

## Project Cost Control: The Way it Works

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In a recent consulting assignment we realized that there was some lack of understanding of the whole system of project cost control, how it is setup and applied. So we decided to write up a description of how it works. Project cost control is not that difficult to follow in theory, it is displayed in graphical form in Figure 1.

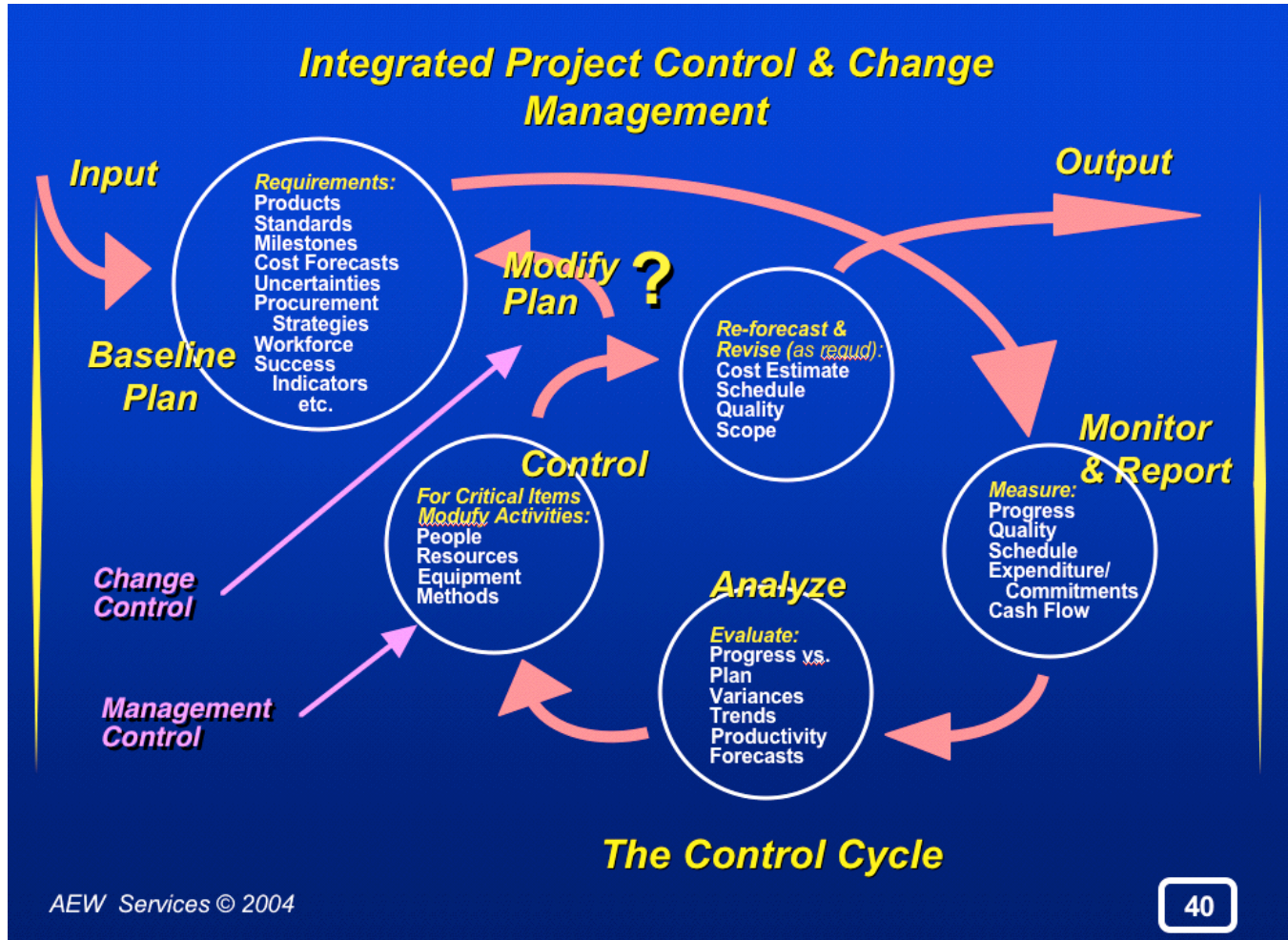


Figure 1: Cost control concept

First you establish a set of reference baselines. Then, as work progresses, you monitor the work, analyze the findings, forecast the end results and compare those with the reference baselines. If the end results are not satisfactory then you make adjustments as necessary to the work in progress, and repeat the cycle at suitable intervals. If the end results get really out of line with the baseline plan, you may have to change the plan. More likely, there will be (or have been) scope changes that change the reference baselines which means that every time that happens you have to change the baseline plan anyway.

