

**If you can't measure it,
you can't manage it.**

Earned Value Management

Objective Reporting of Project Performance

Value:

***the worth that we associate with
an accomplishment***

Earned:

***the realization of that worth when
the achievement is accomplished***

Earned Value:

the worth that is associated with an achievement, when that achievement is accomplished

EVM:

a proven methodology that integrates scope, schedule, and cost to objectively measure project performance.

***Even if you're on the right track,
you get run over if you just sit
there.***

Will Rogers

Project Management =

Scope

Schedule

Quality

Cost

Procurement

Risk

Communication

Human Resources

Stakeholders

+ four others from the **NPMS**

Scope:

Define the scope

Build a WBS

Monitor and control change

Schedule:

Create a Schedule

Establish a Baseline

Monitor and report progress

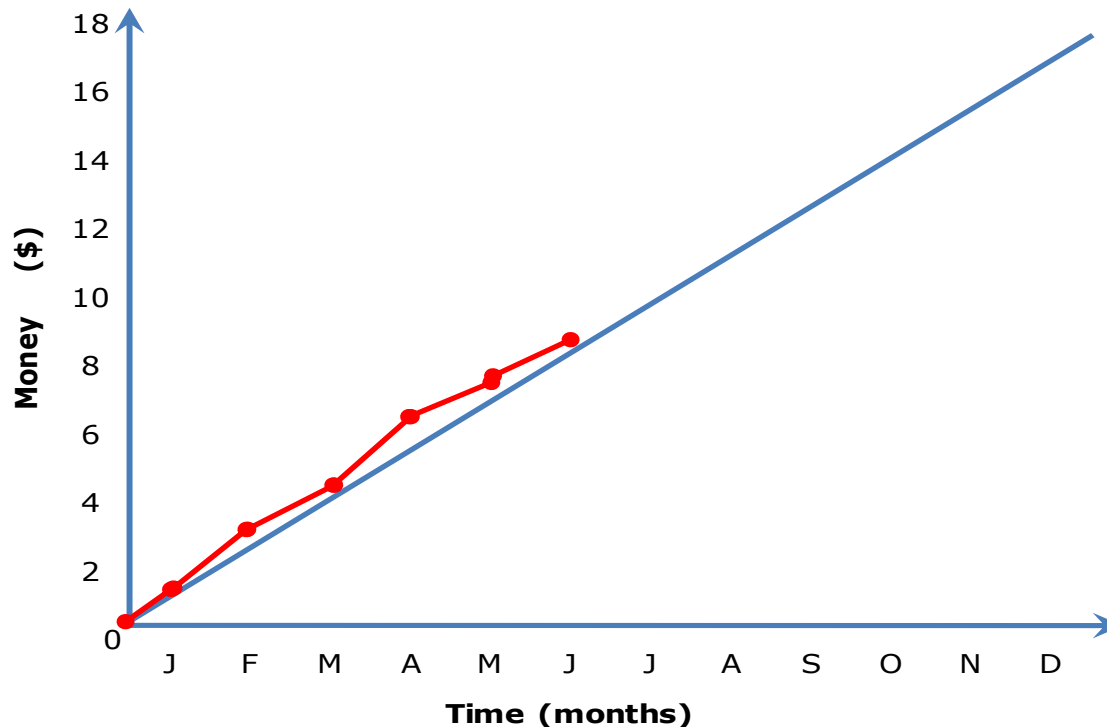
Cost:

Build a budget

Monitor and report variation

The Traditional Approach

Measure planned expenditures to actual expenditures (cash flow)



(Whatever it is, this is not project management!)

“Earned Value Management was chosen by the Olympic Delivery Authority to objectively and consistently measure project performance across the London 2012 construction program.”

Olympic Delivery Authority, London Olympics

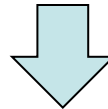
Integration Management is the essential component of effective program/project management.

Earned Value Management is the key to effective integration.

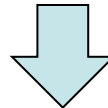
The Performance Measurement Baseline

Is developed by:

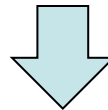
Build a WBS (discrete tasks)



Create a schedule (task start and stop times)



Assign values (to each task)



Create the Planned Value curve

Performance Measurement Baseline

Planned Value (PV):

The value of the work that is planned to be completed.

***This is the essential performance
measurement metric.***

The Performance Measurement Baseline

Build a WBS (discrete tasks)

Task 1
Task 2
Task 3
Task 4
Task 5

The Performance Measurement Baseline

Assign values (to each task)

	J	F	M	A	M	J	J	A	S	O	N	D	Total \$
Task 1	1	1	1	1									4
Task 2			1	1	1	1							4
Task 3						1							1
Task 4						1	1	1	1	1			5
Task 5										1	1	1	3

