

Successfully Presenting Earned Value



Your guide to Earned Value Management

What is Earned Value Management?

Earned Value Management (EVM) is a project management system that combines schedule performance and cost performance to answer the question, “What did we get for the money we spent?”

Basic concepts of EVM:

- All project steps “earn” value as work is completed.
- The Earned Value (EV) can then be compared to actual costs and planned costs to determine project performance and predict future performance trends.
- Physical progress is measured in dollars, so schedule performance and cost performance can be analyzed in the same terms.

Earned Value has been used since the 1960’s by the Department of Defense as a central part of the C/SCSC (Cost/Schedule Control Systems Criteria). Recently, the DOD revised the 35 criteria contained in the C/SCSC and produced the 32 criteria for EVMS (Earned Value Management Systems).

These criteria have since been accepted by the American National Standards Institute/Electronic Industry Association as a new standard, called ANSI/EIA 748. Now, EVM is being used in a wider variety of government contracts, and is spreading through the private sector as a valuable tool for project managers.

What are the benefits of using Earned Value Management?

In a typical spend plan analysis, physical progress is not taken into account when analyzing cost performance. Instead, a project's actual costs to date are simply compared to planned costs, often with misleading results.

Example:

A task has a planned value (PV) of \$1000, and actual costs (AC) of \$1000. It appears this task has perfect cost performance, and is in good shape to finish on-budget (*Figure 1*). However, if physical progress is taken into account, the results may differ.

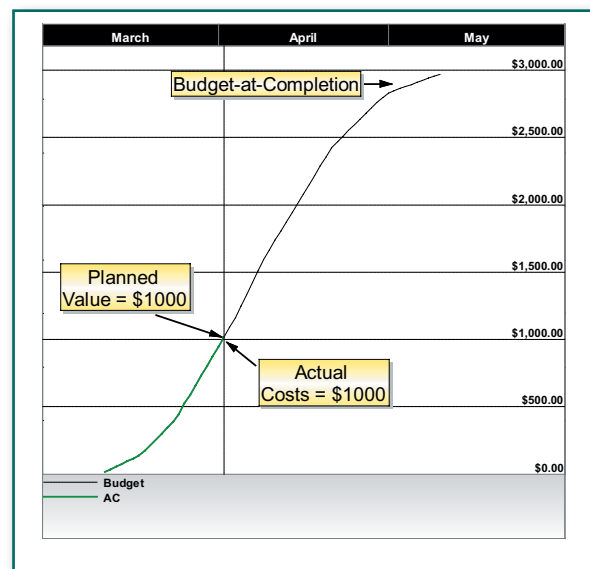


Figure 1

In *Figure 2*, the project has spent \$1000 in actual costs but has only achieved \$750 of Earned Value.

This is called a cost overrun, and this project would have a Cost Variance (CV) of -\$250.

