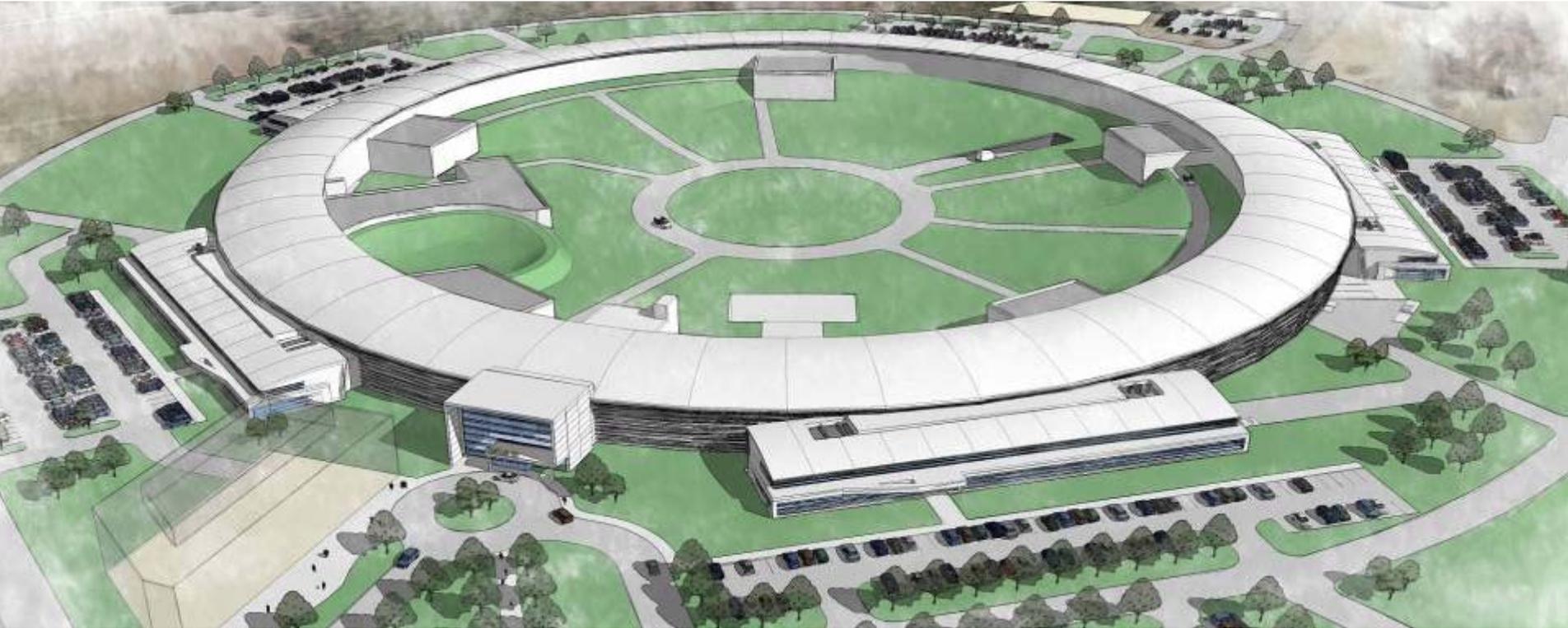


# NSLS-II Project Update

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Steve Dierker  
Associate Laboratory Director for Light Sources  
NSLS-II Project Director  
Conventional Facilities Advisory Committee  
September 25, 2007

# Project Scope

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## Accelerator Systems

- Storage Ring (~ ½ mile in circumference)
- Linac and Booster Injection System

## Conventional Facilities

- Improvements to Land
- Ring Building w/ Operations Center and service buildings (~ 326k gsf)
- Laboratory/Office Buildings (LOBs) to house beamline staff & users (~68k gsf)
- Reuse of existing NSLS office/lab space for NSLS-II staff
- Sustainable design (LEEDS certification)

