5

Preparing the Project Budget

In every operation there is an above the line and a below the line. Above the line is what you do by the book. Below the line is how you do the job.

—JOHN LE CARRÉ, *A PERFECT SPY*—

''I don't get it,'' one manager complained to another. ''No matter how carefully I budget, my projects always run over. Even when I add a little extra, it gets used up.''

The other manager responded, ''Maybe you should get out of the business world and go into politics.''

If budgeting at any level mystifies and frustrates you, you're in good company. But remember, a budget is only an estimate, and you impose too high a standard on yourself if you expect actual results to match your estimates. The budget is only one of many management tools that you can use to set a standard for measuring results.

Since you do not have a crystal ball for predicting the future, you can only calculate the best possible estimate of expenses based on a reasonable schedule, the resources available to you, and management's

expectations. These elements, when properly coordinated, support the development of a realistic budget to guide you through the project maze.

Budgeting Responsibility

The budgeting process creates pressure not only for project managers, but also for departments, divisions, and subsidiaries. There is an implied test of fiscal success built into the budgeting process: If you meet or come in under the budget, you are assumed to be doing a ''good job,'' and if you exceed the budget, you're not.

This is both unfair and unrealistic, even though the assumption is widespread. First of all, a poorly developed budget contains one of two flaws:

1. If expenses are unrealistically low, then failing to meet the budget is not a failure, but a conflict between reality and a poorly drafted budget.

2. If the budget contains generous allowances above a realistic level, then coming in under the budget reveals nothing whatsoever, except that the budget was set at too high a level.

The real purpose of a budget is to set a standard for spending based on the best information you have today—not to meet or come in under that level, but in order to have a means for judging results. When variances occur, it could mean that the budget was in error, or it could mean that expense levels need to be reviewed and brought under control. If you are given a budget that is not unrealistic, it is unfair to hold you to the standard. This problem arises when budgets are imposed on project managers without going through a realistic analysis of expenses that should be expected to occur.

It makes absolutely no sense to use a budget that's been developed without studying the scope of a project. As project manager, you need to develop your own budget for three reasons:

1. ***You are responsible for explaining future project expenses and cost variances.*** This is possible only when the budget is sensible and based on realistic assumptions.

Other Resources

A series of free articles about project management budgeting can be read or downloaded from the website of Resource Management Systems, Inc. (www.rms.net/project_budgeting_r_pbd.htm).

2. *As project manager, you are in the best position to know what the project should cost.* Your budget is a financially stated goal, and it serves two purposes. First, it provides a means for measuring expenses throughout the project; second, it helps you to measure your own performance as project manager.

3. *You must be able to develop assumptions that support the budgeted numbers.* For your variance analysis and explanation to make any sense, assumptions have to be sensible as well. This is the only way to budget effectively.

Project budgets are developed, monitored, and acted upon differently from budgets for individual departments, subsidiaries, or the whole company. This is so because:

■ *Projects are nonrecurring.* Department budgets are prepared annually and often revised every six months (or more frequently). Project budgets are finite, and the budgets are not tied to the fiscal year. (One exception is for the long-term project; when the project term exceeds a full year, its budget could be incorporated into a department's annual budget.) For most projects with a duration under one year, revisions make no sense unless significant errors are discovered in the original budget, or when changes are made to the scope of the project.

■ *You have more direct control.* Department budgets often are coordinated between several departments. Fixed expenses may also be allocated among several departments or divisions. However, decisions concerning systems and personnel often are out of the hands of department managers. Projects, however, involve budgeting on two levels.

First is the use of existing resources—personnel and assets—that have been budgeted already at the department level; second is the limited use of outside resources that will not be permanent. When you add a new employee to your department, that's a permanent increased expense to your budget; an additional employee added to your project team is temporary, and usually you'll call upon an employee already on the payroll.

■ *The success of the budget is tied to scheduling and resource performance.* The success of your project budget depends on how well you set and enforce your schedule and each of its phases, and on how well your core team adheres to your schedule. If a phase is delayed, your budget will reflect an unfavorable variance (assuming that payroll expense is separated out from the department's budget and that the project's resource use is measured within your budget).

