Let’s quickly review what has been covered in the previous class.

• There are three key components to earned value: Planned Value, Earned Value and Actual Cost.
  - PV is the physical work scheduled or “what you plan to do”.
  - EV is the quantification of the “worth” of the work done to date or “what you physically accomplished”.
  - AC is the cost incurred for executing work on a project or “what you have spent”.

• There are numerous EV methods used for measuring progress.
Earned value performance measurements look at the project cost and schedule performance by analyzing the cost and schedule variance along with cost and schedule efficiency. The formulas used are as follows:

**Variance Analyses**
- Cost Variance (CV) = Earned Value (EV) - Actual Cost (AC)
- Schedule Variance (SV) = Earned Value (EV) - Planned Value (PV)

**Performance Indices**
- Cost Performance Index = Earned Value (EV)/Actual Cost (AC)
- Schedule Performance Index = Earned Value (EV)/Planned Value (PV)
The **Cost Variance (CV)** is the difference between the earned value of work performed and the actual cost. CV tells you the earned value of work performed for each dollar’s worth of work scheduled.

\[
\text{Cost Variance (CV)} = \text{EV} - \text{AC}
\]

If the result is **POSITIVE**, project is experiencing an “Underrun” or Under Budget

If the result is **NEGATIVE**, project is experiencing an “Overrun” or Over Budget
Using the ACME Home Building project information from Module 5, let's calculate the Cost Variance (CV) for the project.

<table>
<thead>
<tr>
<th></th>
<th>PV</th>
<th>EV</th>
<th>AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation</td>
<td>$15,394</td>
<td>$15,394</td>
<td>$15,850</td>
</tr>
<tr>
<td>Patio</td>
<td>$8,166</td>
<td>$8,166</td>
<td>$7,200</td>
</tr>
<tr>
<td>Exterior Walls</td>
<td>$8,748</td>
<td>$6,608</td>
<td>$6,250</td>
</tr>
<tr>
<td>Stairway</td>
<td>$5,961</td>
<td>$2,981</td>
<td>$3,100</td>
</tr>
<tr>
<td><strong>Project Total</strong></td>
<td><strong>$38,269</strong></td>
<td><strong>$33,149</strong></td>
<td><strong>$32,400</strong></td>
</tr>
</tbody>
</table>

\[
CV = EV - AC
\]

\[
CV = $33,149 - $32,400
\]

\[CV = $749\]

What does this tell you?

A Cost Variance of $749 tells you that the project is “Underrun” or under budget.
Variances: Cost Variance example

Another calculation for reviewing Cost Variance (CV) Percentage is CV%.

Cost Variance (CV)% = CV/EV

Tells you what percentage cost varies from what has been earned to date.

Using our example, what is the CV%?

CV = EV - AC  
CV = $33,149 - $32,400  
CV = $749

CV% = CV/EV  
CV% = $749/$33,149  
CV% = .023 or 2.3%

To date the project has a Cost Variance of $749 or 2.3%

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The **Schedule Variance (SV)** is the difference between the earned value of work performed and the work scheduled. SV tells you the value of work performed less value of work scheduled.

\[
\text{Schedule Variance (SV)} = \text{EV} - \text{PV}
\]

If the result is **POSITIVE**, project is on schedule or exceeding the schedule

If the result is **NEGATIVE**, project is behind schedule

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Using the ACME Home Building project information from Module 5, let's calculate the Schedule Variance (SV) for the project.

<table>
<thead>
<tr>
<th></th>
<th>PV</th>
<th>EV</th>
<th>AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation</td>
<td>$15,394</td>
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</tr>
<tr>
<td>Patio</td>
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<td><strong>$38,269</strong></td>
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<td><strong>$32,400</strong></td>
</tr>
</tbody>
</table>

\[ SV = EV - PV \]
\[ SV = $33,149 - $38,269 \]
\[ SV = -$5,120 \]

What does this tell you?

A Schedule Variance of -$5,120 tells you that the project is “Behind” schedule.
Schedule Variance status **does**:  
- indicate the dollar value difference between work that is ahead or behind the plan  
- reflect a given measurement method

Schedule Variance status **does not**:  
- address impact of work sequence  
- address importance of work  
- reflect critical path assessment  
- indicate amount of time it will slip  
- identify source (labor & material) of difference  
- indicate the time ahead/behind (or regain) schedule  
- indicate the cost needed to regain schedule
Another calculation for reviewing Schedule Variance (SV) is SV%.

Schedule Variance (SV)% = SV/PV

Tells you what percentage schedule varies from what has been planned to date.

Using our example, what is the SV%?

