Infosys®
POWERED BY INTELLECT
DRIVEN BY VALUES

Win in the flat world

Earned Value Management for Enterprise Resource Planning Implementations

- Venu Kotamraju

White Paper

Abstract

ERP implementations are a special breed of projects. They are often characterized by aggressive timelines, high budgets and involvement of diverse teams. This emphasizes the need to have a reliable tool to measure the performance of ERP implementations throughout the execution phases.

Earned Value Analysis, with its basis in cost, benefit and timeline is a good financial tool for Project managers. This paper starts by establishing the key concepts of Earned Value analysis. Metrics such as EV, PV, AC, CPI, SPI are explained at an overview level. Earned value analysis is then applied to the individual phases of a typical ERP implementation using an illustrative project. Each phase of the implementation such as, requirements gathering, is then analyzed by giving an overview of the phase, describing the major activities and then describing the EVM(Earned Value Management) activities that need to take place in that phase.

This paper highlights how Earned value analysis can be used for ERP implementations with a focus on the phases of ERP implementation.

June 2008

Introduction

Enterprise Resource Planning (ERP) Implementations – A special breed of projects

Embarking on ERP implementation is a daunting task for any enterprise due to its inherently complex nature. The process often involves big budgets, long durations and large teams across multiple organizational units (IT, Business, Infrastructure, etc.). This places a great amount of stress on the IT and Business leadership involved. They are also a special breed of projects; they are part technology and part business. The primary differentiating factor is the heavy involvement of business and IT. Often, the primary reason for implementing a packaged ERP application is to redesign the existing business processes into industry standard best-of-breed processes, with the ability to scale up to the enterprise's growth plans.

Given this unique nature of ERP implementations, the project management team assumes critical importance in measuring, monitoring and reporting the project status accurately. Most project managers engulf themselves in project plans, resource plans, risk registers, status reports and more status reports. What is often missing in those reports is a standard way of measuring, monitoring and reporting the status. In such a situation, project managers need all the tools and techniques they can get. The earned value technique, tailored for ERP implementation, offers one such performance measurement tool.

