

Applying Earned Value Analysis

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www.projectlearning.net/project_mentor.htm

More useful tips and tricks can be found on the Project Learning blog:

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Related document(s)

Earned Value Analysis Overview www.projectlearning.net/pdf/I2.1.pdf

Applying Earned Value Analysis

Introduction

How many Microsoft Project users update their projects with actual and remaining work and cost information? Furthermore, how many users take advantage of the Earned-Value Analysis capabilities found within Microsoft Project? If your answer is 'No', then you are missing out on a great deal of functionality – that can help you plan and manage your projects more accurately and effectively.

Earned Value Analysis (EVA) does more than just indicate BCWS, ACWP and BCWP values. These tips and tricks illustrate ways to compare these values and provide indices or percentage assessments of good/bad schedule and cost performance. As there may be a lot of earned value data within an average project, methods for filtering or grouping earned value information are also discussed, along with how to produce EVA information in a graphical format.

Background

In addition to assessing any slippages or cost overruns in a project in general terms, Earned Value Analysis (EVA) can be used to help determine if a project is providing value for money or not. EVA concentrates on three basic parameters: How much work SHOULD have been done so far (BCWS); how much money has ACTUALLY been spent to progress the project so far (ACWP) and what is the VALUE of work that has been accomplished so far (BCWP). By comparing these values, assessments can be made about how efficient a project is and where problems may lie.

Applying Earned Value Analysis

Reviewing schedule variances


As discussed in the previous reference topic, a schedule variance exists when there is a difference between the BCWS and BCWP values for tasks or resources. This variance can be expressed as an absolute value or as an index:

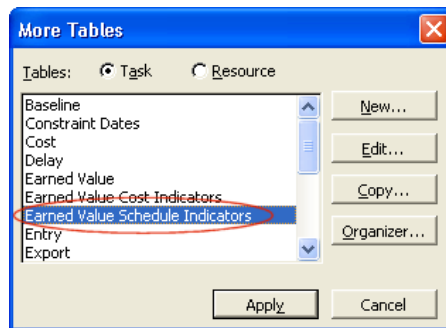
$$SV = BCWP - BCWS$$

$$SV\% \text{ (schedule variance percent)} = (SV / BCWS) * 100$$

$$SPI \text{ (schedule performance index)} = BCWP / BCWS$$

These values can be seen within table columns and can give an indication regarding the schedule status of a project in value terms:

- Select a suitable task-based view (Tracking Gantt for example).
- From the View menu, select Table and then select More Tables.
- Within the table library, select as below, and then click .



Applying Earned Value Analysis

The columns depict that:

	Task Name	BCWS	BCWP	SV	SV%	SPI
0	Manual Project	14,530.00	13,700.96	(829.04)	-5%	0.94
1	Weekly meetings	0.00	0.00	0.00	0%	0
10	Content	8,900.00	6,750.96	(2,149.04)	-24%	0.76
11	Design structure	2,750.00	2,750.00	0.00	0%	1
12	Write body text	6,150.00	4,000.96	(2,149.04)	-34%	0.65
13	Set page layouts	0.00	0.00	0.00	0%	0
14	Exercises	5,630.00	6,950.00	1,320.00	23%	1.23
15	Create exercises	5,300.00	5,300.00	0.00	0%	1
16	Test exercises	330.00	1,650.00	1,320.00	400%	5
17	Create contents & index	0.00	0.00	0.00	0%	0
18	Manual completed	0.00	0.00	0.00	0%	0

- 'Exercises' (ringed in blue above) is ahead of schedule by 23%. \$5,630 worth of work should have been achieved by the status date. \$6,950 worth of work has been performed. As such, this summary task is \$1,320 ahead of schedule in value terms.
- 'Content' (ringed in green above) is behind schedule by 24%. \$8,900 worth of work should have been achieved by the status date. Only \$6,751 worth of work has been performed. As such, this summary task is \$2,149 behind schedule in value terms.
- The project summary task 'Manual Project' (ringed in red) is 5% behind schedule in value terms. \$830 worth of work needs to be caught up for the project to complete on schedule.