■ *The cost and profit factors for projects may be more apparent than the same expenses on the departmental level.* Unfavorable variances in your project budget may be subject to more scrutiny than similar or even more apparent unfavorable variances within the department. Because the department budget is considered part of a larger companywide budget and forecast, variances might be overlooked, absorbed by offsetting numbers in other departments, or accepted as inevitable—especially if a department's budget is prepared by a different department, meaning the manager has no control over that budget. But as a project manager, you may be held accountable to a greater degree because you are responsible for achieving the goals of the project. That means not only getting the desired result by the deadline, but keeping to the budget as well.

It's true that the same standards should apply to each department manager. Ideally, the manager should develop the department's budget and then be held accountable for variances. In practice, however, a company may not exercise the level of follow-up that would make budgeting effective. Few companies allow department managers to participate in their budget's development to the degree that accountability would even be possible. The more common practices include having the accounting department prepare department budgets, or having managers prepare preliminary budgets, with executive-level changes to follow. Both of these practices, while common, make no sense.

For project managers, the opportunity to have more control makes budgeting far more interesting. However, that also means that you will be expected to explain why your actual expenses exceed the budget. As a project manager you may be required to handle variance reporting in a much different way than you would as a department manager.

Checklist: Effective Budgets

In preparing your project budget, remember its purpose: to provide limitations and goals that can be monitored. Bringing a project in at or below budget is just as important as it is for expenditures in a department or a division. The budget is too often a mechanical exercise that is not taken seriously or employed properly. It is intended as a measuring device; no project is going to be approved with an unlimited budget, and a properly prepared budget should provide you a means for control.

Keep these principles in mind to create an effective project budget:

1. *The budget has to be realistic.* There is no point in taking the time to prepare a budget unless it realistically describes what your project is going to cost. Some organizations assign a project and a budget without knowing what is involved; this is a mistake. As project manager, your budgetary responsibilities are part of your responsibility. This means that a budget that does not reflect reality is useless.

2. *The more detailed the budget is, the better the project will be.* Break down the costs and expenses of the budget in great detail. Pay close attention to the most important budget item: labor. Too often, project budgets are reflected in a single lump sum, and as a result of having no line items, the control element is lost. You need to know how the budget is going to be spent in order to monitor your own progress.

3. *The budget term should be tied to the project completion month, not to the business cycle.* A common error is to prepare a budget in conformity with a departmental or segment budget. So it ends at the finish of the fiscal year or the next quarter. But every project has its own completion cycle that does not conform to the fiscal cycle.

So be sure your budget reflects the timing of the project schedule, not the better known quarterly or annual organizational budget.

4. *Cost and expense items should be itemized by budget phase.* Just as a departmental budget is itemized by month, your project budget needs to be broken out by completion phase. So you need to know not only how the budget is to be spent, but also when. This is an effective method for judging the schedule itself. Staying on schedule normally keeps labor costs down, whereas time overruns invariably increase labor costs. Naturally, this creates negative budget variances in labor. So in this regard, the phase-specific budget can work not only as a financial management tool, but also as a means for enforcing the schedule.

5. *All underlying budget assumptions should be written down and explained.* Many budgets fail because no one really knows how the numbers are developed. If you expect to be able to understand the causes of any budget variances, you need to write out the assumptions. For example, in the labor category, you need to document the hours and costs for each team member in each phase. If a phase runs over these estimates, you will know where the budget fell short or where costs ran over budget.

6. *When uncertain, include a reserve in the budget.* Many project phases are going to involve cost elements you cannot identify in advance. These tend to emerge as the project progresses, so how do you budget for them? It is never effective to include an expense buffer merely to provide for uncontrolled overruns, but when a phase of the project cannot be fully understood in advance, it is appropriate to create a reserve. This will allow you to create a basic assumption about future phase costs, even if these will have to be revised later as more facts are revealed.

7. *Prepare a variance report, identify the causes of budget problems, and fix them.* Some budgets include the periodic routine of comparing budgeted items to actual and detailing the variances. But these are of only limited value unless two additional steps are taken. First, the variance needs to be analyzed in the context of the original budget's assumptions. Second, discovered flaws in budgetary controls have to be fixed or, if the flaw is in the original assumptions, the budget

has to be revised. This analysis should be performed at least once per month, and certainly at the conclusion of each project phase.

8. ***If your budget turns out not to be realistic, do a revision.*** Many budget revisions are undertaken primarily because cost overruns are excessive. This is not a good reason for a revision, especially if management steps could reduce those costs and bring them into line. However, if and when you find that your project budget is not realistic, a revision should be prepared for the remaining phases. Remember the reasons to prepare a budget: to control costs and expenses, to focus on controllable variances and fix them, and to provide yourself with a financial measurement of the project.

