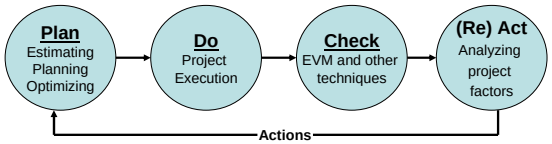

Planning, Optimizing and EVM
-Integrated Approach-

EVM World 2007

PMI-CPM 23rd Annual International Conference

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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

"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 ?

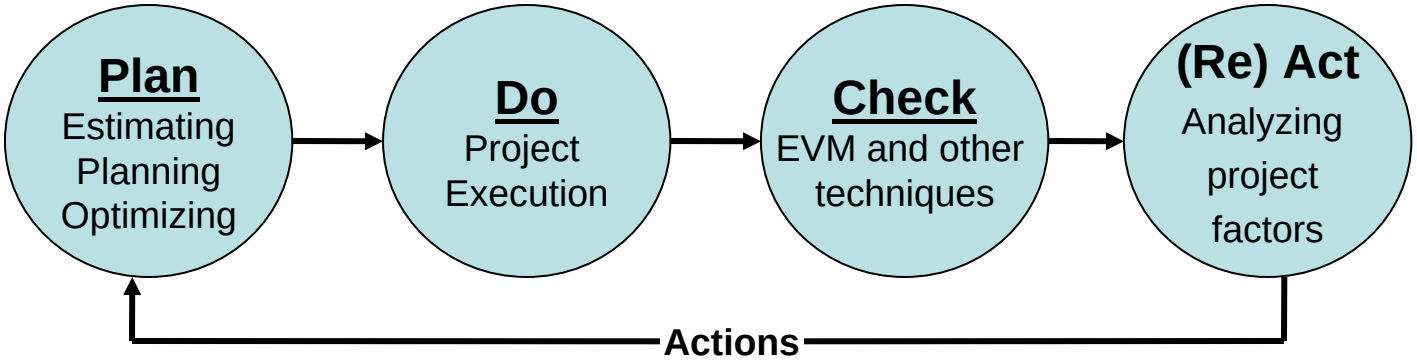
- Estimate at Completion – It Isn't So Simple

EAC(t) = Actual Time + (Planned Project Duration – Earned Schedule) *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