Hints

- The SV, SV% and SPI fields don't exist in Microsoft Project 2000. Custom fields can be created to replicate them using the calculated values shown above.
- Tasks with a SV of 0 or a SPI of 1 are on schedule.
- SV, SV% and SPI values roll up from subtasks to summary tasks and hence ultimately to the project summary task.
- Negative values may be displayed either with the minus sign or in parentheses; for example, "-879.82" or "(879.82)".

Applying Earned Value Analysis

Reviewing cost variances

As discussed in the previous reference topic, a cost variance exists when there is a difference between the ACWP and BCWP values for tasks or resources. This variance can be expressed as an absolute value or as an index:

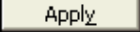
$$CV = BCWP - ACWP$$

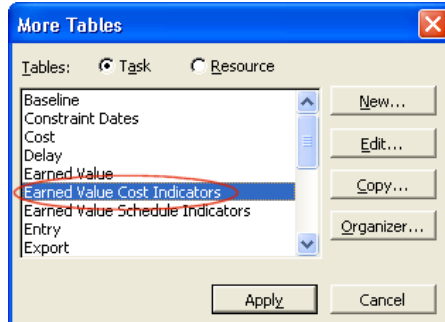
$$CV\% \text{ (cost variance percent)} = [(BCWP - ACWP) / BCWP] * 100$$

$$CPI \text{ (cost performance index)} = BCWP / ACWP$$

These values can be seen within table columns and can give an indication regarding the cost status of a project in value terms:

a. From the View Menu, select Table and then select More Tables.

b. Within the table library, select as below, and then click .



Applying Earned Value Analysis

The columns depict that:

	Task Name	ACWP	BCWP	CV	CV%	CPI
0	Manual Project	14,037.50	13,700.96	(336.54)	-2%	0.98
1	Weekly meetings	0.00	0.00	0.00	0%	0
10	Content	8,047.50	6,750.96	(1,296.54)	-19%	0.84
11	Design structure	2,750.00	2,750.00	0.00	0%	1
12	Write body text	5,297.50	4,000.96	(1,296.54)	-32%	0.76
13	Set page layouts	0.00	0.00	0.00	0%	0
14	Exercises	5,990.00	6,950.00	960.00	13%	1.16
15	Create exercises	4,660.00	5,300.00	640.00	12%	1.14
16	Test exercises	1,330.00	1,650.00	320.00	19%	1.24
17	Create contents & index	0.00	0.00	0.00	0%	0
18	Manual completed	0.00	0.00	0.00	0%	0

- 'Exercises' (ringed in blue above) is under budget by 13% as of the project's status date. \$6,950 worth of work has been achieved by the status date and only \$5,990 has actually been spent to achieve that progress. As such this summary task is currently \$960 under budget.
- 'Content' (ringed in green above) is over budget by 19% as of the project's status date. \$6,750 worth of work has been achieved by the status date and \$8,047 has been spent to achieve that progress. As such this summary task is currently \$1,296 over budget.
- The project summary task 'Manual Project' (ringed in red) is 2% over budget. \$337 worth of work needs to be achieved at no additional cost for the project to complete on budget.

Hints


- The CV, CV% and CPI fields don't exist in Microsoft Project 2000. Custom fields can be created to replicate them using the calculated values shown above.
- Tasks with a CV of 0 or a CPI of 1 are on budget.
- Additional fields can provide further cost analyses: EAC and VAC (the difference between EAC and BAC).

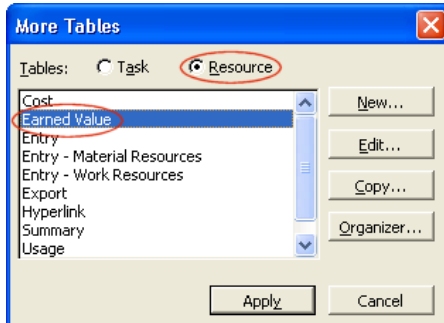
	Task Name	EAC	VAC
0	Manual Project	19,876.52	(476.52)
1	Weekly meetings	0.00	0.00
10	Content	12,466.95	(2,006.95)
14	Exercises	7,713.74	1,236.26
18	Manual completed	0.00	0.00

Applying Earned Value Analysis

Earned value assessments for resources

Earned value can also be analyzed on a resource-by-resource basis:

- a. From the View menu, select Resource Sheet.
- b. From the View Menu, select Table and then select More Tables.
- c. Within the table library, select as below, and then click .