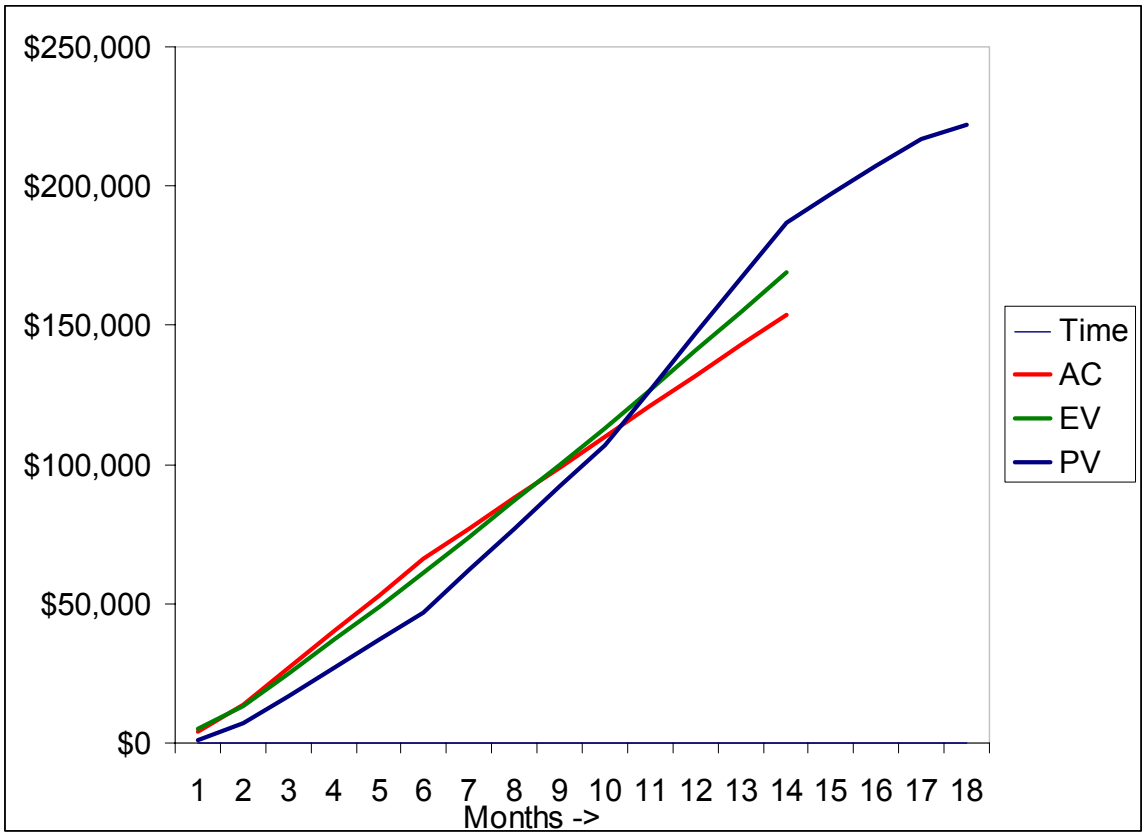
Earned Value Analysis – Key Concepts

Earned value analysis or Earned Value Management (EVM) is a financial measurement tool that combines the conflicting aspects of scope, schedule and cost into a unified set of metrics. These metrics can be used for measuring, monitoring, reporting and forecasting project performance. It can be used through all the phases of a project, from Initiation to Closure. The building blocks of this technique are

1. Defining the Work Breakdown Structure (WBS)
    - Identifying a mutually exclusive and collectively exhaustive set of activities/ tasks
    - Identifying the level at which earned value analysis will be performed
2. Assign values to each WBS Item, also called Planned Values (PV)
    - Allocate the total budget into the individual items
3. Establishing earning rules for each WBS Item
    - 0/100, 50/50 or 20/80 are some of the methods of tracking the value earned as a percentage complete of the work accomplished.

Once these basic steps are achieved, a project plan can be created to track the project. As the tasks are started, the value earned can be tracked. Some of the common metrics available for measurement are:

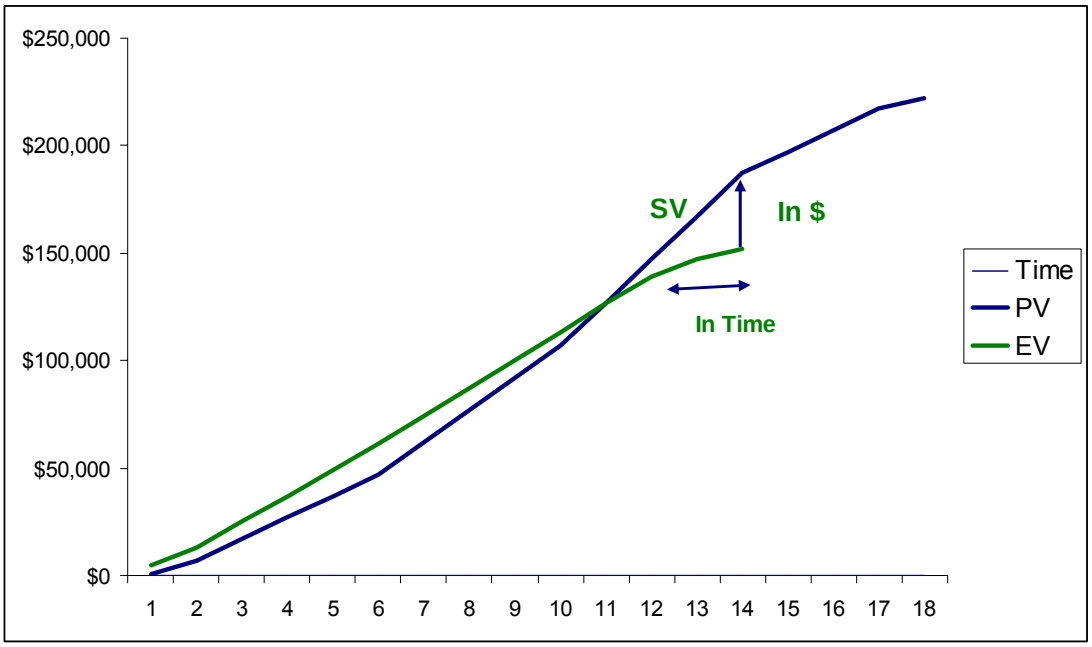
- **Planned Value (PV):** is the Budgeted Cost for Work Scheduled (BCWS/ BAC) to be completed on an activity or WBS Item up.
- **Earned Value (EV):** is the Budgeted Cost of Work Performed (BCWP)
- **Actual Cost (AC):** is the total cost incurred in accomplishing the work scheduled. This must correspond to what was budgeted.