## Experimental Facilities

- Initial suite of 6 insertion device beamlines and instruments
- Capable of hosting at least 58 beamlines

## R&D

- Advanced optics for achieving 1 nm and 0.1 meV
- Nanopositioning and mirror metrology
- Advanced insertion devices

# Some Activities Since Last CFAC Meeting

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- Finalized Lattice Design & Footprint May 4
- SC Mini-Review May 22
- Project Advisory Committee (PAC) May 24-25
- Kick off cost estimate for CD-2 June
- CD-1 ESAAB June 13
- CD-1 Approval July 12
- Held User Workshop July 17-18
- WBS Level 2 Cost Estimate Meetings July/August
- Internal Cost and Schedule Review Aug 30
- Held seven Accelerator Technical Design Reviews Aug/Sep
  - Storage Ring Magnets, Vacuum Systems, Front Ends
  - Instrumentation and Diagnostics
  - Insertion Devices
  - Power Supplies
  - Control Systems
  - Accelerator Physics
  - Interlock Systems
- Conventional Facilities 90% Title I Submission Sep 7
- Comprehensive Project Design Review Sep 11-13

# NSLS-II User Workshop

## First Day Session

- Described conceptual design and status of project
- Highlight talks on physical and life sciences and user access models
- Described process for beamline development at NSLS-II
- Described Joint Photon Sciences Institute
- Described plans for transitioning from NSLS to NSLS-II
- Discussions at reception and dinner
- > 450 Attendees
- OSTP: John Marburger
- DOE: Pat Dehmer (BES), Pedro Montano (BES), Susan Gregurick (BER)
- NIH: Charles Edmonds (NIGMS), Alan McLaughlin (NIBIB), Michael Marron (NCRR), Amy Swain (NCRR)
- NSF: Guebre Tessema



# NSLS-II User Workshop

## 2<sup>nd</sup> Day Breakout Sessions

### Technique-based Sessions

- Hard x-ray Nanoprobe
- Soft Coherent Scattering and Imaging
- Powder Diffraction
- Macromolecular Crystallography
- Liquid Interfaces
- Inelastic X-ray Scattering
- Hard Coherent and XPCS/SAXS
- XAFS
- Bio-SAXS
- Photoemission Spectroscopy

### Science-based Sessions

- Life Sciences
- Catalysis
- Environmental Science
- High-Pressure
- Strongly Correlated Electrons
- Magnetism
- Radiometry and Metrology
- Soft Condensed Matter