Applying Earned Value Analysis

The columns depict that:

	Resource Name	BCWS	BCWP	ACWP	SV	CV
1	John Garner	3,520.00	4,800.00	3,840.00	1,280.00	960.00
2	Sally Beaumont	4,000.00	4,000.00	4,000.00	0.00	0.00
3	Tim Brown	6,000.00	3,900.00	5,200.00	(2,100.00)	(1,300.00)
4	Joanne Lewis	700.00	700.00	700.00	0.00	0.00

- John (ringed in green above) has achieved \$4,800 worth of work by the status date. As he was only expected to achieve \$3,520 by that date his work is ahead of schedule by \$1,280 worth of work. In addition, his work so far has only cost \$3,840. As such he is \$960 below budget.
- Tim (ringed in red above) has only achieved \$3,900 worth of work as of the status date. He should have achieved \$6,000 worth of work and as such is \$2,100 worth of work behind schedule. In addition, his work so far has cost \$5,200. As such he is \$1,300 over budget.

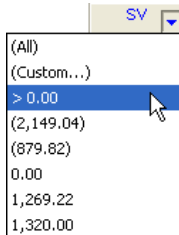
Hints	<ul style="list-style-type: none">• Values for EAC, BAC and VAC can also be seen on a resource-by-resource basis:																									
	<table border="1"><thead><tr><th></th><th>Resource Name</th><th>EAC</th><th>BAC</th><th>VAC</th></tr></thead><tbody><tr><td>1</td><td>John Garner</td><td>3,840.00</td><td>4,800.00</td><td>960.00</td></tr><tr><td>2</td><td>Sally Beaumont</td><td>5,200.00</td><td>5,200.00</td><td>0.00</td></tr><tr><td>3</td><td>Tim Brown</td><td>10,250.00</td><td>8,250.00</td><td>(2,750.00)</td></tr><tr><td>4</td><td>Joanne Lewis</td><td>700.00</td><td>700.00</td><td>0.00</td></tr></tbody></table>		Resource Name	EAC	BAC	VAC	1	John Garner	3,840.00	4,800.00	960.00	2	Sally Beaumont	5,200.00	5,200.00	0.00	3	Tim Brown	10,250.00	8,250.00	(2,750.00)	4	Joanne Lewis	700.00	700.00	0.00
		Resource Name	EAC	BAC	VAC																					
	1	John Garner	3,840.00	4,800.00	960.00																					
	2	Sally Beaumont	5,200.00	5,200.00	0.00																					
3	Tim Brown	10,250.00	8,250.00	(2,750.00)																						
4	Joanne Lewis	700.00	700.00	0.00																						

Applying Earned Value Analysis

Filtering and grouping on earned value

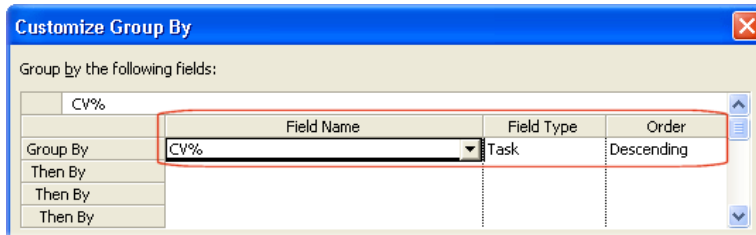
As well as simply reviewing earned value information, filters and groups can be applied to help in analyzing the data. For example:

- Use AutoFilter to select all tasks with SV >0



	Task Name	BCWS	ACWP	BCWP	SV
0	Manual Project	14,530.00	14,037.50	13,700.96	(829.04)
14	Exercises	5,630.00	5,990.00	6,950.00	1,320.00
16	Test exercises	330.00	1,330.00	1,650.00	1,320.00

- Group tasks by CV% values:



	Task Name	EAC	VAC	ACWP	BCWP	CV	CV%
	CV%: 19%	1,330.00	320.00	1,330.00	1,650.00	320.00	19%
16	Test exercises	1,330.00	320.00	1,330.00	1,650.00	320.00	19%
	CV%: 12%	4,660.00	640.00	4,660.00	5,300.00	640.00	12%
15	Create exercises	4,660.00	640.00	4,660.00	5,300.00	640.00	12%
	CV%: 0%	6,300.00	0.00	2,750.00	2,750.00	0.00	0%
	CV%: -32%	8,142.95	(1,992.95)	5,297.50	4,000.96	(1,296.54)	-32%
12	Write body text	8,142.95	(1,992.95)	5,297.50	4,000.96	(1,296.54)	-32%

Applying Earned Value Analysis

- Custom fields can be created to highlight where CV percentages are positive or negative. These fields can then be added to tables and enhanced by using graphical indicators:

Formula for 'Cost Variance Status'

Edit formula

Cost Variance Status =
 $\text{IIf}([\text{CV}\%]>0,2,\text{IIf}([\text{CV}\%]<0,1,0))$

Insert:

	Task Name	EAC	VAC	ACWP	BCWP	Cost Variance Status	CV
	<input type="checkbox"/> CV%: 19%	1,330.00	320.00	1,330.00	1,650.00		320.00
16	Test exercises	1,330.00	320.00	1,330.00	1,650.00	●	320.00
	<input type="checkbox"/> CV%: 12%	4,660.00	640.00	4,660.00	5,300.00		640.00
15	Create exercises	4,660.00	640.00	4,660.00	5,300.00	●	640.00
	<input type="checkbox"/> CV%: 0%	6,300.00	0.00	2,750.00	2,750.00		0.00
2	Weekly meetings 1	0.00	0.00	0.00	0.00	●	0.00
3	Weekly meetings 2	0.00	0.00	0.00	0.00	●	0.00
4	Weekly meetings 3	0.00	0.00	0.00	0.00	●	0.00
5	Weekly meetings 4	0.00	0.00	0.00	0.00	●	0.00
6	Weekly meetings 5	0.00	0.00	0.00	0.00	●	0.00
7	Weekly meetings 6	0.00	0.00	0.00	0.00	●	0.00
8	Weekly meetings 7	0.00	0.00	0.00	0.00	●	0.00
9	Weekly meetings 8	0.00	0.00	0.00	0.00	●	0.00
11	Design structure	2,750.00	0.00	2,750.00	2,750.00	●	0.00
13	Set page layouts	1,550.00	0.00	0.00	0.00	●	0.00
17	Create contents & index	2,000.00	0.00	0.00	0.00	●	0.00
18	Manual completed	0.00	0.00	0.00	0.00	●	0.00
	<input type="checkbox"/> CV%: -32%	8,142.95	(1,992.95)	5,297.50	4,000.96		(1,296.54)
12	Write body text	8,142.95	(1,992.95)	5,297.50	4,000.96	●	(1,296.54)

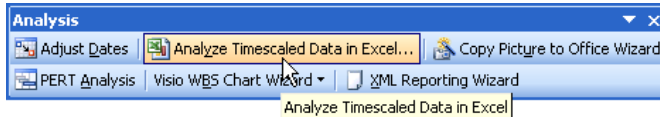
Hints	<ul style="list-style-type: none"> • To achieve the formula shown above within Microsoft Project 2000, a custom field would first have to be created to become CV%. This field could then be applied within the formula. • To hide unnecessary detail (for example where CV% = 0), click on <input type="checkbox"/>. To expand detail, click on <input checked="" type="checkbox"/>. • Group criteria, global filters and custom fields are common project components. As such, they are saved with the project document and can be copied to other projects using the Organizer. • Aim for consistency in the use of groups and custom fields, especially if working in a programme environment. Contact a programme office for advice (if one exists).
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Applying Earned Value Analysis

