Performance Measurement Technique (PMT)

What These guidelines serve as reference information to describe the use of PMTs.

Why Use these guidelines to understand the Fermi National Accelerator Laboratory (FNAL) implementation of PMT in Fermilab's projects.

1 Performance Measurement Techniques (PMT)

The Control Account Managers (CAMs) specify the performance measurement technique for each of the work packages they manage. PMTs should be consistently applied to similar work packages across a project. PMTs should be applied such that objective measurements can be made at appropriate intervals to demonstrate progress on the activities to which they have been assigned.

The three types of PMTs are as follows: discrete effort, level of effort, and apportioned effort.

- Separate and distinct work effort that is related to the completion of specific and tangible end products or services, and can be directly planned and measured is called discrete effort.
- Support-type activity that does not produce definitive end products is referred to as level of effort.
- Effort applied to project work that is not readily divisible into discrete efforts for that work, but is related in direct proportion to measurable discrete work efforts is called apportioned effort.

Note: PMTs on already opened work packages cannot be changed. For unopened work packages, PMTs can be changed only through the change control process.

There are a variety of PMTs available:

- **Milestone:** Milestones are defined, and relative weights are assigned to them based on an objective measure. At any point, the value earned is the original work package budget multiplied by the combined weight of the completed milestones and divided by the total weight of all milestones. This method can be applied to any work package and is generally the preferred method for work packages that span more than two fiscal periods.
- **Percent Complete:** The CAM determines percent complete, based on some sort of objective measurement of work completed and remaining.
- **Units Complete:** This PMT is applicable to any work package that comprises a predefined number of similar tasks. The value earned at any point in time is simply the work package budget multiplied by the number of these tasks completed and divided by the total number to be done. Use of this PMT assumes that budgets are based on the units being measured.
- **50-50:** 50% of the value is earned as soon as the work package is started, and the rest is earned when it is completed. This PMT should be used only for work packages that span a maximum of two fiscal accounting periods since value cannot be earned in any intermediate periods.
- **0-100:** No value is earned until the work package is completed; at which point, the entire budget is earned. This method should be used only if the work package is scheduled to start and finish in the same fiscal accounting period.
- **User-Defined %:** A variation of the 50-50 PMT. The percentage earned at the start of the work package (1 to 99%) is defined in advance by the user. The remaining percentage is earned when the

work package is completed. This method should be used only for work packages whose schedule dates span a maximum of two fiscal accounting periods.

- **Level of Effort:** effort with no tangible product. Budgeted and earned by passage of time. BCWP is always equal to BCWS.

2 General Guidance

The PMT should be considered early, during initial planning of the WBS by the Project Manager with appropriate input from the CAM. This early planning consideration will prevent Control Accounts from mixing LOE and discrete PMT. Not mixing LOE and discrete PMT is important to provide the CAM with usable EVM data, since true discrete earned value can be obscured by the LOE activities. However, a small ratio of LOE/Discrete PMT is allowed where it would be impractical to create a separate control account. For example, a small-dollar discretely-measured activity (e.g., obtain NEPA CX) within a LOE project management control account, or a small-dollar LOE activity (e.g., engineering oversight) within a discretely-measured control account is acceptable.

The CAM designates the PMT most appropriate to the way in which BCWS is planned. The earning method is determined at the time the work package is prepared. PMTs on already opened work packages cannot be changed. For unopened work packages, PMTs can be changed only through the change control process. To provide traceability and transparency the PMT should be captured in the P6 notebook and Basis of Estimate (BOE) documentation.

3 Coding Guidance

PMT coding must be assigned in P6, which in turn passes the code to Cobra where the PMT is captured, retained, and used to calculate EVM data. The following codes are available:

- **A = Level of Effort**
  LOE usage should be kept to a minimum. By definition LOE has no deliverable, but should be time-phased to ensure actual effort used reflects, as closely as possible, planned effort required.
- **C = Physical Percent Complete**
  Physical Percent Complete is the most commonly used method of earning value. Care should be taken to ensure the percentage complete is quantitative (based on deliverables) and not qualitative (based on opinion). The defined deliverables can be tracked using P6 steps, milestones, peg-points, lower-level schedules (for example, firm-fixed-price subcontractor resource-loaded schedule), or other quantity/deliverable tracking mechanisms such as databases and spreadsheets. However, the tracking mechanism should be auditable and conform to change control procedures.

