



Closeout Presentation

Director's Earned Value Management Follow-up Review of the LHC CMS Detector Upgrade Project

July 23, 2014

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Executive Summary

A Fermi National Accelerator Laboratory (Fermilab) Director's Review of the Large Hadron Collider (LHC) Compact Muon Solenoid (CMS) Detector Upgrade Project (CMS project) was held on May 28-30, 2014. As a result of that review, an Earned Value Management follow-up review was held on July 23, 2014. The purpose of this review was to assess the project's progress and readiness to proceed to CD-2/3 as it relates to Earned Value Management requirements as specified in DOE O 413.3B and by Laboratory procedures.

The CMS project, funded by the Department of Energy (DOE) and National Science Foundation (NSF), will upgrade CMS detector components provided by the original CMS detector construction project. The project is to design, construct, test, and commission upgrades to the Hadron Calorimeter (HCAL), Forward Pixel detector (FPIX), and parts of the Trigger (TRIG or L1T) to sustain current performance with increasing LHC luminosity. The project is required to report monthly on both DOE and NSF funded areas.

During the May 2014 Director's Review, the project lacked data related to earned value management – specifically cost/schedule performance – and a complete understanding still needed to be demonstrated by the team. The project team should be commended for improving so quickly in such a short period of time. Each of the CAMs interviewed were very knowledgeable of their control accounts and monthly variances. This is attributed to the amount of training and practice received over the recent reporting periods. The earned value management related information presented during the review exhibited typical issues expected for the first three months of reporting on a baseline: missed accruals, errors in charging task codes, integration glitches, and legitimate problems with schedule/cost. These are all areas that should be discovered now, prior to establishing the official baseline. This practice should continue and be further extended to the baseline change process to allow for a successful baseline establishment post achieving DOE CD-2/3.

There are two areas noted in this report where additional improvements will be needed prior to a DOE CD-2/3 Review planned in early August. After addressing these recommendations, the CMS project should proceed to its DOE CD-2/3 review and close the related recommendation from the May Director's review.

1.0 Introduction

A Director's Independent Design and Critical Decision (CD)-2/3 Review of the Large Hadron Collider (LHC) Compact Muon Solenoid (CMS) Detector Upgrade Project was held on May 28-30, 2014 at the Fermi National Accelerator Laboratory. The objective of that review was to assess the level of maturity of the Project's design and to determine if the project meets the CD-2/3 (CD-2, Approval of Performance Baseline and CD-3, Approve to Start Construction) requirements as specified in DOE O 413.3B. As a result of a recommendation from that review, an Earned Value Management follow-up review was held on July 23, 2014. The purpose of this review was to assess the project's progress and readiness to proceed to CD-2/3 as it relates to Earned Value Management requirements as specified in DOE O 413.3B and by Laboratory procedures.

This closeout report is broken down into two basic sections. The first section provides the assessments of the project's earned value management data. Each area within this first section is organized by Findings, Comments and Recommendations. Findings are statements of fact that summarize noteworthy information presented during the review. The Comments are judgment statements about the facts presented during the review and are based on reviewers' experience and expertise. The comments are to be evaluated by the project team and actions taken as deemed appropriate. Recommendations are statements of actions that should be addressed by the project team. The second section of this presentation has the committee's answers to the review's charge question.

The LHC CMS Detector Upgrade Project is to develop a response to the review recommendations and present it to the Laboratory Management and regularly report on the progress during the Project's Project Management Group Meetings (PMGs) and at the Performance Oversight Group (POG). The recommendations will be tracked to closure and a documented status of the project's resolution will need to be available for future reviews.

2.0 Earned Value Management

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Findings

- Three months of Earned Value Management (EVM) data (April, May, June) were posted for the review committee.
- A Responsibility Assignment Matrix (RAM) was presented with fourteen Control Accounts (CAs) and ninety-five Chargeable Task Codes (CTCs).
- Sixteen change requests appear in the change log provided for the review. Ten of the sixteen were already implemented into the baseline.
- Two Control Account Managers (CAMs) were interviewed during the review (Hirschauer and Cheung).
- The project has an established monthly reporting calendar that documents the business cycle and provides reminders to key participants.
- Variance Analysis is performed on current and cumulative values with required reporting on thresholds that are triggered as red and are encouraged for those triggered as yellow.
- CAM generic EVM training and internal Fermi Lab EVM training, including lessons learned, was provided to the CMS project team.

Comments

- The training provided to the project team seemed effective based on the CAM interviews performed.
- The CAMs interviewed demonstrated ownership of schedule, cost, and scope information.
- Monthly status sheets are being utilized and appear to feed the performance metrics for the project.
- The Variance Analysis Reports (VARs) reviewed for May and June provided sufficient detail to be able to determine issues taking place within the control accounts and provided corrective actions which are logged for completion.
- VARs for April were not generated, only the contract performance reports were created. The consistency of reporting level and type of information is different with each of the months provided. A consistent level and type needs to be provided.

- Accruals still need to be monitored for timely implementation into the EVM system. Due to the typical fluctuations at the start of a project's baseline, it is currently too difficult to determine the timeliness and effectiveness of this process.
- CAMs still need to be familiarized and able to speak to the EAC and ETC at the CA level. Each CAM interviewed was able to generally speak to the EAC values but need to continually assess their EACs validity each month.
- Based on a review of changes to the baseline, preliminary analysis and initiation has been demonstrated for change control but there are missing processes and implementations regarding updating key project documents such as work authorization documents, change control log (with contingency/management reserve impact), Responsibility Assignment Matrix (RAM), and Contract Performance Report (CPR) Format 3 (or equivalent).
- The project team needs to be more familiar with change thresholds at all levels.
- Work Authorization Documentation needs to be enhanced to comply with Fermi Laboratory EVM requirements.
- The amount of Level of Effort (LOE) in each of the CAs and CTCs needs to be addressed, as the current values exceed thresholds typically considered acceptable by EVM practices (less than 15% per CA).
- The project's documentation should be consistent and reflect the current baseline as referenced in the change control log (example being the RAM should match the CPRs).

Recommendations

1. Prepare a more formalized and consistent standard of reporting for the DOE CD2/3 review.
2. Better demonstrate the complete change control process beyond initiation and preliminary assessment for the DOE CD2/3 review.

3.0 Charge Question

Has the Project demonstrated a process for monthly statusing and reporting that satisfies DOE and Laboratory EVM requirements?

The US CMS upgrade has made vast improvements since the Director's review. There are still areas for improvement to satisfy all of the Laboratory's Earned Value Management requirements; however, a clear path to full compliance exists. Following the implementation of the recommendations from this review, the US CMS upgrade project should be successful in its endeavor for obtaining CD-2/3.