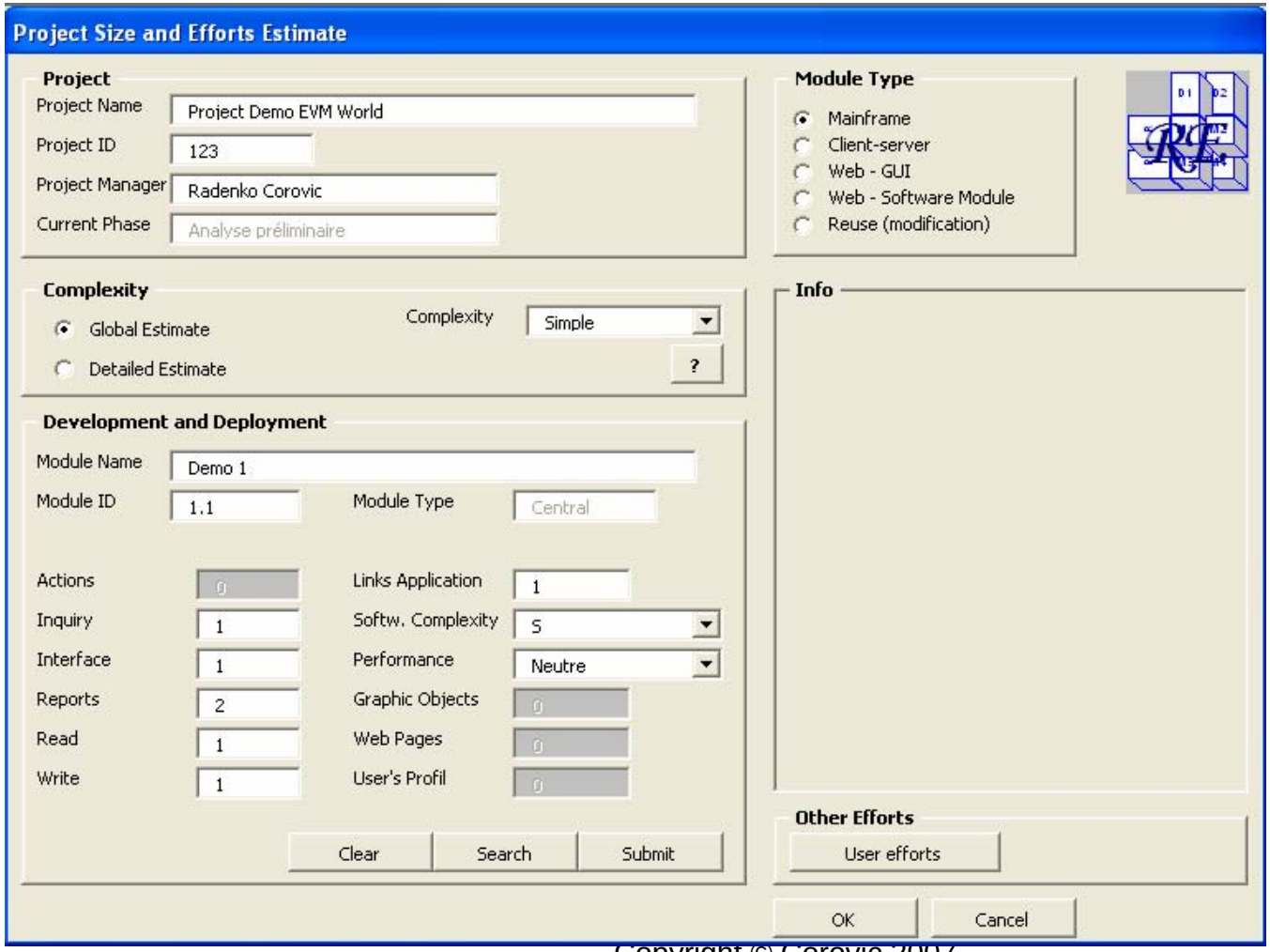
- Recommendations:
  - Don’t miss a big picture; Manage the project execution on the activity level, but manage the project performance on the project level
  - Choose only the factors whose impact on project performance can be quantified
  - Integrate dynamically project planning, project optimization 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.