But project cost control is a lot more difficult to do in practice, as is evidenced by the number of projects that fail to contain costs. It also involves a significant amount of work, as we shall see, and we might as well start at the beginning. So let us follow the thread of project cost control through the entire project

life span.

And, while we are at it, we will take the opportunity to point out the proper places for several significant documents. These include the Business Case, the Request for (a capital) Appropriation (for execution), Work Packages and the Work Breakdown Structure, the Project Charter (or Brief), the Project Budget or Cost Plan, Earned Value and the Cost Baseline. All of these contribute to the organization's ability to effectively control project costs.

The way it works is described in the following pages.

### ***Footnote***

I am indebted to my friend Quentin Fleming, the guru of Earned Value, for checking and correcting my work on this topic.

### **The Business Case and Application for (execution) Funding**

It is important to note that project cost control is most effective when the executive management responsible has a good understanding of how projects should unfold through the project life span. This means that they exercise their responsibilities at the key decision points between the major phases. They must also recognize the importance of project risk management for identifying and planning to head off at least the most obvious potential risk events.

#### ***In the project's Concept Phase***

- Every project starts with someone identifying an opportunity or need. That is usually someone of importance or influence, if the project is to proceed, and that person often becomes the project's sponsor.
- To determine the suitability of the potential project, most organizations call for the preparation of a "Business Case" and its "Order of Magnitude" cost to justify the value of the project so that it can be compared with all the other competing projects. This effort is conducted in the Concept Phase of the project and is done as a part of the organization's management of the entire project portfolio.
- The cost of the work of preparing the Business Case is usually covered by corporate management overhead, but it may be carried forward as an accounting cost to the eventual project. No doubt because this will provide a tax benefit to the organization. The problem is, how do you then account for all the projects that are not so carried forward?
- If the Business case has sufficient merit, approval will be given to proceed to a Development and Definition phase.

#### ***In the project's Development or Definition Phase***

- The objective of the Development Phase is to establish a good understanding of the work involved to produce the required product, estimate the cost and seek capital funding for the actual execution of the project.
- In a formalized setting, especially where big projects are involved, this application for funding is often referred to as a Request for (a capital) Appropriation (RFA) or Capital Appropriation Request (CAR).

- This requires the collection of more detailed requirements and data to establish what work needs to be done to produce the required product or "deliverable". From this information, a plan is prepared in sufficient detail to give adequate confidence in a dollar figure to be included in the request.
- In a less formalized setting, everyone just tries to muddle through.

## **Work Packages and the WBS**

### ***The Project Management Plan, Project Brief or Project Charter***

- If the deliverable consists of a number of different elements, these are identified and assembled into Work Packages (WPs) and presented in the form of a Work Breakdown Structure (WBS).
- Each WP involves a set of activities, the "work" that is planned and scheduled as a part of the Project Management Plan. Note, however, that the planning will still be at a relatively high level, and more detailed planning will be necessary during execution if the project is given the go ahead.
- This Project Management Plan, by the way, should become the "bible" for the execution phase of the project and is sometimes referred to as the "Project Brief" or the "Project Charter".
- The cost of doing the various activities is then estimated and these estimated costs are aggregated to determine the estimated cost of the WP. This approach is known as "detailed estimating" or "bottom up estimating". There are other approaches to estimating that we'll come to in a minute. Either way, the result is an estimated cost of the total work of the project.

**Note:** that project risk management planning is an important part of this exercise. This should examine the project's assumptions and environmental conditions to identify any weaknesses in the plan thus far, and identify those potential risk events that warrant attention for mitigation. This might take the form of specific contingency planning, and/or the setting aside of prudent funding reserves.

## **Request for capital**

### ***Converting the estimate***

- However, an estimate of the work alone is not sufficient for a capital request. To arrive at a capital request some conversion is necessary, for example, by adding prudent allowances such as overheads, a contingency allowance to cover normal project risks and management reserves to cover unknowns and possible scope changes.
- In addition, it may be necessary to convert the estimating data into a financial accounting format that satisfies the corporate or sponsor's format for purposes of comparison with other projects and consequent funding approval.
- In practice all the data for the type of "bottom up" approach just described may not be available. In this case alternative estimating approaches are adopted that provide various degrees of reliability in a "top down" fashion. For example:
  - Order of Magnitude estimate – a "ball park" estimate, usually reserved for the concept phase only
  - Analogous estimate – an estimate based on previous similar projects
  - Parametric estimate – an estimate based on statistical relationships in historical data
- Whichever approach is adopted, hopefully the sum thus arrived at will be approved in full and proves to be satisfactory! This is the trigger to start the Execution Phase of the project

**Note:** Some managements will approve some lesser sum in the mistaken belief that this will help everyone to "sharpen their pencils" and "work smarter" for the benefit of the organization. This is a mistaken belief because management has failed to understand the nature of uncertainty and risk in project work. Consequently, the effect is more likely to result in "corner cutting" with an adverse effect on product quality, or reduced product scope or functionality.