  When using this type of PMT, the CAM can also establish rules of credit for applying deliverable tracking. Rules of credit is a method of applying effort or cost weighting to determine earned value for specific deliverables.

  For example, a procurement task could incorporate deliverables such as letting the contract or Statement of Work (SOW), receiving goods, and testing goods. Depending on the contract and complexity of work, rules can be established on how each deliverable will be weighted relative to each other. To further define the contract, assume the contract language indicates a payment of 10% of total value will be given to the supplier at the time of order, to cover material costs. The contract also states that payment is due upon receipt of goods, with a 50% total contract value holdback pending quality inspection. With these assumptions, the deliverable rules of credit are defined by the contract, that is, 10% at start, 40% for receipt (cumulative 50%), 50% for successful QC inspection (cumulative 100%).

However, not all activities are so clearly defined or serial in nature. When a task is not serial in nature, the value earned in independent of previously performed activities.

Without clearly defined rules, it is a CAM's prerogative to define how value will be judged or earned in the rules of credit identifying the weighting of deliverable's steps, based on expected effort, complexity, or cost.
Caution should be exercised to judge percent complete by the amount of actual progress made in completing the specific deliverable/work product or by comparing progress made in relation to effort needed to complete a task. It is critical that physical percent complete is not based on irrelevant data, such as actual cost or actual hours. For example, actual cost is unrelated to relative effort needed to complete a task. The relative effort can be higher or lower than actual cost. This can be demonstrated using effort and actual hours. If a task is planned to take 100 hours of effort and 50 hours are expended, this does not mean that 50% of the work has been accomplished. If quantitative deliverable analysis is used, the work is judged as 40% complete and that means, it took 20% more effort to complete the task than planned. Using the actual cost data to evaluate the effort expended would have resulted in an overstated BCWP or EV.

- **D = Units Completed**
  Units complete is very similar to deliverable tracking used to determine physical percent complete. However, units complete is designed for the CAM to status P6 using quantity or hours earned for progress. It is important to note that, in our present P6/Cobra system configuration, there can be only one resource used per P6 activity with a PMT of units completed. Having more than one resource per activity may cause the system to reflect false EVM data.
- **E = 50-50**
  This method employs a strategy of earning 50% of value when the activity starts and the remaining 50% upon completion. Generally, this technique should be limited to activities with duration of less than two reporting periods.
- **F = 0-100**
  This method uses the strategy of not earning any value until the task is complete. Generally, this technique should be limited to activity durations of one reporting period. Caution needs to be exercised when selecting this technique. For example, it is tempting to use this technique for all material deliveries. However, if there are multiple deliveries, with the final delivery being delayed, nothing will be earned until that final delivery.
- **K = Planning Package**
  Planning packages are created to describe work within a control account that will occur in the future. Planning packages must have a work scope, schedule, and time-phased budget. Planning packages are normally larger (scope, schedule, and budget) than individual detailed work packages, but planning packages must still relate to a specific work scope. Individual planning packages do not require as much cost or schedule detail as work packages, but must have resources assigned and realistic durations. When planning packages are converted into work packages, they are defined in greater detail. See also the procedure Control Accounts, Work Packages, Planning Packages (EVMS 12.PM-002).

  The use of planning packages is encouraged, when appropriate, especially for work greater than one year in the future. Planning packages must be converted to work packages, through change control, prior to the work reaching a one-month window from execution, with some exception (i.e., within one month of award of a firm-fixed-price subcontract). Planning packages could have much of the detail of Work Packages i.e. duration, coding, etc. Appropriate use of planning packages gives the CAM time to validate or change execution planning, and reduces change control restrictions. However, when converting planning packages to work packages, the CAM should keep within budget limitations and constraints that established the planning package. Use of planning packages does not eliminate the

need to establish proper logic and interdependencies with other control accounts, which may be necessary to establish a realistic schedule and/or determine the project's true critical path.

4 Document Revision History

Date	Version	Author	Description
07/25/2014	1.0	Richard Marcum	This is the initial release of this document.