

# Earned Value Analysis Overview

Document author:

Andy Jessop

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Project Learning International  
Limited

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[www.projectlearning.net/project\\_mentor.htm](http://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):

Applying Earned Value Analysis [www.projectlearning.net/pdf/I2.2.pdf](http://www.projectlearning.net/pdf/I2.2.pdf)

# Earned Value Analysis Overview

## 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.

These tips and tricks provide an introduction into Earned Value Analysis and illustrate the potential that it provides.

## 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.

# Earned Value Analysis Overview

## What is earned value analysis, and why use it?

Earned Value Analysis (EVA) was developed by the US Department of Defense to determine the performance of large military procurement contracts. Its techniques can still be applied to the smaller projects currently in use today. Indeed, as Microsoft Project allows you to drill down through and across a project, specific variances and general trends can be easily found.

EVA looks at three basic parameters:

- What value of work SHOULD have been accomplished to date?
- How much value has been realized to date?
- How much has actually been spent to date?

By comparing these parameters, an objective assessment of cost AND schedule performance can be gained. Instead of simply concentrating on how much time has been taken to achieve progress, earned value looks at how much value has been achieved so far. For example, take the following project summary task:

Task Name	Baseline Cost	Cost	Cost Variance	Start Var.	Finish Var.
Help	\$9,960.00	\$11,240.00	\$1,280.00	0 days	5 days

- This project started on time, but it is currently expected to finish 5 days late.
- This project is expected to overspend by \$1,280 - approximately 13% greater than its baseline cost.

Whilst this may appear to be adequate information, greater insight into the project's status can be gained by looking at its earned value figures:

Task Name	BCWS	BCWP	ACWP	SV	CV	EAC	BAC	VAC
Help	\$7,960.00	\$6,360.00	\$7,640.00	(\$1,600.00)	(\$1,280.00)	\$11,964.53	\$9,960.00	(\$2,004.53)

- So far (as of the project's status date), the project is behind schedule to the value of \$1,600 worth of work. In addition the current best estimates indicate that it will (if things continue as planned) overspend by \$2,004, which is \$725 more than forecast in the topmost example.

Whilst these figures may not indicate too large an overspend / overrun, these figures are from a sample project containing ONLY seven tasks. If there were 70 tasks (or even several hundred tasks), the potential for error becomes much larger.

# Earned Value Analysis Overview

## Hints

- The discussions below have been written around Microsoft Project 2002 and Microsoft Project 2003. This has a number of enhancements over Project 2000 regarding earned value. Where possible, these changes have been highlighted.
- EVA can be accomplished manually; a computer helps by adding up the numbers.

# Earned Value Analysis Overview

## Assessing the value of work scheduled

When work is scheduled within a project, so too is cost. At the end of the planning stage, this cost information is translated to become baseline cost. In earned value terms, this cost is also referred to as the Budget At Completion (BAC). This BAC cost is calculated for tasks, resources and assignments. It is also summed at summary task and project summary task levels. This cost can be shown as a column within a table:

	Task Name	BAC
0	<b>Manual Project</b>	<b>19,400.00</b>
1	<b>Weekly meetings</b>	<b>0.00</b>
10	<b>Content</b>	<b>10,450.00</b>
11	Design structure	2,750.00
12	Write body text	6,150.00
13	Set page layouts	1,550.00
14	<b>Exercises</b>	<b>8,950.00</b>
15	Create exercises	5,300.00
16	Test exercises	1,650.00
17	Create contents & index	2,000.00
18	Manual completed	0.00

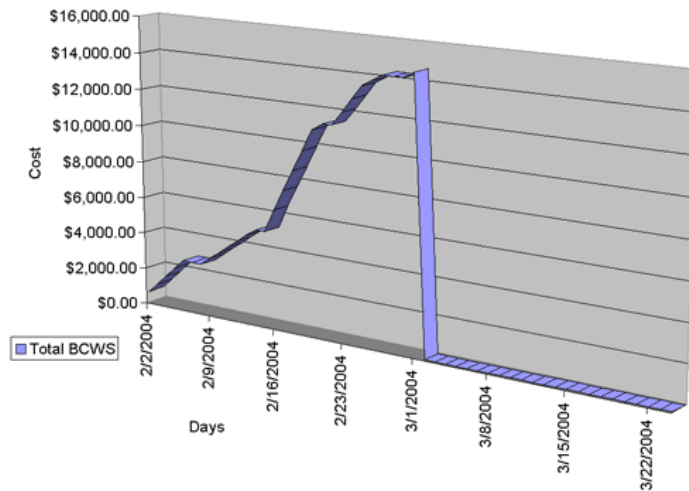
As a project progresses, the status date will change. Initially this date will be equivalent to the project start date. When the project is complete, it will be the same as the project finish date. A key earned value field is the Budgeted Cost of Work Scheduled (BCWS). This is the baseline cost up until the status date:

	Task Name	BAC	BCWS
0	<b>Manual Project</b>	<b>19,400.00</b>	<b>14,530.00</b>
1	<b>Weekly meetings</b>	<b>0.00</b>	<b>0.00</b>
10	<b>Content</b>	<b>10,450.00</b>	<b>8,900.00</b>
11	Design structure	2,750.00	2,750.00
12	Write body text	6,150.00	6,150.00
13	Set page layouts	1,550.00	0.00
14	<b>Exercises</b>	<b>8,950.00</b>	<b>5,630.00</b>
15	Create exercises	5,300.00	5,300.00
16	Test exercises	1,650.00	330.00
17	Create contents & index	2,000.00	0.00
18	Manual completed	0.00	0.00

- The BCWS for the project summary task indicates that approximately 75% of the project's baseline cost should have been incurred as of the project's status date.
- Tasks with a BCWS equivalent to their baseline cost BAC value should have been completed by the project's status date.
- Tasks with a BCWS less than their BAC value aren't expected to be complete (baseline finish) until after the project's status date.

# Earned Value Analysis Overview

BCWS values can also be displayed in graphical form:



- As of the status date, the Manual project should have cost \$14,530.
- As of February 16, the Manual project should have incurred approximately \$5,000.

# Earned Value Analysis Overview

## Assessing the value of work performed

As actual work is performed, actual costs will also be incurred. This in turn will calculate ACWP values for tasks up to the project's status date:

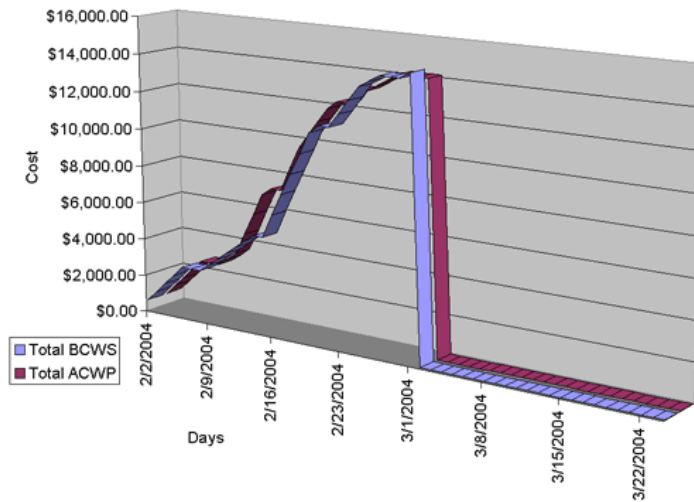
	Task Name	BAC	BCWS	ACWP
0	[-] Manual Project	19,400.00	14,530.00	14,037.50
1	[-] Weekly meetings	0.00	0.00	0.00
10	[-] Content	10,450.00	8,900.00	8,047.50
11	Design structure	2,750.00	2,750.00	2,750.00
12	Write body text	6,150.00	6,150.00	5,297.50
13	Set page layouts	1,550.00	0.00	0.00
14	[-] Exercises	8,950.00	5,630.00	5,990.00
15	Create exercises	5,300.00	5,300.00	4,660.00
16	Test exercises	1,650.00	330.00	1,330.00
17	Create contents & index	2,000.00	0.00	0.00
18	Manual completed	0.00	0.00	0.00

Simply comparing BCWS and ACWP values can be less than conclusive:

- If ACWP is greater than BCWS then this will indicate an overspend. It doesn't necessarily mean that more value (or actual progress) has been earned, it just means that more money has been spent to date than that originally scheduled.
- If ACWP is less than BCWS then this will indicate underspend. This doesn't necessarily mean that less value has been earned. It just means that less money has been spent to date than that originally scheduled.

# Earned Value Analysis Overview

ACWP and BCWS values can also be compared in a graph:



- As of the status date, the Manual project has actually cost \$14,037.
- As the curves for BCWS and ACWP are fairly similar, this indicates that the actual spending was similar to the planned expenditure. This is still not conclusive of any value earned.



# Earned Value Analysis Overview

## Assessing value that has been earned

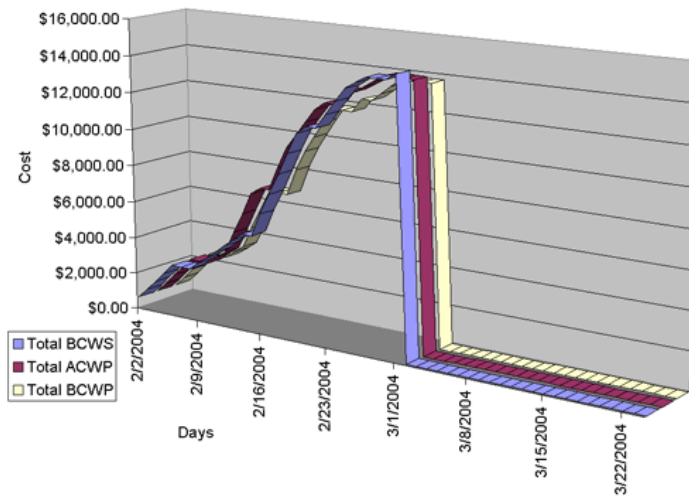
As comparing ACWP with BCWS has little value, one other earned value parameter needs to be measured. This is the Budget Cost of Work Performed (BCWP). BCWP is the value of work that has been achieved as of the project's status date. In general terms it is calculated as:

$$\text{BCWP} = \text{Baseline Cost} * \text{Percent Complete}$$

	Task Name	BAC	BCWS	ACWP	BCWP
0	[-] Manual Project	19,400.00	14,530.00	14,037.50	13,700.96
1	[-] Weekly meetings	0.00	0.00	0.00	0.00
10	[-] Content	10,450.00	8,900.00	8,047.50	6,750.96
11	Design structure	2,750.00	2,750.00	2,750.00	2,750.00
12	Write body text	6,150.00	6,150.00	5,297.50	4,000.96
13	Set page layouts	1,550.00	0.00	0.00	0.00
14	[-] Exercises	8,950.00	5,630.00	5,990.00	6,950.00
15	Create exercises	5,300.00	5,300.00	4,660.00	5,300.00
16	Test exercises	1,650.00	330.00	1,330.00	1,650.00
17	Create contents & index	2,000.00	0.00	0.00	0.00
18	Manual completed	0.00	0.00	0.00	0.00

- If BCWP is greater than BCWS, the task / project is ahead of schedule.
- If BCWP is less than BCWS, the task / project is behind schedule.
- If BCWP is greater than ACWP, the task / project is under budget.
- If BCWP is less than ACWP, the task / project is overspending.

# Earned Value Analysis Overview



- As of the status date the Manual project has earned \$13,700 worth of value (\$13,700 worth of work has been achieved).
- As of the status date the Manual project should have earned \$14,530. The project is behind schedule to the value of \$830 worth of work.
- As of the status date the Manual project has actually cost \$14,037. The project is over budget to the value of \$337 worth of work.
- All the curves are fairly similar in gradient until February 23. After this date the BCWP gradient reduces. This could indicate the lack of progress as the ACWP curve is still similar in gradient to the BCWS curve.

## Hints

- When in-progress tasks have been split (in the case of 'Write body text'), Microsoft Project calculates BCWP values based upon timephased data. This can be more accurate than simply using a percent complete value, but results given can vary slightly to a general  $BCWP = \text{Baseline Cost} \times \text{Percent Complete}$  calculation.

# Earned Value Analysis Overview

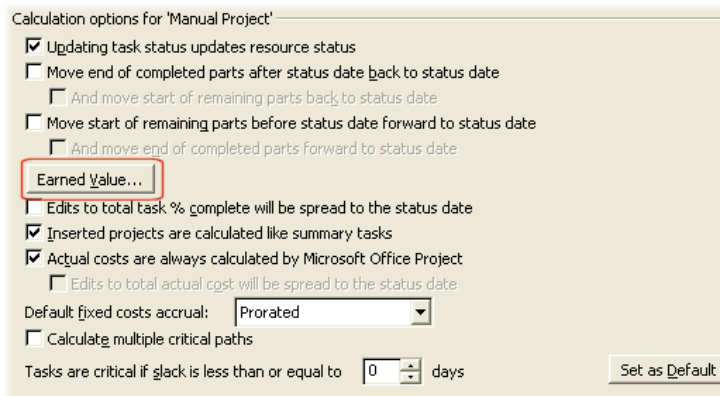
## Setting earned value calculation parameters

When Microsoft Project performs earned value calculations it bases them around two overall parameters:

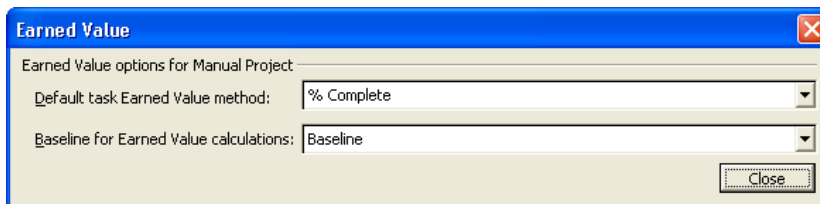
- Percent Complete.
- Baseline data.

To review (and if necessary) change the current settings:

- a. From the Tools menu, select Options and then select the Calculation tab.



- b. Click on the EARNED VALUE button.



The options are:

- To base the calculations around percent complete or physical percent complete values.
- To select which baseline is used for the calculation process.

Hints	<ul style="list-style-type: none"><li>• Earned value calculations in Microsoft Project 2000 are based around percent complete values and the project's single baseline data.</li><li>• Percent complete can be an entered or a calculated value. Physical percent complete can only be an entered value.</li><li>• To allow periodic project comparisons, save an additional baseline (up to 10 baselines are available) every time the project is updated. DO NOT overwrite the master project baseline unless authorized by the project's sponsor (for example following a major change request).</li></ul>
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