Labor Expense: The Primary Factor

In any discussion of a project budget, top management's first question is, "What will the project cost, and is that reasonable?" If the project is optional, the decision to proceed will probably be based on cost rather than the desirability of having the end result.

The only way to know the cost of the project in advance is to identify the actual expenses. Remembering that your budget is no more than an estimate (an educated guess, in other words), be sure to include labor expenses—the cost of paying members of your team. Although labor is often the largest portion of the project's cost, it often is left out entirely. The thinking is that because existing staff members are used on the project, the payroll expenses occur anyhow—why calculate them for the project? The answer, of course, is that the hours worked on your project are hours taken away from other duties. Labor is a very real expense, even if it remains hidden in a department budget. To calculate the feasibility of doing the project, labor should be counted.

Example 1

A project manager is asked to estimate the expense of hiring an outside consultant, researching historical financial results, and leasing equipment needed for the project. In addition, she is authorized to recruit a team of five employees from other departments. However, payroll for those core team members is not included in the budget.

The real cost of this project depends largely on the time required

to complete tasks, and most of that work is going to be performed by employees. In this situation, management does not gain a true picture of the project cost because the most significant cost element is excluded.

Here are three recommendations for project budgeting where labor is concerned:

1. ***Don't overlook the labor expense portion of your project.*** Even when team members come from within the company, and even though payroll is already budgeted in a departmental budget, the only way to know what a project costs is to include labor. This is true even if labor expenses are developed on a footnote basis; it is important to calculate and report the real project cost.

2. ***Don't add a "fudge factor" to labor—or to any other segment of your budget.*** Remember, the purpose of your budget isn't to end up within the budget, but to estimate as accurately as possible what it is going to cost. Fudge factors are meant to protect against unfavorable variances, should they occur. But such approaches are contrary to the intended purpose of budgeting.

3. ***Develop your labor estimate before selecting your project team.*** Labor demands for each project phase dictate the needed size, scope, and capabilities of your team. Estimate total hours required for completion of each phase, broken down by individual. Use a worksheet, such as the one shown in Figure 5-1, to document the hours you require. This defines your resource pool, or your core team needs. You may also need to adjust this estimate after meeting with team members.

Example 2

The manager of a technical support department has several recurring tasks to execute: developing and modifying internal systems, writing documentation, and training employees. The manager was recently given a project assignment to develop user procedures for a newly installed database system used by several processing departments. The manager needs to create a budget and schedule, and has broken the project out into seven distinct phases. Team members are identified as follows:

Figure 5-1. Preliminary labor estimate worksheet.

Project: _____

TEAM MEMBER	PHASE						
TOTAL							

- One employee from the processing department

- One employee from the systems development department

- Three employees from the technical support department, with responsibilities broken down into areas of responsibility for research, documentation, and testing

The manager develops a preliminary estimate of hours required for each of the seven phases. The preliminary estimate looks like this:

Preliminary Labor Estimate (Hours)
Project: Automation, Processing Unit

Team Member	Phase						
	1	2	3	4	5	6	7
Project manager	23	22	8	25	30	24	40
Processing unit	6	18	25	10	5	0	0
Systems development	20	25	25	20	10	5	5
Research	15	15	20	5	0	0	5
Documentation	0	0	10	10	15	20	35
Testing	0	0	0	5	25	15	10
Total	64	80	88	75	85	64	95

Both the estimate of hours and the schedule itself are subject to revision once the team members have reviewed and added their suggestions.

Additional Budgeting Segments

Many projects are characterized exclusively by the labor factor, especially when all tasks are administrative. Management makes a mistake by expecting project costs to be absorbed within a departmental budget without at least studying the cost, both to determine whether it makes sense to proceed and to estimate whether the project is proceeding within budget.

Additional budgeting is required whenever resources and facilities beyond labor will also be involved. Additional budgeting may be required for:

■ *Fixed overhead allocation.* Some companies decide to allocate overhead expenses to departments and may also assign expenses to projects. This is most likely to occur on long-term projects that exceed a single fiscal year, when the project operates much like a department.

Fixed overhead allocations are random by nature and done by formula. For example, departments may be allocated a portion of utilities and maintenance on the basis of square footage in their department or the number of employees. Allocations don't make any sense for projects if, in fact, the project manager's department has already been allocated a portion of fixed overhead. However, if your company's accounting department uses a full cost accounting approach, you may end up having to budget for allocated expenses.

