



**Earned Value Management Tutorial
Module 1: Introduction to Earned Value
Management**

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Module1: Introduction to Earned Value

Welcome to Module 1. The objective of this module is to introduce you to Earned Value and lay the blueprint for the succeeding modules.

This module will include the following topics:

- Earned Value Management defined
- The differences between Traditional Management and Earned Value Management
- How Earned Value Management fits into a Program and Project environment
- The framework necessary for proper Earned Value implementation



What is Earned Value Management?

Earned Value Management (EVM) is a systematic approach to the integration and measurement of cost, schedule, and technical (scope) accomplishments on a project or task. It provides both the government and contractors the ability to examine detailed schedule information, critical program and technical milestones, and cost data.

Earned Value Management is intended to provide data from a contractor's management system to the government in standard data elements that...

- Relate time-phased budgets to contract tasks
- Integrate cost, schedule, and technical performance
- Indicate work progress objectively
- Are valid, timely and auditable
- Are from the internal system the contractor uses to manage
- Are at a practical level of summarization



Why use Earned Value Management?

By using Earned Value and implementing an Earned Value Management System (EVMS), the following questions can be answered objectively:

- Where have we been?
- Where are we now?
- Where are we going?

Why use Earned Value? For one, it is mandated by some key DOE directives and guidance that Earned Value will be implemented. The following pages will discuss these.



DOE guidance for Earned Value

A memorandum from the Deputy Secretary of Energy, dated September 19, 2001....

“I intend to continue the direction contained in DOE Order 413.3. The responsibilities contained in the Order require that you know what is going on with your projects and that you assist your program managers and project managers in resolving issues and problems. The quarterly performance reviews, monthly status updates utilizing the Earned Value Management System as a metric, and periodic independent reviews are all sources for project information that allow us the opportunity to intercede before projects get off track.”

Now let's look at the DOE Order 413.3



DOE guidance for Earned Value

Current Department of Energy policy, DOE Order 413.3, Program and Project Management for the Acquisition of Capital Assets, states the requirements for contractor's project management system

“_The industry standard for project control systems described in American National Standards Institute (ANSI) EIA-748, Earned Value Management Systems, must be implemented on all projects with a total project cost (TPC) greater than \$20M for control of project performance during the project execution phase.”

Finally, below let's look at some Best Practice guidance currently in the DOE.

The Office of Field Management has issued a series of 33 Good Practice Guides. Though they are not official guidance, each guide describes the good practices used throughout DOE and industry for specific topic including Earned Value Management, and provides examples of performance objectives, criteria, and measures.



Earned Value Management History

With the understanding of what Earned Value is and why it used, let's take a brief look at the history of Earned Value.

1960s - Earned value-based performance management began in the 60s, based initially on Department of Defense (DOD) Cost/Schedule Control Systems Criteria (C/SCSC).

- Earned Value was used as an objective measure for progress, i.e., physical accomplishment

1970s-80s – The DOD continued the use of Earned Value in response to bearing cost and schedule risk in cost-plus contracting.

- Contractors pushing high tech, newly developed weaponry
- Military having critical schedule needs (“Arms Race”)

1990s – Policy moved Earned Value into all Federal agencies

- OMB Circular: A-11, NASA Policy Directive 9501.3, DOD 5000.2R, and DOE Order 413.3 to name a few



Traditional Management vs. Earned Value Management

To better understand Earned Value Management, let's take a look at how earned value management compares with traditional management.

There is an important and fundamental difference between the data available for analysis in a traditional management environment as compared to an environment using earned value.