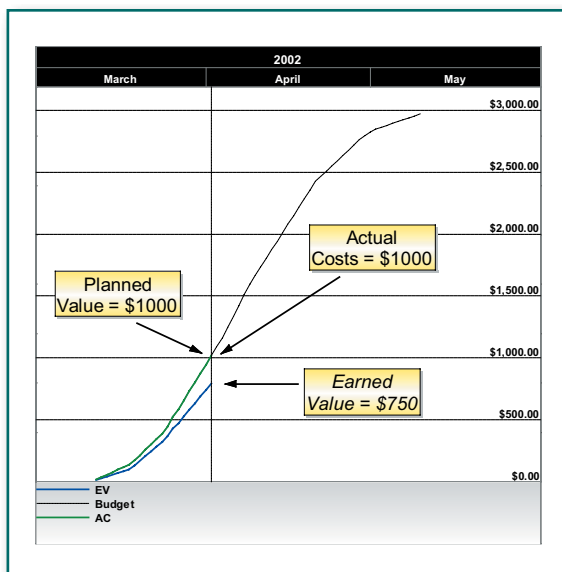


Figure 2

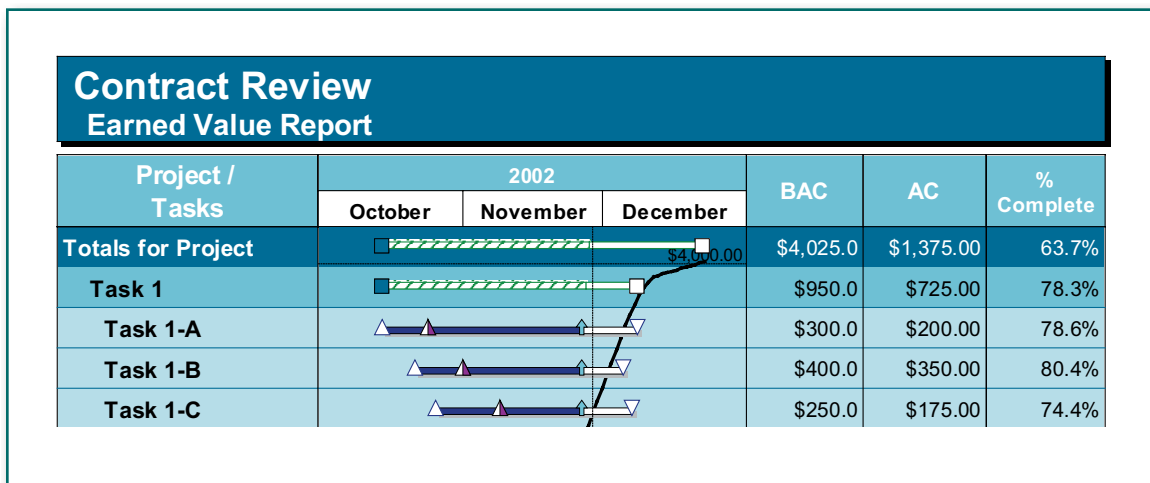
From this example, we can see that EVM expands on the two-dimensional analysis—“Has this project spent more or less money than planned?”—by adding the third dimension—“What did we get for the money we spent?”

Building Blocks of Earned Value Analysis

In addition to more accurate project status assessment, EVM makes it easy for a project manager to analyze both schedule and cost performance in a variety of ways. Using a limited set of basic task information, it is possible not only to determine how a project has been performing, but to predict future performance trends as well.

Basis for Earned Value Analysis:

- **Budget at Completion (BAC)** = Overall approved budget for a task.
- **Actual Costs (AC)** = Total amount spent on a task up to the current date.
- **Percent Complete** = Task progress, related as either EV/BAC, or simply physical progress shown by the fill of the task bar.



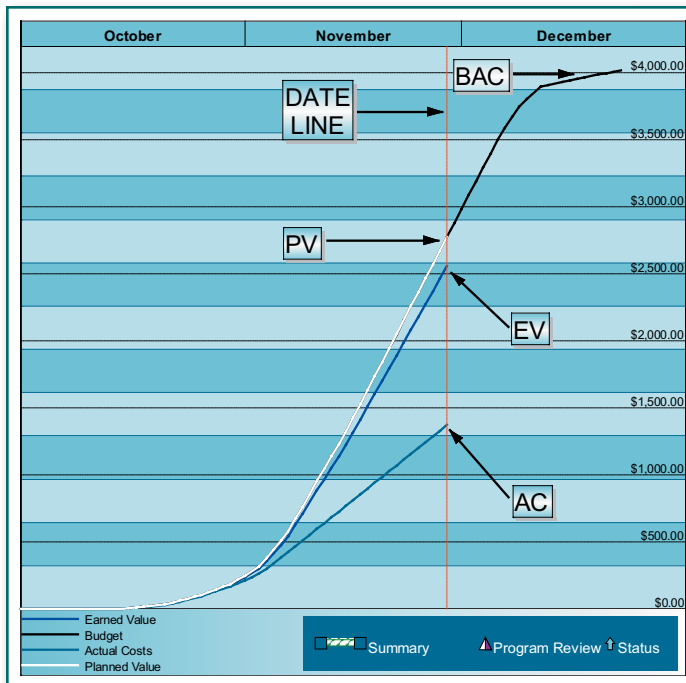
Once these three measurements have been established, the following calculations can be performed:

- **Earned Value (EV)** = BAC x Percent Complete. The budgeted cost of completed work as of the current date.
- **Planned Value (PV)** = The point along the time-phased budget that crosses the current date. Shows the budgeted cost of scheduled work as of the current date.

Building Blocks of Earned Value Analysis

Project / Tasks	October					November					December				%	BAC	Actual Costs	Earned Value	Planned Value
	1	2	3	4	5	6	7	8	9	10	11	12	13	14					
Totals for Project															64%	\$4,025	\$1,375	\$2,564	\$2,780
Task 1															78%	\$950	\$725	\$743	\$783
Task 1-A															79%	\$300	\$200	\$236	\$246
Task 1-B															80%	\$400	\$350	\$322	\$339
Task 1-C															74%	\$250	\$175	\$186	\$198

View detailed EVM data in actual dollars as part of a presentation schedule...