■ *Variable expenses.* Some projects are subject to the same accounting formats used in departments. This means that project-related expenses are broken out and reported apart from the usual department expenses. A long-term project or series of related projects may even be assigned its own cost center in the company books; this is not at all unusual. In this instance, you must budget for variable expenses, both by phase and for the entire project. When a separate cost center is

established, your project will be expected to conform to the reporting norms of other cost centers, specifically departments.

■ *Special expenses.* A third area you may need to include in your budget is for special expenses. These costs depend on the nature of your project. For example, you may need to hire an outside consultant, use an independent research company, or lease equipment. Some internal departments will contribute to your project in ways other than providing direct labor. Systems development may supply automated services for testing and running data, for example. If departments break down their nonlabor services by cost, you may need to include those costs in your budget.

It is also possible that a project will require a capital expenditures budget. For example, if your project involves comparing costs and benefits of assets and then purchasing the best ones for use in your company, you'll need to estimate the cost of acquiring assets. In this case, the end result (i.e., asset acquisition) may itself be a budget item.

When a series of projects begins to take on similar attributes, the projects can be executed by formula. They then become more routine than exceptional, and your project management duties begin to look more and more like a departmental operation. Even so, unless your project work actually evolves into its own department, your projects are most likely to be budgeted individually.

Because the majority of projects are unique, you will probably find the budgeting process frustrating. Not only do you need to account for fixed and variable expenses, you'll also discover that some of those allocations are not actually controlled or spent by you. They are merely entries made to account for costs when the real spending occurs in a department. The purpose, once again, is to show what the project costs, not what you have spent. As important as it is to conclusively show the total cost of a project, when you are provided no real control over spending levels, budgeting becomes an exercise in analysis. However, this is a necessary part of the project management routine. Unless your project is of such scope that management is willing to set up a temporary cost center and provide you with your own staff and budget,

the project budget will never be as easy to calculate as the budget of a department.

Budgeting Each Phase of Your Project

An effective project budget enables you to monitor progress at each phase and identify exactly when and why actual expense levels vary from your estimate. Thus, your budget is best constructed and defined phase by phase.

All of your budget elements—labor, fixed expenses, and variable expenses—vary according to the requirements of each phase. Some phases will move along quickly and require minimal team involvement and little or no expense. Others will demand many staff hours, involve the use of external resources and facilities, and require more careful monitoring.

To identify problems expressed as budget variances, you need to match actual results to the assumptions underlying your budget. If you assume that a particular phase will require fifteen hours from an outside consultant, but it actually comes in at twenty-two hours, you will be able to identify the exact cause of the variance.

Breaking down your budget by phases also allows you to identify timing problems, time overruns, and miscalculations of the scope of a particular phase. The breakdown is mandatory for budget monitoring. Some expenses may come in under budget while others run over. Some expenses will occur earlier or later than expected. Identifying the causes of variances requires matching original estimates of phase completion costs with actual outcomes.

If your project is set up with labor as the major expense factor, then actual hours spent should also be matched to the percentage-of-completion of the whole project. In other words, if 30 percent of total labor hours are budgeted for the first four phases, a variation from that match could spell a budget problem in future phases as well. Labor hours and costs can serve as the central point for budget monitoring.

Example

In the preliminary labor estimate of your project, seven phases were identified, with estimates for total labor hours per phase. To identify

the budgeted percentage-of-completion level for each phase, divide the number of hours in each phase by the total estimate of labor hours and round to the nearest full percentage, as follows:

Phase	Hours	Percentage (%)
1	64	12
2	80	14
3	88	16
4	75	14
5	85	15
6	64	12
7	95	17
Total	551	100

Assuming that nonlabor expenses will follow labor trends, the rest of the project budget can be designed along labor-hour lines. When expenses occur at levels different from the labor trend, a variance report should be footnoted to explain the discrepancy. However, if you know in advance that a particular expense won't follow the labor trend, that information can be separated out. For example, if you plan to hire a consultant for the first phase of the project, it makes sense to include the budget for that expense in the first phase rather than spread out among all phases.

A percentage-of-completion variance report is prepared on the basis of project phases completed to date. A worksheet for this type of variance report is shown in Figure 5-2.

The estimated percentage-of-completion for each phase is cumulative. Thus, in our example, at the end of phase two, completion should be at 26 percent (12 plus 14); and at the end of phase three, it should rise to 42 percent (12 plus 14 plus 16).