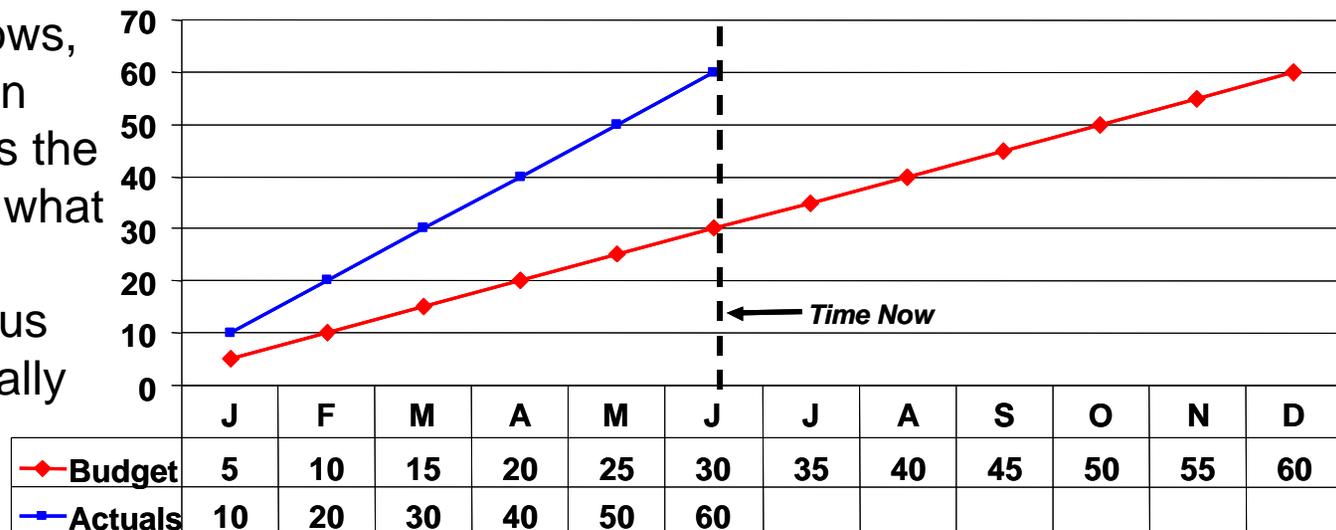
Following pages will discuss and contrast the different between the two management approaches.



Traditional Management

In Traditional management, there are two data sources, the budget (or planned) expenditures and the actual expenditures. The comparison of budget versus actual expenditures merely indicates what was planned to be spent versus what was actually spent at any given time. But how much has been produced? As you can see, with this approach there is no way to determine the physical amount of work performed. It does not indicate anything about what has actually been produced for the amount of money spent nor whether it is being produced at the rate, or according to the schedule, originally planned. In other words, it does not relate the true cost performance of the project.

As the graph shows, this comparison only represents the relationship of what was budgeted (planned) versus what was actually spent.





Earned Value Management

In Earned Value Management, unlike in traditional management, there are three data sources:

- **the budget (or planned) value of work scheduled**
- **the actual value of work completed**
- **the “earned value” of the physical work completed**

Earned Value takes these three data sources and is able to compare the budgeted value of work scheduled and compare it to the “earned value of physical work completed” and the actual value of work completed.

Let’s take a closer look at how earned value appears in a graph.