SV = EV - PV
SV = $33,149 - $38,269
SV = -$5,120

SV% = SV/PV
SV% = -$5,120/$38,269
SV% = -.134 or -13.4%

To date the project has a Schedule Variance of -$5,120 or -13.4%
You should have a solid understanding of the cost and schedule variance calculations and what they mean. Let’s review them now.

Cost Variance (CV) = EV - AC  
Schedule Variance (SV) = EV - PV

If the result is POSITIVE→ “Underrun”  
If the result is POSITIVE → “On Schedule”  
If the result is NEGATIVE → “Overrun”  
If the result is NEGATIVE → “Behind Schedule”

Using these variance calculations, our project information is as follows.

<table>
<thead>
<tr>
<th></th>
<th>as of 1/31</th>
<th>PV</th>
<th>EV</th>
<th>AC</th>
<th>SV</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation</td>
<td>$15,394</td>
<td>$15,394</td>
<td>$15,850</td>
<td>0</td>
<td>-456</td>
<td></td>
</tr>
<tr>
<td>Patio</td>
<td>$8,166</td>
<td>$8,166</td>
<td>$7,200</td>
<td>0</td>
<td>966</td>
<td></td>
</tr>
<tr>
<td>Exterior Walls</td>
<td>$8,748</td>
<td>$6,608</td>
<td>$6,250</td>
<td>-2,140</td>
<td>358</td>
<td></td>
</tr>
<tr>
<td>Stairway</td>
<td>$5,961</td>
<td>$2,981</td>
<td>$3,100</td>
<td>-2,980</td>
<td>-119</td>
<td></td>
</tr>
<tr>
<td>Project Total</td>
<td>$38,269</td>
<td>$33,149</td>
<td>$32,400</td>
<td>-5,120</td>
<td>749</td>
<td></td>
</tr>
</tbody>
</table>

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The **Cost Performance Index (CPI)** is a measure of Cost Efficiency. The CPI measures the value of work performed against the actual cost.

Cost Performance Index (CPI) = EV/AC

If the result is less than 1.0, cost is GREATER than budgeted.

If the result is greater than 1.0, cost is LESS than budgeted.

**Example 1:**

PV = $950  
EV = $1000  
AC = $900  

\[ \text{CPI} = \frac{1000}{900} = 1.11 \]

**Example 2:**

PV = $1100  
EV = $1000  
AC = $1200  

\[ \text{CPI} = \frac{1000}{1200} = 0.83 \]

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Performance Indices: Cost Performance Index example

Using the ACME Home Building project information, let's calculate the Cost Performance Index (CPI) for the project.

<table>
<thead>
<tr>
<th>as of 1/31</th>
<th>PV</th>
<th>EV</th>
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</table>

CPI = EV/AC
CPI = $33,149/$32,400
CPI = 1.02

What does this tell you?

A Cost Performance Index (CPI) of 1.02 tells you that your actual costs are less than what was budgeted.
You are getting $1.02 worth of work for every $1.00 spent.
The **Schedule Performance Index (SPI)** is a measure of Schedule Efficiency. The SPI measures the value of work performed against the work scheduled.

\[
\text{Schedule Performance Index (SPI)} = \frac{EV}{PV}
\]

If result is less than 1.0, project is “BEHIND” schedule
If the result greater than 1.0, project is “AHEAD of schedule

**Example 1:**

- PV = $950
- EV = $1000
- AC = $900

\[
SPI = \frac{1000}{950} = 1.05
\]

**Example 2:**

- PV = $1100
- EV = $1000
- AC = $1200

\[
SPI = \frac{1000}{1100} = .91
\]
Using the ACME Home Building project information, let’s calculate the Schedule Performance Index (SPI) for the project.

<table>
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<tr>
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$$\text{SPI} = \frac{\text{EV}}{\text{PV}}$$

$$\text{SPI} = \frac{33,149}{38,269} = .87$$

What does this tell you?

A Schedule Performance Index (SPI) of .87 tells you that you are behind schedule. It can be defined in two ways:
Performance Indices: Schedule Performance Index example

You are 13% behind schedule

Or

You are working at an 87% efficiency

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# Review of Variance and Performance Indices

Take some time to review the formulas below.

<table>
<thead>
<tr>
<th><strong>Cost Variance (CV)</strong> = EV - AC</th>
<th><strong>Schedule Variance (SV)</strong> = EV - PV</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the result is POSITIVE → “Underrun”</td>
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</tr>
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<th><strong>Cost Variance (CV)% = CV/EV</strong></th>
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<tbody>
<tr>
<td>Tells you what percentage cost varies from what has been earned to date.</td>
<td>Tells you what percentage schedule varies from what has been planned to date.</td>
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</table>

<table>
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