Taking this a step further, let's assume that the project's budget is broken down into these groups:

Labor	$8,200
Variable expenses	1,250
Consulting	2,000
Total budget	$11,450

Figure 5-2. Variance report worksheet.

Variance Report

Date: _____

Project: _____

Completion: _____ %

Description	Budget	Actual	Variance	
			Amount	%
	$	$	$	%
Total	$	$	$	%

A completed worksheet at the end of the third phase (i.e., 42 percent completion) may look as follows (amounts have been rounded to the nearest $25):

Variance Report

Date: 5/31

Project: Automate processing unit

Completion: 42%

Description	Budget	Actual	Variance	
			Amount	%
Labor	$3,450	$3,135	$ 315	10.0
Variable expenses	525	615	(90)	(14.6)
Consulting	840	0	840	100.0
Total	$4,815	$3,750	$1,065	28.4

The Budget column is computed by multiplying the total budget by the indicated percent completed (i.e., 42 percent). Actual expenses to date

are compared to project-to-date budget. A favorable variance (i.e., when actual is lower than budget) appears without parentheses; an unfavorable variance (i.e., when actual exceeds budget) is shown in parentheses. (In this example, the consulting expense is assumed to be budgeted in early phases, but payment for those services has not yet been made). Variance percentage is the variance amount divided by the actual column.

Accompanying this variance report is a full explanation of variances in each category. For example, the labor budget explanation may be broken down by team member and with an analysis of phase completion levels versus original assumptions.

Remember that the purpose of this exercise is to identify potential problems. The overall variance can be meaningless unless its components can be isolated and identified. As project manager, you may not need to formalize the process of variance analysis unless your project involves a large budget and many team members. The report examples provided in this chapter are intended to demonstrate how the analysis occurs, not the precise format required in every case.

To study labor variances by team member or, more precisely, by function performed, break down actual versus budget and perform the same comparison you used for the total budget. An example follows:

Labor Variance (Hours)

Team Member	Hours, Project-to-Date		
	Budgeted	Actual	Variance
Project manager	53	37	16
Processing unit	49	42	7
Systems development	70	61	9
Research	50	71	(21)
Documentation	10	8	2
Testing	0	0	0
Total hours	232	219	13

The initial three phases required less time than anticipated for organizing and defining automation requirements. This was offset by higher than expected research time demands.

The example used here shows how and why labor variances occurred; it also shows that variances can be absorbed during future phases, or that miscalculations in original estimates cause variances in many instances. The problem may not be limited to completed phases but may continue through additional phases as well. You may also discover that a final deadline will not be met because of overruns in the hours required for particular functions (such as research in the aforementioned example).

The hours variance is fairly easy to analyze; the study can also be translated into dollar amounts if necessary. If you are required to report your project's budget variances as part of a periodic review, it will be necessary to report the dollar amounts of variances in labor.

Budgeting Controls

Variance reporting may occur in two ways: You can present a report summarizing the status of your project, with explanations of variances (provided to management as part of the oversight function), or you can use the procedure yourself to track the budget and take corrective action where possible. The latter is an important part of your project management routine even if you are not required to make interim reports during the execution of the project.

Here are some examples of budgeting problems you may encounter, with corrective actions you can take.

Labor Expenses Exceed Budget

The cause of this problem may be that phases are taking longer than you anticipated. Several actions may be appropriate:

Solution 1: Examine the budgets for remaining phases to determine if they are realistic. If not, revise the entire budget to reflect a realistic likely outcome.

Solution 2: Determine whether any unfavorable variances can be absorbed in future phases. In some cases, project-to-date variances are the result of advance work for future phases. In this instance, the variance is nothing more than a timing problem.

Solution 3: Check your level of supervisory involvement. It may be necessary to work more closely with core team members to ensure that they are working efficiently.

Variable Expenses Exceed Budget Levels

This problem may occur because original assumptions were wrong, or because you are not exercising appropriate control over spending. Consider these actions:

Solution 1: Check original assumptions against experience to date. Are the assumptions still valid? If not, revise the budget.

Solution 2: Determine whether any of the expenses to date will be absorbed during later phases. If so, the variance is due to timing differences.

Solution 3: Initiate needed controls just like you enforce spending limits in your department. For a long-term project, controls could involve preapproval of requisitions or check requests.