This often leads to a "game" in which estimates are inflated so that management can adjust them downwards. But to be fair, management is also well aware that if money is over allocated, it will get spent anyway. The smart thing for managements to do is to set aside contingent reserve funds, varying with the riskiness of the project, and keep that money under careful control.

### ***Ownership of approved capital***

- If senior management approves the RFA as presented, the sum in question becomes the responsibility of the designated project sponsor. However, if the approved capital request includes allowances such as a "Management Reserve", this may or may not be passed on to the project's sponsor, depending on the policies of the organization.
- For the approved RFA, the project sponsor will, in turn, further delegate expenditure authority to the project's project manager and will likely **not** include any of the allowances. An exception might be the contingency allowances to cover the normal variations in work performance.
- The net sum thus arrived at constitutes the project manager's Approved Project Budget.

**Note:** If management does **not** approve the RFA, you should **not** consider this a project failure. Either the goals, objectives, justification and planning need rethinking to increase the value of the project's deliverables, or senior management simply has higher priorities elsewhere for the available resources and funding.

## **The Project's Execution Phase**

### ***The project manager's Project Budget responsibility***

- Once this Approved Project Budget is released to the project manager, a reverse process must take place to convert it into a working control document. That is, the money available must be divided amongst the various WBS WPs that, by the way, have probably by now been upgraded! This results in a project execution Control Budget or Project Baseline Budget, or simply, the Project Budget. In some areas of project management application it is referred to as a Project Cost Plan.
- On a large project where different corporate production divisions are involved, there may be a further intermediate step of creating "Control Accounts" for the separate divisions, so that each division subdivides their allocated money into their own WBS WPs.
- Observe that, since the total Project Budget received formal approval from Executive Management, you, as project manager, must likewise seek and obtain from Executive Management, via the project's sponsor, formal approval for any changes to the total project budget. Often this is only justified and accepted on the basis of a requested **Product** Scope Change.
- In such a case the project's sponsor will either draw down on the management reserve in his or her possession, or submit a supplementary RFA to upper management.

- Now that we have the Project Budget money allocated to Work Packages we can further distribute it amongst the various activities of each WP so that we know how much money we have as a "Baseline" cost for each activity.
- This provides us with the base of reference for the cost control function. Of course, depending on the circumstances the same thing may be done at the WP level but the ability to control is then at a higher and coarser level.

### Use of the Earned Value technique

- If we have the necessary details another control tool that we can adopt for monitoring ongoing work is the "Earned Value" (EV) technique. This is a considerable art and science that you must learn about from texts dedicated to the subject.
- But essentially, you take the costs of the schedule activities and plot them as a cumulative total on the appropriate time base. Again you can do this at the activity level, WP level or the whole project level. The lower the level the more control information you have available but the more work you get involved in.
- Either way, the result is a curve in the shape of an "S", known (surprise, surprise) as an "S-curve". This curve (obviously) has a distinctive shape but one way only as shown at <http://www.maxwideman.com/issacons3/iac1303/sld008.htm> (see Figure 2). For an explanation as to why the S-curve is inevitably the way it is, and how to approximate its shape, go to <http://www.maxwideman.com/papers/resource/loading.htm>.

