



# DOE Critical Decision Process

Ruben Carcagno  
February 17, 2014



# Outline

- Standard DOE/SC Critical Decision Process
- Tailoring for LARP
  - CD Consolidation
  - LARP actions needed prior to CD process initiation
  - Long Lead Items Procurements prior to CD process
- Summary



LARP

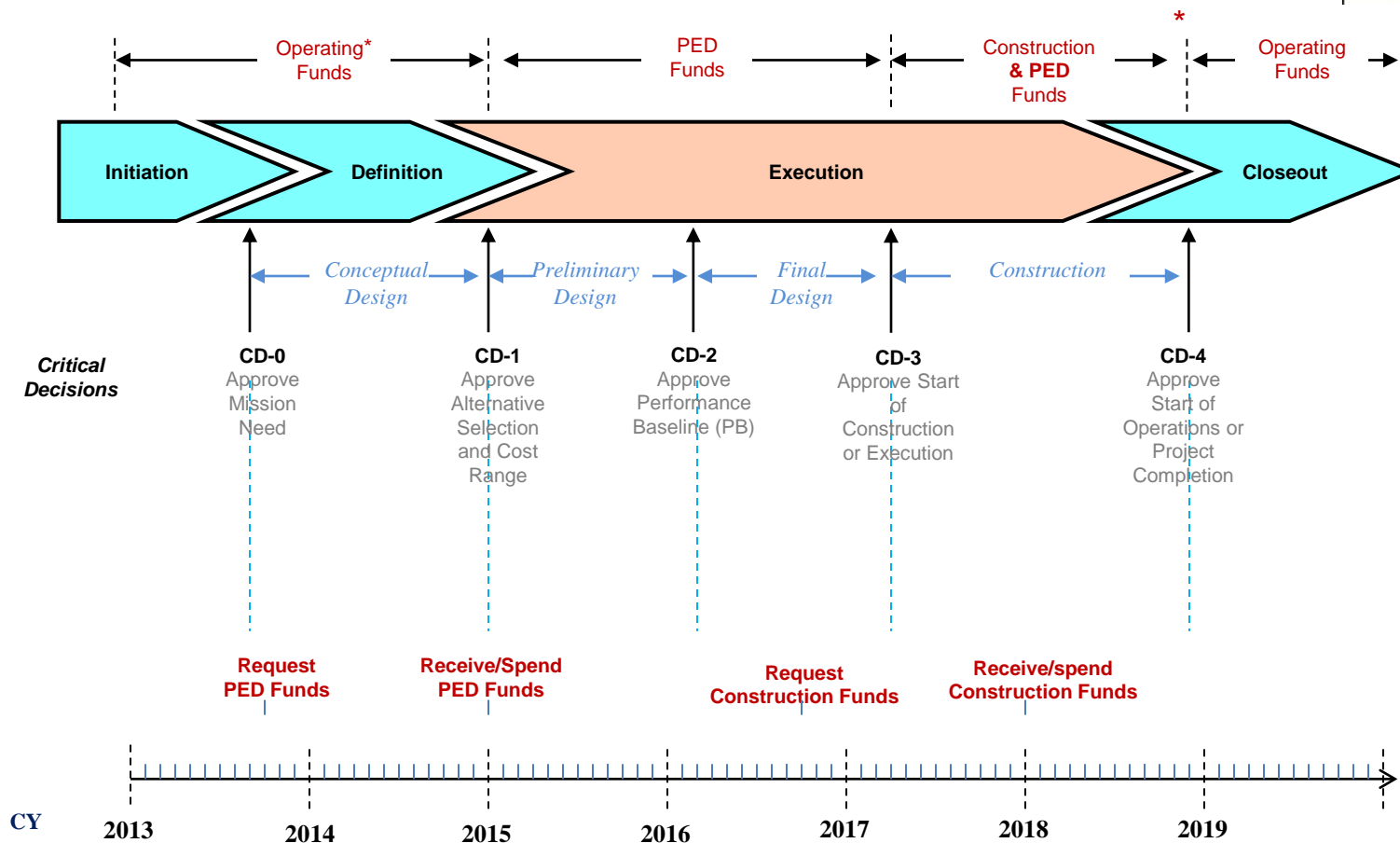


# Critical Decisions

- Based on DOE Order 413.3B
  - Applies to capital assets projects having a Total Project Cost greater than or equal to \$50M
- Critical Decision (CD) Gateways
  - CD-0: Approve Mission Need
  - CD-1: Approve Alternative Selection and Cost Range
  - CD-2: Approve Performance Baseline
  - CD-3: Approve Start of Construction/Execution
  - CD-4: Approve Start of Operations or Project Completion
- A project shall be completed at CD-4 within the original approved performance baseline (CD-2)



# Project and Budget Process—Standard Scenario



•Operating Funds are used for conceptual design between CD-0 and CD-1.



LARP



# CD-0 and CD-1

- CD-0
  - CD-0 is important because its approval officially marks a project start
    - The Total Project Cost (TPC) clock starts ticking from CD-0 approval date
    - All costs from this date forward accrue to the project's TPC
  - CD-0 approval allows Programs to request Project Engineering and Design (PED) funds
- CD-1
  - After CD-1 approval the project is allowed to spend design or PED funds