The Planned Value Curve

- The abscissa
- Also known as the horizontal axis
- Also known as the “x” axis



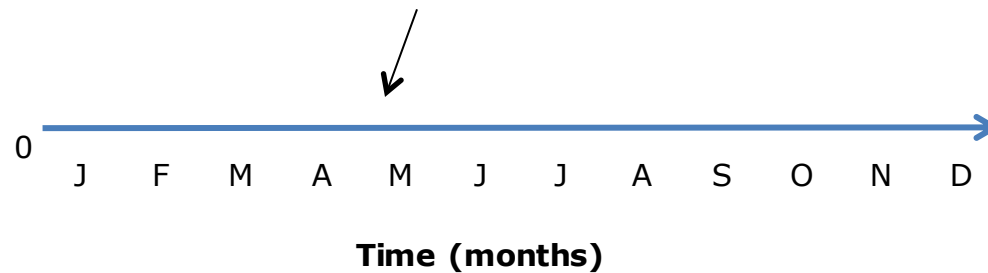
The Planned Value Curve

- The abscissa
- Also known as the horizontal axis
- Also known as the “x” axis

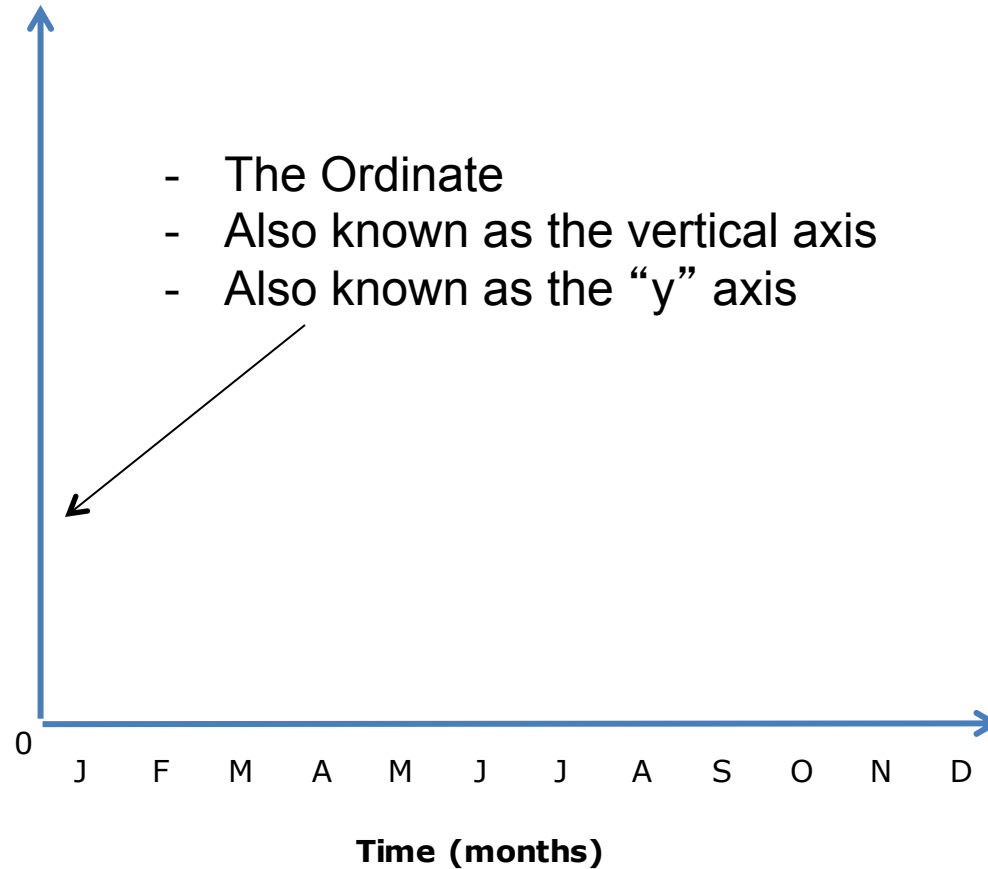


The Planned Value Curve

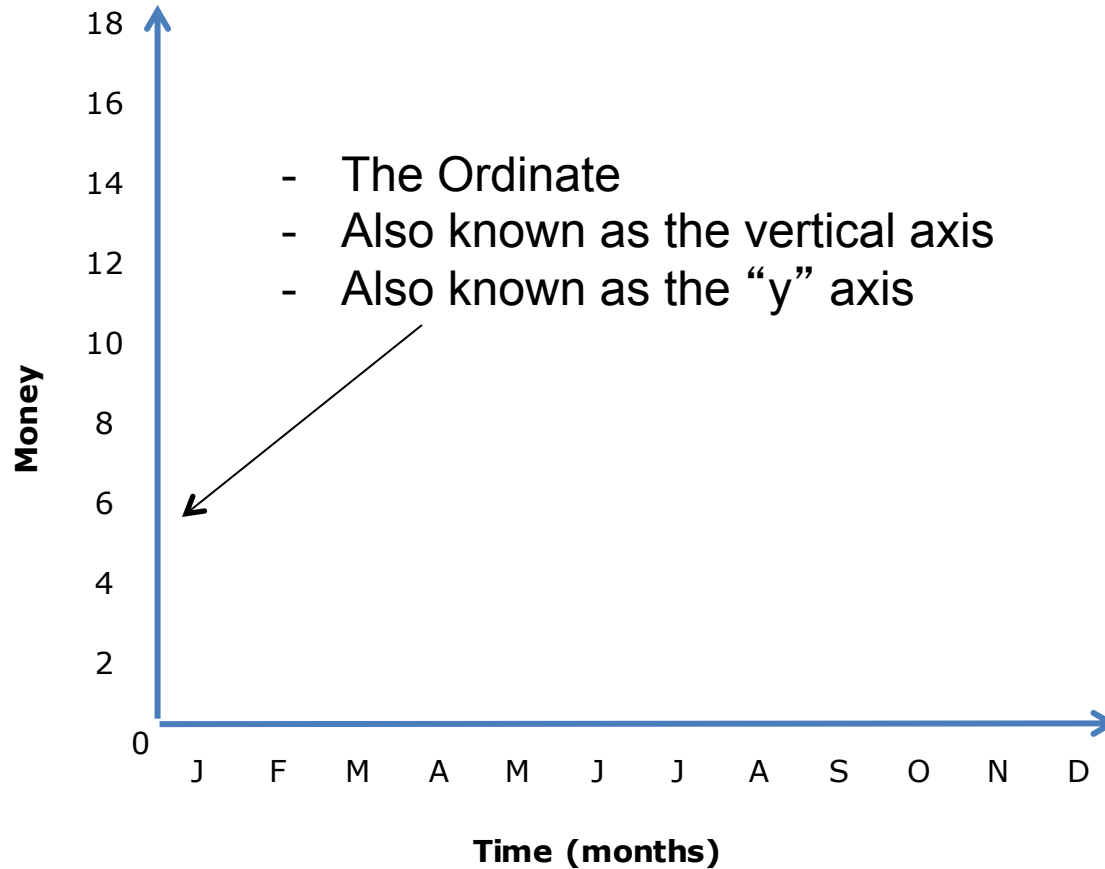
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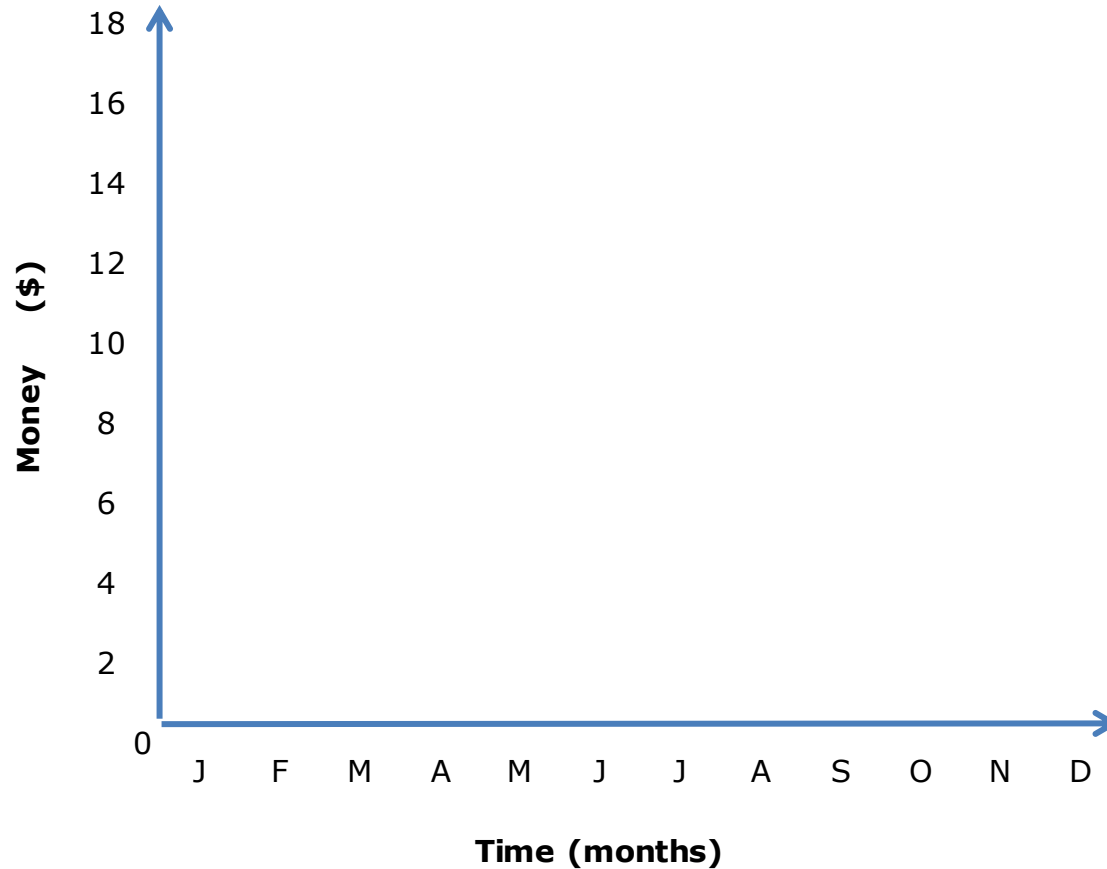
The Planned Value Curve