# Some Upcoming Events

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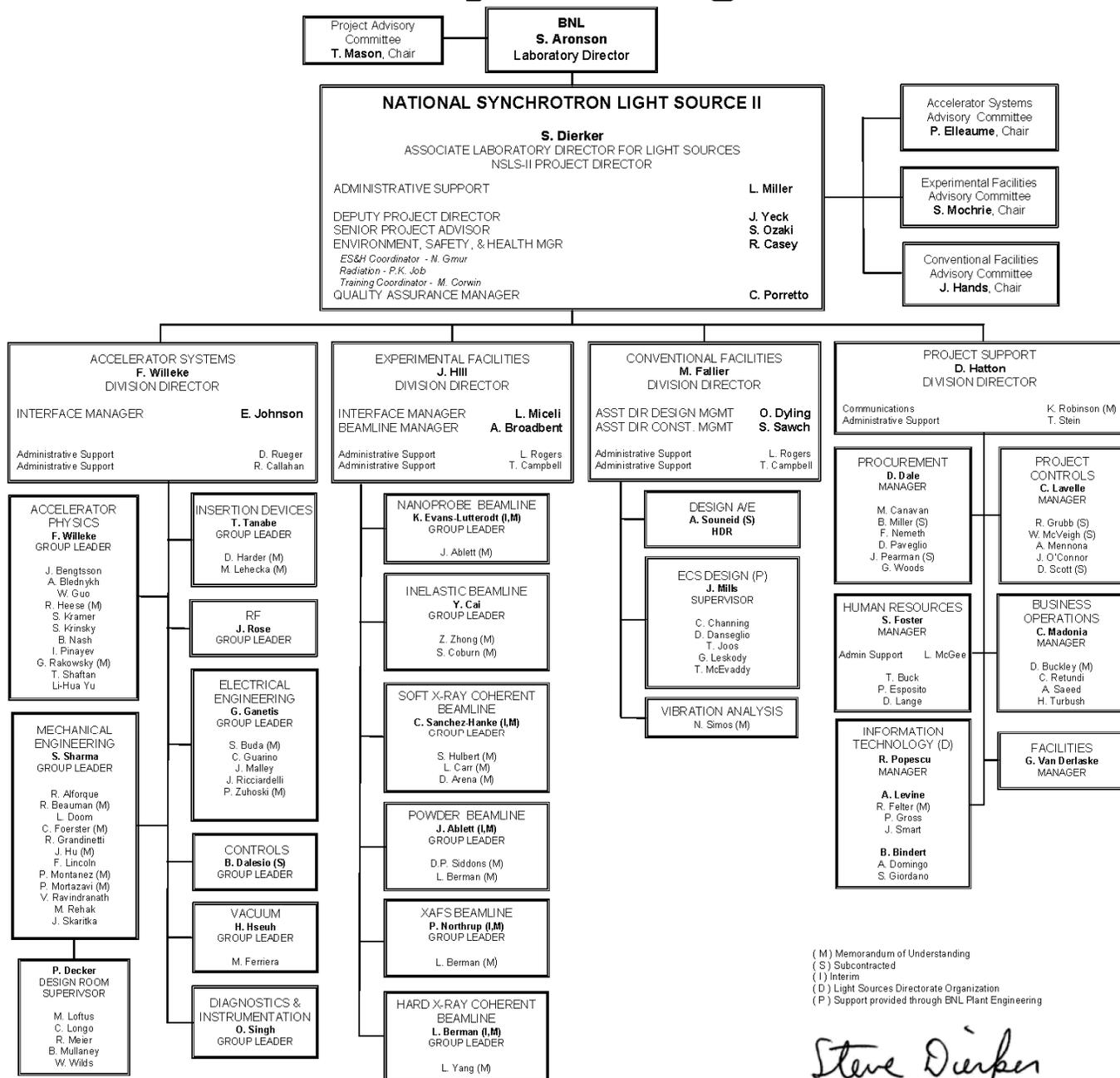
- SC Mini-review of Cost/Schedule Baseline Sep 28
- BSA-EVMS Certification Review Oct 1-5
- Experimental Facilities Advisory Committee (EFAC) Oct 4-5
- Post material for CD-2 EIR Review Oct 5-19
- Accelerator Systems Advisory Committee (ASAC) Oct 8-9
- **DOE CD-2 Review and External Independent Review** Nov 6-9
- Project Advisory Committee (PAC) Nov 20

# Organization & Staffing

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- Organization is well established
- Making good progress with staff additions
  - Ferdinand Willeke joined project full-time on August 1 to succeed Satoshi Ozaki as Director of Accelerator Systems Division
  - Interface Managers for ASD, CFD, and XFD all in place
  - Asst Director for Construction Management hired
  - Other recent hires:
    - QA Manager, IT Manager, many physicists, engineers, & designers (see org chart on next vg)
  - 26 open requisitions – many candidates identified; interviews ongoing

# NSLS-II Project Organization



( M ) Memorandum of Understanding  
 ( S ) Subcontracted  
 ( I ) Interim  
 ( D ) Light Sources Directorate Organization  
 ( P ) Support provided through BNL Plant Engineering

