Measuring the Value of Work Accomplishment

Part Four: Managing the Baseline for Phased Projects
(i.e. IT/AD Applications)

Author's Note: This is the fourth in a series of articles on practical applications of the Earned Value Analysis concept. We will address common issues and misunderstandings about EVA and provide examples of very simple and practical uses of this extremely valuable tool.

Earned Value Analysis: Purposes and Problems

In this series of papers on practical applications of Earned Value Analysis concepts we have discussed the benefits of establishing a project baseline for the purpose of measuring and analyzing variances from the project plan. We have provided examples of simple applications; even allowing for valuable results in cases where cost management is not included in the EVA model.

Paramount to effective utilization of EVA, in any degree of implementation, is the need to establish a valid baseline and to manage the baseline for the inevitable changes without invalidating the baseline. In Part Three of this series, we discussed practical approaches to avoiding scope creep and how to incorporate authorized changes into the EVA baseline. In the examples provided, we used a contract-based project model wherein the project was primarily defined at the time of authorization and only minor changes were expected … mostly very early in the project execution.

Obviously, this contract-based model does not apply to a large portion of managed projects, especially those in the Information Technology/Applications Development (IT/AD) arena and other applications where the project scope is defined (or refined) as the project progresses.

Phased Baselining

Human nature dictates that we cannot expect people to participate in a flawed process. In the case of EVA, if the participants realize that the baseline is suspect or invalid, then how can we demand that they diligently manage the project to achieve baseline values? If the project team is experiencing rampant changes in the measurement base, perhaps 20% to 50% of original values, how can we ask them to then manage the project to stay within, say 10% of the baseline? The process becomes a farce and support for that process goes down the drain.

With the recognition that such is that nature of most IT/AD projects, does this mean that the EVA process cannot be effectively applied in this environment? The answer is an emphatic NO!

The solution lies in integrating the EVA process with the normal phased approach toward IT/AD projects. What happens in these projects is that as each phase develops, a finer definition of the phases to follow is included as part of its deliverables.

If we develop a work breakdown structure (WBS) based on the project phases, we can create an EVA model that will permit us to have the following:

1. an original EV baseline, based on the estimated scope of the project when it is authorized,

2. a modified EV baseline, based on the updated estimate at the completion of each phase,

3. a phase-specific baseline based on the latest valid estimates for each phase.

For example, let's use a phased project model that appeared in Lois Zell's book "Managing Software Projects" [1]. The phases are as follows:

1. The Kickoff Phase
2. The Sizing Phase
3. The Data Gathering Phase
4. The Implementation Modeling Phase
5. The Design Phase
6. The Coding Phase
7. Testing

Refining the Baseline

In such a phased project, it would be reasonable to assume that the project estimate and workscope would be refined as we completed each phase. Here is a way that we could deal with this phenomenon to maintain a valid EVA baseline.

1. Develop an "Original" baseline based on the project workscope as conceived at the time of authorization. This might be developed using one of the traditional estimating methodologies, such as COCOMO or Function Point Analysis. Or it may be derived from a repository of project models, perhaps applying a multiplier. In some cases, it might be a top-down authorization, just to establish a preliminary budget. For instance, the sponsor authorizes a preliminary budget of $150,000, which, based on prior experience and models, is broken down into percentages for each phase, totaling 100% for the entire project. At this time, the WBS is only two levels: Project and Phase.

2. Along with this high-level phase-based cost estimate, there should be a phase-based project milestone schedule. This will define the top-level schedule objectives and constraints at the time of project conception.

3. During the Kickoff Phase, the project review team puts the request or authorization through a vigorous review process. If the project passes review

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(some projects may not survive this initial screening), it gets placed in the project portfolio. Surviving projects will probably have modifications to scope and budget

4. Each phase may have some modifications and the next phase (Sizing) should have a detailed plan, schedule, and EV (earned value) estimate. This plan (for the Sizing Phase) should expand the WBS at least two more levels, to include the various work packages that comprise the phase and the measurable components of these work packages (often called Activities and Tasks in traditional IT/AD WBS lingo). Each item in the plan should have a budget or an effort estimate (or at least a weight factor). Any one of these three quantification values will allow you to express the relative percentage of the work item against the work package, phase, and project. All key milestones and other deliverables should be identified.

5. If you do not want to push your EVA process down to the task level, you can apply values at the work package level, or you can apply values only to the deliverables. Using the latter method can reduce the number of measurement points, but also provides a coarser analysis of progress and variances. Also, you will have to estimate the percent complete of the deliverable, or wait until the deliverable has been accomplished before recording it as 100% complete. (See part one of this series for a discussion on progressing methods.)

6. The original EV basis should be retained (Original Baseline). This will allow a comparison of progress against the original plan, for historical purposes.

7. The modifications determined during the Kickoff Phase should be documented. What are the modifications? What caused the modifications? What work changes result from the plan modifications? What is the effect of these changes on the original schedule and budget?

8. A new baseline is established for the Sizing Phase. Progress (% Complete and Actual Costs/Hours, if these are tracked) is compared to the new baseline for a valid variance analysis.

9. This stepped process (items 4 through 8, above) is repeated as each phase is accomplished. Each phase is expanded and the modified scope and budgets are incorporated into the plan for that phase. The original baseline is maintained and a new baseline is created at each phase, for practical variance analysis.

10. Essentially, what you will be doing is setting up a series of subprojects … one for each phase … that will have a reasonably valid baseline. This validity is because the baseline is established when information from prior phases allow for the definition of a sound workscope and plan.