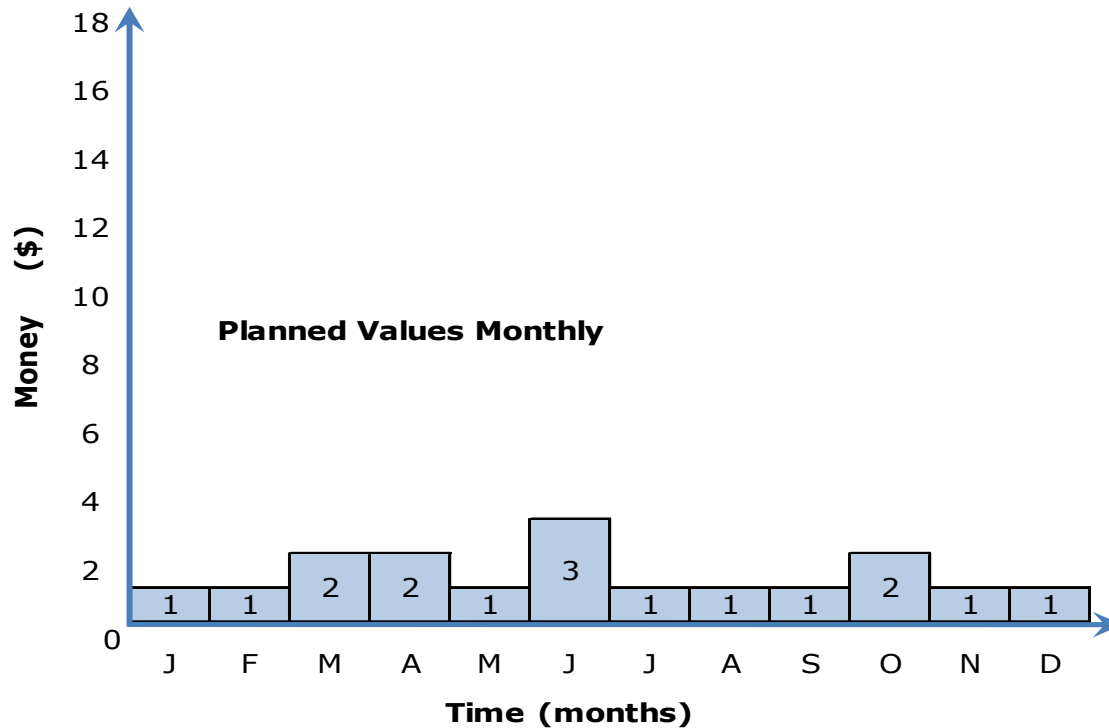
The Planned Value Curve



The Planned Value Curve



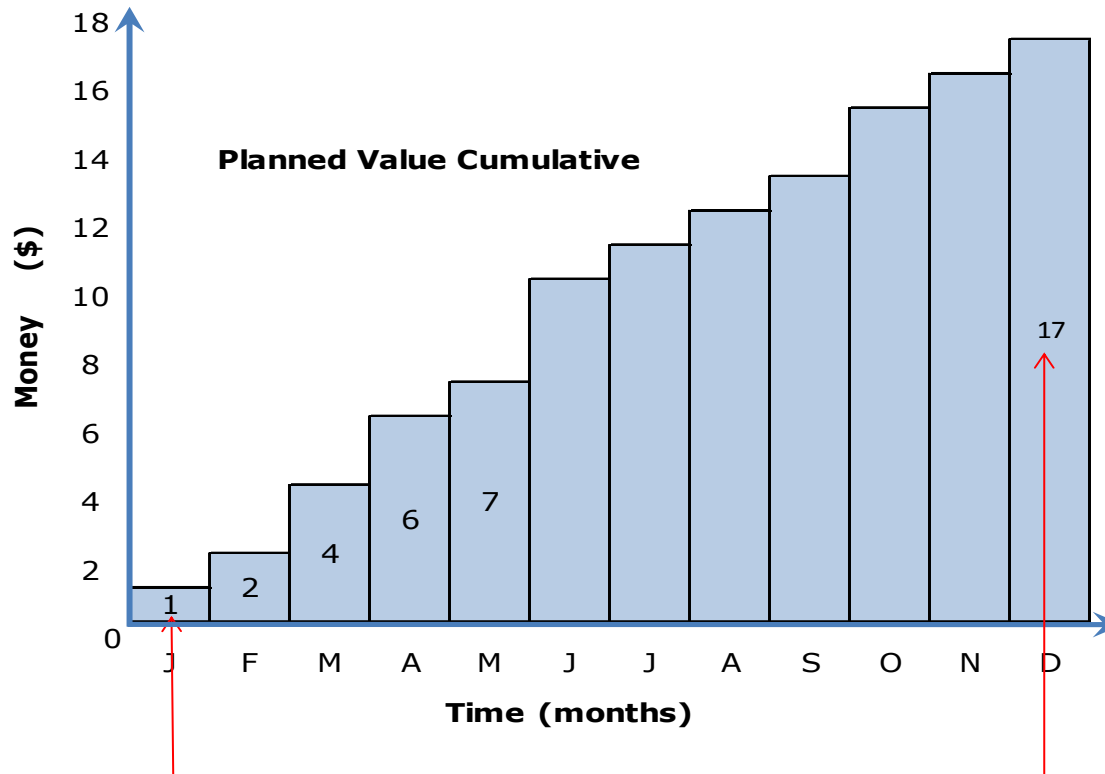
The Planned Value Curve



PV Monthly (\$)	1	1	2	2	1	3	1	1	1	2	1	1	17
------------------------	---	---	---	---	---	---	---	---	---	---	---	---	-----------