...or use an easy-to-read DataGraph for at-a-glance visual analysis of project trends.

Performance Indices and Variance

Once Earned Value and Planned Value are known, they can then be used to determine schedule and cost variance, and calculate performance efficiency.

- **Schedule Variance (SV)** = Earned Value – Planned Value. The difference between what was planned to be completed and what has actually been completed as of the current date.
- **Cost Variance (CV)** = Earned Value – Actual Costs. The difference between the work that has been accomplished (in dollars) and how much was spent to accomplish it.

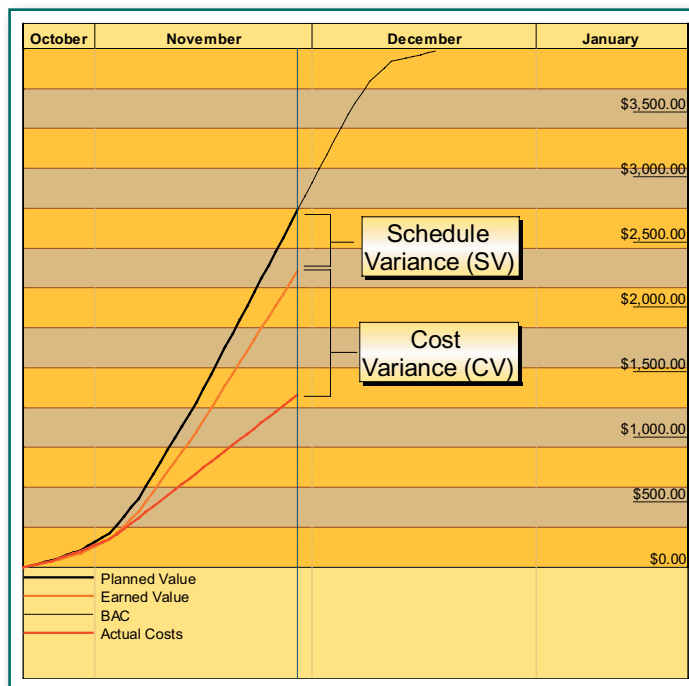


Figure 6

In *Figure 6*, the project shown has a negative SV, because it has “earned” less value than was planned, as of the current date.

However, it has a positive CV, because the Earned Value is greater than the Actual Costs accrued.

Performance Indices and Variance

- **Schedule Performance Index (SPI)** = Earned Value / Planned Value. Schedule variance related as a ratio instead of a dollar amount. A ratio less than 1 indicates that work is being completed slower than planned.
- **Cost Performance Index (CPI)** = Earned Value / Actual Costs. Cost variance related as a ratio instead of a dollar amount. A ratio less than 1 indicates that the value of the work that has been accomplished is less than the amount of money spent.

Performance Review									
Tasks	BAC	2004			Earned Value	Planned Value	Actual Costs	CPI	SPI
		March	April	May					
Project A	\$850				\$270	\$335	\$250	1.08	0.81
Task 1	\$350				\$195	\$260	\$150	1.30	0.75
Task 2	\$500				\$75	\$75	\$100	0.75	1.00