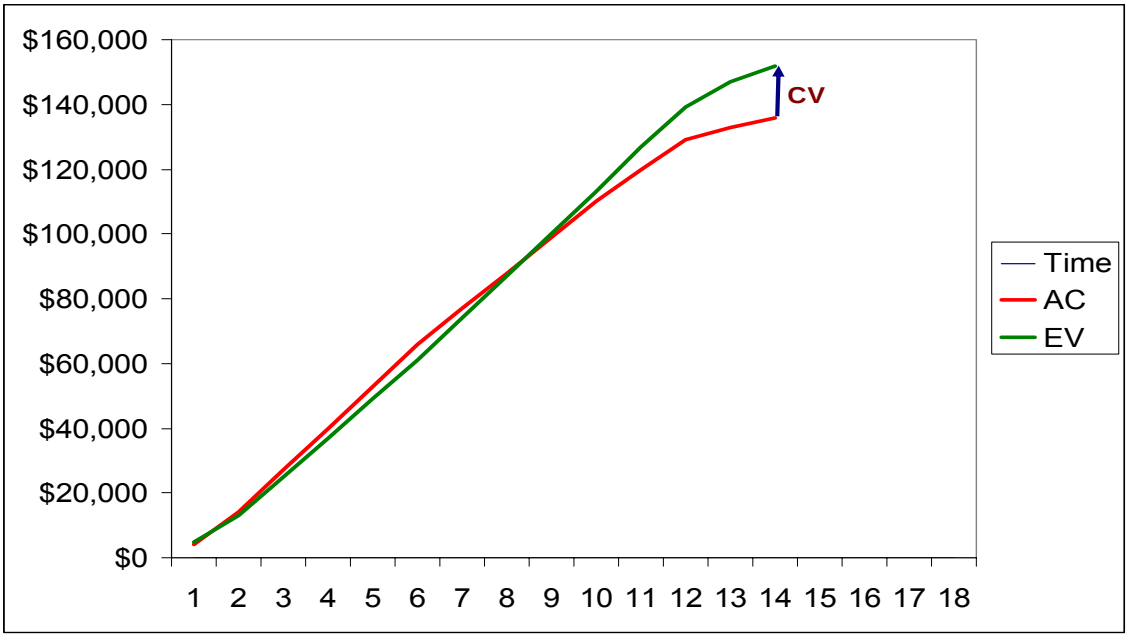
The chart above shows the interplay between the three components of the EV analysis.

Based on these three variables, we can calculate the following indicators

- **Cost Variance (CV)** = EV-AC



- **Schedule Variance (SV)** = EV-PV



The first two set of indicators measure the cost and schedule variance of the work accomplished.

The next two are efficiency indicators that can be used for forecasting the cost and schedule performance.

- **Cost Performance Indicator (CPI)** = EV/AC
- **Schedule Performance Indicator (SPI)** =EV/PV

ERP Implementation Phases Overview

Note: This section refers to the Infosys Package implementation methodology (Intrak), explaining the various phases for a typical ERP Implementation.

A typical ERP Implementation has the following stages

Strategic Stage

- Planning Phase
  - Business Case preparation
- Package Evaluation Phase
  - Package solution options are generated and finalized
- Organizing Phase
  - Project organization, methodology and change management processes finalized.

This stage is the precursor to the project organization being formed. It is at this point that the Budget for the entire implementation is usually identified at the high level.

Project Stage

- **Project scoping**
- **Requirements Gathering**
- **To-Be Process Design**
- **Configuration and Development**
- **Cut-over and Support**

The individual phases and the nature of EVM for each phase has been discussed in the sections below. For this purpose, an illustrative ERP project has been used.

Project Size	220 K USD	**Project Duration**	18 Months

Phase wise duration split

PHASE NAME	DURATION IN MONTHS
Scoping	2
Requirements	4
To Be Design	4
Configuration and Development	4
Integration and Acceptance Testing	3
Cutover and Support	1
Total	**18**

Let us assume that these values were finalized during the strategic phase of the ERP implementation.

EVM Application to ERP Phases

Project Scoping

Overview

The activities in this phase are directed towards a clear-cut definition of the project with respect to its scope, requirements and resources.

Major Activities

- Project Manager (Client) and scoping team selection
- Project Scope definition
- Project team formation
- Project team requirements identification
- Orientation Workshops
- Project planning and sign-off
- Formal kick-off

Earned Value Analysis Activities

This phase is key in establishing the basic building blocks for the EVM.

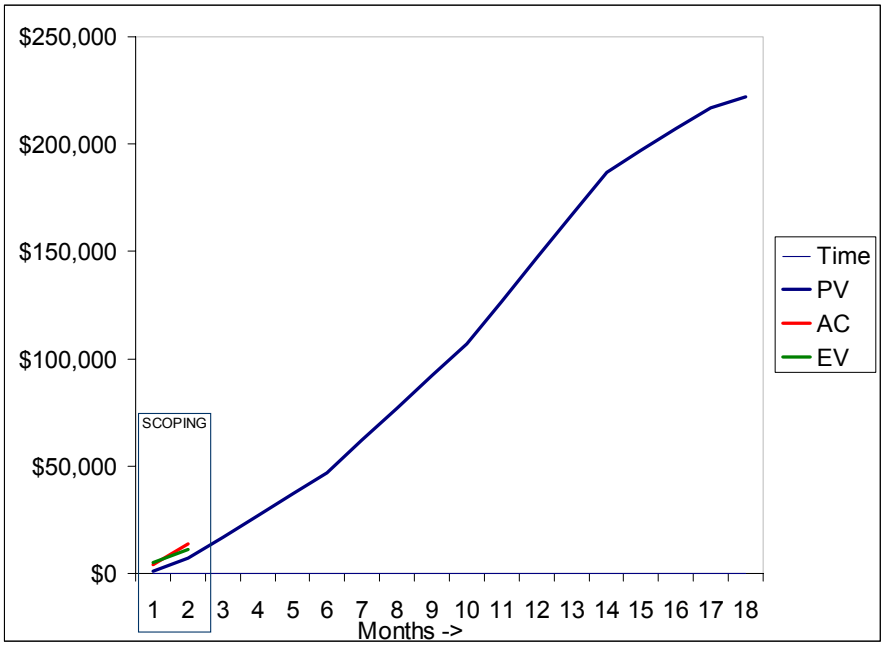
- WBS has to be built from the project scope definition
- WBS level, at which tracking will be done, has to be established.

Note: At this point in time, the project management does not have the detailed information for all the tasks. Therefore, these values can later be refined during the requirements gathering stage.

- PVs have to be assigned to the WBS Items at the level at which planning will be done. This has to be discussed and agreed upon with the business users during the scope discussions.
- Earning rules for the WBS Items also have to be established in this phase.
- Finally, the Project Plan is created in this phase and it clearly establishes all the phases and the duration of the entire implementation. This project plan will be key to tracking the actual cost and earned values to the planned values.

All of the above steps will be represented in the Project measurement plan, which is usually discussed with the key stakeholders during the Formal kickoff.

At this point, most of the actual cost goes into establishing the cost, scope and operational baselines. EVs will also be toward the same tasks. The chart given below gives a graphical representation of the S- Curves, showing the AC, EV and PV values. We will continue to monitor these S-curves through the rest of the implementation phases



Requirements Gathering

Overview

The Core Business Processes (CBP), identified during Project Scoping phase, are used to derive the “As-Is” processes. The high level gap analysis is carried out.

Major Activities

- Business Process Mapping
- Identification of sources of information
- Environment installation
- Training to core team (client) on specific modules
- Prepare for workshop
- Workshop to capture business processes
- High level Process mapping and Gap Analysis
- System Status Mapping

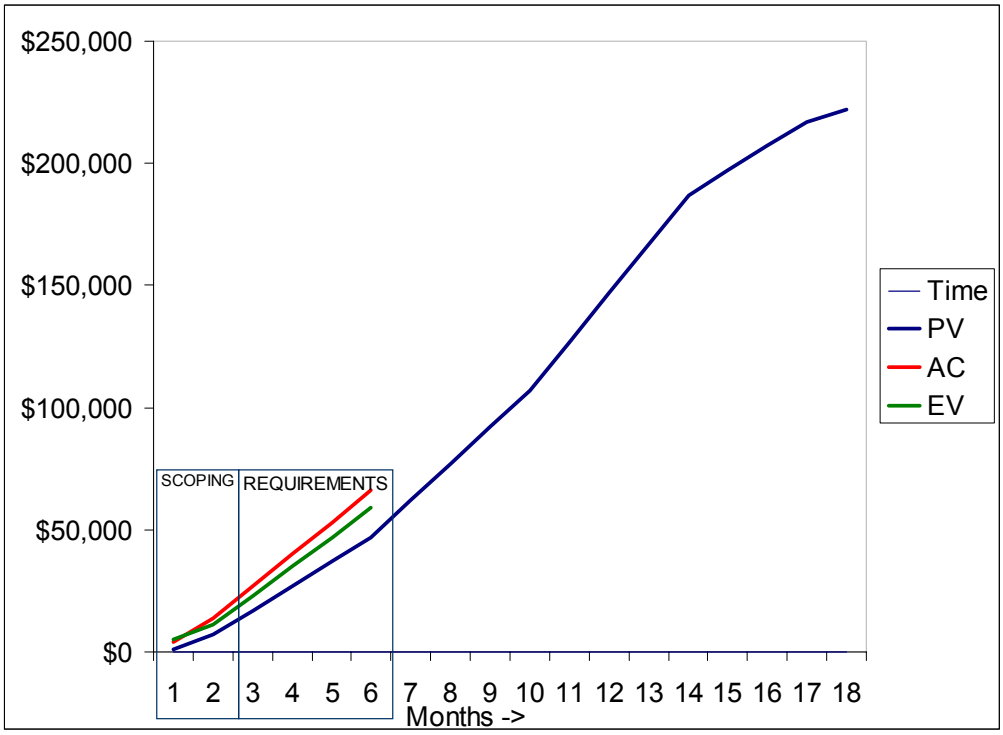
EVM Activities

This is the first phase where tracking costs, schedule and quality start to assume greater importance.

- Project Plan is being tracked and updated on a regular basis - usually on a weekly basis.
- Actual Cost starts to accumulate in this phase and can be obtained by combining the timesheet data, from the time tracking systems, along with resource cost details and other material costs from the project accounting systems.
- Most of the actual costs at this point are licensing, hardware and software costs that will be used throughout the course of the project.
- Schedule variance can be tracked at this point, using the EVs against the PVs.
- Tasks which have begun will get 20% EV, and completed tasks will get 100% as per the 20-80 earning rule.
- Total EV can then be calculated as

$$EV = \sum_{Beginning}^{Current} PV_{WorkElementsCompleted}$$

- Due to the complex nature of ERP implementation, the requirements phase usually runs over budget. The key reasons for this are:
  - Scope Change, due to new work item identification
  - Complexity change, due to difficulty of getting information on existing process
  - Lower productivity, due to team dynamics – the various members of the team are working together for the first time and this could lead to lower productivity at the team level
- In the chart below, the project is shown to be ahead of schedule and over budget.



To-Be Design

Overview

The To-Be Design Phase involves key activities such as “To-Be” Process Design of the proposed solution, Data Migration Design, Configuring the proto-type, and conducting the Conference Room Pilot (CRP).

Major Activities

- To-Be Process Design
- Functional Specifications for Custom Components, Data Migration Programs
- Configure the Proto-Type
- Conduct CRP

EVM Activities

This is the phase where schedule and cost overruns have to be tracked with the utmost care.

- WBS Updates, if required, are done in this phase.
- All WBS Items are broken to the tracking level and their PVs are finalized
- The total PV of the project is baselined
- Actual cost values be obtained by combining the labor costs from the time keeping systems and material costs from the project accounting systems.
- Most of the ACs, at this point, are towards the deliverables for the project.
- Schedule variance can be tracked, using the EVs against PVs.

This phase is also a good time to start predicting/ forecasting the cost and schedule performance.

- In this phase, forecasting ratios can be calculated and used.
  - SV = EV-PV >0 is good; it indicates that the project is ahead of schedule.
  - <0 indicates that the project is behind schedule
- SPI can be calculated as
  - SPI = EV/PV
- This SPI can be used to forecast the completing of the design stage
- Additional CPI can be used for tracking the cost performance.
- CPI and SPI combined together give a very good tool to the project manager to tack corrective actions.

In addition to tracking, correcting cost and schedule overruns, this phase also involves estimating the total budget at cost.

$$BAC = \sum_{\text{BEGINING}}^{\text{END OF PROJECT}} PV$$

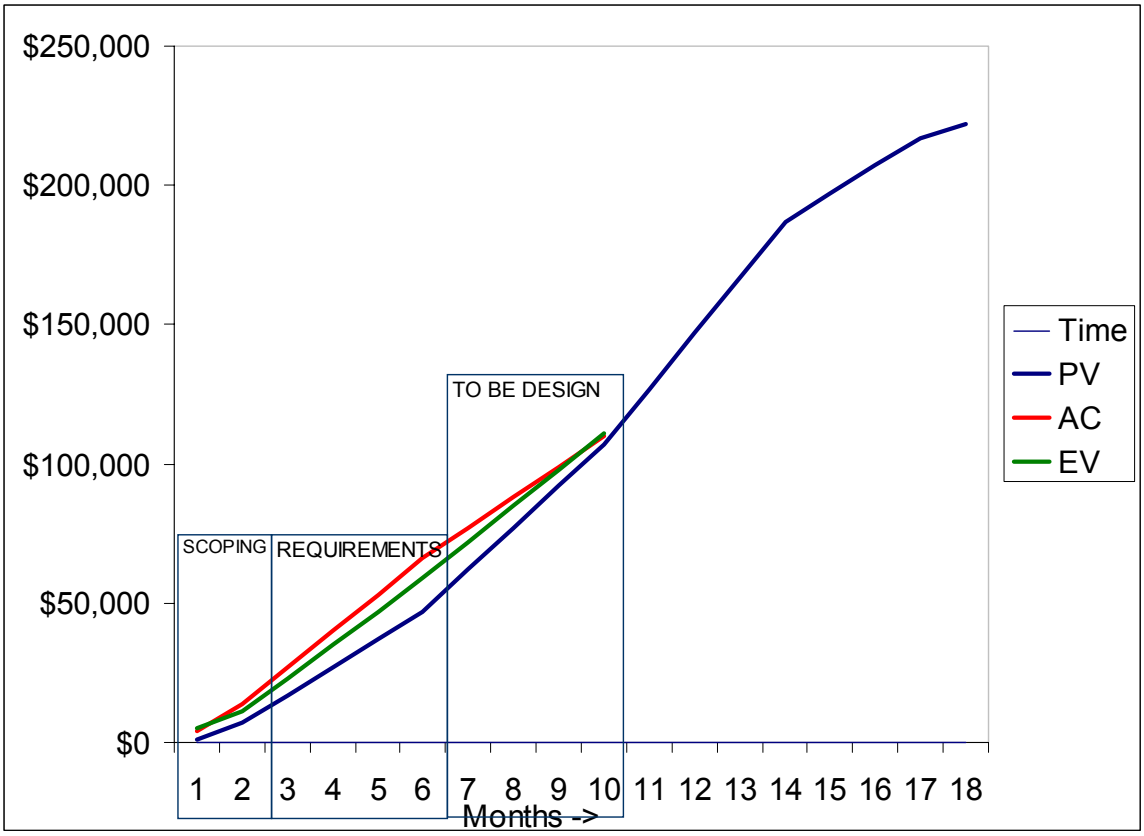
- The Budget at Completion (BAC) indicates the total PV for the project at completion
- Using the CPI and BAC, we can calculate the Expected Budget at Completion (EAC).

$$EAC = AC + \frac{(BAC - EV)}{CPI}$$

- The Estimate to Complete (ETC) is another key indicator to indicate the estimate of work left to be completed before the project can go live.

$$ETC = EAC - ACWP$$

- In the chart below, the project is shown to be tracked closer to the PV of the budget. Both, the AC and EVs are approaching the PVs.



Configuration & Development

Overview

The activities during this phase are directed towards:

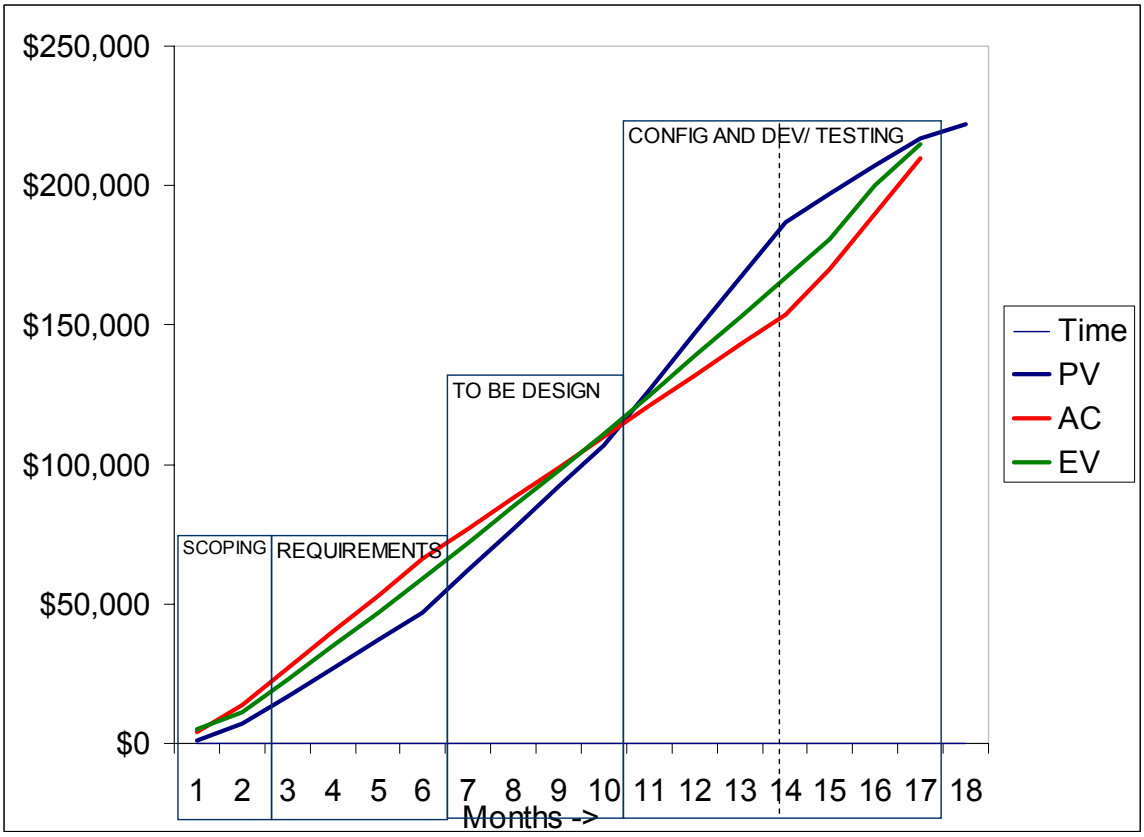
- Technical Design, Development and Testing of custom components
- Final Configuration of the package/ components – in accordance with the solution design, as per the "To-Be" processes document and Configuration plan.
- Training – 'Train the Trainer'
- System Integration Testing (Includes Regression Testing)
- UAT
- Data Migration of Master Data

