY09 Management & Integration LOE	249		01OCT08*	30SEP09	1,272	16,773.60	ec/em=120					
R58-40		WBS58 -FY10 Management & Integration LOE	248		01OCT09*	30SEP10	1,024	17,264.40	ec/em=120					
R58-50		WBS58 -FY10 Management & Integration LOE	248		01OCT10*	28SEP11	776	18,139.20	ec/em=120					

5 - Facility Svstems



# Risks and Mitigation



Reference *NCSX Risk Register* (page 2, item 'e') for WBS5 risks.

[http://ncsx.pppl.gov/Reviews/FY08/BCP\\_2008/Docs/RR\\_Rev28a.pdf](http://ncsx.pppl.gov/Reviews/FY08/BCP_2008/Docs/RR_Rev28a.pdf)

Risk Description	Mitigation Plan	Likelihood	Consequence	Risk Ranking
Loss of staff with experience in specialized software will delay availability of Central I&C system.	Staff have recently been brought on board in anticipation of growing NCSX I&C needs. The planned shutdown of NSTX after FY10 will increase the availability of similar resources for NCSX.	VU	Marginal	Low

# Response to Past Review Findings

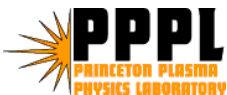


## 1. Work with ES&H on Safety System Requirements and design basis.

- PPPL's *ES&H Directives Manual, section 2-5 "Personnel and Safety Interlock Systems"* is in the process of being updated.

## 2. Document Basis of Estimate

- A WBS5 notebook has been prepared to compile the design basis.
  - Copies of recent requisitions for similar equipment.
  - Catalog cut-sheets with prices.
  - Actual NSTX engineering-hours (labor) tabulation for first plasma.



# Conclusion



The NCSX central controls and computing are **similar in both function and scale to NSTX**. The availability of a technically diverse and **experienced staff** provides confidence that the WBS5 work elements will effectively support the NCSX project's CD-4 objectives.