Practice Standard for Earned Value Management

Padova, 27 maggio 2005
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## Costruzione di un recinto
- Costo 1000 € per lato
- Time now fine del terzo giorno

Fonte R. Mulcahy PMP Exam Prep ®

### Come stiamo andando?

<table>
<thead>
<tr>
<th>Task</th>
<th>Giorno 1</th>
<th>Giorno 2</th>
<th>Giorno 3</th>
<th>Giorno 4</th>
<th>Avanzamento</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lato 1</td>
<td>S----------F</td>
<td></td>
<td></td>
<td></td>
<td>Completo. Speso 1000 €</td>
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<tr>
<td>Lato 2</td>
<td></td>
<td>S----------PF</td>
<td>-----F</td>
<td></td>
<td>Completo Speso 1200 €</td>
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<tr>
<td>Lato 3</td>
<td></td>
<td>PS----S-----PF</td>
<td></td>
<td></td>
<td>A metà Speso 600 €</td>
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<tr>
<td>Lato 4</td>
<td></td>
<td></td>
<td></td>
<td>PS----------PF</td>
<td>Da fare</td>
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La risposta !!!

<table>
<thead>
<tr>
<th>Valore</th>
<th>Formula</th>
<th>Calcolo</th>
<th>Valore</th>
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<tbody>
<tr>
<td>PV</td>
<td>1000 € + 1000 € + 1000 €</td>
<td>3000 €</td>
<td></td>
</tr>
<tr>
<td>EV</td>
<td>1000 € + 1000 € + 500 €</td>
<td>2500 €</td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td>1000 € + 1200 € + 600 €</td>
<td>2800 €</td>
<td></td>
</tr>
<tr>
<td>BAC</td>
<td>1000€+1000€+1000€+1000€</td>
<td>4000 €</td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td>EV - AC</td>
<td>2500€ - 2800 €</td>
<td>-300 €</td>
</tr>
<tr>
<td>CPI</td>
<td>EV / AC</td>
<td>2500 € / 2800 €</td>
<td>0.893</td>
</tr>
<tr>
<td>SV</td>
<td>EV - PV</td>
<td>2500 € - 3000 €</td>
<td>-500 €</td>
</tr>
<tr>
<td>SPI</td>
<td>EV / PV</td>
<td>2500 € / 3000 €</td>
<td>0.833</td>
</tr>
<tr>
<td>EAC</td>
<td>BAC / CPI</td>
<td>4000 € / 0.893</td>
<td>4479 €</td>
</tr>
<tr>
<td>ETC</td>
<td>EAC - AC</td>
<td>4479 € - 2800 €</td>
<td>1679 €</td>
</tr>
<tr>
<td>VAC</td>
<td>BAC-EAC</td>
<td>4000 € - 4479 €</td>
<td>-479 €</td>
</tr>
</tbody>
</table>

**Earned values**

**Interpretazione**
The Earned Value Management (EVM) Practice Standard has been developed as a supplement to A Guide to the Project Management Body of Knowledge (PMBOK® Guide). **The EVM Practice Standard is designed to provide readers who are familiar with the PMBOK® Guide with a fundamental understanding of the principles of EVM and its role in facilitating effective project management.**

The EVM Practice Standard assumes that the reader has a basic working knowledge of the project management process groups, knowledge areas and other key concepts, such as work breakdown structures (WBS) and critical path method (CPM) scheduling, which are outlined in the PMBOK® Guide. If that is not the case, it is recommended that the reader undertake a review of the PMBOK® Guide before reading the EVM Practice Standard.

Fonte: Practice Standard for Earned Value Management
In pratica ....

Una macchina per spremere le arance

Rube Goldberg, *Inventions of Professor Lucifer Butts*, 1932

Standard per applicare correttamente la tecnica degli Earned values
Il compito di EVM

EVM provides organizations with the methodology needed to integrate the management of project scope, schedule, and cost. EVM can play a crucial role in answering management questions that are critical to the success of every project, such as:

• Are we ahead of or behind schedule?
• How efficiently are we using our time?
• When is the project likely to be completed?
• Are we under or over our budget?
• How efficiently are we using our resources?
• 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?

If the application of EVM to a project reveals that it is behind schedule or over budget, the project manager can use the EVM methodology to help identify:

• Where problems are occurring;
• Whether the problems are critical or not;
• What it will take to get the project back on track.

Fonte: Practice Standard for Earned Value Management
La struttura del “Practice standard”

Chapter 1 Introduction
  1.1 The Role of Earned Value Management
  1.2 EVM and the Project Management Process

Chapter 2 Basic Elements of Earned Value Management
  2.1 Descriptions of the Basic EVM Elements
  2.2 Derivations of the Basic EVM Elements
  2.3 Putting it All Together

Chapter 3 EVM Performance Analysis and Forecasting
  3.1 Schedule Analysis and Forecasting
  3.2 Cost Analysis and Forecasting
  3.3 Management by Exception

Chapter 4 Guidance for the Use of Key EVM Practices
  4.1 Establish a Performance Measurement Baseline
  4.2 Measure and Analyze Performance Against PMB
### EVM & Project Management