Task 1	1	1	1	1									4
Task 2			1	1	1	1							4
Task 3						1							1
Task 4						1	1	1	1	1			5
Task 5										1	1	1	3

The Planned Value Curve

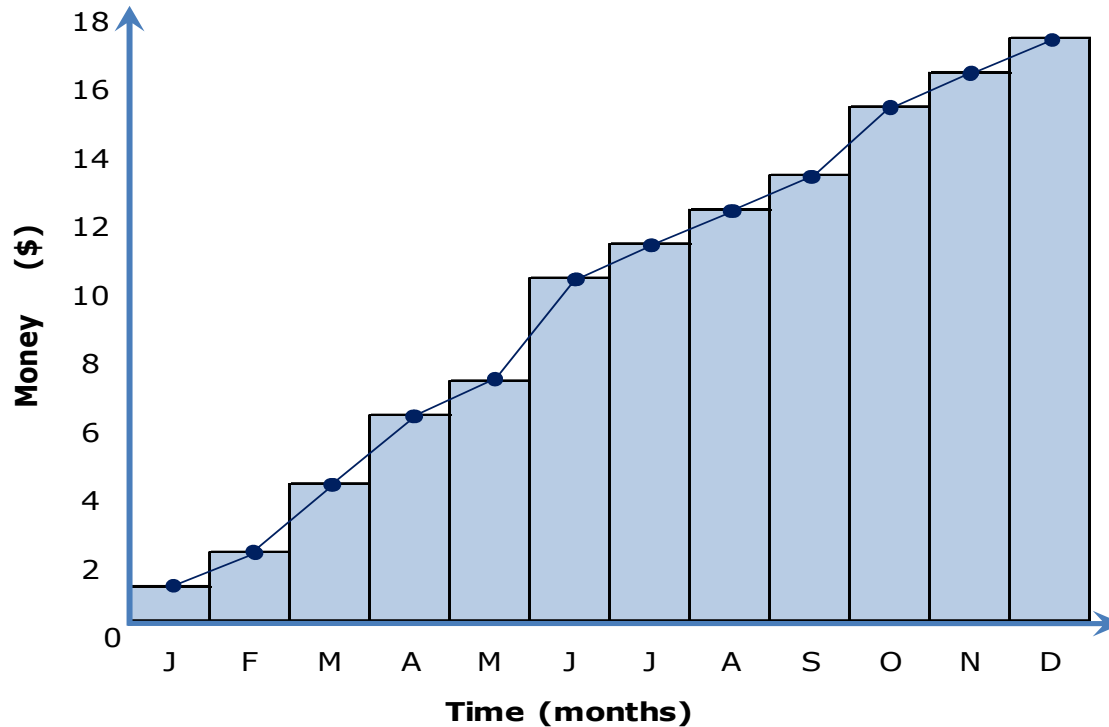


PV Cumulative (\$)	1	2	4	6	7	10	11	12	13	15	16	17	Total
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PV Monthly (\$)	1	1	2	2	1	3	1	1	1	2	1	1	17
------------------------	---	---	---	---	---	---	---	---	---	---	---	---	-----------

Task 1	1	1	1	1									4
Task 2			1	1	1	1							4
Task 3						1							1
Task 4						1	1	1	1	1			5
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The Planned Value Curve

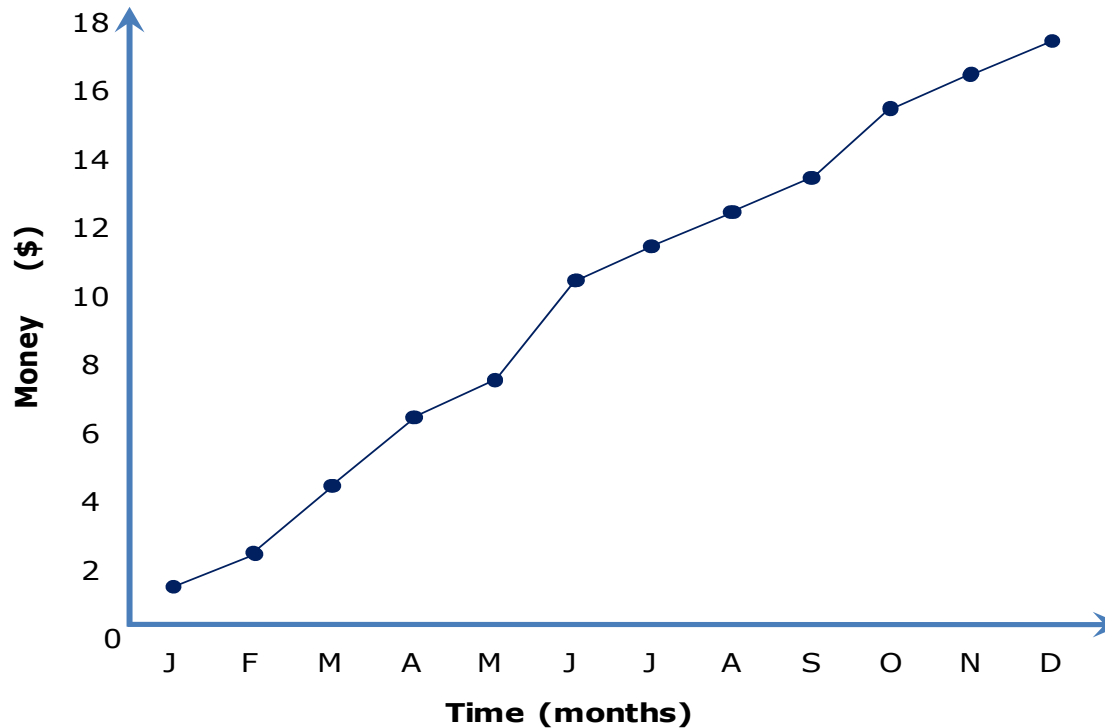


PV Cumulative (\$)	1	2	4	6	7	10	11	12	13	15	16	17	Total
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The Planned Value Curve