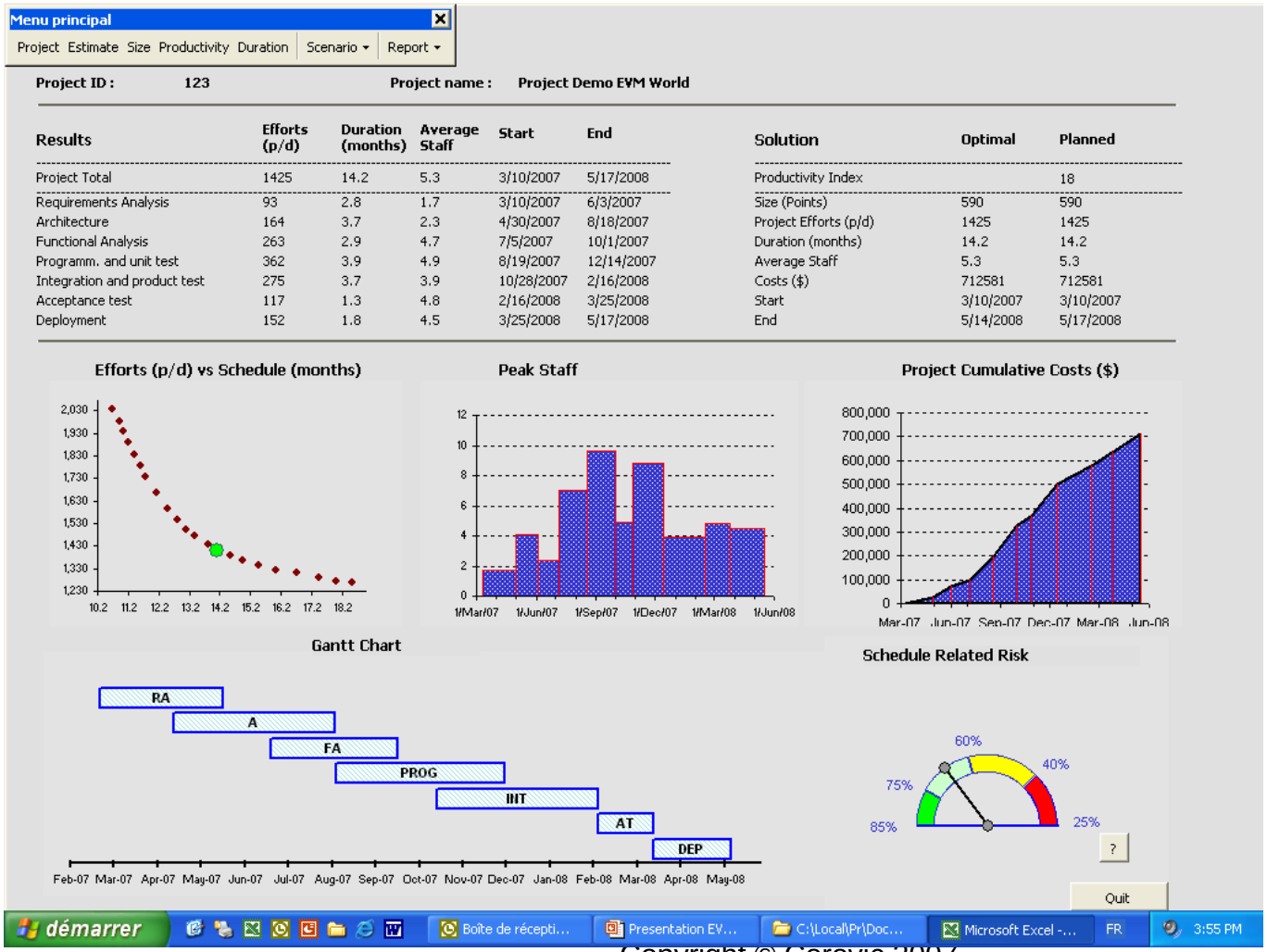
Estimating can be parametric (as the estimating module shown here)

or

based on another estimating technique (you can enter the efforts directly in the module).

Integrated Approach - Characteristics

Second step - Planning



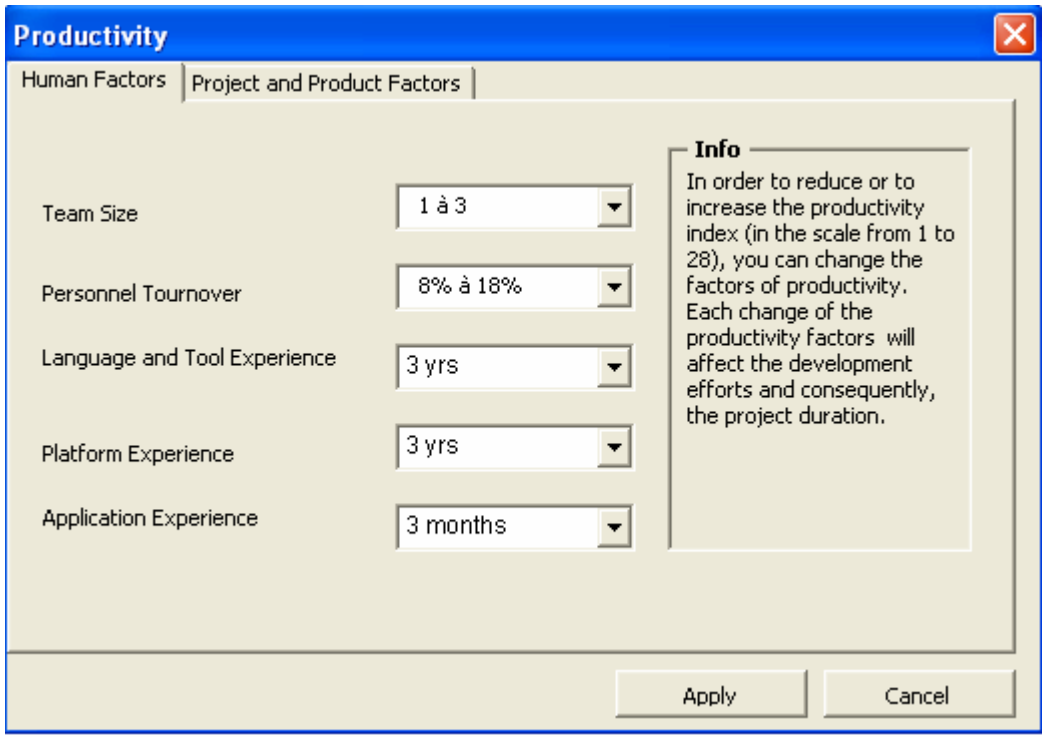
Planning is performed on a project (2nd WBS) level.