*Steve Dierker*  
 S. Dierker August 17, 2007

# ES&H Status

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- ES&H Plan and ES&H Policy have been issued
- ES&H operating procedures and requirements from NSLS are being migrated to the Directorate Level to ensure uniform approach at both NSLS and NSLS-II
  - e.g.: Work Planning and Control Procedures, EMS/OHSAS Manuals, etc
- All on-going work activities being performed for NSLS-II have been reviewed to make sure that program requirements are in place
- ESH Assessments of design and operation on-going as design progresses
- Final Hazards Analysis in review for approval by BHSO
- Issue:
  - Defining path forward for top-off analyses

# Scope Changes Post CD-1 Review/CDR

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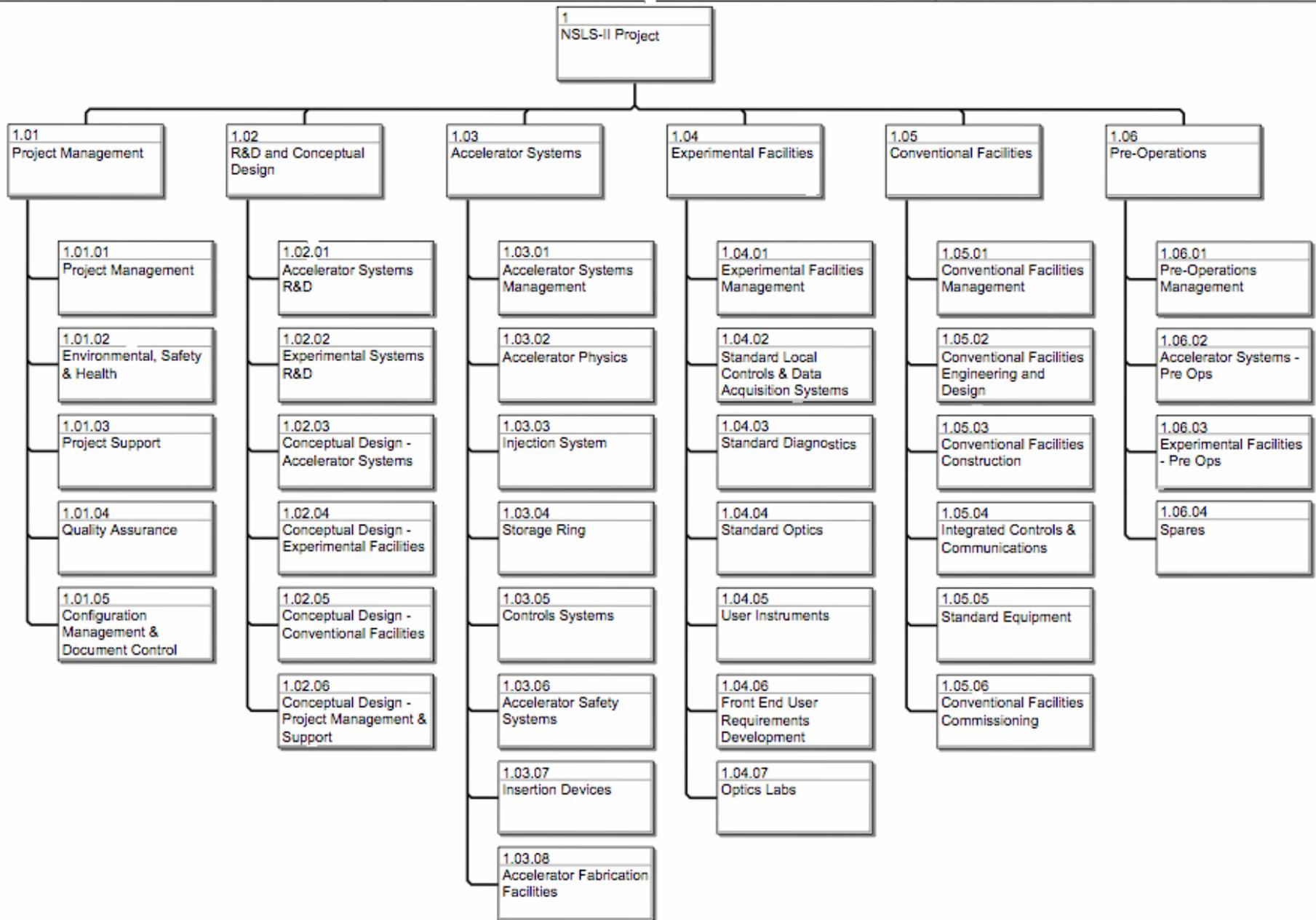
## NSLS-II Construction Project Scope

- Changed from Internal to External Booster
- Increased Experimental Facilities Budget for Additional Beamlines
- Eliminated the Central Laboratory Office Building
- Expanded Distributed Laboratory Office Space (3 Larger LOBs)
- Added Ratchet Wall Shield Doors
- Addressed Omissions in the Global Systems Estimate
- Established CD-4A, Beneficial Occupancy of Experimental Floor

## Additional Changes

- Developed Transition Plan for NSLS Beamlines

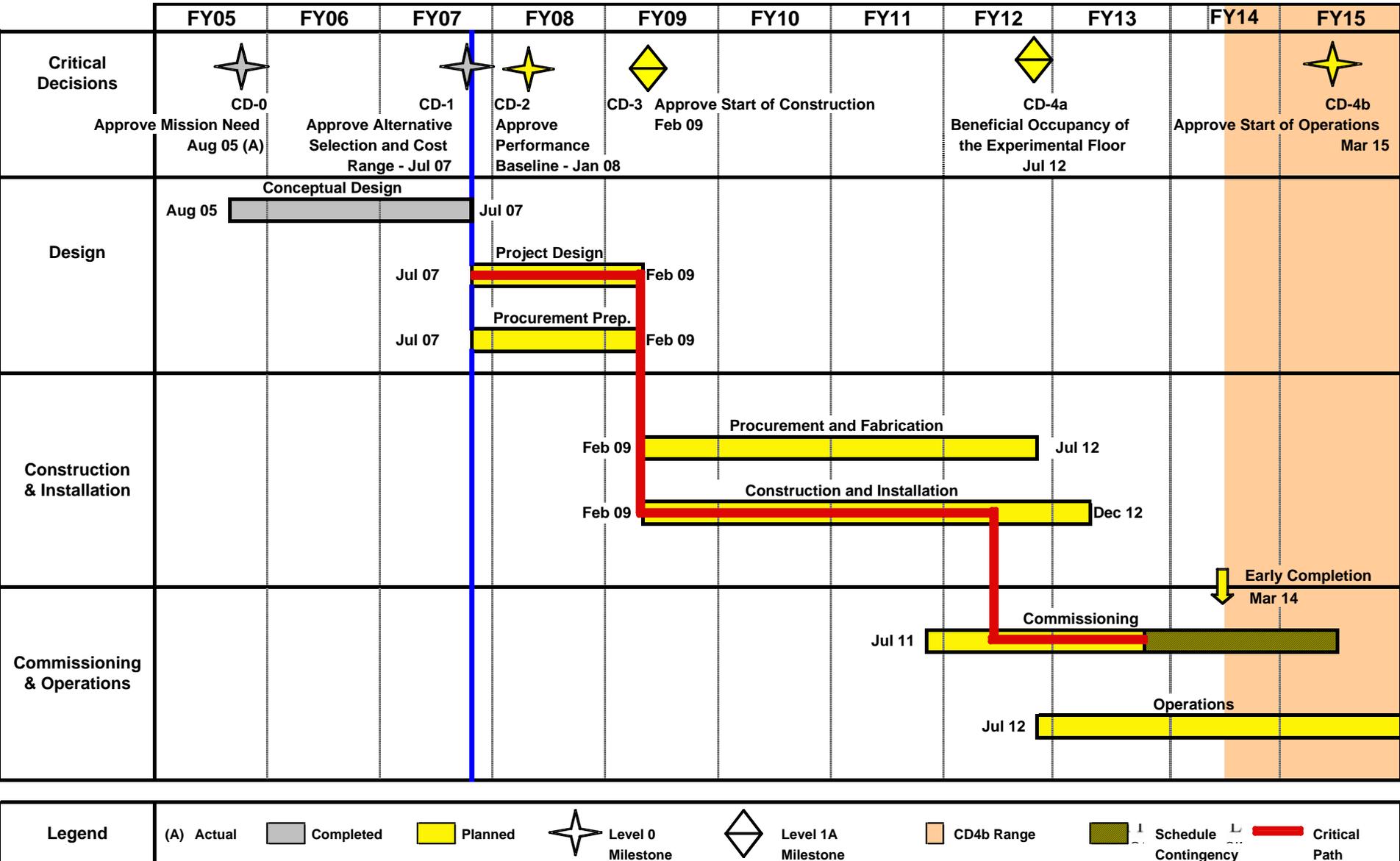
# WBS Structure - Level 3



# DOE Preliminary Milestones

Date	Milestone	Activity
Aug. 2005	CD-0	Approve Mission Need <i>(Complete)</i>
Jan. 2006		Initiate Environmental Assessment and A/E Selection Process <i>(Complete)</i>
Oct. 2006		Complete EA/FONSI; Internal Advisory Committee Reviews <i>(Complete)</i>
Nov. 2006		Complete Conceptual Design Report, Preliminary Baseline <i>(Complete)</i>
Dec. 2006		CD-1, Preliminary Baseline, Review <i>(Complete)</i>
Jul. 2007	CD-1	Approve Alternative Selection and Cost Range <i>(Complete)</i>
Jan. 2008	CD-2	Approve Performance Baseline
Jan. 2009	CD-3	Approve Start of Construction
Dec. 2010		First Ring Tunnel Section Complete, Start Installation and Subsystem Integration
Feb. 2012		Last Ring Tunnel Section Complete
Jul. 2012	CD-4a	Beneficial Occupancy of Experimental Floor
Jan. 2013		Storage Ring Commissioning Complete
May 2013		Storage Ring Operational with Initial Insertion Devices
Mar. 2014		Early Project Completion
Mar. 2015	CD-4b	Approve Start of Operations

# Schedule Schematic



## Legend

- (A) Actual
- Completed
- Planned
- Level 0 Milestone
- Level 1A Milestone
- CD4b Range
- 1-month Schedule Contingency
- Critical Path

# Planning Assumptions

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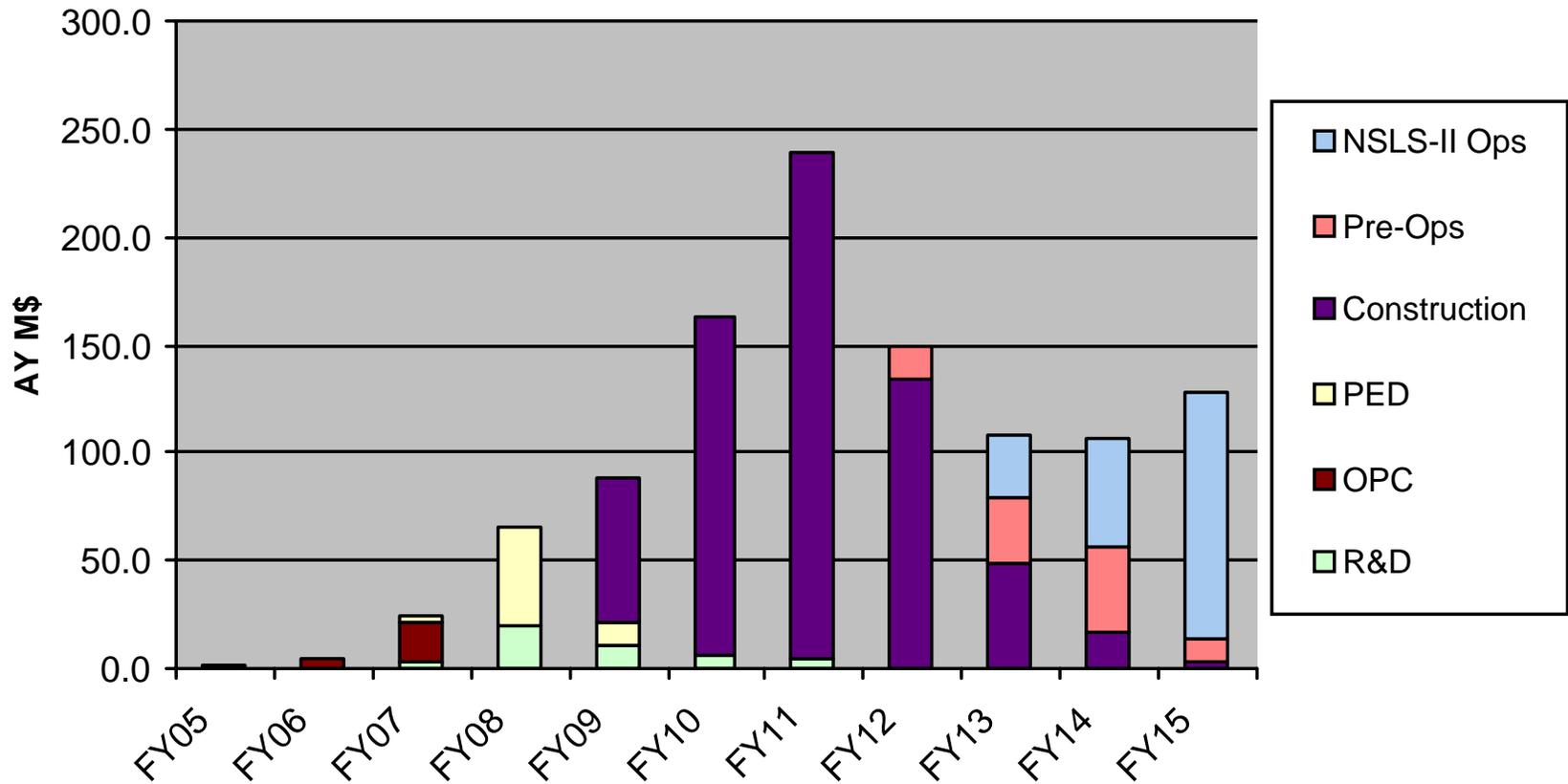
- Estimates developed in FY2007\$; One man-year = 1760 hours
- Base estimates do not include contingency, escalation, or burdens
- Confidence in base estimate should be relatively high (e.g., a given task would be completed successfully at least two-thirds of the time)
- Standard BNL standard overhead applied to R&D and lower extraordinary rate applied to other activities
- Escalation rates of 5.0% on construction contracts and 3.2% on all other activities (compare w/ standard DOE composite rate of 2.3%)
- BCWS (planned work) ends at early finish date (March 2014) and not the CD-4b date one year later
- Transition to Pre-Operations and to Operations
  - Start transitioning staff to pre-ops when experimental floor is available (July 2012, CD-4a)
  - Start shifting staff to operations in FY2013
  - Transition all staff to pre-ops or ops after early finish date (March 2014)
- Hold contingency above 30% on TEC items

# Current Cost Estimate \$M

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Project Management	62
Accelerator Systems	245
Conventional Facilities	215
Experimental Facilities	80
Contingency (on TEC items above)	<u>181</u>
<b>Total Estimated Costs (TEC)</b>	<b>683</b>
R&D and Advanced Conceptual Design	50
Pre-Operations	<u>55</u>
<b>Other Project Costs (OPC)</b>	<b><u>105</u></b>
<b>Total Project Costs (TPC)</b>	<b>888</b>

