Planning, Optimizing and EVM -Integrated Approach-

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Agenda

• There Is Nothing Permanent Except Change
• EVM Is About Anticipating the Future
• What to Do With EVM Data?
• EVM As Integrated Part of Project Management
• Plans Are Nothing; Planning Is Everything
• Integrated Approach - Characteristics
• Why ES Instead of EVM?
• How It Works in Practice-Demonstration of the Tool for Project Estimating, Planning, Optimization and Earned Value Management – Real Project Example
• Summary - Questions

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"There is nothing permanent except change."
Heraclitus of Greece

- Project environment is not static and its impact on project performance has to be analyzed continually
- Project factors (scope, time, efforts, quality) are interrelated and should not be considered separately
- However, in reality, project factors are often managed independently and in a static way
- The impact of project environment on project performance has to be quantified
- The corrective actions are often based more on the project manager’s intuition then on the reliable and quantitative data
EVM Is About Anticipating the Future

• Performance indicators are not sufficient to decide what to do with a project.
• Quantitative value of performance indicators is very important in order to decide which action to take.
• Syndrome of weight watching: Measuring our weight doesn’t make us thinner.
• The benefits of EVM and other performance measurement techniques come from their ability to anticipate the future project behavior rather than from capacity to explain what happened in the past.
• Corrective actions should be based more on lead (proactive) indicators than on lag (past performance) indicators.
What to Do With EVM Data?

- Future project performance (cost or schedule) is, to some extent, influenced by its past performance.
- Simply add the recorded delay to the remaining planned time or/and the cost overrun to the remaining budget or
- …use the past performance to forecast the end of the project.
- It depends…
- It’s not automatic; you have to analyse project data to understand the factors causing bad or good performance.
- The crucial question: Are these factors temporary or they are more structural?
What to Do With EVM Data?

• Estimate at Completion – It Isn’t So Simple

\[
EAC(t) = \text{Actual Time} + (\text{Planned Project Duration} - \text{Earned Schedule}) \times Cf
\]

• Cf is an adjustment factor representing the degree by which the past performance is supposed to affect the performance in the remaining time

• Cf should consider the following productivity factors:
  – Human factors: Team experience, team competence, personnel turnover, team size, etc.
  – Project and product factors: Schedule compression, project scope, use of methodology, etc.

• The Cf is the interaction of the environment factors which influence project performance
EVM As Integrated Part of Project Management

- Manage projects performance as a process using PDCA (Plan-Do-Check-Act) cycle
  - Before to take corrective actions, performance measurement baseline (PMB) should be revised
  - The PMB has to be adjusted according to the new project environment and not just to the factors which have caused a bad performance
EVM As Integrated Part of Project Management

The obstacles to the integrated dynamic approach:

• Project performance is often considered on a very low level (not see the forest for the trees)
• The impact of project environment factors on project performance is not quantified
• Corrective actions are often focused on symptoms and not on the root causes of a bad performance
• Lack of tools with integrated dynamic approach
• Tendency to automate all. We forget that the best project management “tool” is a judgment of a good project manager based on good project data
"Plans are nothing; planning is everything“
- Napoleon Bonaparte

• Recommendations:
  – Don’t miss a big picture; Manage the project execution on the activity level, but manage the project performance on the project level
  – Choose only the factors whose impact on project performance can be quantified
  – Integrate dynamically project planning, project optimization and project control (it is not realistic to change one project factor, time for example, and expect the other project factors to remain the same)
  – Be proactive: Adjust your PMB continually throughout the project execution, because project performance management is a proactive process and not just a reaction to the bad news.

• Is it easy? Certainly not, but it’s possible.
Integrated Approach - Characteristics

• Project planning, optimization and control are interrelated dynamically
• No need to perform detailed WBS; works very well with parametric estimating techniques
• No need to calculate the control accounts. Time and costs baselines are integrated automatically
• EVM can be performed at any time during the project execution
• Doesn’t need an advanced degree of project management maturity (can be performed by small organizations as well)
• It is not expensive
• And guess what : There is a tool for it
Integrated Approach - Characteristics

First step - Estimating

Estimating is the first step of the integrated approach.

Estimating can be parametric (as the estimating module shown here) or based on another estimating technique (you can enter the efforts directly in the module).
Integrated Approach - Characteristics

Second step - Planning

Planning is performed on a project (2nd WBS) level.

System automatically calculates the components of the optimal solution: Size, efforts by phase, duration by phase, average staff, project cumulative costs and schedule related risk.

It is possible to develop and to record several project scenarios and every project scenario can be chosen at any time to become a working performance measurement baseline.
Integrated Approach - Characteristics

Third step - Optimizing

The impact of different environment factors on project performance is quantified.
Integrated Approach - Characteristics

Optimization is made by comparing the planned to the optimal scenario.