#### Table: Knowledge Areas and Process Groups

<table>
<thead>
<tr>
<th>Knowledge Areas</th>
<th>Process Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initiating</td>
</tr>
<tr>
<td>Integration</td>
<td>X</td>
</tr>
<tr>
<td>Scope</td>
<td>X</td>
</tr>
<tr>
<td>Time</td>
<td>X</td>
</tr>
<tr>
<td>Cost</td>
<td>X</td>
</tr>
<tr>
<td>Quality</td>
<td></td>
</tr>
<tr>
<td>Human Resources</td>
<td></td>
</tr>
<tr>
<td>Communications</td>
<td>X</td>
</tr>
<tr>
<td>Risk</td>
<td>X</td>
</tr>
<tr>
<td>Procurement</td>
<td>X</td>
</tr>
</tbody>
</table>

- **X**: One or more project management processes for which EVM is fundamentally applicable
- **Shaded Box**: One or more project management processes for which EVM is of little significance
- **No Box**: No project management process is mapped here

**Figure 1-1.** EVM and Project Management

**Figure 1-2.** EVM and the Basic PM Process

**Plan**
- Scope
- Schedule
- Cost

**Execute**
- Work
- Record

**Control**
- Measure
- Analyze
- Report
Gli indicatori BASE

Fonte: Practice Standard for Earned Value Management

**Figure 2-6.** Work Plan and Status for Project EZ (As of April 30)

**Figure 2-7.** Cumulative Planned Value, Earned Value, and Actual Cost for Project EZ (As of April 30)
Gli indicatori

- How are we doing time wise?
- How we will proceeed?
- How are we doing cost wise?

- PV Planned Value
- EV Earned Value
- AC Actual Cost
- CV Cost Variance
- SC Schedule variance
- CPI Cost performance index
- CPI\textsuperscript{C} Cumulative CPI
- SPI Schedule performance index

Project Baseline
Time now
Avanzamento

- ETC based on new estimate
- ETC based on atypical variance
- ETC based on typical variance
- EAC using a new estimate
- EAC using remaining budget
- EAC using CPI\textsuperscript{C}
L’applicazione

- Come scegliere le modalità di applicazione
- Come definire le modalità di misurazione
As project significance and uncertainty increase, the rigor with which EVM is applied also needs to increase. There are two basic dimensions to EVM rigor: the granularity and the frequency of the measurement of project performance. Granularity refers to the level of detail to which the project work scope is broken down using a WBS. Frequency is the time interval at which project performance is assessed, analyzed and reported, ranging from daily to monthly or longer. EVM implementation can be scaled along these two dimensions (granularity and frequency) to achieve the degree of rigor required by the significance and the uncertainty of the project.
### Earned values measurement techniques

**Figure 2-5. Earned Value Measurement Techniques**

<table>
<thead>
<tr>
<th>Product of Work</th>
<th>Duration of Work Effort</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-2 Measurement Periods</td>
</tr>
<tr>
<td><strong>Tangible</strong></td>
<td>Fixed Formula</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intangible</strong></td>
<td>Apportioned Effort</td>
</tr>
</tbody>
</table>

Fonte: Practice Standard for Earned Value Management
Figure 3.1. EVM Performance Measures

Figure 3.3. Interpretations of Basic EVM Performance Measures
Variance: Schedule Variance (SV); Cost Variance (CV); and Variance at Completion (VAC)

Indices: Schedule Performance Index (SPI); Cost Performance Index (CPI); and To-Complete Performance Index (TCPI)

Forecasts: Time Estimate at Completion (EACt); Estimate at Completion (EAC); and Variance at Completion (VAC)
Time-Based Schedule Measures

**Time based**

\[
SV(t) = PT - ET = 12 - 16 = -4 \text{ months}
\]

\[
SPI(t) = PT / ET = 12 / 16 = 0.75
\]

If the work were to continue at this rate, then all of the work of Project EZ would take 16 months to accomplish instead of the 12 months planned \((12 / 0.75 = 16)\).

**Cost based**

\[
SV($) = EV - PV = 24 - 32 = -8
\]

\[
SPI($) = EV / PV = 24 / 32 = 0.75
\]

If the work were to continue at this rate, then all of the work of Project EZ would take 16 months to accomplish instead of the 12 months planned \((12 / 0.75 = 16)\).
Le stime a finire

Somewhere, something went terribly wrong

\[ EAC = AC + \left( \frac{BAC - EV}{EV_i + EV_j + EV_k} \right) \]

Future cost performance will be the same as the last three measurement periods (i, j, k)

\[ EAC = AC + \frac{BAC - EV}{CPI \times SPI} \]

Future cost performance will be influenced additionally by past schedule performance

\[ EAC = AC + \frac{BAC - EV}{0.8 CPI - 0.2 SPI} \]

Future cost performance will be influenced jointly in some proportion by both indices
Guidance for the Use of Key EVM Practices

Establish a Performance Measurement Baseline (PMB)
• Decompose work scope to a manageable level
• Assign unambiguous management responsibility
• Develop time-phased budget for each work task
• Select EV measurement techniques for all tasks
• Maintain integrity of PMB throughout the project

Measure and analyze performance against the baseline
• Record resource usage during project execution
• Objectively measure physical work progress
• Credit earned value according to EV techniques
• Analyze and forecast cost/schedule performance
• Report performance problems and/or take action
Conclusioni
Any questions?