Expenses Are Lower Than Budget, and Not Due to Timing

Some project managers budget conservatively in their departments yet build in safety levels in their project budgets. This, too, can be problematic and requires corrective action:

Solution: If you have added a "fudge factor" in your budget, revise it and remove the excess. The fudge factor defeats the purpose of project budgeting. Your budget isn't meant to anticipate actual spending levels, but only to establish an assumed reasonable level for the purpose of future comparisons. Thus, a safety factor prevents you from exercising any meaningful controls.

. . . .

Remember, it is the nature of budgets to become increasingly inaccurate as time passes. They are nothing more than your best estimate. You should never expect actual expenses to match your budget. However, that budget can be used as a standard for judging how well you are able to control expense levels throughout your project. Your purpose in estimating expenses is not to know ahead of time how much you are allowed to spend, but to create that standard.

WORK PROJECT

1. You are preparing a labor budget for your project. You have defined four separate phases, and your team contains five members. The following table summarizes your initial estimate of hours. What is the percentage-of-completion for each phase? Show individual phases and cumulative percentages.

| | **Phase** | | | |
Team Member	**1**	**2**	**3**	**4**
1	10	15	15	25
2	8	8	6	12
3	0	15	25	20
4	0	20	20	25
5	10	5	10	15
Total	28	63	76	97

2. Your team members earn varying amounts on a per-hour basis. Those amounts are broken down and presented in the table that follows. Calculate the total dollar amount of labor budget for each phase of the project.

Team Member	**Hourly Payroll**
1	$20.00
2	15.00
3	18.00
4	9.00
5	10.00

3. You have estimated a total of $2,800 for nonlabor expenses during your project. Based on labor percentage-of-completion (hours), what is the nonlabor budget for each phase?

6

Establishing a Schedule

*We are continually faced with a series of great opportunities
brilliantly disguised as insoluble problems.*

—JOHN W. GARDNER—

The project manager called a team meeting for 9:00 A.M. the next morning. ''Don't be late,'' he said sternly. ''We'll be discussing the project schedule.''

The team assembled promptly at 9:00 as instructed. But the manager was nowhere to be seen. At 9:20, one of the team members called the manager's home and asked for him.

''He'll be a little late this morning,'' the manager's wife explained. ''He missed the bus.''

Your project ran over budget, you didn't have the right people on your team, and you missed the final deadline. In fact, you went on vacation so you wouldn't be there when your boss found out.

If this describes your experience with projects in the past or your fear about future ones, then you need to find effective ways to plan and

control your schedule. In a sense, the schedule is a budget for time. If you do not plan, coordinate, and control the schedule, you probably will not make the final deadline, either. Scheduling techniques, when applied in the project environment, can help anticipate and solve problems, get the team working together, and advance each project with the final deadline in mind.

In creating a schedule, you will need to apply five skills:

1. *Task definition and team function.* Every task is related to a series of other tasks in a project's phase, and each phase is related to all other phases. In addition, every team member's efforts affect every other member's. This means that exceptional work helps, but slow, incomplete, or error-prone work hurts everyone else. To succeed with your schedule, you will need to define carefully each task and how each team member functions as part of the overall team.

2. *Risk management.* Remember that risk exists everywhere and by definition is invariably a surprise. The degree to which you are able to anticipate risk and then prevent it or mitigate its effects will ultimately determine how well your project succeeds. As project manager, you need to be continually aware of this and to look for potential threats to the smooth operation of your schedule.

3. *Organization of tasks in detail.* In the next chapter, the concept of Work Breakdown Structure (WBS) is examined in detail. The greater the effort you put into defining tasks as an outline of the project, the greater your chances will be of (a) creating a realistic schedule, (b) completing each phase on time, and (c) responding to delays to get effectively back on schedule.

4. *Realistic time estimates.* Just as expense budgeting is uncertain, your estimate of the time required to complete each task and each phase is going to determine whether you can complete your project on time. In other words, the more time you invest in creating scheduling assumptions, the more likely it will be that your schedule will work out.

5. *Effective use of resources.* Some projects can be operated with a small, local team. This is fairly easy compared to a broader proj-

ect involving many outside resources or remote team members. In either case, project management and scheduling rely heavily on your ability to effectively identify, call upon, and apply all of the resources you need. This usually means personnel in the form of team members but may also include outside expertise and even nonpersonnel resources (equipment or information technology data, for example).