<table>
<thead>
<tr>
<th>Project ID: 123</th>
<th>Project name:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Results</strong></td>
<td><strong>Solution</strong></td>
</tr>
<tr>
<td>Project Total</td>
<td>Productivity Index</td>
</tr>
<tr>
<td>Requirements Analysis</td>
<td>Size (Points)</td>
</tr>
<tr>
<td>Architecture</td>
<td>Project Efforts (p/d)</td>
</tr>
<tr>
<td>Functional Analysis</td>
<td>Duration (months)</td>
</tr>
<tr>
<td>Programing and unit test</td>
<td>Average Staff</td>
</tr>
<tr>
<td>Integration and product test</td>
<td>Costs ($)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Efforts (p/d) vs Schedule (months)</th>
<th>Peak Staff</th>
<th>Project Cumulative Costs ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gantt Chart</td>
<td>Schedule Related Risk</td>
<td>Mar-07</td>
</tr>
<tr>
<td>2.969</td>
<td>1,200,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>2.750</td>
<td>1,000,000</td>
<td>800,000</td>
</tr>
<tr>
<td>2.540</td>
<td>800,000</td>
<td>600,000</td>
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<tr>
<td>2.330</td>
<td>600,000</td>
<td>400,000</td>
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<tr>
<td>2.120</td>
<td>400,000</td>
<td>200,000</td>
</tr>
<tr>
<td>1.910</td>
<td>200,000</td>
<td>0</td>
</tr>
</tbody>
</table>

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Integrated Approach - Characteristics

Forth step - Performance Analysis

The user can calculate EV indicators at whatever time he wants (no need to previously establish the CAPs).

EV is credited in person/days and can be calculated as a percentage of completion or/and as the physical work progress on every phase.

Future project performance is calculated based on past performance or on the initial performance baseline.
Integrated Approach - Characteristics

Recommendations based on EVM (ES) indicators, level of schedule compression and risk related to schedule.

Schedule
Concerning the schedule, at 9/15/2007, you are 42 days behind the planned schedule.

Efforts/Budget
According to the information entered at 9/15/2007, you already spent 48 p/d or 23848 $ more than planned.

Recommendations
Considering the fact that the accumulated delay (17% in comparison with the remaining time) is situated within the acceptable limits and that the initial schedule was quite realistic, you can consider assigning the additional resources or to put certain activities in parallel (where that is possible) in order to recover the lost time. Nevertheless, for the remaining time it is necessary to exercise more rigorous project management to avoid the further delay.

As the needs until the end of the project are slightly greater than the remaining budget (4%), you should take certain measures (to abandon non essential functionalities, to increase effectiveness, to optimize the resources, etc.) in order to reduce the costs and to respect the allocated budget.

Schedule performance indicators are calculated according to the EVM standard as well as to the Earned Schedule (ES) concept.

Performance Indicators

<table>
<thead>
<tr>
<th>Earned value (EV) at current date</th>
<th>$151,152</th>
<th>Actual costs in at current date</th>
<th>$175,000</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Costs</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost Variance (CV)</td>
<td>$-23,848</td>
</tr>
<tr>
<td>Schedule Variance (VS)</td>
<td>$-110,242</td>
</tr>
<tr>
<td>Cost Performance Index (CPI)</td>
<td>0.86</td>
</tr>
<tr>
<td>Schedule Performance Index (SPI)</td>
<td>0.58</td>
</tr>
<tr>
<td>Estimate at Completion (EACc)</td>
<td>$825,007</td>
</tr>
<tr>
<td>Estimate at Completion (EACt)</td>
<td>24.6 months</td>
</tr>
</tbody>
</table>

ES Performance Indicators

| Schedule Variance (VS) | -42 days |
| Schedule Performance Index (SPI) | 0.77 |
| Estimate at Completion (EACt) | 18.4 months |
Why ES Instead of EVM?

• What is not new :
  – EVM is not a reliable predictor of project duration
  – SPI is usually good and reliable in first two thirds of the project and it starts to be defective over the final third of a project's life cycle and especially after the planned end of the project

• What is new :
  – EVM schedule indicators are unreliable and deficient over the all project life cycle for projects with a non-linear cumulative cost curve
  – Non-linearity of cumulative cost curve is a principal cause of distortion of EVM schedule indicators
Why ES Instead of EVM?

A) First Measure

\[ EV_1 = $233,000 \quad SV_1 = EV - PV = -$450,000 \]
\[ PV_1 = $683,000 \quad SPI_1 = EV/PV = 0.34 \]
Real delay 1 = 1.6 months

B) Second Measure

\[ EV_2 = $775,000 \quad SV_2 = EV - PV = -$183,000 \]
\[ PV_2 = $958,000 \quad SPI_2 = EV/PV = 0.81 \]
Real delay 2 = 2.7 months

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Why ES Instead of EVM?

### Number of performance measures

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SVt (Real Delay) in days</strong></td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td><strong>Earned Value (EV) ($)</strong></td>
<td>96 000</td>
<td>145 000</td>
<td>195 000</td>
<td>331 000</td>
<td>382 000</td>
</tr>
<tr>
<td><strong>SPI (EVM)</strong></td>
<td>0.66</td>
<td>0.75</td>
<td>0.59</td>
<td>0.86</td>
<td>0.88</td>
</tr>
<tr>
<td><strong>SPI (ES)</strong></td>
<td>0.79</td>
<td>0.83</td>
<td>0.85</td>
<td>0.87</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Legend:
- Same Delay
- Inconsistent Behavior
- Consistent Behavior

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How It Works In Practice?

Demo of the Tool For Project Estimating, Planning, Optimization and Earned Value Management
- Real Project Example -