

Earned Value Management

What is Earned Value Management (EVM)?

Simply, it is a project monitoring and measurement system that establishes a clear relationship between **planned** accomplishments and **actual** accomplishments

- ***A method of integrating scope, schedule, and resources, and for measuring project performance.***
- ***It compares the amount of work that was planned with what was actually earned with what was actually spent to determine if cost and schedule performance are as planned.***

Earned Value Management

What is needed for EVM?

- *A baseline plan*
- *A project budget (BAC – Budget at Completion)*
- *A project end date*
- *Tasks are identified & scheduled*
- *Each task has a budget or effort (resource loaded / weighting)*
- *Actuals tracked*

Earned Value Management

To perform EVM, three values need to be determined

- ***Planned Value (PV or BCWS)*** Budget Cost of Work Scheduled
- ***Actual Costs (AC or ACWP)*** Actual Cost of Work Performed
- ***Earned Value (EV or BCWP)*** Budgeted Cost of Work Performed

Earned Value Management

Planned Value (PV)

What are the budgeted costs of the work scheduled?

- *Time phased based on baseline budget*
- *Only changes when baseline is changed*
- *Also referred as “BCWS” & “BAC”*

Earned Value Management

Actual Costs (AC)

What are the actual costs of the work performed?

- *Based on the actual completion of work packages*
- *Actual costs for reported work*
- *Also referred as “ACWP”*

Earned Value Management

Earned Value (EV)

What are the budgeted costs of the work performed?

- *Based on the actual completion of work packages*
- *Baseline value of the reported work*
- *Also referred as “BCWP”*

Earned Value Management Example

Task – Drill & install 10 piezometers

- *Budget - \$100,000 (\$10K per piezometer)*
- *Time – 10 weeks (1 piezometer per week)*

At week 5:

- *4 piezometers drilled and installed*
- *\$47,500 spent to date*

PV = \$50,000

AC = \$47,500

EV = \$40,000

Earned Value Management

Calculating Earned Value and interpreting results

- *to measure the progress of the project*
- *help identify trends*
- *forecast costs*
- *and identify ways to correct/mitigate project pitfalls.*

Earned Value Management

Cost Variance (CV)

$$CV = EV - AC$$

- Good News: If CV value is positive, the project is currently under budget (spending less than planned for the work)
- Bad News: If CV value is negative, the project is currently over budget (spending more than planned for the work)

Earned Value Management

Cost Performance Index (CPI)

$$CPI = EV / AC$$

- Good News: If CPI value is >1 or $=1$, the project cost trend is currently under or at planned budget
- Bad News: If CPI value <1 , the project cost trend is currently over budget

Earned Value Management

Cost Variance % (CV%)

$$CV\% = CV / EV$$

- Good News: If CV% value is positive, the project is currently under budget by the CV%
- Bad News: If CV% value is negative, the project is currently over budget by the CV%

Earned Value Management

Schedule Variance (SV)

$$SV = EV - PV$$

- Good News*: If SV value is positive, the project is currently ahead of schedule
- Bad News: If SV value is negative, the project is currently behind schedule

** - not all positive SVs are good*

Earned Value Management

Schedule Performance Index (SPI)

$$SPI = EV / PV$$

- Good News: If SPI value is >1 or $=1$, the project schedule trend is currently ahead or on planned schedule
- Bad News: If SPI value <1 , the project schedule trend is currently behind schedule

Earned Value Management

Schedule Variance % (SV%)

$$SV\% = SV / PV$$

- Good News: If SV value is positive, the project is currently ahead of schedule
- Bad News: If SV value is negative, the project is currently behind schedule

Earned Value Management

Estimate at Completion (EAC)

#1

Actual costs to date plus a new estimate for all remaining work (original plan no longer valid)

$$EAC = AC + ETC$$

(ETC □ Estimate to Complete)

Earned Value Management

Estimate at Completion (EAC)

#2

Actual costs to date plus remaining budget
(current variances are viewed as atypical of future
variances)

$$EAC = AC + BAC - EV$$

Earned Value Management

Estimate at Completion (EAC)

#3 & #4

Actual costs to date plus remaining budget modified by a performance factor (CPI) (current variances are viewed as typical of future variances).

$$EAC = AC + [(BAC - EV) / CPI]$$

$$EAC = BAC / CPI$$

Earned Value Management Example

Task – Drill & install 10 piezometers

- *Budget - \$100,000 (\$10K per piezometer)*
- *Time – 10 weeks (1 piezometer per week)*

At week 5:

- *4 piezometers drilled and installed*
- *\$47,500 spent to date*

PV = \$50,000 CV = -\$7,500 SV = -\$10,000

AC = \$47,500 CPI = 0.82 SPI = 0.80

EV = \$40,000 CV% = -19% SV% = -20%

Earned Value Scenario



Washington State
Department of Transportation

Monthly Project Status Report

SR999, Main Street Intersection Signal & Channelization

Dear Boss,

As of 5/30/04, we are 42% complete and have spent \$48,000.