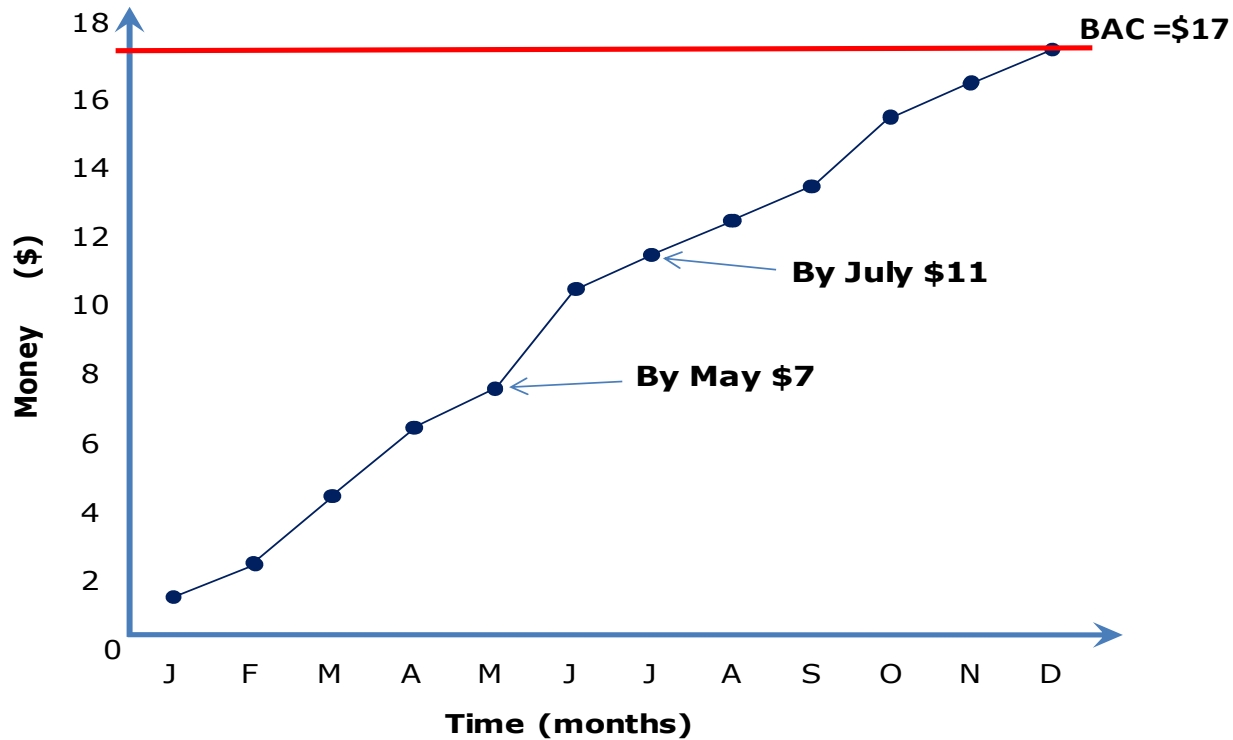


PV Cumulative (\$)	1	2	4	6	7	10	11	12	13	15	16	17	Total
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The Planned Value Curve



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Task 4						1	1	1	1	1			5
Task 5										1	1	1	3

EVM is Simple

- Simple formula
- Easy to understand
- Manage by exception (actual vs planned)

How does EVM work?

Establish the performance measurement baseline: the Planned Value curve

- What is to be done? (scope)
- When will the activities be completed? (schedule)
- What is its value (cost)?

How does EVM work?

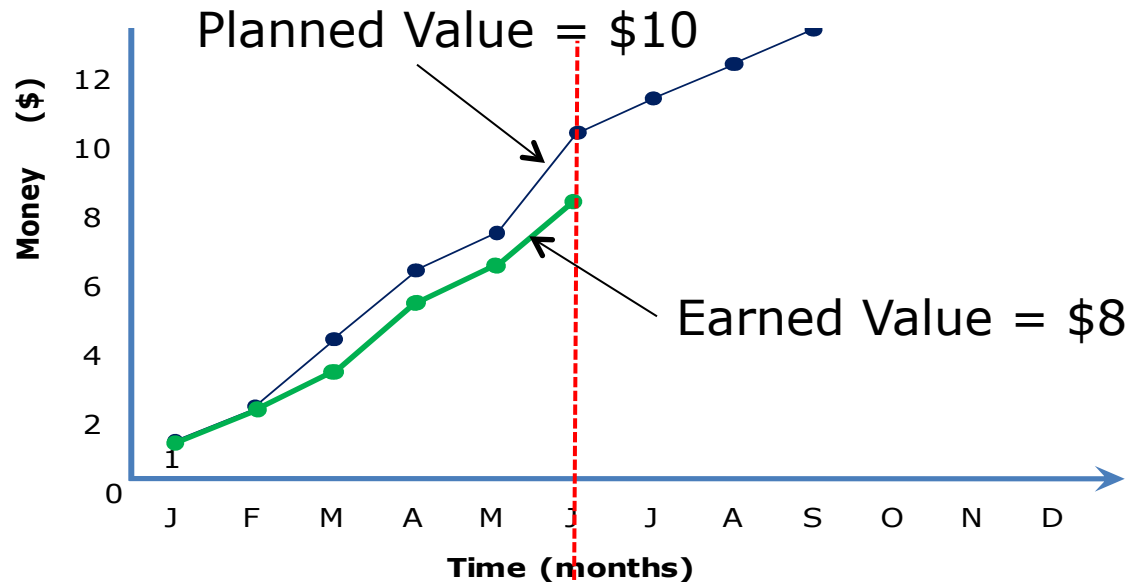
EVM depends on three performance metrics:

- Planned Value (PV)
- Earned Value (EV)
- Actual Cost (AC)

How does EVM work?

Having established Planned Value, we monitor the Earned Value and Actual Cost.