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

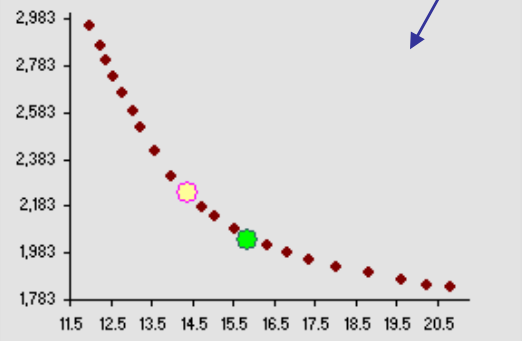
Optimization is made by comparing the planned to the optimal scenario

Project ID : 123 **Project name :**

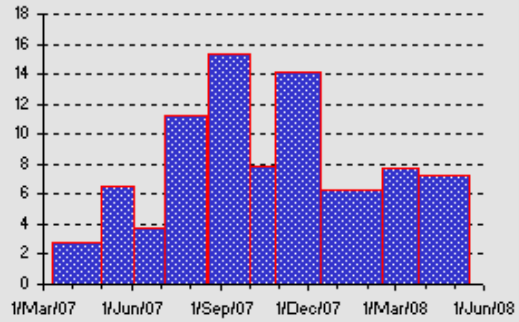
Results	Efforts (p/d)	Duration (months)	Average Staff	Start	End
Project Total	2277	14.2	8.4	3/10/2007	5/17/2008
Requirements Analysis	149	2.8	2.8	3/10/2007	6/3/2007
Architecture	261	3.7	3.7	4/30/2007	8/18/2007
Functional Analysis	420	2.9	7.6	7/5/2007	10/1/2007
Programm. and unit test	579	3.9	7.8	8/19/2007	12/14/2007
Integration and product test	439	3.7	6.3	10/28/2007	2/16/2008
Acceptance test	187	1.3	7.7	2/16/2008	3/25/2008
Deployment	243	1.8	7.2	3/25/2008	5/17/2008

Solution	Optimal	Planned
Productivity Index		12
Size (Points)	590	590
Project Efforts (p/d)	2066	2277
Duration (months)	16	14.2
Average Staff	6.8	8.4
Costs ($)	1032874	1138744
Start	3/10/2007	3/10/2007
End	7/8/2008	5/17/2008

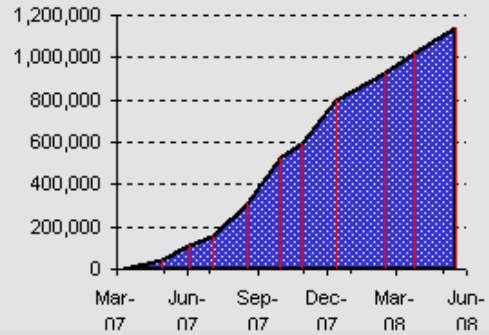
Efforts (p/d) vs Schedule (months)



Peak Staff



Project Cumulative Costs ($)

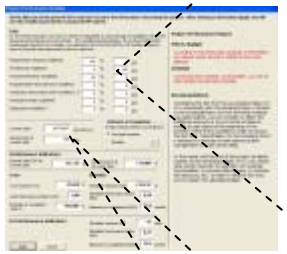


Gantt Chart

Schedule Related Risk

Integrated Approach - Characteristics

Forth step - Performance Analysis



Info

In the textboxes below you have to enter EV calculated as a percentage of completion OR as the physical work progress on every phase . EV is credited in person/days. If you have finished the Requirement Analysis for example, you will enter 100 in the first left box OR number of person days of physical work performed in the first right box.

