Project Management System

Marc Kaducak
Head of Office of Project Support Services
CAS Review
17-Dec-2015
Outline

- Background: Projects at Fermilab
- Contract Requirements
- Management System Described and in Practice
- Project Dashboard
- Interface with other Management Systems
- Planned Maturation
- Management System Maturity
- Outlook
Background

- Decadal effort in HEP through Snowmass and P5 process
  - Fermilab following DOE and P5 roadmap
- Large suite of projects at Fermilab
  - Each project’s outcome impacts others
- Increased focus on management
  - Effective project management is imperative
  - Dedicated people with authority to span Divisions/Sections
  - Need for outstanding project management systems
    - People, Processes, and Tools

Fermilab is committed to excellence in project management so we can deliver the science
Fermilab’s Project Status

• Recently Completed Projects:
  – NOvA – Completed on budget and on schedule
  – MicroBooNE – Completed on budget and on schedule
  – 3rd and 4th projects after MINERvA and DES delivered on budget and on schedule

• Current Active Projects (in DOE O 413.3 system):
  – Mu2e – Baselined, CD-3b approved, CD-3c planned 2016
  – LCLS-II – BES accelerator project, CD-2/3 review held Dec. 8-11, 2015
  – PIP-II – CD-0 approved.
  – LBNF/DUNE – international project, CD-1R approved. CD-3A review held Dec.2-4, 2015.
  – SLI Utility Upgrade – CD-3 approved, fully funded.
  – CMS Phase One upgrade (LHC) - CD-2/3 approved.
  – Muon g-2 – CD-2/3 approved.
  – SLI-IERC – CD-0 approved.

A well phased and extensive suite of projects
Contract Requirements related to PM System

M&O Contract

The Contractor shall:

◦ C.3.1.2: strive to meet the highest standards of scientific quality and productivity, "on-time, on-budget, as promised" delivery of program deliverables, and first rate service to the research community through user facility operation.

◦ C.3.2(a)(3): provide for effective and efficient stewardship of resources and capabilities, through expert planning, delivery, and risk management.

◦ C.4(a): utilize appropriate technologies and management systems to improve cost efficiency and performance.

◦ C.4(c)(5)(v): maintain a project management system to ensure project scope is completed within budget and schedule. The system shall include an earned value management system consistent with requirements under DOE Order 413.3

Other DOE orders, regulations, and statutes
◦ DOE Order 413.3(b) Program and Project Management for the Acquisition of Capital Assets
◦ ANSI/EIA-748B Earned Value Management Systems
1. Project initiation, preliminary planning, and conceptual design
   - Assign team leadership and key staff
   - Develop conceptual design and corresponding cost/schedule
   - Begin PMG meetings and reporting at POG
   - Begin Director’s reviews and project design reviews

2. Project advanced planning and baseline development
   - Refine design, cost, and schedule
   - Validate project assumptions
   - Exercise the full EVMS reporting process
3. Project procurement, fabrication, and construction
   – Secure personnel, facility, equipment resources from suppliers
   – Execute and monitor procurements/fabrication/construction
   – Transition to operations and closeout

4. Develop, maintain, and deploy supporting processes, systems, tools, documents, and project controls resources*
   – Support of EVMS, cost estimating, scheduling, project controls, risk management
   – Ensure project readiness through each phase
   – Develop and conduct training
*More on this support process in later slides
Management engagement with Projects

- Lab has a critical role in project management and construction
  - Work closely with DOE Program Managers and FSO PD’s
    - DOE attend lab oversight/management meetings
- Oversight/engagement through
  - Project Management Group (PMG)
    - Monthly for each project
  - Performance Oversight Group (POG)
    - Monthly for all projects together
- CPO, OPSS, IPPM collectively focused on project success
- Chief Project Officer - accountable for project portfolio in concert with successful operation of the scientific program. Examples of CPO resource initiatives:
  - Lab-wide Technical resource coordinator – Karen Kephart
  - Cryo Task Force – deliverable is plan for engineers and facilities
Project Oversight and Support Organizations

Office of the COO
Timothy Meyer
Chief Operating Officer

Office of the CPO
Mike Lindgren
Chief Project Officer

Office of Integrated Planning and Performance Management
E. Gottschalk - Head
T. Erickson - Admin

Office of Project Support Services
M. Kaducak – Head
D. Hoffer – PM Consultant
L. Temple - Admin

Technical Resource Coordination
K. Kephart

Project Controls
R. Marcum – Project Controls Mgr
M. Elrafih
F. Leavell
D. Leeb
S. Saxer