  - Conceptual Design Report Complete



# CD-2

- CD-2
  - Approval of CD-2 establishes the Performance Baseline (PB) against which the project success or failure will be measured
    - The PB represents the DOE's commitment to Congress to deliver the project's defined scope by a particular date at a specific cost.
  - CD-2 approval allows project to request construction/fabrication funds
    - There is a waiting period of about 1.5 to 2 years before the project receives the funds for construction.
      - During this time, PED funds can be used for long-lead procurement (LLP). LLP approval is designated as CD-3A, which may happen in advance of CD-2 approval.
  - Preliminary Design Report Complete



# CD-3

- CD-3
  - CD-3 approval allows contract awards and construction money can be spent.
    - LLP option can be used to alleviate this constraint (CD-3A)
  - Final Design Report Complete
- CD-4
  - Project is complete



LARP



# Specific DOE/SC CD Requirements

Documented in DOE/SC Project Decision Matrix:

[http://science.energy.gov/~media/opa/pdf/processes-and-procedures/Project\\_Decision\\_Matrix\\_11\\_2010\\_p.pdf](http://science.energy.gov/~media/opa/pdf/processes-and-procedures/Project_Decision_Matrix_11_2010_p.pdf)

- Provides requirements for documentation, reviews, and approval authority
- Example for CD-2 →