Requirements Analysis completed	100	%	0	p/d
Architecture completed	0	%	130	p/d
Functional Analysis completed	30	%	0	p/d
Programmation and unit tests completed	0	%	0	p/d
Integration and product tests completed à	0	%	0	p/d
Acceptance tests completed	0	%	0	p/d
Deployment completed	0	%	0	p/d

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

Current Date 9/15/2007 mm-dd-yyyy

Actual costs at current date 350 p/d

Estimate at Completion

Project should continue according to

- (•) Past performance
- ( ) Baseline

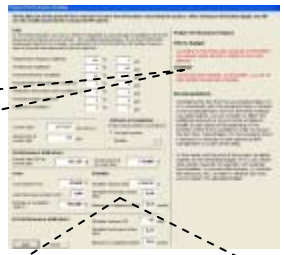
?

Future project performance is calculated based on past performance or on the initial performance baseline

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

Integrated Approach - Characteristics

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



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

Efforts/Budget

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

Schedule

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

Recommandations

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 grater 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.

Performance Indicators

Earned value (EV) at current date	151,152	$	Actual costs in $ at curect date	175,000 $

Costs			**Schedule**		
Cost Variance (CV)	-23,848	$	Schedule Variance (VS)	-110,242	$
Ciost Performance Index (CPI)	0.86		Schedule Performance Index (SPI)	0.58	
Estimate at Completion (EACc)	825,007	$	Estimate at Completion (EACt)	24.6	months

ES Performance Indicators

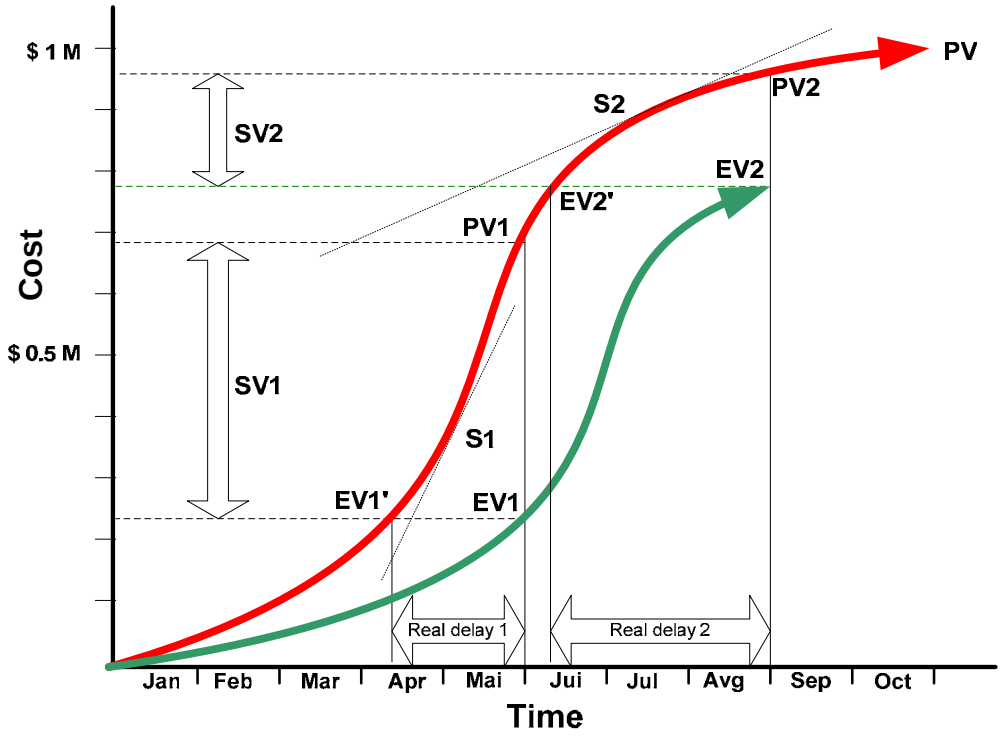
Schedule Variance (VS)	-42	days
Schedule Performance Index (SPI)	0.77	
Estimate at Completion (EACt)	18.4	months