Figure 7

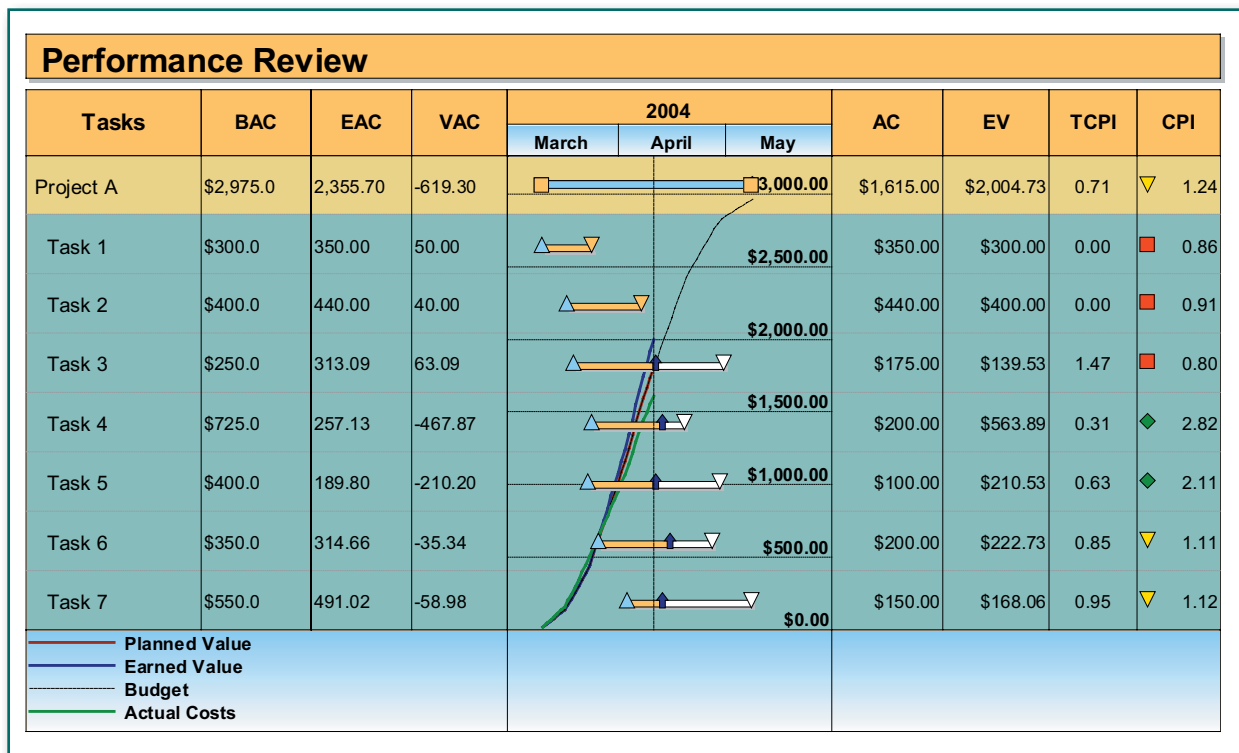
In *Figure 7*, Project A has a CPI greater than 1.00. This shows us that the project has been earning value faster than it has been accruing costs.

However, Project A also has a SPI value that is less than 1.00. Although Actual Costs are low, Task 1 is behind schedule, so the project has not earned as much value as was planned.

Forecasting Future Performance Trends

The Schedule Performance and Cost Performance Indices not only monitor current project performance, they can also be used to predict future performance trends.