Major Activities

- Technical Design and Development of all Custom components
- Final Configuration
- Training
- System Integration Testing
- User acceptance
- Data Migration of Master Data

EVM Activities

- This phase involves configuration of the actual application along with component development
- This phase has peculiar characteristics as most of the work is technical in nature and tracking such work becomes even more critical.
- The first half of configuration and development can be easily tracked using the ratios of CPI/SPI, which is a good indicator of how the work is progressing.
- Any overruns are typical in nature, and the performance indicators are a good tool for the project manager to predict the schedule and cost for this phase.
- Also, using the metrics of EAC and ETC, the estimated budgets can be forecasted reasonably well.
- The second half of this phase is spent in testing. This phase too can be tracked using the CPI/SPI indicators, since testing usually involves two critical activities -
  - Test Execution
  - Defect Resolution
- Both of the above activities are fairly predictable using the metrics available, such as execution progress measured in test cases executed per day, or in case of defects - defects resolved per day.
- The ACs and EVs start to approach closer to the PVs.
- Any deviations in this phase will result in overruns of cost and duration.



Cutover & Support

Overview

The purpose of this phase is to ensure a smooth transition from the existing legacy system(s) to the new system (installed package), and to establish a procedure for issue resolution. This includes –

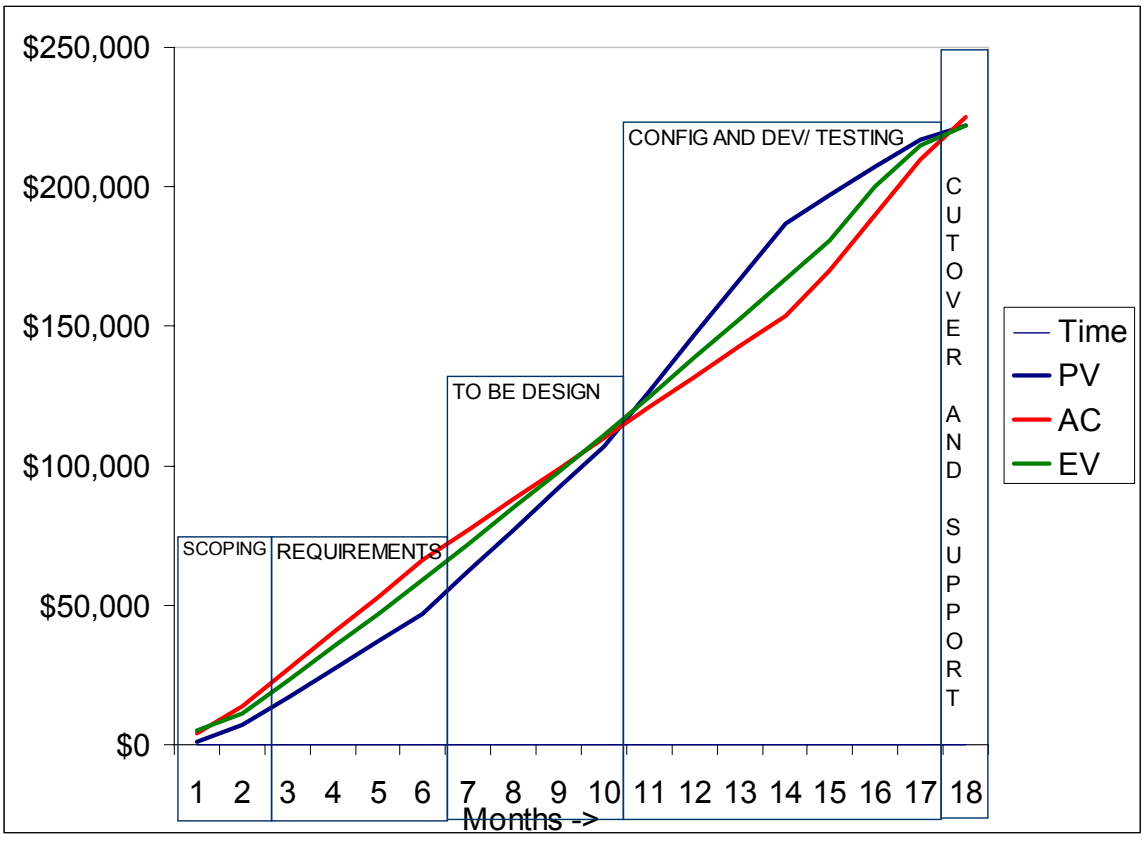
- Perform Freeze Period Activities and Cut-Over
- Verify that the activities in the 'Go-Live Check List' (system administration and establishment of Help Desk activities that need to be communicated/ coordinated to the client – including Go-Live Readiness) have been accomplished
- Go-Live and Post Production Support
- Project Closure and Sign Off

Major Activities

- Freeze Period and Cut-Over
- Verify Activities in the Go-Live Check List

EVM Activities

- This phase requires tracking all the costs and EVs to the PVs
- Most of the costs for the project have been accrued and the values have been earned.
- EAC will be approaching the BAC and ETC will be approaching zero
- SPI/CPI over the entire project can be calculated for future projects
- Lessons learnt throughout the project execution stages around earning rules, such as what rules worked better for what system/team can be documented in this phase