The Earned Value Curve



EV Cumulative (\$)	1	2	3	5	6	8									Total
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EV Monthly (\$)	1	1	1	2	1	2									8
------------------------	---	---	---	---	---	---	--	--	--	--	--	--	--	--	----------

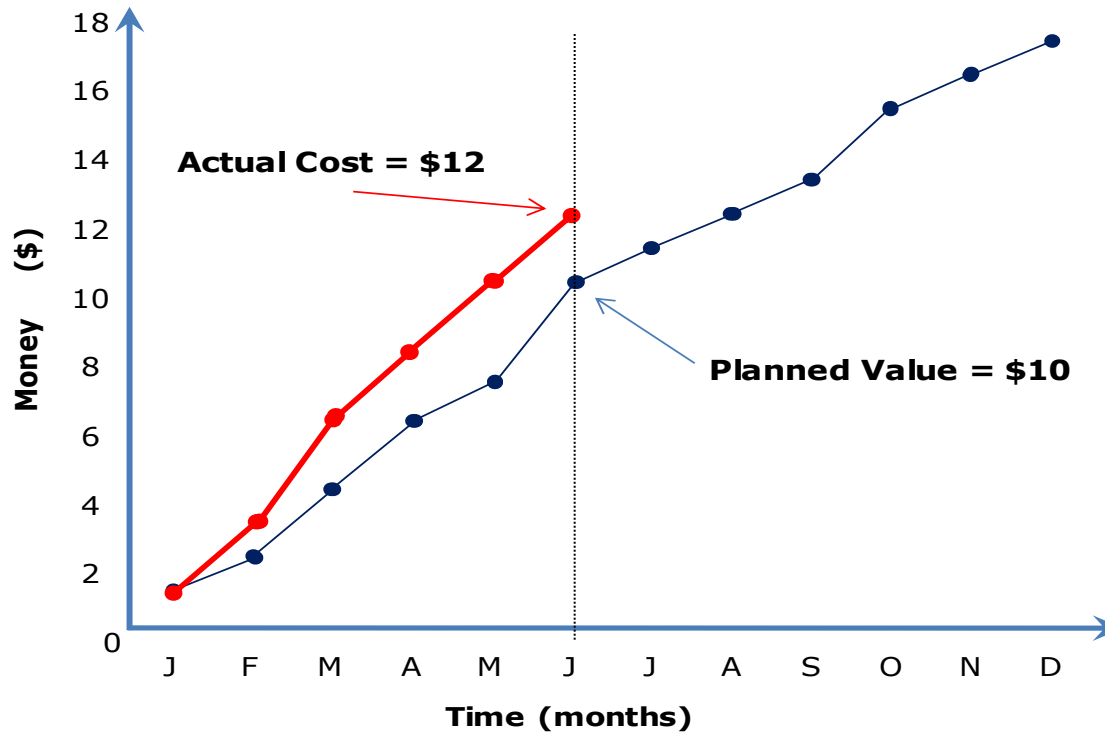
Task 1	1	1	1	1											4
Task 2			0	1	1	1	1								4
Task 3						0	1								1
Task 4						1	1	1	1	1					5
Task 5										1	1	1			3

Earned Value - June	
% Complete	EV
100	4
75	3
0	0
20	1
Total	8

Actual Cost

- The amount actually spent.

Actual Cost



AC Cumulative	1	3	6	8	10	12						
AC Monthly	1	2	3	2	2	2						

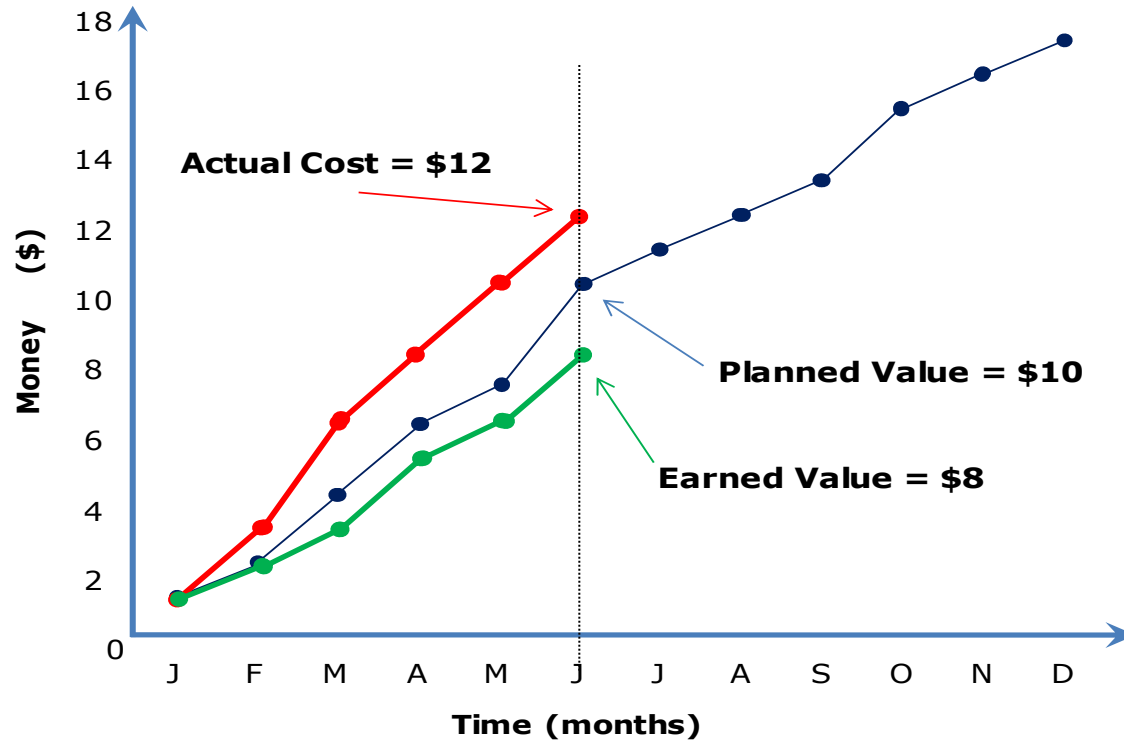
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---------------------------	---	---	---	---	---	----	----	----	----	----	----	-----------	--------------

PV Monthly (\$)	1	1	2	2	1	3	1	1	1	2	1	1	17
------------------------	---	---	---	---	---	---	---	---	---	---	---	---	-----------

Task 1	1	1	1	1									4
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Task 3						1							1

- EVM compares the work completed with what was scheduled and budgeted, to determine if cost (AC), schedule (PV), and value of work accomplished (EV) are progressing as planned.
- By **integrating** these three measurements, EVM provides consistent, numerical indicators which can be used to assess performance across portfolios, programs and projects.

Integrated Performance Reporting



- Calculates variances in cost and schedule performance.
- Calculates performance indices that allow direct comparison to other projects' performance.
- Analyzes trends in project performance.
- Formulates predictions as to how well the project will perform in the future.