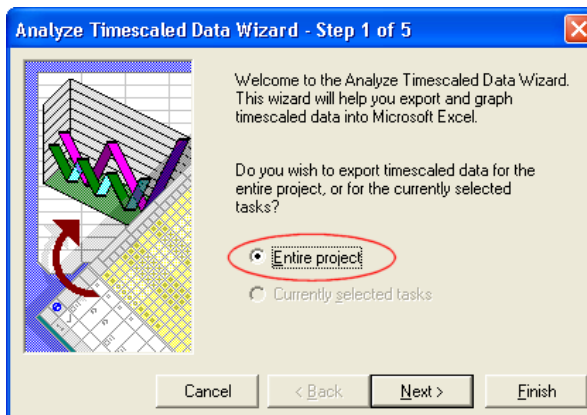
Producing earned value graphs

Earned value information can also be shown in a graph using Microsoft Project and Microsoft Excel. This can be achieved by using a module that is activated from the Analysis toolbar:

- a. From the View menu, select Toolbars and then select Analysis.
- b. Activate the wizard as below:

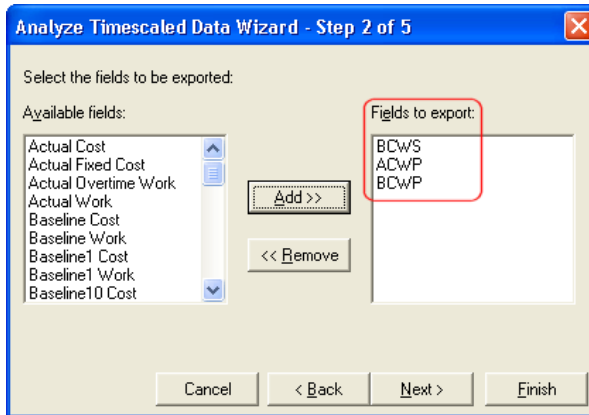


- c. Choose to export data for all tasks or just those that have been selected, followed by NEXT.



- d. Use **Add >>** or **<< Remove** to select appropriate fields to export, then NEXT.

Applying Earned Value Analysis



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- e. Choose a suitable date range and granularity of data to export, then NEXT.

Analyze Timescaled Data Wizard - Step 3 of 5

What date range and units would you like to use?
The default date range is the project start and finish dates.

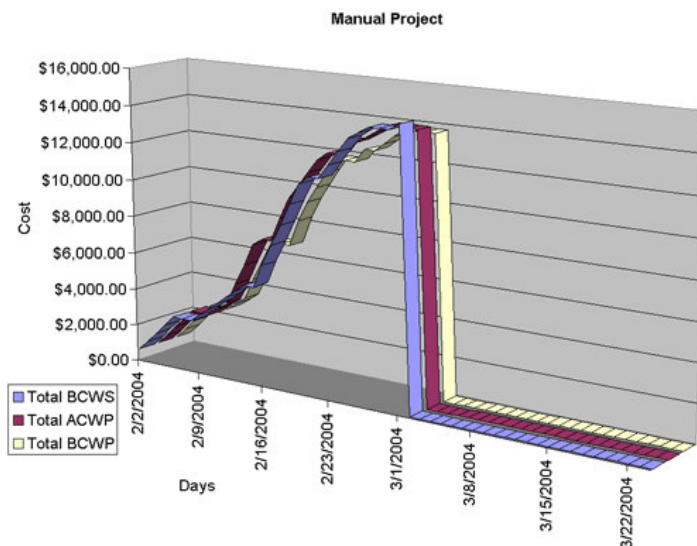
From: February 2, 2004

To: March 24, 2004

Units: Days

Buttons: Cancel, < Back, Next >, Finish

- f. Choose if a graph should be produced by Excel at step 4 of the wizard, NEXT.
- g. Export the data at step 5 of the wizard and then review within Microsoft Excel.



Hints	<ul style="list-style-type: none"> • Aim to export similar values with an equivalent scale; for example cost values OR work values. Aim to not have cost and work values within the same graph and therefore sharing the same graph scale. • For long timescale projects, choose a unit of weeks for the timescale granularity or a 'To' date equal to the project's status date. • When data is exported, the file created is called Timedata.TXT. This file should be saved as a .XLS file before any further analysis is made against the data.
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