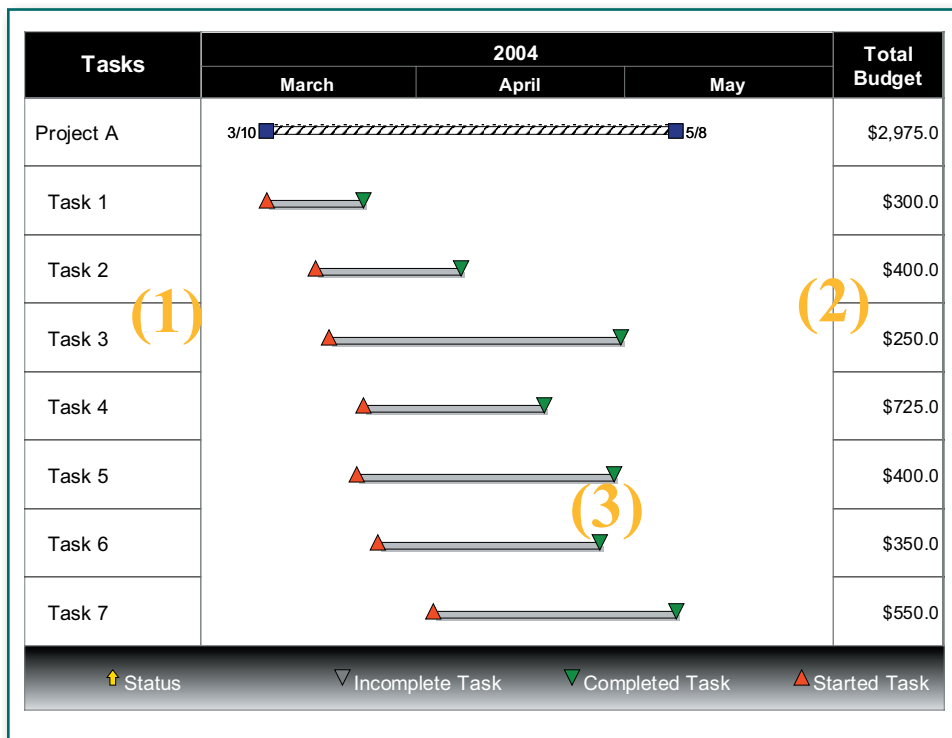
- To-Complete Performance Index (TCPI)** = $(BAC - EV) / (BAC - AC)$.
 Indicates the CPI required throughout the remainder of the project to stay within the stated budget.
- Estimate at Completion (EAC)** = $AC + ((BAC - EV) / CPI)$. A forecast of total costs that will be accrued by project completion based on past cost performance trends.
- Variance at Completion (VAC)** = $EAC - BAC$. The difference between the new Estimate at Completion and the original Budget at Completion.