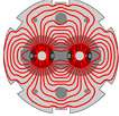
		TOTAL PROJECT COST (TPC)					
DECISION / REQUIREMENTS / APPROVAL <sup>1</sup>		\$700M or more	Less than \$700M to \$400M	Less than \$400M to \$100M	Less than \$100M to \$50M <sup>2</sup>	Less than \$50M <sup>2</sup> to \$20M	Less than \$20M to \$10M <sup>2</sup>
<b>CD-2--APPROVE PERFORMANCE BASELINE</b>		SC-1	SC-1	SC-2	SC-AD	SC-AD	SC-AD
Approve updated Acquisition Strategy if changes are major		SC-1 with SC-2B concurrence	SC-1 with SC-2B concurrence	SC-2 with SC-2B concurrence	SC-AD with SC-2B concurrence	SC-AD with SC-2B concurrence	SC-AD with SC-2B concurrence
Establish a Performance Baseline (PB)		FPD	FPD	FPD	FPD	FPD	FPD
Approve updated PDP		SC-1	SC-1	SC-2	SC-AD	SC-AD	SC-AD
Prepare a Baseline Fund. Profile & reflect in budget docs. & PDP. Consider full funding if TPC < \$50M		SC-1	SC-1	SC-2	SC-AD	SC-AD	SC-AD
Approval of Long-Lead Procurement		SC-1	SC-1	SC-2	SC-AD	SC-AD	SC-AD
Develop Project Management Plan, if applicable		N/A	N/A	N/A	N/A	N/A	N/A
Complete Preliminary Design		Project	Project	Project	Project	Project	Project
Incorporate High Perf. & Sustainable Bldg. & Sustainable Environmental Stewardship		Project	Project	Project	Project	Project	Project
Conduct a Preliminary Design Review		Team external to project	Team external to project	Team external to project	Team external to project	Team external to project	Team external to project
Complete Preliminary Design Report		Project	Project	Project	Project	Project	Project
Perform Baseline Validation Review		ICE by APM with SC-2B	ICE by APM with SC-2B	ICE by APM with SC-2B	SC-2B	SC-2B	SC-2B
Conduct a Project Definition Rating Index analysis as part of an DR		N/A	N/A	N/A	N/A	N/A	N/A
Conduct a Technical Readiness Assessment & develop a Technical Mitigation Plan		N/A	N/A	N/A	N/A	N/A	N/A
Employ an EVMG compliant with ANSI/ISA-789A, or as defined in the contract		Contractor	Contractor	Contractor	Contractor	Contractor	N/A
Prepare a Hazard Analysis Report		Field Organization (Site Office or Lab)	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab
Continue with Quality Assurance Programs		Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab
Conduct Preliminary Security Vulnerability Assessment, if necessary		Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab	Site Office or Lab
Issue Final NEPA determination (i.e., FONSI)		SC-1 or Site Office	SC-1 or Site Office	SC-1 or Site Office	SC-1 or Site Office	SC-1 or Site Office	SC-1 or Site Office
Update budget documents and Exhibit 300 if applicable		SC-AD	SC-AD	SC-AD	SC-AD	SC-AD	SC-AD
Nuclear Facility	Hazard Cat. 1, 2, 3 Nuclear Facility—Update Safety Design Strategy (SDS)	SBA4 & PFD, w/CHG or CDNS concurrence, as appropriate	SBA4 & PFD, w/CHG or CDNS concurrence, as appropriate	SBA4 & PFD, w/CHG or CDNS concurrence, as appropriate	SBA4 & PFD, w/CHG or CDNS concurrence, as appropriate	SBA4 & PFD, w/CHG or CDNS concurrence, as appropriate	SBA4 & PFD, w/CHG or CDNS concurrence, as appropriate
	Hazard Cat. 1, 2, 3 Nuclear Facility—Prepare a Preliminary Safety Design Report updating the CSDF	SBA4 via the PSVR	SBA4 via the PSVR	SBA4 via the PSVR	SBA4 via the PSVR	SBA4 via the PSVR	SBA4 via the PSVR
	Hazard Cat. 1, 2, 3 Nuclear Facility—Prepare a Preliminary Safety Validation Report (PSVR)	SBA4	SBA4	SBA4	SBA4	SBA4	SBA4
	Hazard Cat. 1, 2, 3 Nuclear Facility—Conduct a Technical Readiness Assessment Program Review	PSO	PSO	PSO	PSO	PSO	PSO
Hazard Cat. 1, 2, 3 Nuclear Facility—Place Grid of Hazard under Configuration Control	Project	Project	Project	Project	Project	Project	
POST CD-2	Submit approved CD or equivalent documents to APM. If applicable, any PR SCP to APM	SC-2B	SC-2B	SC-2B	SC-2B	SC-2B	SC-2B
	Submit budget request for the remainder of TPC	SC-AD	SC-AD	SC-AD	SC-AD	SC-AD	SC-AD
	Funding profile changes that negatively impact project	SC-1	SC-1	SC-2	SC-3	SC-3	SC-3
	Update PARG I with monthly status	Prog. Mgr., PFD, and Contractor	Prog. Mgr., PFD, and Contractor	Prog. Mgr., PFD, and Contractor	Prog. Mgr., PFD, and Contractor	Prog. Mgr., PFD, and Contractor	Prog. Mgr., PFD and Contract Value (CV)
	Continue with Monthly or Quarterly Project Reporting/Meetings	SC-AD	SC-AD	SC-AD	SC-AD to initiate SC-2B	SC-AD to initiate SC-2B	SC-AD to initiate SC-2B
	SC-AD Regional Annual Project Peer Review by PMDO	SC-2B	SC-2B	SC-2B	SC-2B	SC-2B Tailored	SC-2B Tailored