Risk Management
L. Taylor

Project Software Admin and Development
J. Badillo (Jan 2016)
P. Grawender (CD)
L. Taylor
OPSS coordinates project controls resources and practices across projects, whether resources are based in OPSS or within divisions.
OPSS functions include:

- Supporting the lab's scientific and facility projects.
- Establishing standard project management processes, tools and training.
- Supplying project controls resources, providing mentorship through all project phases, maintaining the Earned Value Management System, and organizing and help preparing for reviews.
### Reviews supported since 2014 CAS review

<table>
<thead>
<tr>
<th>Review</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLI-UUP Director’s CD-2/3a</td>
<td>Oct 2014</td>
</tr>
<tr>
<td>Mu2e DOE CD-2/3b</td>
<td>Oct 2014</td>
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<tr>
<td>SLI-UUP DOE CD-2/3a</td>
<td>Dec 2014</td>
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<tr>
<td>EVMS Surveillance</td>
<td>Dec 2014</td>
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<tr>
<td>MicroBooNE DOE CD-4</td>
<td>Dec 2014</td>
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<tr>
<td>PIP 700kW DOE Review</td>
<td>Jan 2015</td>
</tr>
<tr>
<td>Mu2e DOE CD-2/3b follow up</td>
<td>Feb 2015</td>
</tr>
<tr>
<td>EVMS Assessment of Muon g-2</td>
<td>May 2015</td>
</tr>
<tr>
<td>SLI-UUP Director’s CD-3b</td>
<td>June 2015</td>
</tr>
<tr>
<td>Muon g-2 DOE CD-2/3 follow up</td>
<td>June 2015</td>
</tr>
<tr>
<td>PIP-II DOE Independent Project Review</td>
<td>June 2015</td>
</tr>
<tr>
<td>LBNF/DUNE Director’s CD-1 Refresh Review</td>
<td>June 2015</td>
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<tr>
<td>LBNF/DUNE DOE CD-1 Refresh Review</td>
<td>July 2015</td>
</tr>
<tr>
<td>LBNF/DUNE APM Independent Cost Review</td>
<td>July 2015</td>
</tr>
<tr>
<td>SLI-UUP DOE CD-3b</td>
<td>Aug 2015</td>
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<tr>
<td>CMS HL-LHC Director’s Review</td>
<td>Sept 2015</td>
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<tr>
<td>LBNF/DUNE Director’s CD-3A Review</td>
<td>Oct 2015</td>
</tr>
<tr>
<td>LBNF/DUNE DOE CD-3A Review</td>
<td>Dec 2015</td>
</tr>
<tr>
<td>Short Baseline Neutrino Director’s Progress Review</td>
<td>Dec 2015</td>
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</table>
Project Team and CAM Training Timeline

- **Start**
  - Assemble Project Team
  - Prepare Conceptual Design, Cost, Schedule
  - Prepare Baseline Resource Loaded Schedule
  - EVMS on Internal Baseline RLS
  - EVMS on Official Baseline
  - Prepare Preliminary Design
  - EVMS 1-hr Series Phase 1
  - PREMS Annual Refresher

- **End**
  - EVMS Reporting to DOE with PARS-II
  - Prepare Final Design
  - Construction

**Timeline Details**

- Intro to Projects
- Procurement
- Risk
- EVMS Theory/Boot Camp
- EVMS 1-hr Series Phase 1
- EVMS 1-hr Series Phase 2

**Training Sessions**

- Start
  - Training Sessions
  - Project Activities

**Cost Estimating and Scheduling for EVMS**

- 6 mo prior to CD
- CD-2
- CD-3
- CD-4
Project Risk Management

• Established standard Fermilab project risk management procedure.

• Projects can point to this document as their risk management procedure without need to generate their own.
Typical topics and materials at POG:
- Overall performance and top issues
- Major procurements (planned and in process)
- Review Readiness checklist
- Change requests
- Upcoming Reviews
- Project Dashboard
# Interfaces of PM (aka M2) with other Management Systems