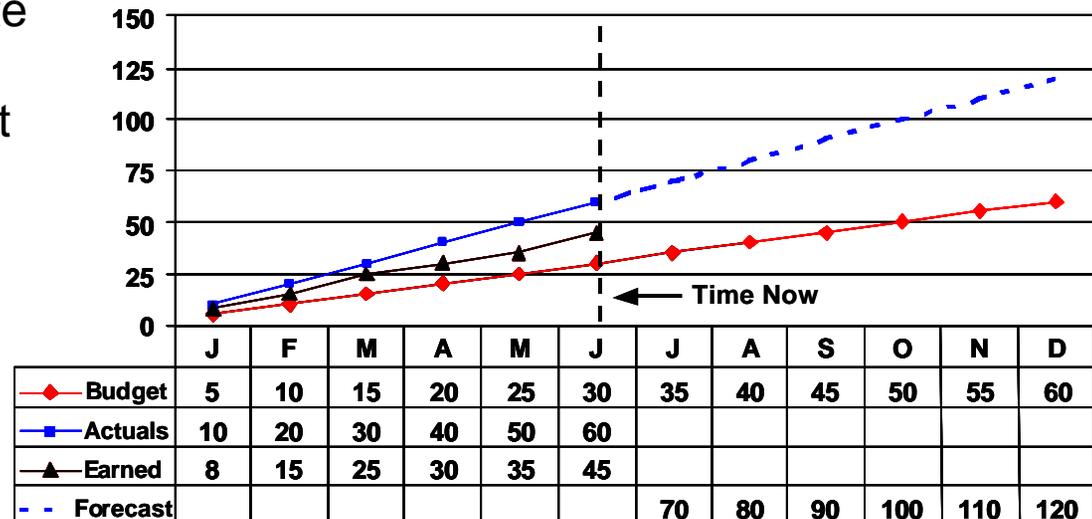


Earned Value Management

Notice the three lines on the graph below. These lines correspond to the three components of earned value: budget (in red), actual expenditures (in blue), and the earned value of the production (in black). Note how the budget line is below both the actual expenditures and the earned value lines. What does this indicate?

First, it is obvious that the project is expending more (blue line) than it was budgeted to spend, to date (red line). Given the progression of each line, it is also apparent that this trend has occurred since the beginning of the project.

But what else can be interpreted from the graph? Let's take a closer look on the next page.



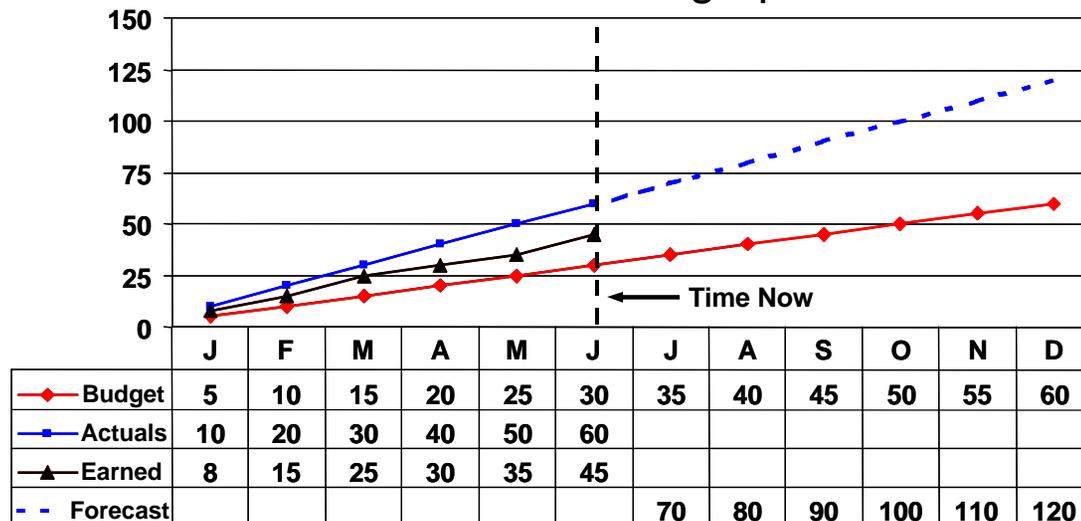


Earned Value Management

In addition to tracking budget and actual expenditures, the graph indicates what has been completed or “earned”.

By comparing the budget line (in red) to the earned value line (in black), it is immediately apparent that the project is producing more than it was budgeted to produce to date. Additionally, by comparing the actual expenditures (in blue) to the earned value line (in black), it is immediately apparent that the project is spending more than it was budgeted to date. So while the project is expending more (blue line) than budgeted (red line), it is also producing more (black line) than budgeted.

So what conclusions can be drawn from this graph? Let’s find out on the next page.