# Target Funding Profiles w/ NSLS-II Ops



# Current Cost Estimate Profiles

WBS Element (\$ x 1000)	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	Total
<i>Funding Target</i>	<i>1000</i>	<i>4800</i>	<i>25000</i>	<i>65000</i>	<i>88000</i>	<i>162500</i>	<i>239400</i>	<i>148800</i>	<i>78600</i>	<i>57100</i>	<i>13000</i>	<i>883200</i>
1.0 NSLS-II	1,000	4,800	22,979	61,581	89,572	177,980	268,104	164,316	63,954	24,068	9,501	887,855
1.01 Project Management			250	11,491	11,484	10,828	11,675	10,596	4,344	1,256	0	61,924
1.02 R&D	1,000	4,800	19,979	10,696	5,735	3,911	3,553	0	0	0	0	49,674
1.03 Accelerator Systems			500	14,453	35,084	55,857	87,612	37,482	11,594	2,715	0	245,297
1.04 Experimental Facilities			250	3,752	5,491	7,847	13,782	36,708	11,500	950	0	80,280
1.05 Conventional Facilities			2,000	15,680	23,470	82,287	70,246	18,375	2,085	801	0	214,944
1.08 Pre Operations			0	518	0	0	760	9,069	19,669	15,485	9,501	55,002
Contingency			0	4,991	8,308	17,250	80,476	52,086	14,762	2,861	0	180,734

Cost estimates are fully burdened and escalated

# Project FTE Profiles

<i>Category</i>	<i>Total</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>	<i>2015</i>
Project Management	235	42	44	42	42	40	18	6	0
R&D & Adv Concept Design	73	19	19	18	17	0	0	0	0
Accelerator Systems	503	76	108	69	107	112	20	12	0
Experimental Facilities	124	16	23	23	24	20	14	4	0
Conventional Facilities	60	15	8	9	9	9	7	3	0
Pre-Operations	172	0	0	0	3	37	75	57	0
<b>Total</b>	<b>1167</b>	<b>169</b>	<b>203</b>	<b>160</b>	<b>202</b>	<b>217</b>	<b>133</b>	<b>83</b>	<b>0</b>

Total FTEs after bottom-up estimate is ~50% higher than the original parametric estimate

# External Independent Review

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## Lines of Inquiry

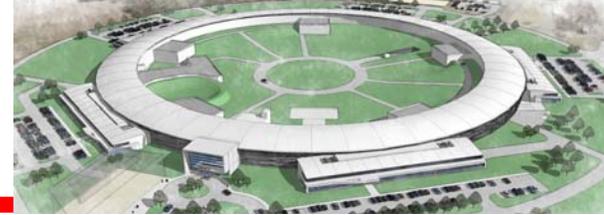
- Resource Loaded Schedule
- Total Project Cost and Project Schedule
- Work Breakdown Structure
- Risk Management [Plan & Registry]
- Preliminary Design and Design Review
- System Functions and Requirements
- Final Hazards Analysis
- Value Management/Engineering
- Project Controls/Earned Value Management System
- Project Execution Plan
- Start-up Test Plan (as appropriate)
- Acquisition Strategy
- Integrated Project Team

# Issues

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- Aggressive schedule for establishing the Performance Baseline
  - Preliminary design period shortened due to FY07 Continuing Resolution and lead time required for FY09 budget submission
  - Project baseline will be approved when the project is ~5% complete
- FY09 and FY10 funding constrain the technically limited plan. Work not on the critical path has been deferred.
- Some additional resource leveling is required and better staffing plans needed, especially for FY10
- Aggressive schedule for documenting preliminary design

# Summary



- Conceptual design has matured into an exciting design, promising superlative experimental capabilities.
- Novel design w/ outstanding performance and flexibility from the far-IR to the very hard x-ray. A range of sources will be available to match the various scientific needs.
- Baseline scope meets performance and cost goals and provides substantial experimental capability
- Good progress at resolving design challenges
- Project Organization well developed to execute project
- Have plan for transition from NSLS and reuse of experimental and conventional facilities from NSLS