<table>
<thead>
<tr>
<th>ID</th>
<th>Management System</th>
<th>Example Interfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>Governance</td>
<td>DOE O413.3B for projects where it applies. Director’s Policy on Project Management:</td>
</tr>
<tr>
<td>M3</td>
<td>Planning &amp; Performance</td>
<td>Strategic Planning, Performance Management, and Enterprise Risk as they relate to projects.</td>
</tr>
<tr>
<td>M4</td>
<td>Science</td>
<td>Project management interactions with scientific collaborations</td>
</tr>
<tr>
<td>M5</td>
<td>Finance</td>
<td>Budget planning, accounting system, labor rates, overhead charges</td>
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<tr>
<td>M6</td>
<td>Procurement</td>
<td>Project procurement planning, staffing, training, and execution. Travel support. Procurement reports at POG.</td>
</tr>
<tr>
<td>M7</td>
<td>ES&amp;H</td>
<td>ES&amp;H subject matter expertise for projects, 413.3b and internally required safety documentation, National Environmental Policy Act (NEPA)</td>
</tr>
<tr>
<td>M8</td>
<td>Quality</td>
<td>Quality management expertise for projects, 413.3b and internally required quality documentation, quality audits, issue tracking</td>
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<tr>
<td>M9</td>
<td>Engineering</td>
<td>Engineering processes, cost/schedule estimating, conventions, design review plans</td>
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<tr>
<td>M10</td>
<td>Information</td>
<td>Collaborative tools, document management</td>
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<tr>
<td>M11</td>
<td>Stakeholder Relations &amp; Communications</td>
<td>Communication between Fermilab, DOE, the scientific community, and the public.</td>
</tr>
<tr>
<td>M12</td>
<td>Partnerships</td>
<td>Cooperative R&amp;D agreements</td>
</tr>
<tr>
<td>M13</td>
<td>Security</td>
<td>Security plans, security related risks, 413.3b required security documentation</td>
</tr>
<tr>
<td>M14</td>
<td>Property</td>
<td>Shipping material amongst project institutions, shipping regulations, compliance with space offset requirements, demolition approvals.</td>
</tr>
<tr>
<td>M15</td>
<td>Human Resources</td>
<td>R2A2s for project roles. Recruitment and retention, especially of critical skills.</td>
</tr>
<tr>
<td>M16</td>
<td>Legal</td>
<td>Non-disclosure agreements, cooperative agreements, procurement and construction legal issues.</td>
</tr>
</tbody>
</table>
Ongoing Project Management Improvement Initiatives

- Continuous focus on ways to improve project performance
  - Project Management Planning Board
    - Forum for issues, initiatives
  - Training
    - Implementing CD phased (ongoing) training
  - Human Capital Management (HCM) platform adopted July 2014
    - Longer term development for resource planning
  - Budget and Planning System (BPS) system being implemented
    - Integrate strategic, resource, and budget planning
    - Major input from projects on requirements
  - Standardization
    - Tailoring usually required, but standards improve efficiency.
    - EVMS standardized tools, forms, guidelines developed
    - Standard risk management plan developed
    - Design review process outlined in a guidance document
    - Templates for project management plans, quality management plans, procurement plans, others available
    - Adopting change control and risk tools from US-ITER
Project Management System External Inputs

Fermilab PM system benefits from external experts, reviews:
• Annual EVMS Surveillance
• Annual Contractor Assurance System Review
• Bi-monthly Project Management Office meeting with other labs. Frequent informal communication as well.
• Reports from Project Management Ideal End State and Improvement Initiative Steering Group
• Project Reviews
2014 EVMS Surveillance Committee Conclusions

The Surveillance Team reached some general conclusions concerning the FRA EVMS implementation:

• The FRA EVMS continues to meet the requirements and intent of ANSI/EIA-748 Standard.
• There is a **Lab-wide emphasis on project performance, in general, and EVMS in particular.**
• Since the August 2013 Surveillance Review, Fermilab appointed a Chief Project Officer and an Office of Project Support Services (OPSS) Manager. The Project Controls Group hired an experienced manager and several additional project controls staff were hired.
• There are **noticeable improvements in the implementation of the FRA EVMS** since the August 2013 surveillance review. Both the CMS and Mu2e Projects are using the FRA EVMS to manage their respective projects. The **FRA EVMS is integrated into the Project Management structure and not an appendage.**
• Additional EVMS training was conducted. This included tailored (to the FRA EVMS) training. In addition, the training focused on individual topics, which reflects feedback from the Project staff.
• **The CAMs interviewed during the surveillance were knowledgeable and engaged. Ownership is clear.**
• During the surveillance, the Surveillance Team members identified several positive actions taken by Fermilab with identifiable results to correct EVMS issues. However, these actions are continuing. The CIO* category was used to give Fermilab credit for successful actions taken to resolve these EVMS issues. To ensure that these actions fully resolve identified issues, they were placed in the CIO* category and the CIO* description uses the word “continue” in the title.
• Having said the above, the FRA EVMS continues to mature but **some elements still need further refinement.** These refinements are discussed further as part of the Continuous Improvement Opportunities as well as the root and contributing causes sections of this report.
PM System Maturity

