Module 5: Earned Value Management

This module, we will discuss Gantt Charts, Critical Path Methods, use of automation tools, as well as many other topics relating to time management.

Think about how you use to manage time in your personal life, what causes you to successfully manage your time? Do you use any tricks or tools? Do you often mismanage your time? If so, what things cause these delays or setbacks?

Module 3

Learning Objectives

- Define and describe the difference between planned value, earned value and actual cost
- Calculate earned value Describe cost and schedule performance indices
- Develop techniques for cost and schedule analysis
- Develop techniques for forecasting

In last module we discussed:

- Cost Estimating
- The types of estimates and their accuracies
- The difference between top down and bottoms up estimates
- How to make parametric estimates Calculate Budget Baselines

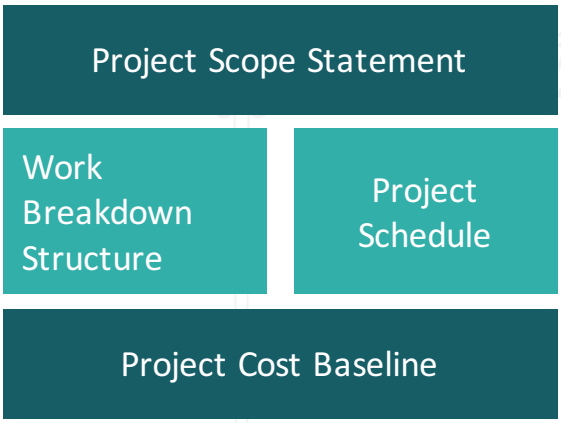
How have the past 4 Modules combined so far to add to your overall understanding of Project Management when it comes to scope, time and cost management?

Module 3

Monitoring Our Project

Where are we?

The project baseline has been created



Next Step: Resource Loading Curves

- **Cost Resource Curve**
  - Based on the Budget Estimate
  - Favored by PM's who are responsible for the total cost of the project
  - Planned cost vs time
- **Man-hour Resource Curve**
  - Based on man-hour estimate
  - Favored by PM's who are only asked to manage the direct hours expended
  - Planned hours vs time

What's the difference between the Cost Resource Curve and the Actual vs Plan Curve?

Earned Value Management (EVM) is an approach that combines the scope, schedule and cost baseline into a project performance and progress measurement tool.

The key element of EVM is an agreed method to measure the "physical" progress of each WBS Work Package.

Module 3

Calculating Earned Value 1

Earned Value Management

Level of Management Control

The appropriate level of control (Control Account Plan) is typically based on the following considerations:

1. Defined scope definition with clear boundaries for each package
2. Package activities grouped in one WBS area
3. Each package should have a single owner
4. Each package should be a manageable size

How do we make these decisions?

- For small projects, there may be one single Control Account
- For large projects, there may be many
- Each Control Account should be treated like a mini project or project segment. It will have its own status and progress

Your notes:

Module 3

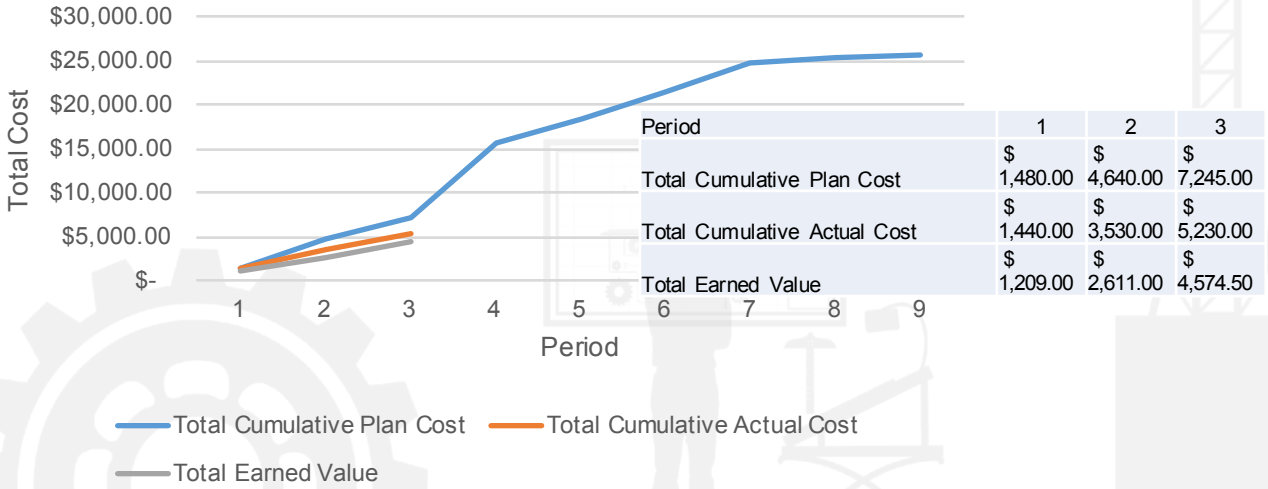
Calculating Earned Value 1 *Continued*

The basic approach to Earned Value is:

1. Estimate a percent complete for each WBS Work Package
2. Multiply the percent complete x the value of the Work Package to calculate the "Earned Value" for that package
3. Sum up the Work Package Earned Values to calculate the Earned Value of the Control Account and ultimately the Project

There are six common methods for estimating percent complete in a Work Package.

% Complete	Subjective measure based on experience	Good for small projects where there is a lot of experience on what it will take to complete
Fixed Formula	Fixed % based on completing fixed activities in package	Good for recurring packages where the formula is developed over time
Weighted Milestones	Values are assigned to intermediate milestones in each package.	Good when you must "prove" the progress; takes a lot of planning and effort
% Complete with Milestone Gates	Combine % complete with weighted milestones to take up partial credit for milestone	More complex than milestones, but more accurate
Earned Standards	Uses established metrics to give credit for partial work	Good for piece work or repetitive work such where units can be estimated
Equivalent Units	The value for the package is earned when it is complete	Requires a detailed bottoms up estimate and small work packages/units



Period	1	2	3
Total Cumulative Plan Cost	$ 1,480.00	$ 4,640.00	$ 7,245.00
Total Cumulative Actual Cost	$ 1,440.00	$ 3,530.00	$ 5,230.00
Total Earned Value	$ 1,209.00	$ 2,611.00	$ 4,574.50

Module 3

Calculating Earned Value 2

Schedule Indices

Schedule Variance (SV) = Earned Value (EV) – Planned Value (PV)

If the Schedule Variance is negative, then we are behind plan.

If the Schedule Variance is positive, then we are ahead of plan.

Schedule Performance Index (SPI) = EV/PV

If the SPI is less than 1.0, then we are behind plan

If the SPI is greater than 1.0, then we are ahead of plan

One thing to watch out for when using schedule indices – while they are accurate relative to plan – if the activities that are behind are not on the critical path, then the overall schedule may not be behind.

The indices are a guideline to tell use if and where to look for issues.

Cost Indices

Cost Variance (CV) = Earned Value (EV) – Actual Costs (AC)

If the CV is positive, then the project is running under budget

If the CV is negative, then the project is running over budget

Cost Performance Index (CPI) = EV/AC

If the CPI is greater than 1.0, then the project is running under budget

If the CPI is less than 1.0, then the project is running over budget.