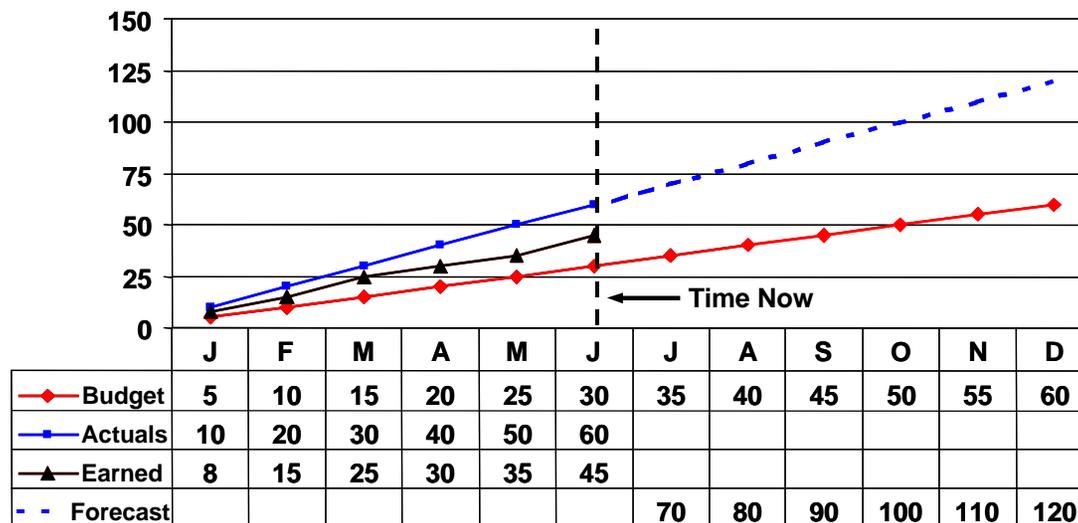




Earned Value Management

There are two conclusions the earned value data will immediately let you make; they deal with schedule and cost variances.

Schedule Variance - the project is experiencing a schedule variance of 15. This is derived from comparing the Earned (45) to the Budget (30). Another way of stating this is that the project is ahead of schedule in comparison to what was supposed to be done in the frame time measured.

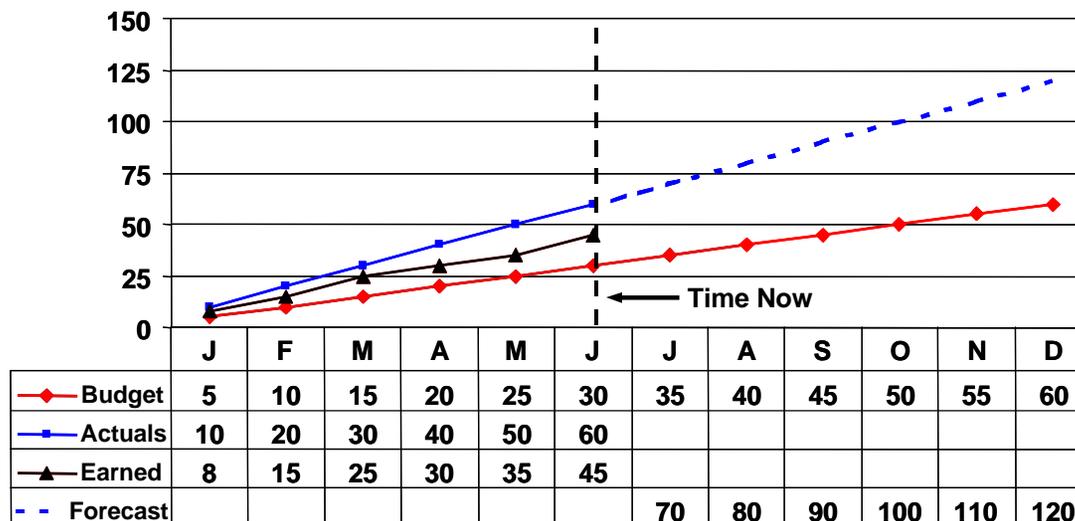




Earned Value Management

Cost Variance - the project is experiencing a cost variance of -15. This is derived from comparing the Earned (45) to the Actual expenditures (60). Another way of stating is that the project is experiencing an overrun of 15. This cost variance is very important because history tells us that overruns in cost do not correct themselves and need management intervention.

Along with the schedule and cost results discussed, earned value management enables you to forecast the final results of the project (blue dashed line).





Summarizing Traditional Management vs. Earned Value Management

In summarizing, **Traditional management provides you with...**

- How much money and time a particular job is likely to require prior to starting and once stated, how much money was spent at any given time.