Schedule Variance

- Comparison of value of work performed (EV) to what was scheduled to be performed (PV).
- A negative variance means the project is behind schedule.

$$SV = EV - PV$$

$$SV = \$8 - \$10$$

$$SV = - \$2$$

Schedule Performance Index (SPI)

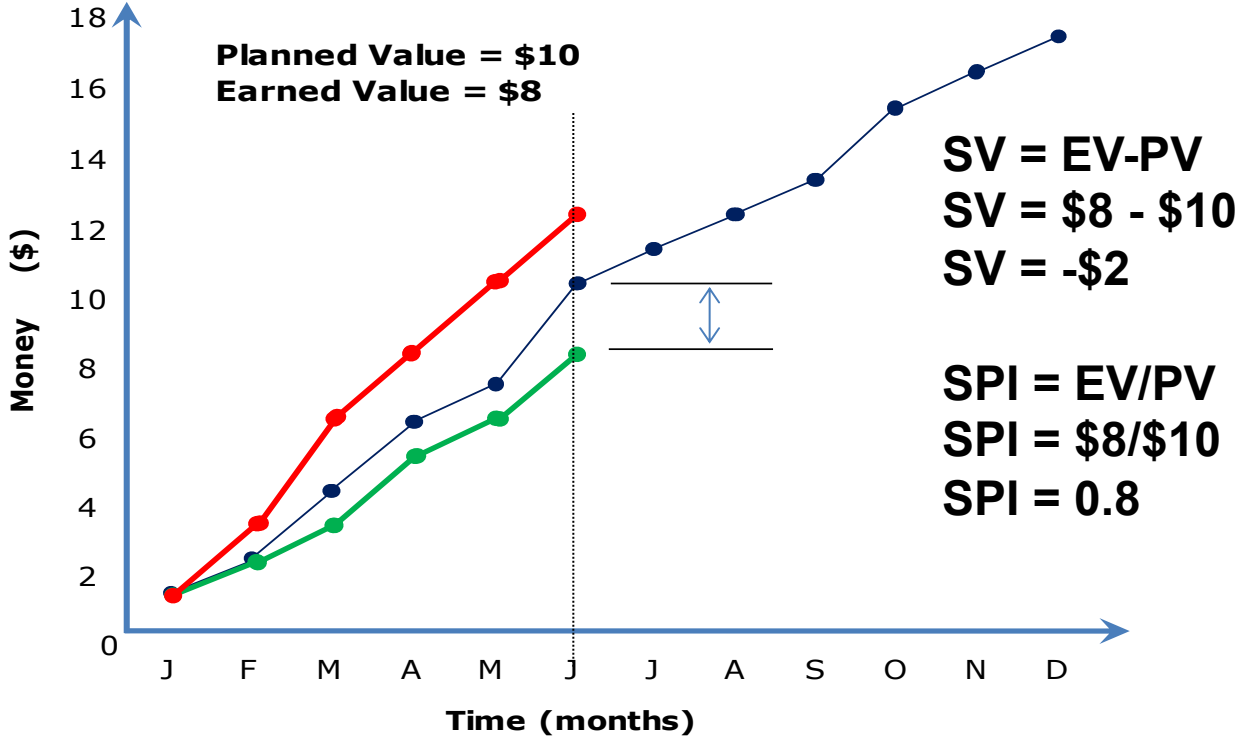
- The ratio of the value of work performed (EV) to what was scheduled to be performed (PV).
- An index of less than 1.00 means the project is behind schedule.

$$\text{SPI} = \text{EV} / \text{PV}$$

$$\text{SPI} = \$8 / \$10$$

$$\text{SPI} = 0.80$$

Schedule Performance



Cost Variance

- Comparison of the value of work performed (EV) with actual cost (AC).
- A negative variance means the project is over budget.

$$CV = EV - AC$$

$$CV = \$8 - \$12$$

$$CV = -\$4$$

• *Note that this is not “budget vs actuals.”*

Cost Performance Index (CPI)

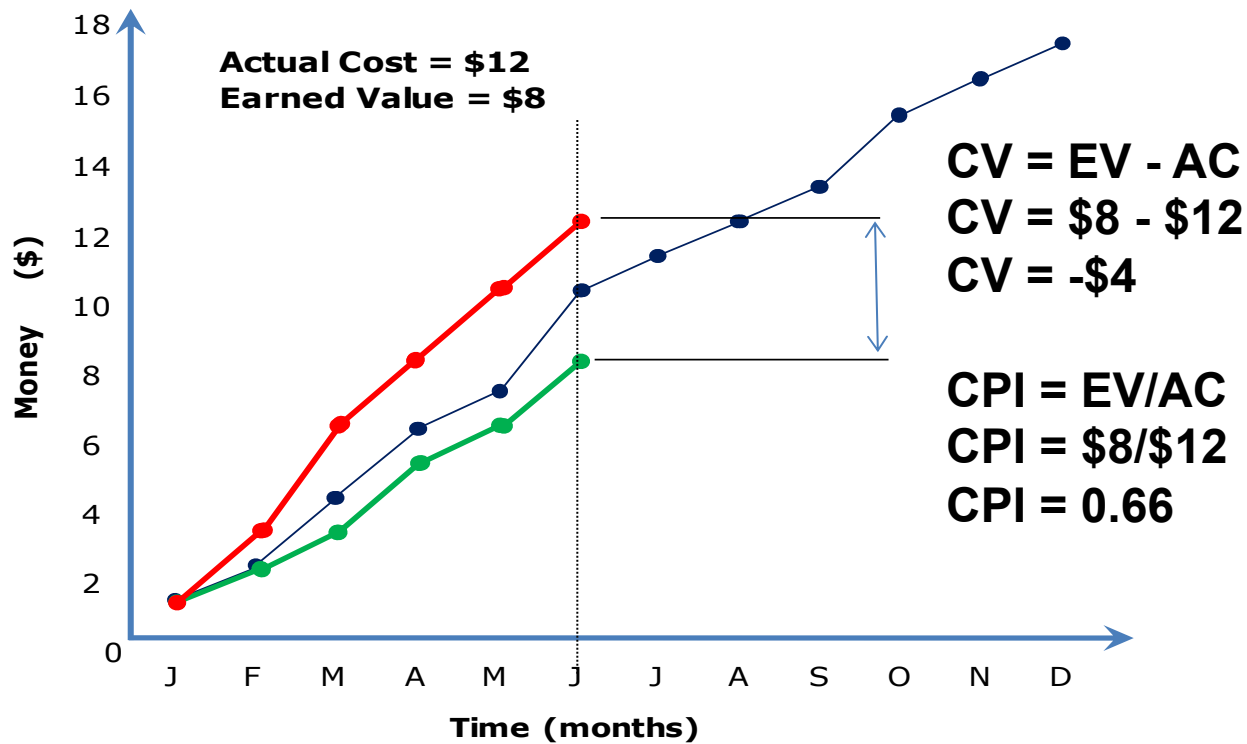
- The ratio of the value of the work performed (EV) to the actual cost (AC).
- An index less than 1.00 means the project is over budget.