How do I get started using Earned Value Management?

Identify and Organize all Project Steps

First, identify all tasks that need to be accomplished and organize the tasks into sub-groups (1). Breaking down activities into the smallest possible steps makes it easier to pinpoint schedule and cost performance problems.



Allocate the Budget and Schedule the Tasks

Each activity in the project should have a planned Budget-at-Completion (BAC). All subsequent earned value calculations will be based on this amount (2). In addition to the BAC, each task should also have a specific duration (3), which provides the basis for monitoring actual costs and physical progress.

How do I get started using Earned Value Management?

Update Task Status and Enter Actual Costs

As the project progresses, the percent complete for unfinished tasks should be updated and monitored (4). Earned Value (EV) is determined by relating this physical progress to the BAC. Along with task status and budget, it is necessary to maintain actual costs accrued for each task in order to calculate cost performance (5).

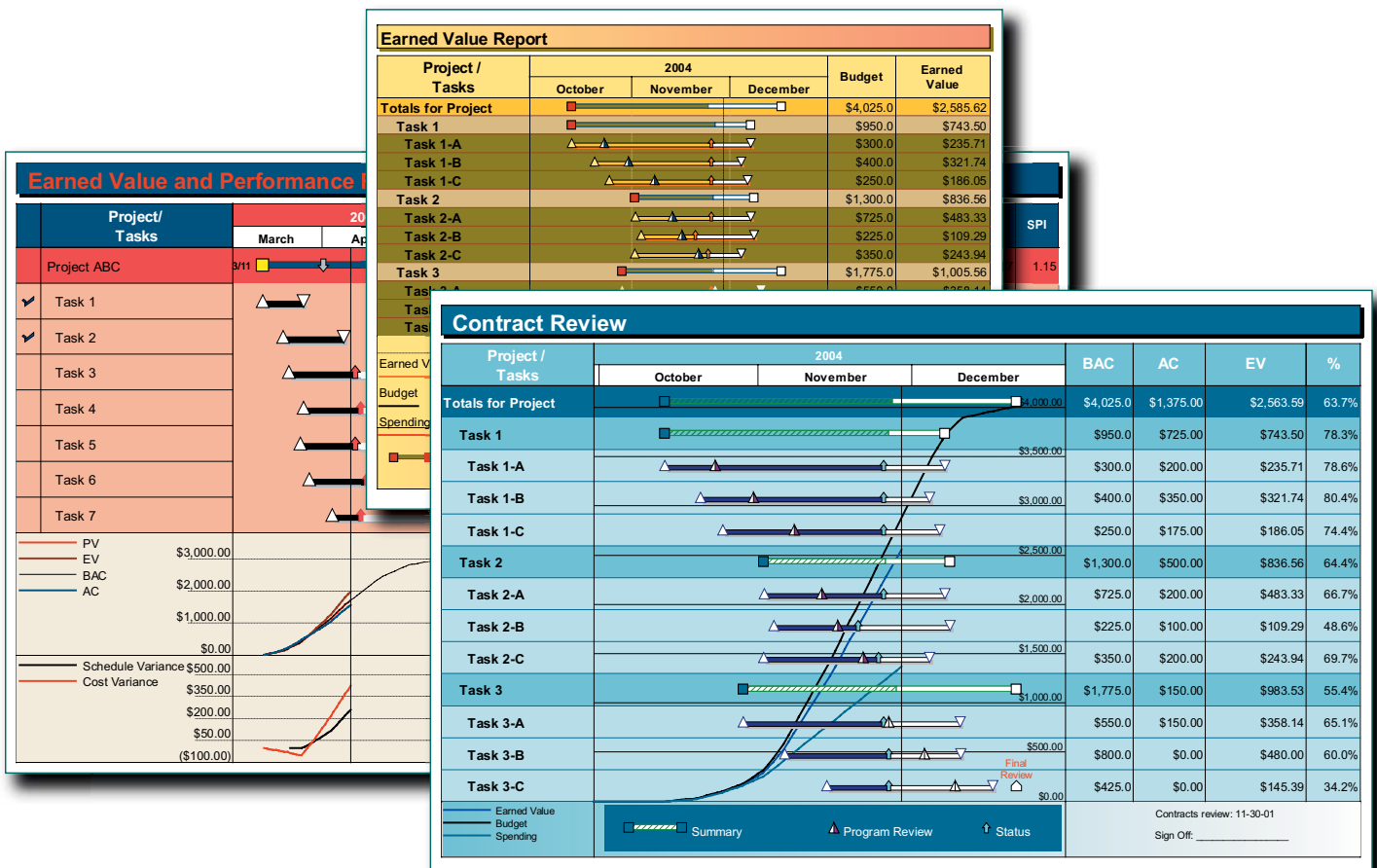
Tasks	% Comp.	2004			Total Budget	AC
		March	April	May		
Project A	59%				\$2,975.00	\$1,575.00
Task 1	100%				\$300.00	\$350.00 (5)
Task 2	100%				\$400.00	\$400.00
Task 3	51%				\$250.00	\$175.00
Task 4	78%				\$725.00	\$200.00
Task 5	47%				\$400.00	\$100.00
Task 6	73%				\$350.00	\$200.00
Task 7	14%				\$550.00	\$150.00