The Scheduling Problem

If you could work as a team of one, you wouldn't need to coordinate other people's efforts and phase deadlines. Instead, you could plan, control, and achieve the end results of the project all on your own.

When working with a team, however, your schedule is the ''crunch point'' for the whole team. Their networking requirements work on at least three levels: with one another, with you as the project manager, and with their recurring departmental tasks. Even at the beginning of your project, the schedule can get off track. For example, the entire core team may agree on your schedule and proceed with phase one, but it would take only one unexpected delay to throw off the entire schedule. Without your continual supervision, such delays certainly arise. Even when you supervise carefully, you need to be prepared for the unexpected.

A small delay within one phase would not be a problem if the shortfall could be absorbed within subsequent phases. But chances are that a single delay near the beginning of the project will carry over in further delays affecting all phases yet to come. Keep these five important points in mind concerning delays:

   1. *Every delay affects scheduling for the remainder of the project.* Some projects start out with chronic delays from the very beginning. If you don't begin phase one on the scheduled start date, you have already encountered a problem that is likely to carry through to other phases. Be sure that your schedule is realistic and then follow it faithfully. Your ability to keep the project on schedule is a real test of your project management abilities.

2. *To meet your deadline, the delay has to be absorbed in a later phase.* It's always desirable to build a little flexibility into your schedule by allowing more time than you think you will need for completion. However, when a deadline has been imposed on you, that luxury is not always possible. Chances are you'll have enough problems meeting the deadline without any opportunity for moving delays to future phases. If a delay takes place in an early phase, your team will have to make up the lost time somewhere along the way.

3. *It's always desirable to meet the final deadline, unless that means the outcome will be incomplete, inaccurate, or otherwise short of the desired result.* To make up for a delay, you may need to accelerate the team's work schedule, look for shortcuts in the original plan, or put in more core team hours. So delays usually translate into labor budget overruns. Your goal should be to meet the promised deadline unless that means cutting down on quality and thoroughness of the result. Your project should end up with the highest possible quality report, implemented procedure, or other outcome— even if that requires asking for a deadline extension.

4. *Staying on schedule and meeting the deadline is the project manager's job.* If you miss your deadline, you may be asked for an explanation. Remember that delays are your responsibility, regardless of the cause. Project managers are expected to monitor progress; in fact, that should be high on the list of your functions in that role. You also are expected to anticipate problems before they create delays and take action to offset those problems. Never blame team members or outside forces for delays when explaining missed deadlines; you are the project manager and that responsibility goes with the job.

5. *When schedule delays are beyond your control, the final deadline has to be kept flexible.* Some projects require interim review and approval before you can proceed. For example, your project might proceed to a point where a preliminary report is prepared and submitted for approval. If your supervisor does not get back to you by a deadline, then the final deadline for your project has to be pushed forward. In developing your schedule, keep in mind which deadlines are within your control and which ones are not.

Your initial schedule can be summarized in chart form, which helps you to visualize the progress of each phase. Visualized schedule control is an effective tool for project managers. It also helps your core team to understand and to see how the project is progressing against the schedule. Your chart should report both planned and actual timing of phase completion, and it serves several purposes:

■ It works well as your primary tracking tool, especially in the early phases.

■ It provides core team members with scheduling guidance, which works as a visual expression of your project goals.

■ It gives everyone on your team an ongoing view for spotting and overcoming emerging problems.

The schedule chart also helps you monitor your project methodically—a task that, without some form of planning aid, is formidable. The overall scope of a project can be complex; charting the phases helps isolate and solve problems while keeping the entire schedule moving along. The final deadline can be met only when you also meet a series of smaller deadlines along the way, which also means absorbing small delays as a means of avoiding big ones.

The Gantt Chart

Initial scheduling is effectively planned and tracked by the use of the Gantt chart. This device, also called the timeline chart, was developed and used by industrial engineer and management expert Henry Gantt.

Gantt worked with the Army Bureau of Ordnance during World War I, when he was faced with the task of controlling munitions production. He realized that by breaking down the process into precise phases, control would be easier and several phases could be executed at the same time in whole or in part. Gantt also understood that this idea could be best communicated to others visually. The visual display chart he developed has come to be known as the Gantt chart.

The chart can be constructed using boxes, lines, or symbols. It

shows comparative completion status for several phases, comparing planned start/stop dates to actual; it also shows where phases can overlap one another. Phases are listed from top to bottom and completion schedule and actual durations are shown from left to right.