While **Earned Value Management provides you with...**

- How much money and time a particular job is likely to require prior to starting and once stated, how much money was spent at any given time.

Plus

- Once started, what work has been accomplished to date for the funds expended (what you got for what you spent)
- Once started, what the total job will cost at completion, and how long it will take to complete



Earned Value in a Management Environment

Understanding how Earned Value fits into the program and project management environment is also essential.

On the following page we will discuss and define items such as project vs. program, project management, program management and the relationship between them.



What is Program/Project Management?

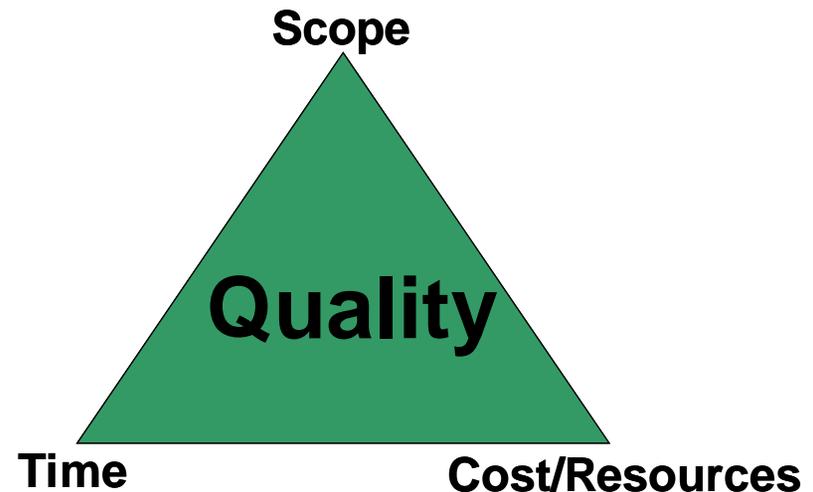
Program/Project Management is the application of knowledge, skills, tools, and techniques to meet or exceed stakeholder needs and expectations.

Program/Project Management requires the ability to get the job done:

- On Time!
- Within Budget!
- According to Specifications!
- With a High Level of Customer Satisfaction

These requirements are known as the
“Triple Constraint”

So how do projects and programs differ?
Take a look on the next page.





What is a Project vs. Program

The Characteristics of a Project are:

- Temporary endeavor undertaken to create a unique product or service
- Having a definite beginning and a definite end

The Characteristics of a Program are:

- A group of projects
- Managed in a corresponding way
- To obtain benefits not available from managing them individually



Earned Value Management vs Program/Project Management

Earned Value is a Program/Project management technique used to objectively evaluate cost and schedule efficiency, thereby facilitating better management of customer needs and expectations.

Earned Value Management is a subset of Program/Project Management.

As this hierarchy indicates, Earned Value Management is a component of Project Management, which in turn is a component of Program Management. While many components comprise Program and Project Management, this tutorial focuses on the Earned Value Management component.

Program Management

Project Management

Budgeting

Cost Proposals/Negotiations

Cost Collection

Change Control

Earned Value Management

Forecasting

Funding

Resource Management

Reporting

Risk Management

Scheduling



Framework for an Earned Value Management System (EVMS)

So far, we have discussed what Earned Value is, why to use it, and how it fits into a program and project management environment. Next, we need to discuss the framework needed to implement earned value.

The EVMS framework can be divided into three phases:

1. Inputs - what is needed to implement Earned Value
2. Earned Value Methods – formulas, metrics and performance measurements used
3. Outputs – reporting requirements (structure, time-phases, details)

On the following pages these three phases for developing an Earned Value Management System (EVMS) will be discussed in more detail.