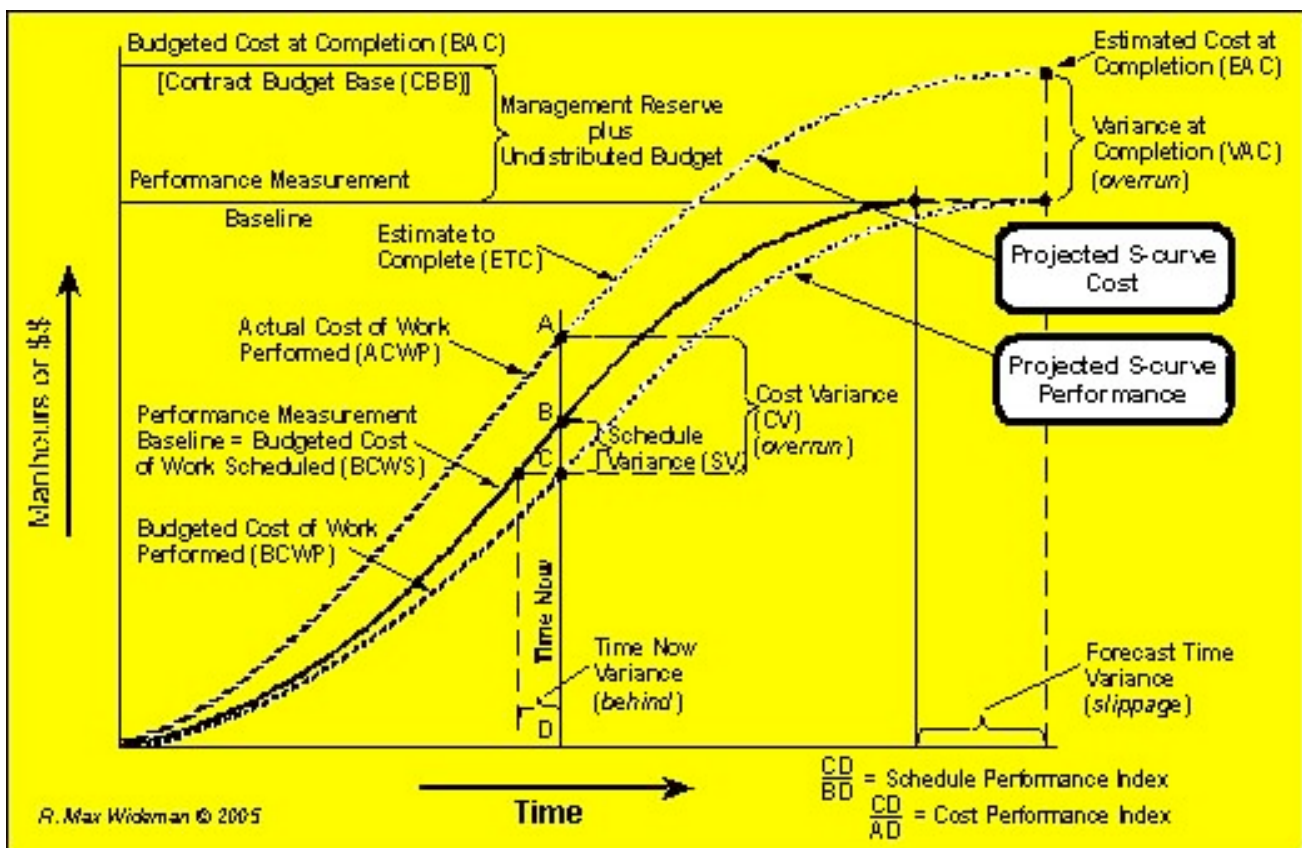


Figure 2: Earned Value concepts

## The Cost Baseline

- This planned reference S-curve is sometimes referred to as the "Cost Baseline", typically in EV parlance. That is, it is the "Budgeted Cost of Work Scheduled" (BCWS), or more simply the "Planned Value" (PV).
- ***Observe that you need to modify this Cost Baseline every time there is an approved scope change*** that has cost and/or schedule implications and consequently changes the project's Approved Project Budget.
- Now, as the work progresses, you can plot the "Actual Cost of Work Performed" (ACWP or simply "Actual Cost" - AC).
- You can plot other things as well, see diagram referred to above, and if you don't like what you see then you need to take "Corrective Action".

## Commentary

This whole process is a cyclic, situational operation and is probably the source of the term "cycle" in the popularly misnamed "project life cycle".

As an aside, the Earned Value pundits offer various other techniques within the EV process designed to aid in forecasting the final result, that is, the "Estimate At Completion" (EAC). EAC is what you should really be interested in because it is the only constant in a moving project. However, these mathematical wizardries of the EV technique are generally poor predictors of EAC simply because without knowing the shape of the tail end of our S-curve, which we invariably do not, the natural unfolding of project events are not taken into account. Therefore, these extended EV techniques must be considered in the same realm of accuracy as top-down estimating. They are useful, but only if you recognize the limitations and know what you are doing!

But, as we said at the beginning, it is a lot more difficult to do in practice – and involves a significant amount of work. But, let's face it, that's what project managers are hired for, right?