Apply Cancel

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 SV1 = EV- PV = $-450,000
PV 1= $683,000 SPI 1 = EV/PV= 0.34

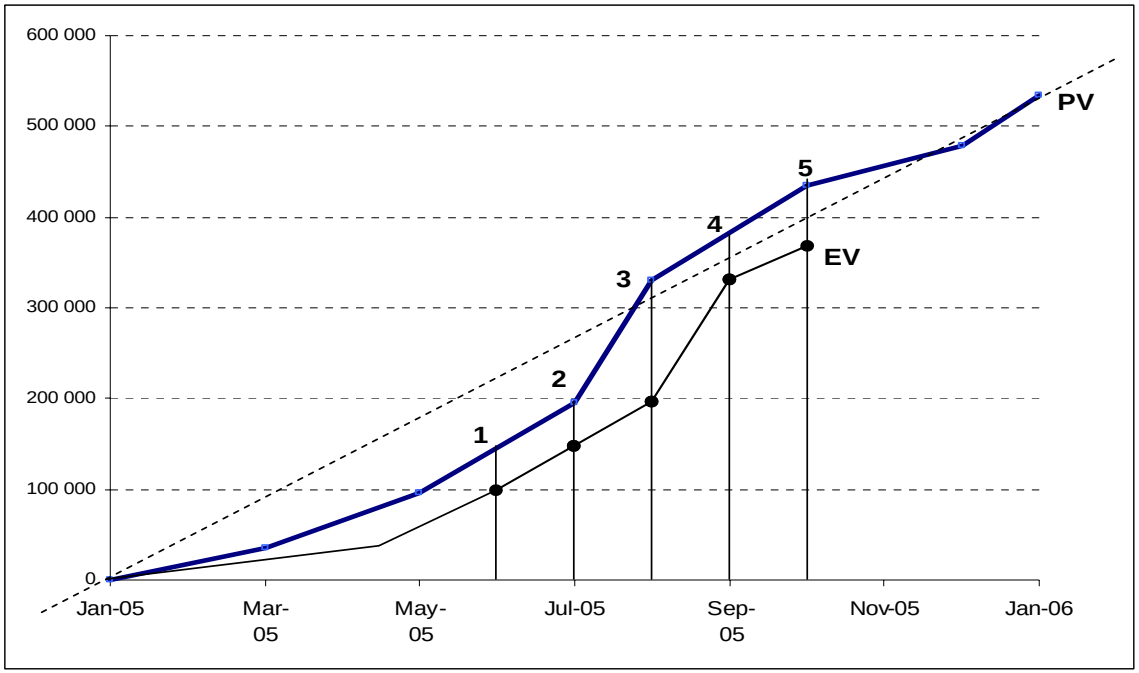
Real delay 1 = 1.6 months

B) Second Measure

EV 2= $ 775,000 SV2 = EV- PV = $-183,000
PV 2= $ 958,000 SPI 2 = EV/PV= 0.81

Real delay 2 = 2.7 months

Why ES Instead of EVM?



	Number of performance measures				
	1	**2**	**3**	**4**	**5**
SVt (Real Delay) in days	**31**	**31**	**31**	**31**	**31**
Earned Value (EV) ($)	**96 000**	**145 000**	**195 000**	**331 000**	**382 000**
SPI (EVM)	**0.66**	**0.75**	**0.59**	**0.86**	**0.88**
SPI (ES)	**0.79**	**0.83**	**0.85**	**0.87**	**0.90**

← Same Delay

← Inconsistent Behavior

← Consistent Behavior

How It Works In Practice?

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

- Real Project Example -