Notes:

Project Management Institute, A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – 5th edition, Project Management Institute Inc., 2013, Page 218-219

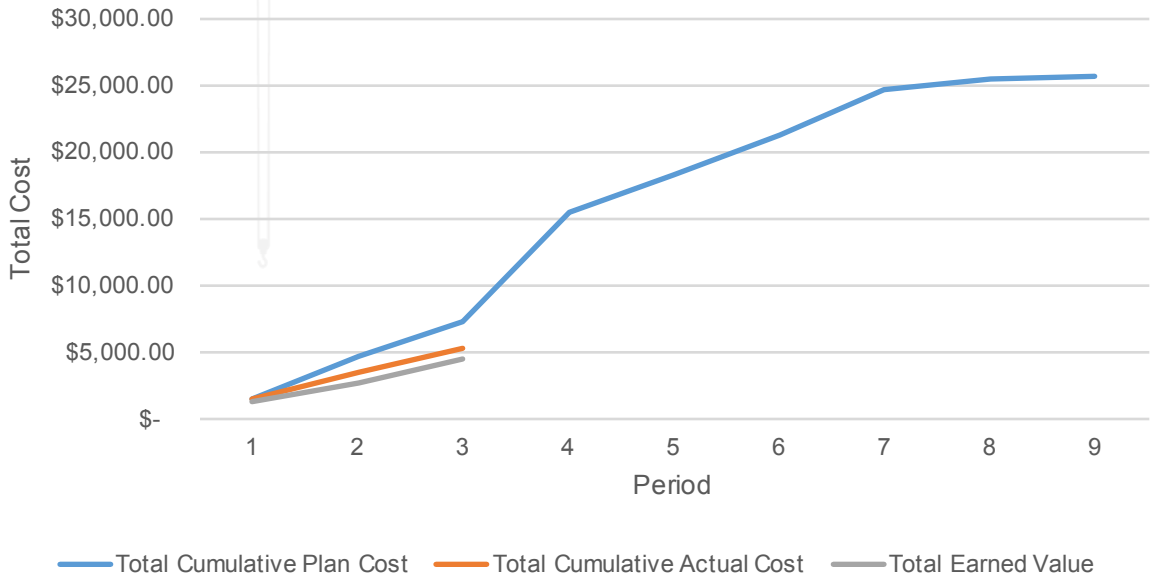
Module 3

Calculating Earned Value 2 *Continued*

Our Example

- SP = EV – PV = 4574.50 – 7245 = - 2670.50
- SPI = EV/PV = 4574.50/7245 = 0.63
- CP = EV – AC = 4574.50 – 5230 = -655.50
- CPI = EV/AC = 4574.50/5230 = 0.87

Your Notes:



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Module 3

Creating a Forecast

If your project has a significant variation either positive or negative relative to cost or schedule, it is your duty to forecast the impact and inform the Project Sponsor.

The longer you wait to recognize an issue, the harder it will be to impact the outcome.

What's the Iron Triangle? Sketch it below.

Three options to forecast what the cost or schedule will be at the end of the Project.

Complete a detail estimate to complete	Perform a bottoms up estimate on the remaining work considering the risk events and performance	Time consuming and requires more work
Assume the remaining work will be done at the budget rate	Add the budget value of the remaining work to the actual costs to the date to estimate a new completion value,	Quick and easy. May be optimistic as assumes any issues are gone.
Assume the remaining work will be done at the current performance.	Divide the remaining work budget be the Performance Index to estimate the remaining work and add to actual costs to date	Quick and easy. May be pessimistic as assume no learning curve on project.

Other Options to Help Understanding

- Calculate Performance Indices by smaller units to pin point the problem area.
- Plot the SPI and CPI by area as a function of time. The trends will give insight on a learning curve or if the problem has been addressed.
- Review scope to understand if there has been undocumented changes – change orders to the budget will impact the performance indices.
- Review the critical path to see how the work is progressing

Project Management Institute, A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – 5th edition, Project Management Institute Inc., 2013, Page 160. Figure 6-11

Module 3 Conclusion

Modules objectives:

- ❑ Define and describe the difference between planned value, earned value and actual cost
- ❑ Calculate earned value Describe cost and schedule performance indices
- ❑ Develop techniques for cost and schedule analysis
- ❑ Develop techniques for forecasting

Module Assignments:

- ❑ Peer Review: Calculate Earned Value Assignment
- ❑ Discussion: Kaz and Tom weekly conclusion
- ❑ Quiz: End of Module 5 Quiz

Summarize this Module and jot down how you will personally use this material: