
CHAPTER 1.1

ABOUT PROJECTS AND PROJECT MANAGEMENT

Here's a familiar scene. It is played out daily, across the world. The firm finds itself with a "project." It "assigns" the project to one or more project leaders. Other people are asked to contribute to the project. The work starts. Responding to an inquiry from a senior level person, the project leader reports, "We're not sure where we're going, but we're making good time." The boss asks, "Where's the plan?" Leader responds, "Who has time to plan? We are already in over our heads." Leader continues, "Where are all the people whom I was promised?" Boss asks, "Where is the project charter? And, besides, without the plan how do we know what you need and when?"

Well, you can fill in the rest. It goes on and on and gets worse and worse. The firm is not set up to work on projects. Roles are not clear. Procedures are nonexistent. Senior management expects that projects will be staffed and managed, but has not provided any mechanism or protocols. They fail to realize that executing and managing projects is not the same as normal daily operations. Meeting deadlines, working with increased risk, using people who normally work in different departments, working to stay within defined budgets, controlling scope creep—these are special characteristics of the projects' environment. It's not "business as usual."

The firm must take steps to organize for projects. This does not mean that there must be a projectized organization. Nor does it mean that any resulting or-

ganization is intended to be permanent. But something must be done to expand from a straight functional orientation. And something must be done to add new skills and to support cross-disciplinary teams.

Just what are these special characteristics that make projects different, and that require special skills to manage? Let's look at a generally accepted definition of project management, prefaced with a definition of a project.

A Project Is

- A group of tasks, performed in a definable time period, in order to meet a specific set of objectives.
- It is likely to be a one-time program.
- It has a life cycle, with a specific start and end.
- It has a workscope that can be categorized into definable tasks.
- It has a budget.
- It is likely to require the use of multiple resources. Many of these resources may be scarce and may have to be shared with others.
- It may require the establishment of a special organization, or the crossing of traditional organizational boundaries.

With the definition, above, we should start to see why we need a different set of practices to manage projects. Here we are managing specific tasks and resources against a time-oriented set of objectives. The budgets are associated with defined work, within a specified time frame. Resources are often led by people to whom they do not report. It's not so much what we manage that is so different, but rather the way that we manage and the measurement and control practices involved in this task. There are many areas of project management, but the eight below are the major components.

What We Manage

- Workscope.
- Time.
- Resources.
- Costs.
- Quality.
- Communication.
- Risk.
- Contracts and Procurement.

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The workscope definition is key to the project management function. Without a precise and complete definition of the work, there is no foundation for the management of time, resources, and costs. There are several techniques that have been recognized to aid in the process of workscope definition. Best known is the WBS (Work Breakdown Structure). See Chapter 2.2. We also strongly advise that traditional strategic planning techniques be applied at the project initiation stage (see Chapter 2.1).

Standard routines have been established for the planning and control of schedules, resources, and costs. Usually, we use computers and project management software to aid in these tasks. Such computer-aided tools are strongly recommended, both for efficiency and standardization. Computers also aid in and improve upon project management communications. In fact, seven of the eight key project management functions, listed previously, can be substantially aided by the use of computer tools. Quality, although perhaps not directly aided by computers, is likely to have a better chance when a project is run effectively using computer tools. And it is a well-accepted doctrine that standardization is an essential element of a quality program.

Typical Planning and Control Functions

The whole process of defining the work and developing and tracking schedules, resources, and costs falls under the general heading of Planning and Control. There is a natural sequence to the steps of this function, as follows.

The Planning Phase

- **Establish the Project Objectives**

Wait! Don't turn on your computer just yet. There's some front-end work to do, first. Resist the tendency to start scheduling the work until you define it. Preface the workscope definition by performing a strategic analysis of the project. See Project Initiation Techniques in Chapter 2.1, for a discussion of project objectives and constraints and other start-up tasks.

- **Define the Work**

As noted earlier, the workscope definition is the foundation of a project plan. If you can't define the work, you can't schedule it, you can't assign and evaluate resources, and you can't define a valid project budget. Use the WBS (Work Breakdown Structure) technique to break the project down into smaller, outlined segments, until you get to work packages and tasks that specifically define the work to be done. See Project Initiation Techniques, in Chapter 2.1, for an introduction to the WBS. Also see Do You

Weebis[®], in Chapter 2.2, for important commentary on Work Breakdown Structures.

- **Determine the Work Timing**

Now that you have a list of defined project tasks, you can work on the schedule. Estimate the task durations and define the links between tasks (precedence relationships). This is the place to use the computer. Let your Critical Path Method (CPM) software calculate a tentative schedule, based on estimated task durations and precedence information.

- **Establish Resource Availability and Resource Requirements**

The first-cut schedule is probably not realistic. It assumes that there are unlimited resources available to do the work. Probably not on your job! So now we need to do two additional things. First, define the resources expected to be available. Who are they? What are their classifications? How many are there? When will they be available? Also, assign a cost rate to each resource, so we can let the computer generate a resource-driven cost estimate for each task.

Then, go back to your task list and schedule, and assign resources to the tasks. You may want to designate some tasks as resource-driven. In this case, the computer will calculate the task duration, on the basis of the defined effort (resource quantities and rate of use).

At this point, your computer will provide an illustration (resource histogram or table) of the loads for each resource for each time period. We call this resource *aggregation*. If the histogram shows periods where the resource demand exceeds the defined availability, you have choice of manually adjusting resource assignments, or using the automatic resource leveling features of your CPM software. The result of a resource-adjusted schedule is the first cut of your project resource loading plan, or your Resource Baseline.

Trap Warning! Most automatic resource leveling routines are not very efficient, leaving periods of unassigned resources where there is work that can be done. See Chapter 4.3 for further discussion on computer-based resource scheduling.

- **Establish the Cost Baseline**

If you have established cost rates for your resources, you are now in a position to develop a cost baseline, or Task Budget. You may have to add fixed (nonresource) cost to some tasks. The computer will calculate the

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estimated cost for each task, and roll it up to various levels of your WBS. Also, because the work is now scheduled, you will have a time-phased budget, usually called a Cash Flow Plan or Project Expenditure Plan. This will become a valuable baseline for tracking project performance, later.

Setting the Baseline

- **Evaluate the Baseline Plan**

So now we have a baseline schedule, and a baseline resource loading plan, and a baseline budget. What are the chances that this first pass will meet all of your project objectives and constraints? Probably, the computed project end date will be unacceptable. We can usually do something about that. Perhaps the resource demand is impracticably uneven, or has peak loads that cannot be supported. We'll probably need to tweak it a little.

- **Optimize the Baseline Plan**

Now is the time to consider alternatives. If time is a problem, look at overlapping or expediting some of the tasks. This is where we really begin to see the computer pay dividends. We can easily do what-ifs. Let the computer point out the critical path. The *critical path* is the series of tasks, in the CPM schedule, that will cause an extension to the project if there is a delay in any of these zero float activities. This is the first place to look for overlapping or expediting options.

If resource loading is a problem, you'll want to consider such options as outsourcing or resource substitution. Time, resource, and cost conflict resolution can also involve applying overtime, changing priorities, and even scope reduction.

- **Freeze the Baseline Plan**

Once you have developed an integrated plan that you can support, you'll want to set the baseline. This will allow you to measure schedule and cost performance during the execution of the project.

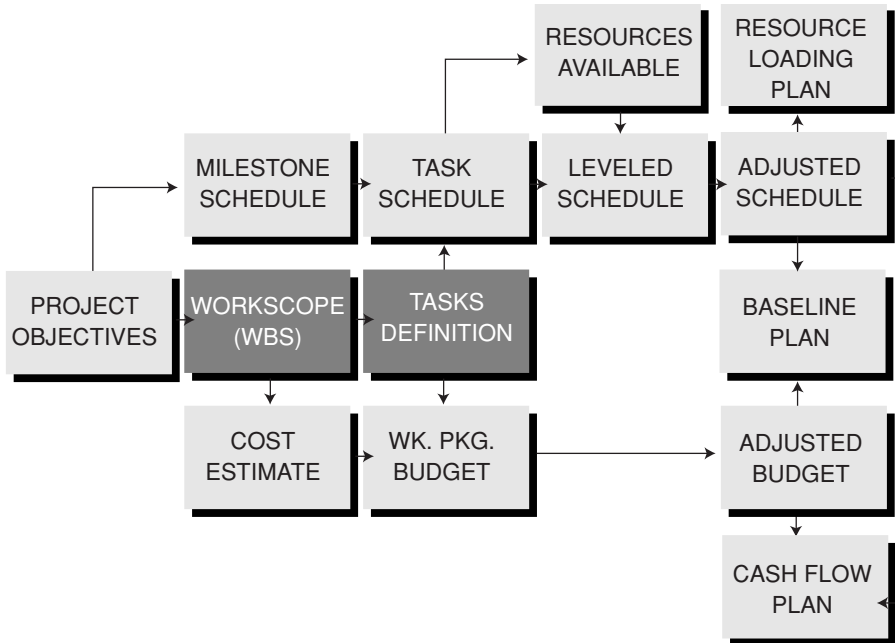
Figure 1.1a shows the traditional sequence of planning activities leading to the baseline plan.

The Tracking Phase

- **Change Control**

During the tracking phase, we will manage the workscope, the schedule, the resources, and the costs. Remember that the baseline that we recently established is like the abominable snowman. It is a myth, and it melts under pressure!

**Figure 1.1a Flow Diagram:
Steps toward Developing the Baseline Plan**



Scope change is a natural situation in projects. This is only a problem if it is not managed. Then it becomes scope creep, a really nasty situation. It is essential to establish a method of change control. When changes are introduced into the workscope, you must define the specific tasks that will be added, changed, or deleted, and the effect of these changes on time, resources, and costs. One rule to follow is that the working budget is always a task budget. The total project cost is the sum of the budgets for each task (plus contingency and margin). The task budget does not get adjusted unless there is a defined change in the task list. See Chapter 7.1 for Change Control and Scope Management.

- **Track Work Progress**

If you follow the defined process up to this point, you should derive significant benefits from your planning investment. From here on out, the process requires extreme diligence, to continue the payoff. It is fair to say that there are those who will not want to make the commitment to track the work in detail, or to track all of the project elements. For instance, you

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may want to track the work accomplished, against the schedule (that's not too hard), and pass up detailed resource and cost tracking. While complete project tracking and control involves the tracking of work, resources, and costs, there will be many situations where this level of effort cannot be supported (due to lack of expertise or resources) or cannot be fully justified. That is a management decision—not something that we can make for you. But here's what it involves.

Tracking the actual work consists of noting when a task has started and when it has been completed. Actual dates should be recorded. When a task has started, but not completed (in progress), we need to note the percent complete, and any adjustment to the remaining duration.

If you are going to do Earned Value analysis, you will need these measurements. The percent complete times the budget will give you the earned value (also known as BCWP—Budgeted Cost of Work Performed). You can compare the work accomplished (BCWP) to the planned work (BCWS—Budgeted Cost of Work Scheduled) to calculate the Schedule Variance (SV). The SV is an excellent indicator of project progress—much better than the popular (but perhaps overused) Total Float (or Total Slack). Keep a trend curve of the SV. If it starts out below target, look for improvement in future updates. Project managers who ignore increasingly negative Schedule Variance get what they deserve when the projects come in late.

- **Track Resource and Cost Actuals**

This is the hard part. If resources and costs are tracked at a different level of detail from the project CPM plan, then it is almost impossible to match the tracking data to the plan data. If you're going to use time sheets and invoices, you will have to set up charging buckets to match the CPM tasks. Easier said than done—but much easier to do at the initiation of the planning process than in midstream.

There are two benefits to doing this tracking, if you can. The first is that you will be able to measure the actuals against the plan—to evaluate performance and facilitate replanning. The second is that you will be able to collect a project history. This is the only way that you can eventually validate your earlier estimates and improve upon them for future projects.

- **Compare to Baseline**

We already discussed the Schedule Variance measurements. These compare the amount of work accomplished to the amount of work that was scheduled to be done. One application for SV is in motivating subcontractors to intensify their project efforts when confronted with a down-spiraling SV curve. There are many others.

If you're tracking cost actuals, you can also get a cost variance (CV). The

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actual cost (ACWP—Actual Cost of Work Performed) is compared to the earned value (BCWP) to compute the CV. You'll find extensive coverage of earned value analysis and performance management in Section 8.

- **Evaluate Performance**

Use your actuals measurements to track SV and CV and to analyze when progress does not support the plan. Using WBS frameworks, you can analyze the data at a high level. Where an out-of-tolerance condition exists, drill down to the details to find the source of the anomaly.

The data can be analyzed in tabular or graphic formats. The data can be produced either directly from the CPM program, or data can be exported to other applications for eventual presentation. The latter option allows for combining data from multiple sources or for adding special formatting or notation.

Figure 1.1b illustrates a Cost/Schedule Status Report. Figure 1.1c compares BCWS, BCWP, and ACWP. Figure 1.1d shows cost (CPI) and schedule (SPI) performance trends.

- **Forecast, Analyze, and Recommend Corrective Action**

There's no sense in collecting all of these data, analyzing, and evaluating, unless you're going to do something about the results. Use these data to fore-

Figure 1.1b CSSR Report

Task Name	BCWS	BCWP	ACWP	SV	CV	BAC	EAC	VAC
<i>Phase One</i>								
<i>Wk Pkg A</i>								
Task 1	200.0	200.0	250.0	.0	-50.0	200.0	250.0	-50.0
Task 2	120.0	80.0	100.0	-40.0	-20.0	200.0	220.0	-20.0
Task 3	120.0	40.0	40.0	-80.0	.0	200.0	200.0	.0
<i>Wk Pkg B</i>								
Task 10	200.0	200.0	200.0	.0	.0	200.0	200.0	.0
Task 11	120.0	160.0	80.0	40.0	80.0	200.0	120.0	80.0
<i>Phase X</i>								
Task 20	500.0	500.0	500.0	.0	.0	500.0	500.0	.0
Task 21	.0	.0	.0	.0	.0	500.0	500.0	.0
<i>Phase Y</i>								
Task Y	300.0	300.0	300.0	.0	.0	500.0	500.0	.0
<i>Phase Z</i>								
Task 30	500.0	.0	.0	-500.0	.0	500.0	500.0	.0
Task 31	200.0	.0	.0	-200.0	.0	200.0	200.0	.0
Task 32	100.0	.0	.0	-100.0	.0	100.0	100.0	.0
Task 33	100.0	.0	.0	-100.0	.0	100.0	100.0	.0

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Figure 1.1c Earned Value Performance Chart

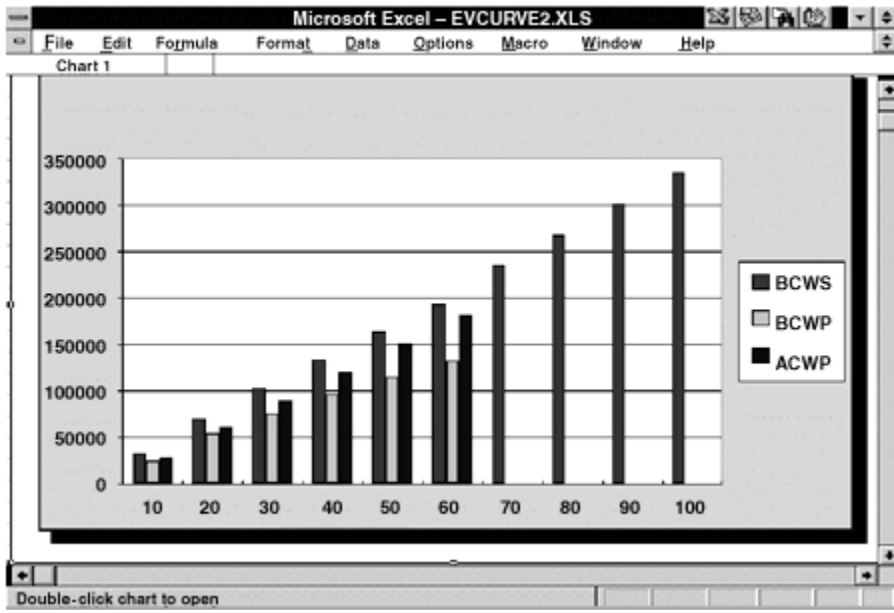
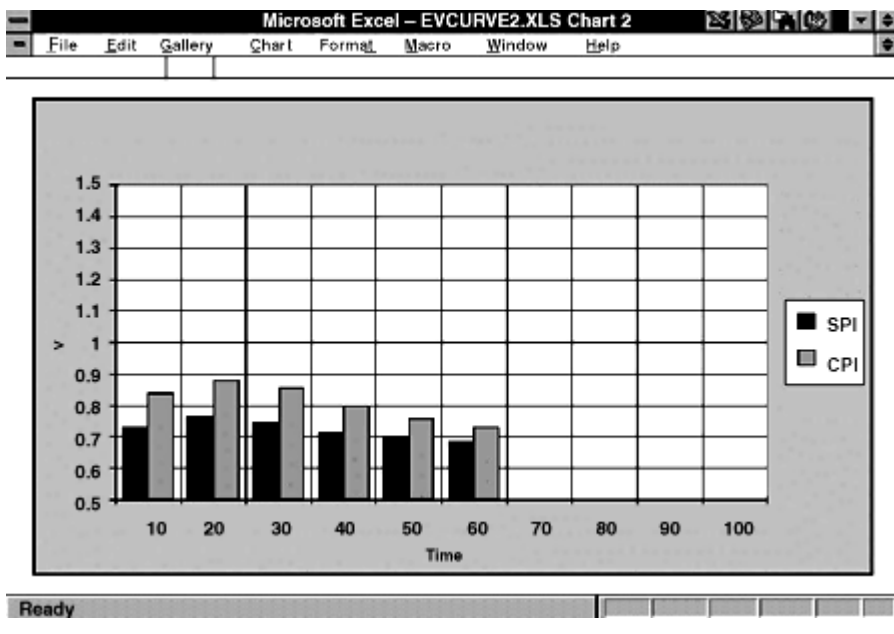


Figure 1.1d Schedule and Cost Performance Trends (SPI-CPI)

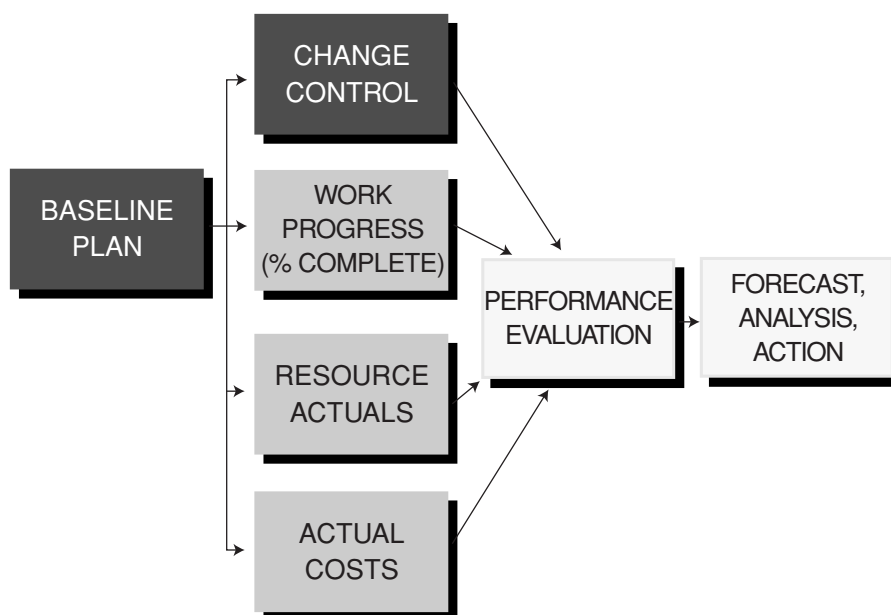


cast against key project milestones and to effect corrective action, where indicated. Establish interim milestones and trigger points. The latter are key events that occur (with adequate lead time) when there is still a window of opportunity to take corrective action or to adopt alternative strategies, when things are not going as planned.

Top management usually wants to know two key pieces of information: When is the project going to be completed? What is it going to cost? Using your computer-based ability to evaluate project performance and forecast these key items, you are in position to provide a precise and intelligent management report. You can present the forecast schedule and costs, compared to the targets. You can include a trend curve and analysis, and can focus in on trouble areas, using the drill-down capabilities. And you can report on pending corrective action and the expected effect of these alternatives (using what-if analyses).

Figure 1.1e shows the typical activities associated with change management and for tracking a project that is in progress.

Figure 1.1e Flow Diagram: Tracking Steps



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Summary

The functions involved in planning and control of projects, as previously described, are just a part of the scope of project management. Add to this some of the soft skills, such as managing resources who report to other managers, using temporary or outsourced personnel, communicating with a wide span of involved or concerned individuals, on several levels, and satisfying multiple stakeholders, the task becomes rather large and specialized.

Each of the functions is discussed in detail later in this book. For now, we wish to consider the implications of these challenges on the organization, and address issues in organizing for project management. These are addressed in the following chapter.