↑ Status
 ▽ Incomplete Task
 ▽ Completed Task
 ▲ Started Task

How do I get started using Earned Value Management?

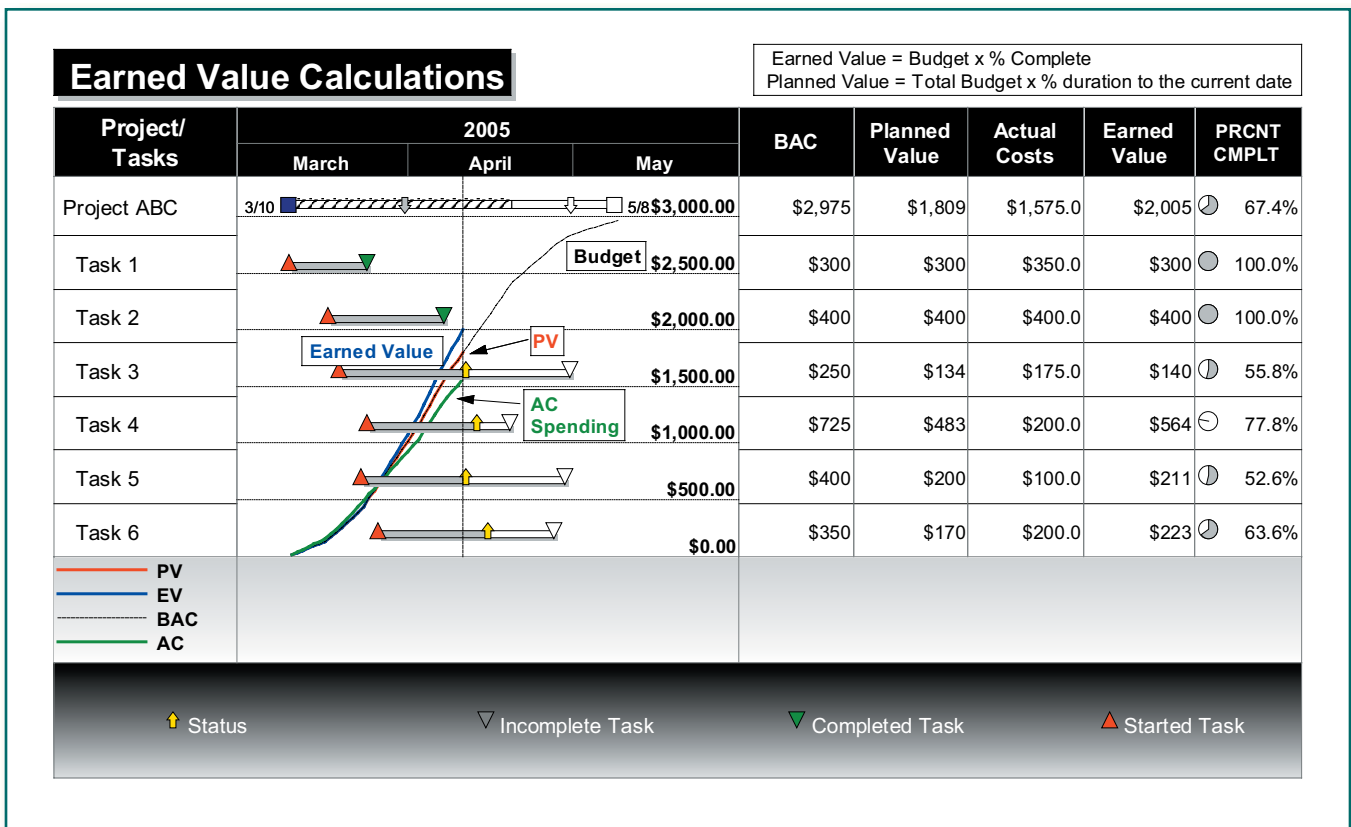
Use the Data to Make Informed Decisions

Now that all tasks have been scheduled, and the BAC, EV, Percent Complete, and AC are known, further analysis can be performed, including schedule and cost variances, performance efficiency, and estimates-at-completion.



Example Reports and Resources

On the following pages, several example Earned Value reports are shown. These examples, as well as the charts on the previous pages, were created in Milestones Professional 2004. Visit KIDASA.com to view these examples and more, or to download a trial version of Milestones Professional.



Earned Value and Performance Review

Schedule Variance = EV - PV Cost Variance = EV - AC
 Cost Performance Index = EV / AC Schedule Performance Index = EV / PV

Project/ Tasks	2005			Total Budget	Planned Value	Actual Costs	Earned Value	PRCNT CMPLT	SV	CV	CPI	SPI
	March	April	May									
Project ABC	3/10		5/8	\$2,975.00	\$1,808.97	\$1,575.00	\$2,004.73	67.4%	\$195.77	\$429.74	1.27	1.11
Task 1				\$300.00	\$300.00	\$350.00	\$300.00	100.0%	\$0.00	(\$50.00)	0.86	1.00
Task 2				\$400.00	\$400.00	\$400.00	\$400.00	100.0%	\$0.00	\$0.00	1.00	1.00
Task 3				\$250.00	\$133.72	\$175.00	\$139.53	55.8%	\$5.81	(\$35.47)	0.80	1.04
Task 4				\$725.00	\$483.33	\$200.00	\$563.89	77.8%	\$80.56	\$363.89	2.82	1.17
Task 5				\$400.00	\$200.00	\$100.00	\$210.53	52.6%	\$10.53	\$110.53	2.11	1.05
Task 6				\$350.00	\$169.70	\$200.00	\$222.73	63.6%	\$53.03	\$22.73	1.11	1.31
Task 7				\$550.00	\$122.22	\$150.00	\$168.06	30.6%	\$45.84	\$18.06	1.12	1.38

— PV	\$3,000.00
— EV	\$2,000.00
— BAC	\$2,000.00
— AC	\$1,000.00
— SV	\$500.00
— CV	\$350.00
	\$200.00
	\$50.00
	(\$100.00)

Summary	Status
Completed Task	CPI above 1.3
Incomplete Task	CPI from 1 to 1.3
Program Review	CPI below 1