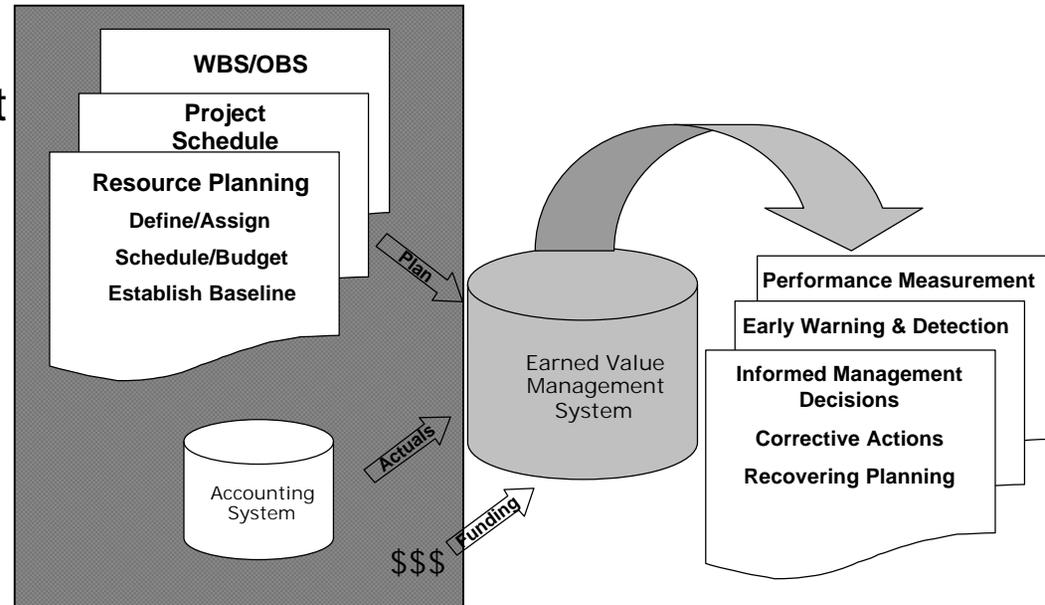


Inputs needed for Earned Value Management System (EVMS)

As you recall, the first phase of Earned Value is inputs. The inputs required for an EVMS include:

- Work Breakdown Structure (WBS)
- Organizational Breakdown Structure (OBS)
- Project Schedule
- Time-phased Baseline Budget
- Cost/Resource Control Plan
- Change Control Plan

These Items are covered in Modules 2 through 4 and Module 8



If any of these items are not completed or are not completed appropriately, the use of Earned Value will be compromised and your outputs will not properly represent the program/project current and future status.

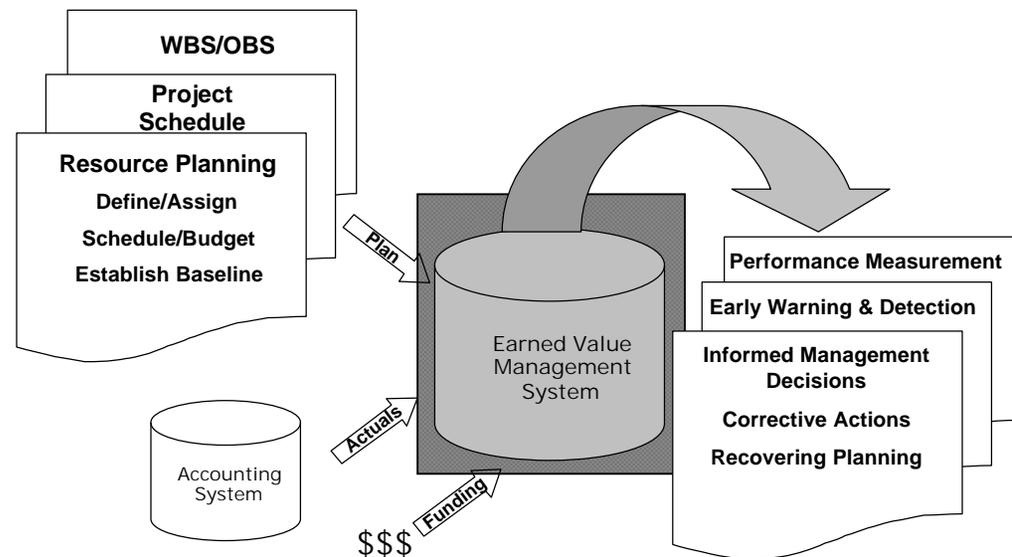


Earned Value Method needed for Earned Value Management System (EVMS)

The second phase of Earned Value is the earned value method. The Earned Value method required for an EVMS include:

- Planned Value (PV), Earned Value (EV) Actual Cost (AC)
- Metrics and Performance Measurements
- Forecasting
- Integrated Baseline Review

These Items are covered in Modules 5 through 7



Once again, if any of these items are not completed or are not completed appropriately, the use of Earned Value will be compromised and your outputs will not properly represent the program/project current and future status.