Maturity of management system gauged using the following elements:

<table>
<thead>
<tr>
<th>CAS Element</th>
<th>Maturity Level</th>
<th>Description</th>
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</table>
| Policies & Procedures | Analyzed       | Collection of Policies, Procedures, Guidelines, and Templates:  
• Director’s Policy on Projects. Brief, references DOE O 413.3  
• EVMS Policy and Procedures. DOE Certified System.  
• Project Risk Management Procedure  
• Guidelines for EVMS implementation  
• Templates for project documents (management plans, design reviews, quality, procurement, safety) |
| KPIs                | Complete       | Performance metrics of projects                                                                                                             |
| Dashboards          | Extensive      | POG Dashboard                                                                                                                               |
| Risk Identification | Integrated     | Project Risk Management Procedure                                                                                                          |
| CAS Adoption        | Mature         | PM System established and applied to several projects                                                                                       |

PM System is well established, but vigilance is required since projects are by definition not routine.
In Closing

• Labs future depends greatly upon performance in project management.
  – Last four projects delivered on time and budget
  – Must continue improvements to succeed on larger scale
• Lab committed to continue to build an integrated system that supports our Projects and Project Managers.
  – We have learned from our experience and have taken advice from the review committees seriously.
  – Improvement initiatives take time, patience and persistence.
• Projects and lab management recognize the importance of a strong suite of integrated management tools.

Thanks for your attention. We welcome your questions and comments.
Backup
Status of “Work Still to be Done” identified at 2014 CAS review

1) Continue to focus near term on the remaining two projects scheduled for a CD-2 Review by the end of the CY. Ensure HQ Program acceptance of proposed project baseline and associated risks prior to CD Reviews.

   Update: These reviews have passed, but in general the CPO aids in this type of communication. Weekly reports to DOE on status and project reviews, daily on LBNF.

2) Fermilab had a very aggressive schedule for implementing the PMII actions. Eleven items were completed out of original 19 plus 6 new were added.

   PMII actions remaining:
   - OPSS to revise documents (refers to EVMS documents and other procedures). EVMS documents updated for 2014 EVMS Surveillance. We continue to build guidance documents.
   - Develop tracking system for participation of Fermilab in reviews. No actions taken on this. Decided against due to a of interest and potential conflicts.
   - Write R2A2s for PM Personnel, and update existing line management R2A2s. PM R2A2s are included in Project Management Plan template.
3) Fermilab is encouraged to continue/expand the effort to examine the PMS tools/techniques of other National Laboratories
   Update: Have contacted SLAC, BNL, FRIB, and ITER regarding tools. In the process of implementing ITER Change Control tool. Also investigating eCAM tools. OPSS Applications Developer starting in Jan 2016.

4) While Project Managers identified some improvements in the Lab-wide project controls systems (new procedures), much still needs to be done. Attention to the EVMS root causes for the surveillance issues is needed in order to prevent recurring issues. Early phased implementation of the EVMS is still encouraged.
   Update: 2014 EVMS surveillance noted improvement in EVMS culture and practice and we are responding to its recommendations.

5) The Project Managers recommended placing priority on a change control procedure, eCAM Notebook, and a better issue tracking system. A Fermilab-wide PMS is a key objective.
   Update: Change control procedures have been refined. In process of implementing ITER change control tool. Projects have developed their own interim eCAM notebooks that are functioning. OPSS Applications Developer starts in Jan 2016 to work on enhancements.
Status of “Work Still to be Done” identified at 2014 CAS review

6) Some changes are too new to assess e.g. Decision-makers not all in place, projects placed in line organizations
   Update: Organization has stabilized since 2014 CAS review. DOE has responded positively organization and other labs have shown interest in our structure.

7) A separate meeting between Fermilab Project Managers and Fermilab Management is encouraged to discuss the Laboratory initiatives, and impacts on the management of projects at Fermilab. Priorities list not uniformly understood by Project Managers.
   Update: The Project Management Planning Board is designed for this purpose.

8) Consider the present use of internal and external review process to ensure that all important issues are raised as early as possible while options remain open and changes are less expensive. May want to focus on high cost/high risk items.
   Update: Design Review Plan template document created for projects' use. Outlines a sequence of design reviews, their functions and content.

9) PMII Steering Group charter ends soon. Responsibility for PMII implementation should continue through some formal mechanism or re-assignment
   Update: Nominally taken up by PMPB. In practice many items are handled by OPSS, which has additional resources since 2014 CAS review.
10) Some changes to POG format including reduced duration of POG meetings which needs to be discussed to ensure that meeting objectives are met (key issues discussed and forum for management questioning).
   Update: POG format restored, added a presentation on status of procurements from the procurement department.