# Major Item of Equipment

- The LARP project is expected to be funded as a Major Item of Equipment (MIE)
  - This designation is only used by the Office of Science for large capital equipment projects
  - It is designed to be more flexible than Line Item Construction (LIC) projects
    - LIC projects involve civil construction (e.g., buildings or tunnels)
    - MIE civil construction must be  $< \$5M$  and  $< 20\%$  of the TPC
  - Equipment will be used for  $> 3$  years
  - Equipment cost (TEC)  $> \$2M$  or Total Project Cost (TPC)  $> \$5M$
  - Prototypes NOT included, unless will be incorporated into the final experiment
    - Funded with R&D or Operating Funds
  - For MIE projects “Fabrication” is used rather than “Construction”



# MIE Funding Type

- Included (Total Equipment Cost, TEC)
  - Engineering and design of final instrument
  - Fabrication of capital equipment
- NOT included (Other Project Costs, OPC)
  - Conceptual Design Report
  - R&D, prototyping and testing
  - Installation and commissioning/pre-operations before CD-4
- $TPC = TEC + OPC$
- Funds can move between TEC and OPC as long as the TPC is not increased
- Project Engineering and Design (PED) funds are only called out separately in the budgets for LIC, not MIE.



LARP



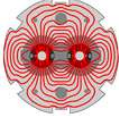
# Tailoring

- Does not imply the omission of essential elements but may include:
  - **Consolidation or phasing of CDs**
  - Substituting equivalent documents
  - Using a graded approach to document development and content
  - Delegation of authority
  - Adjust scope of IPRs and EIRs
  - Others
- Must be identified prior to CD-1 in the Acquisition Strategy, preliminary PEP and/or Tailoring Strategy (if separate document)



# Proposed Tailoring for LARP

- Consolidate CD-0/1/2 by mid-FY17
  - Preceded by years of preparation
    - Details in the following slides
- CD-3 by early FY18
- CD-4 by end FY23
- Proposed tailoring requires funding for Long Lead Item (LLI) **prior to** CD-0/1/2 approval and availability of MIE funds. Examples:
  - Superconducting Strand Procurement
  - Magnet Fabrication Tooling
  - MQXF Test Facility Preparations



# LARP Actions Prior to CD-0/1/2

- **Finalize Work Breakdown Structure (WBS)**
  - WBS Dictionary
  - Work Package
    - Lowest WBS level
    - Activity that has been planned and budgeted in detail
    - Lowest level of activity to which resources are assigned
  - Planning Package
    - Has a firm budget, start and complete dates, and statement of work but details will be defined at a later stage and converted to a Work Package
- **Finalize Organizational Breakdown Structure (OBS)**
  - Defines L1, L2, and L3 managers and their areas of responsibility
- **Define Responsibility Assignment Matrix (RAM)**
  - WBS and OBS Intersection
- **Define Control Accounts**
  - Minimum WBS level where cost and schedule performance is compared to baseline
- **Appoint Control Account Managers (CAMs)**
  - Expected to be L2 Managers, after adequate training (e.g., 2-day EVMS training)
  - Responsible for Control Account Plan, performance of the Control Account, and managing resources
  - Monthly reporting
  - Variance Analysis