$$\text{CPI} = \text{EV} / \text{AC}$$

$$\text{CPI} = \$8 / \$12$$

$$\text{CPI} = 0.66$$

Cost Performance



**You can't manage what has
already happened**

biblical axiom (I think)

Estimate To Completion (ETC)

Estimate At Completion (EAC)

There are three approaches:

1. Recalculate the remaining costs analytically (bottom-up re-estimate)
2. Predict remaining cost based on the remaining budget (value of work remaining)
3. Predict remaining cost based on past performance (CPI based)

1. Re-estimate the Remaining Work

Estimate To Complete (ETC)

= new estimate of cost of remaining work

$$\text{ETC} = ?$$

Estimate At Completion (EAC)

$$\text{EAC} = \text{AC} + \text{ETC}$$

$$\text{EAC} = \text{AC} + ?$$

2. Based on Remaining Budget

Estimate To Complete (ETC)

= (total budget) – (value of work completed)

$$\text{ETC} = \text{BAC} - \text{EV}$$

$$\text{ETC} = \$17 - \$8 = \$9$$

Estimate At Completion (EAC)

$$\text{EAC} = \text{AC} + \text{ETC}$$

$$\text{EAC} = \$12 + \$9$$

$$\text{EAC} = \$21$$

3. Based on Past Performance

Estimate To Complete (ETC)

= remaining work accomplished at the current efficiency:

$$\text{ETC} = (\text{BAC} - \text{EV}) / \text{CPI}$$

$$\text{ETC} = (\$17 - \$8) / 0.66$$

$$\text{ETC} = \$14$$

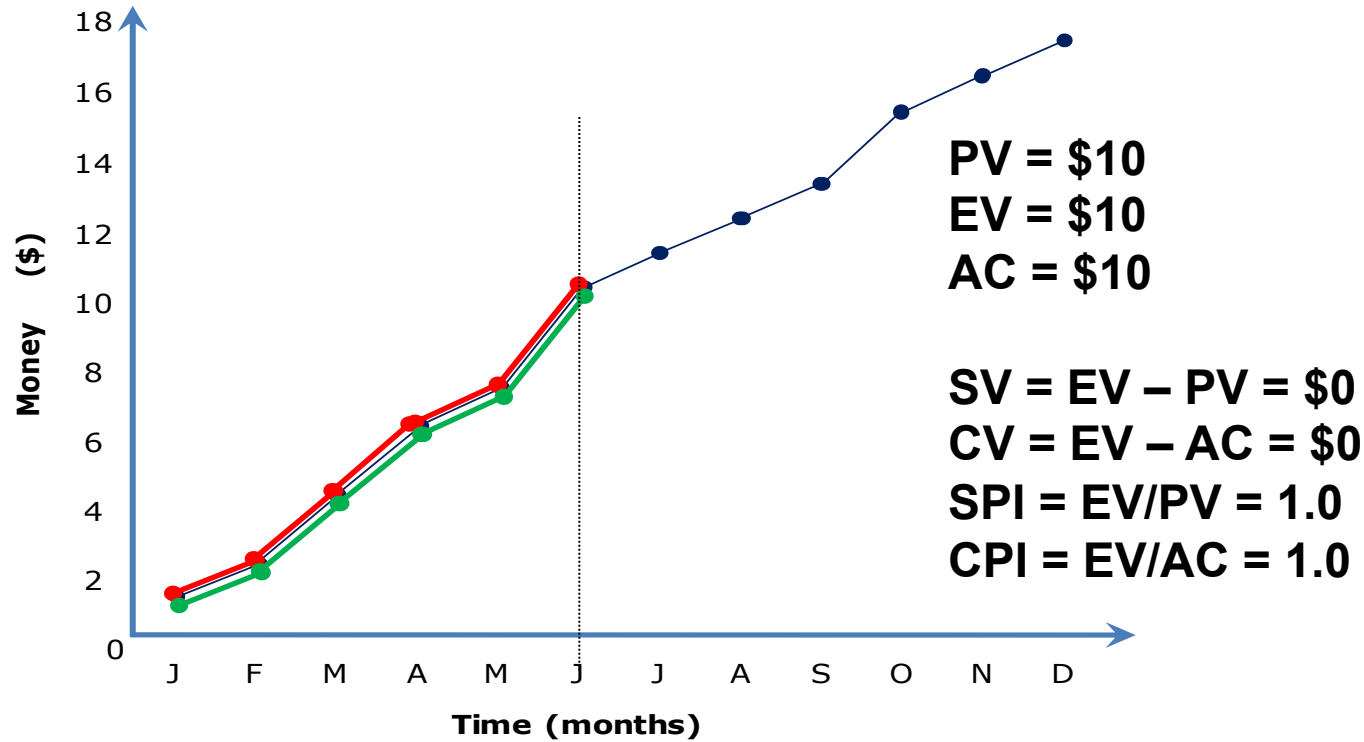
Estimate At Completion (EAC)

$$\text{EAC} = \text{AC} + \text{ETC}$$

$$\text{EAC} = \$12 + \$14$$

$$\text{EAC} = \$26$$

If all goes as planned....



**And on the next day hell froze over
and the Leafs won the Cup**

Elisa Mayhew, Assistant Comptroller General:

“We require objective performance metrics.”

Pierre Marc Mongeau, ADM, PWGSC:

“We require strengthened oversight...”

EVM achieves both.

We must therefore know....

- Are we on Schedule?
- Are we delivering more or less work than planned?
- Is the rate of work sufficient to permit us to forecast on-time completion?
- When is the project likely to be completed?

We must therefore know....

- Are we on Budget?
- What is the remaining work likely to cost?
- What is the entire project likely to cost?
- How much will we be under - or over - budget at the end of the project?
- What is driving cost and/or schedule variances?
- What cost are we incurring for the value we are obtaining?

We must therefore know....

- Are we On Time?
- Are we On Budget?
- Are we On Scope?
- What are the OTOBOS metrics?

EVM delivers:

- **objective, quantitative, consistent, performance metrics**
- **strengthened oversight**
- **performance assessment across portfolios, programs and projects.**

**EVM has the potential to deliver what
Elisa and Pierre-Marc require.**

**If you can't measure it,
you can't manage it.**