11) Line/matrix management attendance at PMG is inconsistent. Some reinforcement of PMG objectives may be valuable.
   Update: Chief Project Officer contacted PMs to reinforce content and also add structure to change control and procurement presentation content.

12) Electronic (or easily accessible contract documents) system for documents is still being examined.
   Update: Technically outside the Project Management CAS, this refers to procurement documentation. Here is the procurement department’s update – “The iProcurement project is underway. Currently in the early stages of determining requirements, hiring IT support, and developing implementation plan/schedule. We are moving ahead steadily and slowly and Core Computing Division is in step.”
13) Continue to closely manage the infrastructure improvements that are required as assumptions for the success of the science projects.
   Update: Technical Resource Coordinator position created and filled. Examples of infrastructure management include establishing Mu2e test facilities for transport solenoids at CDF and creation of a Cryo Task Force to evaluate cryo resources needs across the lab and projects.

14) Risk management is part of strategic planning and project management processes. A comprehensive, consistently applied risk based analysis is needed for projects. Consider a combined/integrated list of issues from strategic planning and project management for management attention.
   Update: See previous slide on project risk procedure and also Planning and Performance presentation on enterprise risk.

15) A tailored training program is needed for the Project Managers and the Project support staff.
   Update: See previous slides on project training.
Performance Oversight Group (POG) meetings

• Background:
  – Organized by Integrated Planning and Performance Management (IPPM)
  – Meets Monthly
  – Attended by Directorate (including CPO, IPPM, OPSS), DOE FSO, Project Managers

• Functions:
  – Review and ensure acceptable trends of performance on projects
  – Provide assistance, if needed, to Line and Project Managers to resolve issues that may threaten budgets, schedules or key performance requirements.
  – Serve as an opportunity to share common experiences between Project and Laboratory managers.
Project Management Group (PMG) meetings

• Background:
  – Organized by Projects and their respective Line Managers
  – Meets Monthly
  – Attended by Directorate (including CPO, IPPM, OPSS), DOE FSO, DOE Program Manager, Project Managers, Project Team, Line Managers

• Functions:
  – First level oversight mechanism
  – Reporting, planning, problem solving
  – Requests for assistance, resources
  – Change control
Project Oversight and Support Organizations - IPPM

IPPM functions include:

- Strategic Planning, Lab Agenda, Annual Lab Plan
- Performance Evaluation Measurement Plan (PEMP)
- Enterprise Risk
- Performance oversight of projects
Successful Project Management Practices
in Office of Science

Daniel R. Lehman, Retired Director
Office of Project Assessment
Office of Science. DOE
http://science.energy.gov/opsa
April 2015

Introduction to DOE 413.3 Projects

Marc Kaducak
Meeting Title
Day Month Year

Outline
- Context of this training and Project Basics
- Oversight and Reviews
- Organization
- Scope
- Cost and Schedule
- EVMS
- Risk
- Quality Management
- Procurements
- Safety and NEPA
- Closing Thoughts

EVMS
- Phase 1 topics – to be given during baseline development
  - CAM responsibilities
  - Performance Measurement Baseline
  - WBS
  - EVM Scheduling
  - Estimating
- Phase 2 topics – to be given during “practice” EVMS using internal baseline
  - Monthly Statusing
  - Variance Analysis Reports
  - EAC/ETC
  - Change Control
EVMS 1-hour Courses on Detailed Topics

- Phase 1 topics – to be given during baseline development
  - CAM responsibilities
  - Performance Measurement Baseline
  - WBS
  - EVM Scheduling
  - Estimating

- Phase 2 topics – to be given during “practice”
  EVMS using internal baseline
  - Monthly Statusing
  - Variance Analysis Reports
  - EAC/ETC
  - Change Control

These use FNAL project examples as their basis and will be scheduled to be in sync with the project’s needs. Developed by Rich Marcum, who also provides this training.
Excellence in projects – NOvA

• NOvA project completed in 2014
  – Under budget: returned $3.7M of $278M TPC to OHEP
  – Ahead of schedule: CD-4 completed September 2014, two months before the CD-2 baselined completion date
  – First neutrino events seen in the 14 kton Far Detector in Ash River in May 2014

• The project received the DOE Secretary’s Award of Excellence in March 2015
  – Pepin Carolan of the Fermilab DOE Site Office also received the Secretary’s award for Federal Project Director of the Year in 2014 for his NOvA work