- Lessons learnt around the work breakdown structure, such as how much effort was spent in breaking down a task to detail versus the benefit achieved in tracking the costs at that level can be documented in this phase.
- At this point, any contingencies in the budget will be utilized or released for other projects.



Go live and Post Production Support

In this phase, the project goes live as per the cutover plan. Continuous monitoring is carried out as per the established support process. All issues are captured using the production support systems as opposed to the defect tracking systems used earlier in the project.

SPI and CPI, measured along the project duration, can be utilized for issue resolutions. Additionally, any lessons learnt in measuring the performance of the entire project execution can be passed on to the production support teams.

Project closure and sign-off

- Intimate all team members about the project closure date and obtain their concurrence for the same
- Arrange for closure meeting in consultation with PMO
- Formally announce the closure of the project and take a sign-off from the PMO

Conclusion

Often, one of the biggest challenges in ERP implementations is the absence of a measurable parameter for its success. EVM provides an excellent measurement tool that can not only help during the implementation, but also in measuring the success of one project against another. An area that EVM does not focus on is the quality aspect of the project. However, with a robust SEI Capability Maturity Model (CMM) and a quality assurance at each phase, quality of the project can also be closely monitored. EVM, along with the CMM assessments, can be a very helpful tool in successfully implementing packaged applications.

About the Author

Venu Kotamraju

(Associate Business Manager, Enterprise Solutions, Infosys Technologies)

Venu has more than 8 years of experience in implementing packaged ERP solutions. His areas of specialization include the package implementation methodology, ERP program management and core financial, order to cash and procure to pay business process design. He has an exposure to various industries such as Retail, Hi Tech and Financial services sectors. Presenting at the Oracle Application User Group conferences in US and Australia, he has also co-authored Rapid Retail Store Opening – An Oracle eBusiness Suite-based Solution.

He is a Certified PMP (PMI, USA).

He holds an MBA from IIM Bangalore, India and spent a term as an MBA exchange student at the Kenan Flagler Business School at UNC, Chapel Hill. He also holds a degree in Electronics Engineering from NIT (REC), Trichy.

Read more on this at Infosys Blog
http://www.infosysblogs.com/oracle/2008/10/earned_value_management_for_er.html