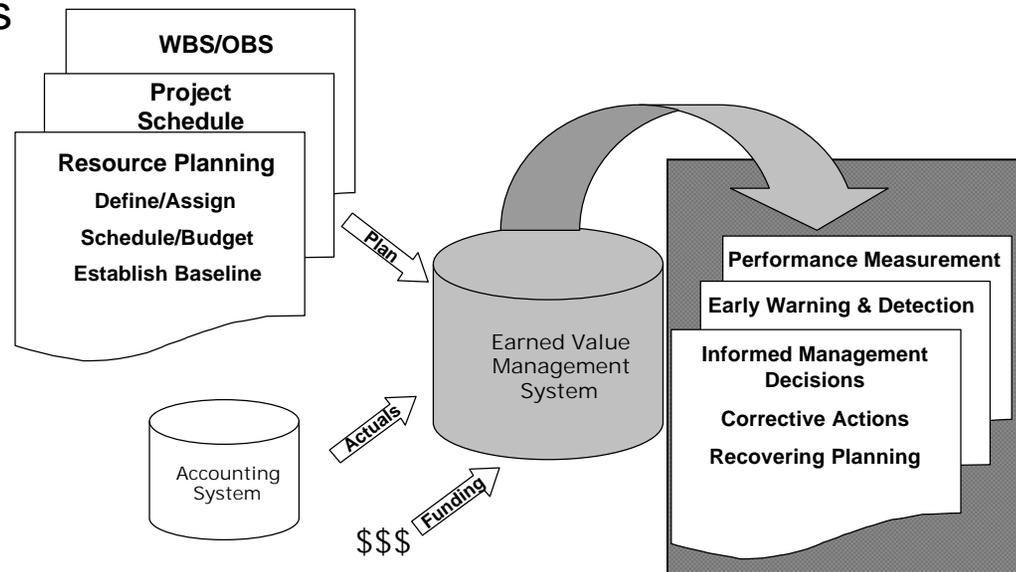


Outputs needed for Earned Value Management System (EVMS)

The last phase of Earned Value is the outputs. The outputs required for an EVMS include:

- Reporting requirements
- Proper Analysis of Reports
- Correct Action taken

These Items are covered in Modules 9,10 & 12



Even if the first two phases are completed appropriately, improper analysis of the outputs could cause inappropriate or inadequate actions to be taken against the program/project and could either create problems that otherwise would not exist or fail to fix the real problem that does exist.



Review of Module 1

“You cannot manage what you cannot measure...and what gets measured gets done.”

--- Bill Hewlett, Hewlett Packard

Reviewing the major items of this module:

- Earned Value Management (EVM) is a systematic approach to the integration and measurement of cost, schedule, and technical (scope) accomplishments on a project or task
- DOE Order 413.3 is the approved policy
- In comparing Earned Value Management to Traditional Management, Traditional Management does not allow for analysis of the physical amount of work performed. Earned Value Management allows for both schedule and cost analysis against physical amount of work performed
- Earned Value Management is a subset of Program/Project Management
- EVMS can be divided into three phases (Inputs, Earned Value method, outputs) and all three must be completed appropriately for proper management of the program/project



Summary of Module 1

At this point, we have examined the basics of earned value. As explored previously, the following modules address in depth the components that comprise earned value to help you incorporate earned value into your projects.

If you have a firm grasp of the concepts covered in this module, you are ready to progress to the next modules. Otherwise, review this module again to ensure you have a solid understanding of the basics of the Earned Value Management System.

This concludes Module 1.