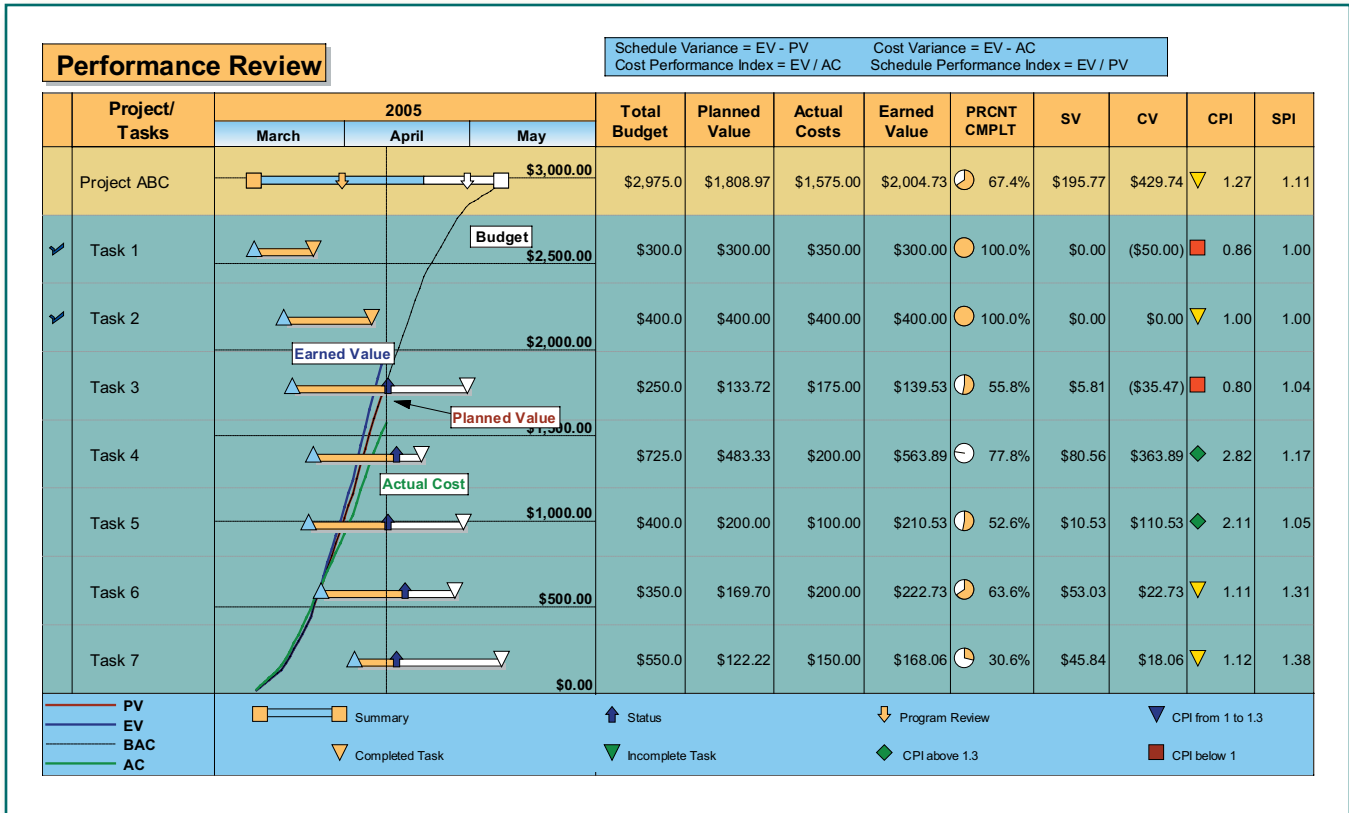
Contract Review Earned Value Report

Summary Program Review Status

Project / Tasks	2005			Budget	Actual Costs	Earned Value	PRCNT CMPLT
	October	November	December				
Totals for Project				\$4,025.00	\$1,375.00	\$2,585.62	64.2%
Task 1				\$950.00	\$725.00	\$743.50	78.3%
Task 1-A				\$300.00	\$200.00	\$235.71	78.6%
Task 1-B				\$400.00	\$350.00	\$321.74	80.4%
Task 1-C				\$250.00	\$175.00	\$186.05	74.4%
Task 2				\$1,300.00	\$500.00	\$836.56	64.4%
Task 2-A				\$725.00	\$200.00	\$483.33	66.7%
Task 2-B				\$225.00	\$100.00	\$109.29	48.6%
Task 2-C				\$350.00	\$200.00	\$243.94	69.7%
Task 3				\$1,775.00	\$150.00	\$1,005.56	56.7%
Task 3-A				\$550.00	\$150.00	\$358.14	65.1%
Task 3-B				\$800.00	\$0.00	\$480.00	60.0%
Task 3-C				\$425.00	\$0.00	\$167.42	39.4%

Earned Value	\$4,000.00
Budget	\$3,000.00
Spending	\$2,000.00
	\$1,000.00
	\$0.00

Contracts review: 11-30-02
 Sign Off: _____



Materials for further Earned Value Management research:

Fleming, Q., & Koppelman, J. (2000). *Earned Value Project Management*. 2nd Ed. Pennsylvania: Project Management Institute.

Lewis, J. (2000). *The Project Manager's Desk Reference*. New York: McGraw-Hill.

Portny, S. (2001). *Project Management for Dummies*. New York: Hungry Minds, Inc.

KIDASA.com - Home of KIDASA Software, Inc., makers of Milestones Professional.

EarnedValueManagement.com - All about Earned Value. Definitions, examples, and more.

PMI.org - Home of the Project Management Institute, and a variety of PM resources.