Respectfully submitted,

John Doe, Project Manager

Earned Value Scenario



Washington State
Department of Transportation

Monthly Project Status Report

SR999, Main Street Intersection Signal & Channelization

Dear Boss,

As of 5/30/04, we estimate that this project will be complete on 8/1/04, at a cost of \$100,000.

Respectfully submitted,

John Doe, Project Manager

Earned Value Scenario



Washington State
Department of Transportation

Program Management Status Report

SR999, Main Street Intersection Signal & Channelization

Status as of 5/30/04

Planned expenditures to date are \$56,000

This is 56% of the project budget

Actual expenditures to date are \$48,000

This is 48% of the project budget

We estimate cost at completion of \$100,000

Respectfully Submitted,
Jane Smith, Program Management

Earned Value Scenario



Washington State
Department of Transportation

Monthly Project Status Report

SR999, Main Street Intersection Signal & Channelization

Schedule:

Current completion is 42%

We estimate project completion on 8/1/04

Budget:

Expenditures to date are \$48,000

We estimate cost at completion of \$100,000

Respectfully submitted,
John Doe, Project Manager

Earned Value Scenario

BAC = \$100,000 (current project budget)

EV = \$42,000 (42% of project completed, \$100,000 planned)

PV = \$56,000 (56% of project planned \$100,000 completed – initial aging report)

AC = \$48,000 (from actual expenditures reporting)

**Is this project on schedule / budget?
Or is it in trouble?**

Earned Value Scenario

Cost Variance (CV):

$$\begin{aligned} CV &= EV - AC \\ &= \$42,000 - \$48,000 \\ &= - \$6,000 \end{aligned}$$

Cost Performance Index (CPI):

$$\begin{aligned} CPI &= EV / AC \\ &= \$42,000 / \$48,000 \\ &= 0.875 \end{aligned}$$

Cost Variance % (CV%):

$$\begin{aligned} CV\% &= CV / EV \\ &= - \$6,000 / \$42,000 \\ &= \underline{\underline{14\% \text{ OVER BUDGET}}} \end{aligned}$$

Earned Value Scenario

Schedule Variance (SV):

$$\begin{aligned} \text{SV} &= \text{EV} - \text{PV} \\ &= \$42,000 - \$56,000 \\ &= - \$14,000 \end{aligned}$$

Schedule Performance Index (SPI):

$$\begin{aligned} \text{SPI} &= \text{EV} / \text{PV} \\ &= \$42,000 / \$56,000 \\ &= 0.750 \end{aligned}$$

Schedule Variance % (SV%):

$$\begin{aligned} \text{SV\%} &= \text{SV} / \text{PV} \\ &= - \$14,000 / \$56,000 \\ &= \underline{\underline{25\% \text{ BEHIND SCHEDULE}}} \end{aligned}$$

Earned Value Scenario

Estimate at Completion (EAC):

Method #1:

$$\begin{aligned}\text{EAC} &= \text{AC} + \text{ETC (say \$68,000)} \\ &= \$48,000 + \$68,000 \\ &= \$116,000\end{aligned}$$

(Change Management for \$16,000 funds request)

Method #2:

$$\begin{aligned}\text{EAC} &= \text{AC} + \text{BAC} - \text{EV} \\ &= \$48,000 + \$100,000 - \$42,000 \\ &= \$106,000\end{aligned}$$

(Change Management for \$6,000 funds request)

Earned Value Scenario

Estimate to Complete (ETC):

Method #3

$$\begin{aligned} \text{EAC} &= \text{AC} + [(\text{BAC} - \text{EV}) / \text{CPI}] \\ &= \$48,000 + [(\$100,000 - \$42,000) / 0.875] \\ &= \$48,000 + \$66,285 \\ &= \$114,285 \end{aligned}$$

(Change Management for \$14,285 funds request)

Method #4

$$\begin{aligned} \text{EAC} &= \text{BAC} / \text{CPI} \\ &= \$100,000 / 0.875 \\ &= \$114,285 \end{aligned}$$

(Change Management for \$14,285 funds request)

Earned Value Scenario



Washington State
Department of Transportation

Monthly Project Status Report

SR999, Main Street Intersection Signal & Channelization

Status as of 5/30/04:

Planned Expenditures:	\$56,000	56%
Progress (EV):	\$42,000	42%
Actual Expenditures:	\$48,000	48%

SPI = 0.75

CPI = 0.875

Budgeted Cost at Completion:	\$100,000
Estimated Cost at Completion:	\$116,000*
Estimated Project Completion Date:	8/1/04

*(Change Management for the additional funds needed)

Respectfully submitted, John Doe, Project Manager

THANK YOU