# LARP Actions Prior to CD-0/1/2

- Finalize Integrated Master Schedule
  - Milestones, Key Events, Technical Performance Measures
- Finalize Cost Estimates and Time-Phased Budget Baseline
- Develop Performance Measurement Baseline (PMB)
  - Time-phased budget plan against which performance is measured
- Have Change Control Process fully functional
  - Document, track, and communicate changes to the PMB
- Have Earned Value Management System (EVMS) fully functional and reporting monthly
  - System must be in place, effective, tracking project progress, and reporting into DOE PARS II prior to CD-2 approval
  - Agree on project thresholds and triggers (green/yellow/red) for cost and schedule variance
    - A red trigger requires variance analysis report to be written. Includes explanation and corrective actions.



# Example of Variance Analysis Control Account Reporting Thresholds

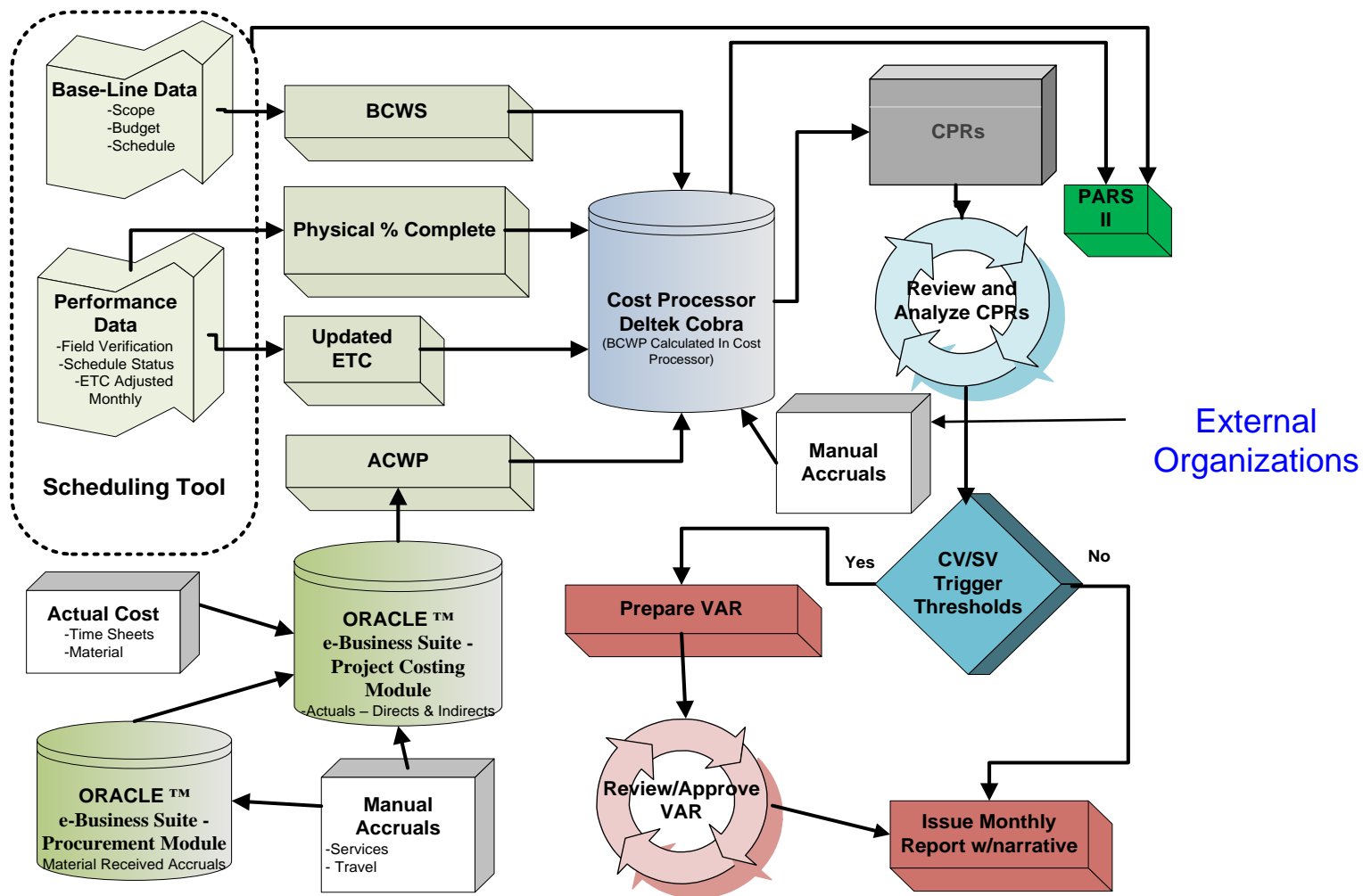
<b>Variance Analysis Thresholds for Control Accounts</b>		
<b>Green Thresholds – Cost and Schedule Performance falling outside of yellow or red thresholds</b>		
<b>Yellow Thresholds</b>		
<b>Cost Variance Schedule Variance</b>	<b>Type</b>	<b>Threshold limit</b>
<b>Dollars</b>	Current Period	$\geq \pm 5\%$ to $< \pm 10\%$ and $\geq \$50K$
	Cumulative	$\geq \pm 5\%$ to $< \pm 10\%$ and $\geq \$100K$
<b>Hours</b>	Current Period	$\geq \pm 5\%$ to $< \pm 10\%$ and $\geq 350$ hrs
	Cumulative	$\geq \pm 5\%$ to $< \pm 10\%$ and $\geq 700$ hrs
<b>Red Thresholds</b>		
<b>Cost Variance Schedule Variance</b>	<b>Type</b>	<b>Threshold limit</b>
<b>Dollars</b>	Current Period	$\geq \pm 10\%$ and $\geq \$100K$
	Cumulative	$\geq \pm 10\%$ and $\geq \$200K$
<b>Hours</b>	Current Period	$\geq \pm 10\%$ and $\geq 700$ hrs
	Cumulative	$\geq \pm 10\%$ and $\geq 1400$ hrs

Note: This applies to SV% (Schedule Variance in %) or CV% (Cost Variance in %) and the SV or CV in \$ or hours.

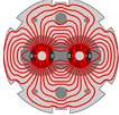
- Apply at Control Account level
- Red trigger requires variance analysis report to be written
- Default thresholds – more restrictive thresholds can be used with customer and senior management approval



# FNAL Monthly Analysis and Management Reporting







# LARP Actions Prior to CD-0/1/2

- Finalize DOE/SC required documentation in collaboration with the Federal Project Director (when appointed by DOE). Examples (from Project Decision Matrix):
  - Mission Need Statement
    - Follows DOE G 413.3-17
  - Acquisition Strategy
    - Follows DOE G 413.3-13
  - Project Execution Plan (PEP)
    - Follows DOE G 413.3-15
    - Prepared by the DOE Federal Project Director (FPD)
  - Project Management Plan (PMP)
    - Prepared by the Project Manager
  - Preliminary Design Report
    - Provides sufficient information to support the PB
  - Performance Baseline (PB)
    - Follows DOE G 413.3-5A
    - Includes Total Project Cost (TPC), time-phased budget plan, CD-4 date, minimum Key Performance Parameters (KPPs)
    - Represents DOE's commitment to Congress
- The Conceptual Design Report is **eliminated** because of CD-0/1/2 consolidation



# DOE Project Dashboard

Report Date: 01/24/2014



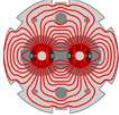
Office of Management  
Office of Acquisition and Project Management

## Project Dashboard - January 2014

Program	Contractor	Project Number	Project Title	Original Project Budget	Project Budget	Monthly Overall Assessment	Cost Performance	Schedule Performance
SC	Brookhaven Science Associates, LLC	NEXT	NSLS II Experimental Tools (NEXT)	\$ 90,000,000	\$ 90,000,000	G	1.00	0.98
SC	University of California-LBNL	NRP-1	NERSC Relocation Project	\$ 19,980,000	\$ 19,980,000	G	NA	NA
SC	Fermi Research Alliance, LLC	SC-25-06-1	NUMI Off-axis Neutrino ( $\nu$ ) Appearance (NO $\nu$ A)	\$ 278,000,000	\$ 278,000,000	Y	0.96	1.00
SC	Brookhaven Science Associates, LLC	SC-25-09-01	Accelerator Project Upgrade to the Large Hadron Collider (LHC) (APUL)	\$ 11,440,000	\$ 11,440,000	G	NA	NA
SC	Fermi Research Alliance, LLC	SC-25-09-04	Micro Booster Neutrino Experiment (MicroBooNE)	\$ 19,900,000	\$ 19,900,000	G	NA	NA
SC	Battelle Memorial Institute	SC-BER-2010-1035070	High Resolution and Mass Accuracy Capability Development Project	\$ 17,500,000	\$ 17,500,000	G	NA	NA

- Once LARP becomes a DOE 413.3B Project, the LARP PMO goal will be to remain in the DOE Project Dashboard "Green" category

Monthly Overall Assessment	LEGEND
	Project is expected to breach its Performance Baseline cost, schedule, or scope.
	Project is at risk of breaching its Performance Baseline cost, schedule, or scope.
	Project is expected to meet its Performance Baseline cost, schedule, and scope.
.90 to 1.15	Typical satisfactory range for Cost/Schedule Performance
NA	Not Applicable I.E. Project cost under \$20,000,000 or firm fixed price.
NR	Not Reported

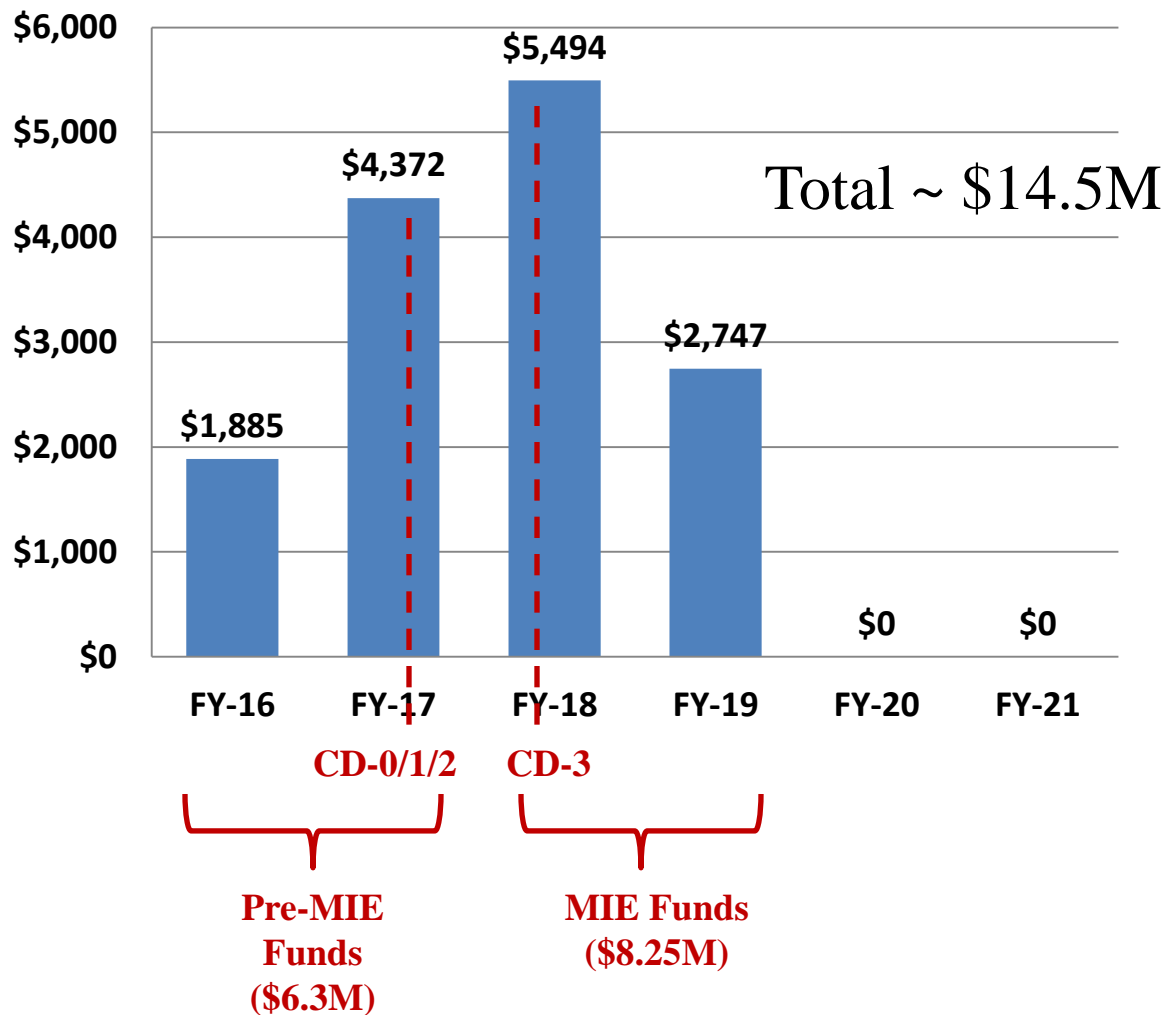


# Examples of Pre-MIE LLI funding needs

- Assuming MIE funding is available in FY18:
  - Strand Procurement
    - Need to start in Q4FY16 to be ready for first coil fabrication in Q3FY18
      - ~ \$6.3M in Pre-MIE funding (preliminary)
  - Magnet Fabrication Tooling
    - Procurement in FY17
      - ~ \$3.7M in Pre-MIE funding (preliminary)
  - Preparations for MQXF Test Facility
    - Test Stand Upgrade needs to start in FY17 , first MQXF test expected January 2019
      - Pre-MIE funding needs being identified



# LLI: MQXF Strand Procurement (preliminary)



- Strand Procurement
  - Starts Q4FY16
- Cable production
  - Starts Q1FY18
- Coil Production
  - Starts Q3FY18
- Contract terms
  - 13% at contract award
  - 27% 6 months ARO
  - First delivery 12 months ARO
  - 1000 kg of wire every two months



# LLI: MQXF Magnet Tooling

(Preliminary)



<b>Magnet Fabrication Tooling</b>	<b>FY17 (\$K)</b>
Winding and Curing Tooling (mandrel)	\$710
Coil handling/storage	\$990
Portable CMM Machine	\$219
Reaction and Impregnation Tooling	\$1,607
Cold mass assembly tooling	\$178
<b>TOTAL</b>	<b>\$3,704</b>



# Summary

- LARP is moving towards a DOE/SC Critical Decision(CD) Process Framework
- A CD Tailoring Strategy for LARP has been proposed, involving consolidation of CD-0/1/2 by mid-FY17
  - Substantial effort is required to be ready for this consolidated CD point
    - Will proceed “as if already in a CD process framework”
      - For example, equivalent level of readiness for CD-0 in FY15, CD-1 in FY16, and CD-2 in FY17
  - With this tailoring strategy, pre-MIE funding is needed for LLI procurements starting in FY16 for items such as strand procurements, magnet fabrication tooling, and test facility preparations