11. At the end of each phase, or whenever the modified plan for a future phase is proposed, the new workscope and baseline should be reviewed with the key stakeholders and approved by the sponsor.

12. Remember, the policy of modifying the baseline for each phase is to incorporate reasonable and approved changes based on what you have learned from the preceding development phases. You are not supposed to modify the baseline to reflect poor performance, and to do so would fully negate the purpose and benefits from EVA. Please see part three of this series for further discussion on valid and invalid modifications to the baseline.

Example I

This first illustration represents a Project Milestone Schedule at the initiation of the project. It lists the phases of the project plus a few key milestone dates. The initial phase is broken down to include milestones and deliverables. A top-down budget, of $160k is apportioned between the seven phases. This will serve as the original baseline, but will most likely undergo several modifications before it becomes a reliable baseline for EVA.

Project Milestone Schedule - Original Baseline

Task Name	Baseline Budget	DUR	Schedule Finish	Required Date
IT/AD Typical Project	$160,000.00	200d	07/06/01	
Project Request	$0.00	0d	10/02/00	
Estb. Prelim. Sched & Budget	$0.00	0d	10/02/00	
Kickoff Phase	$6,000.00	15d	10/20/00	
Proj Assessment & Review	$4,500.00	15d	10/20/00	
Perform Prelim Risk Assessment	$1,000.00	10d	10/13/00	
Prepare Project Charter	$500.00	5d	10/20/00	
Estb. Project Baseline	$0.00	0d	10/20/00	
Proj Approval Milestone	$0.00	0d	10/20/00	10/31/00
Sizing Phase	$12,000.00	20d	11/17/00	
Data Gathering Phase	$15,000.00	20d	12/15/00	
Implementation Modeling Phase	$10,000.00	15d	01/05/01	
Desin Phase	$45,000.00	30d	02/16/01	
Coding Phase	$40,000.00	60d	05/11/01	
Installation Phase	$20,000.00	25d	06/15/01	
Testing	$12,000.00	15d	07/06/01	
Conduct Acceptance Test	$12,000.00	15d	07/06/01	
Testing Complete Milestone	$0.00	0d	07/06/01	07/15/01

IT/AD Typical Project

Benefits and Uses

Getting back to our base case, we were concerned with the practicality of applying Earned Value Analysis principles to projects with unstable baselines. On the surface, we might conclude that, when the size, budget, or duration of a project is subject to considerable change during its execution, that EVA could not be used effectively. Certainly, we make a case that a stable baseline is a design element of the EVA process.

Nevertheless, we can make a supportable case for an exception to this preference, as long as a structured and managed approach is applied to modifying the baseline as each phase is executed. In this approach, we will have multiple baselines, as follows:

There will be an original baseline, for the project and each phase, to be used for reference only. There will be a modified baseline, as each phase is reached, approved by the owner/sponsor and key stakeholders, and used to measure performance.

What we gain is a reasonably valid and up-to-date basis for measuring performance. What we avoid is the appearance of a flawed process … one in which the team is asked to be measured against an invalid baseline. To the contrary, this process actually invites the participants to examine their plan and to maintain its freshness.

Obviously, in the case of phased projects, where the details of each phase are developed as a product of a preceding phase, this stepped approach toward baselining and EV analysis is our only option.

Example II

As a result of decisions made during the Kick-off Phase, the Data Gathering Phase was expanded, with an increase of $5K to the budget and 5 days to the schedule. Also, milestones and deliverables were added for the next (Sizing) phase. The estimates for the Sizing Phase were validated and will be used for the EVA. Sponsor approved changes.

Project Milestone Schedule - Revised Baseline - Kickoff Phase

Task Name	Baseline Budget	DUR	Schedule Finish	Required Date
IT/AD Typical Project	**$165,000.00**	**205d**	**07/13/01**	
Project Request	**$0.00**	**0d**	**10/02/00**	
Estb. Prelim. Sched & Budget	$0.00	0d	10/02/00	
Kickoff Phase	**$6,000.00**	**15d**	**10/20/00**	
Proj Assessment & Reviw	$4,500.00	15d	10/20/00	
Perform Prelim Risk Assessment	$1,000.00	10d	10/13/00	
Prepare Project Charter	$500.00	5d	10/20/00	
Estb. Project Baseline	$0.00	0d	10/20/00	
Proj Approval Milestone	$0.00	0d	10/20/00	10/31/00
Sizing Phase	**$12,000.00**	**20d**	**11/17/00**	
Finalize Project Charter/SOW	$1,000.00	10d	11/03/00	
Finalize Risk Assessment	$1,000.00	10d	11/10/00	
Perform Intermediate-level Analysis	$8,000.00	15d	11/10/00	
Revise Estimate	$1,000.00	5d	11/17/00	
Prepare Plan for Next Phase	$1,000.00	5d	11/17/00	
Sign-off on Phase Deliverables	$0.00	5d	11/17/00	
Data Gathering Phase	**$20,000.00**	**25d**	**12/22/00**	
Implementation Modeling Phase	**$10,000.00**	**15d**	**01/12/01**	
Desin Phase	**$45,000.00**	**30d**	**02/23/01**	
Coding Phase	**$40,000.00**	**60d**	**05/18/01**	
Installation Phase	**$20,000.00**	**25d**	**06/22/01**	
Testing	**$12,000.00**	**15d**	**07/13/01**	
Conduct Acceptance Test	$12,000.00	15d	07/13/01	
Testing Complete Milestone	$0.00	0d	07/13/01	07/15/01

IT/AD Typical Project

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