The chart can be developed by hand or on a computer spreadsheet. Numerous scheduling and project management software programs include Gantt chart management as part of their programs. The chart is most effective when it is used both by the project manager and by team members in planning, controlling, and operating the project.

Finding the Best Scheduling Software

Nicely designed scheduling software is often found as part of a broader application. *Software Magazine* (www.softwaremag.com) tracks newly developed programs and offers. Also check the following for software designed specifically for scheduling:

Computer Associates	www.ca.com
Microsoft Project	www.microsoft.com/en-us/project
Open Plan Professional	www.welcom.com

To illustrate the best use of the Gantt chart, let's work through a sample project. The use of black-and-white boxes or bars is the most easily comprehended and used form of the Gantt chart. For this reason, our example is shown using this simplified Gantt system.

Example

The accounting department manager undertakes a project to examine current procedures in the accounts payable department. She will identify changes needed to improve efficiency and reduce processing expenses, concluding with the implementation of revisions. Her team consists of the accounting department assistant manager, the supervisor of accounts payable, and a senior-level employee from the systems development department.

The manager's first step is to break down the project into phases, as follows:

Phase 1   Document current procedures for each of three employees in the department.
             Estimated completion time: four days

Phase 2   Prepare procedure flowcharts for the department.
             Estimated completion time: three days

Phase 3   Summarize paper flow and methods for receiving, processing, and sending out information (including timing, approval, and payments).
             Estimated completion time: five days

Phase 4   List problem areas and develop initial recommendations for solutions.
             Estimated completion time: six days

Phase 5   Develop improved processing procedures.
             Estimated completion time: three days

Phase 6   Track sample transactions for one week under existing procedures.
             Estimated completion time: five days

Phase 7   Track sample transactions for two weeks under proposed new procedures.
             Estimated completion time: ten days

Phase 8   Prepare and deliver a final report to the treasurer, including recommended changes in procedures, estimate of savings, and automation, if applicable.
             Estimated completion time: two days

This listing of phases can be expressed on a Gantt chart using the most common method, the bar chart. The schedule for this project, including both planned and actual completion for each phase, is shown in Figure 6-1.

In Figure 6-1, note that the planned phases are shown as white or

Figure 6-1. Gantt chart (bar form).
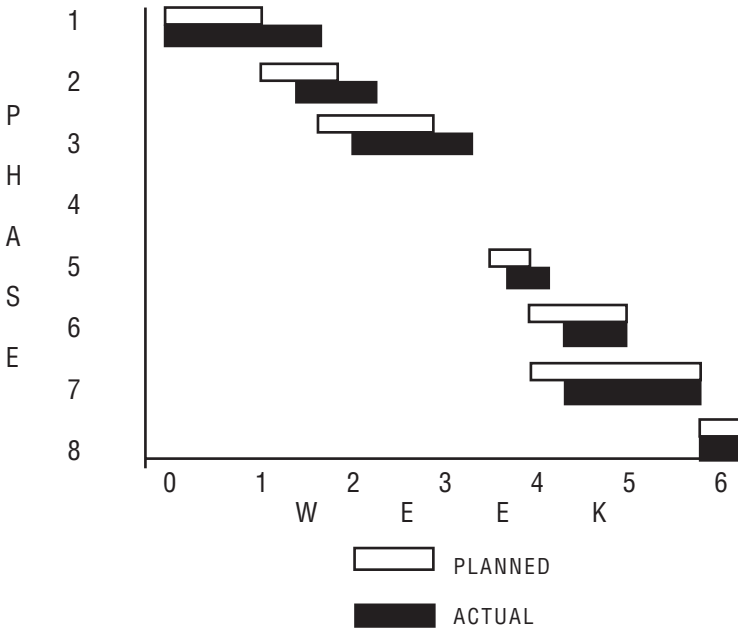
clear bars, and actual completion ranges are filled in black. This method shows where delays occurred during execution of the project; it tells both the project manager and team members that these delays need to be absorbed later on. Phase 1, for example, took longer than scheduled, thus delaying phase 2. That delay carried through all the way to phases 6 and 7, where it was absorbed by abbreviating the tracking periods.

Some phases can be run concurrently. For example, the longest phases (6 and 7) involved testing (i.e., tracking) current and proposed procedures. These tests are conducted over the same period, saving a full week. In this example, both test periods were shortened slightly to bring the project back on schedule, in the belief that a shortened test period would not compromise the project.

Scheduling Control

The more planning you put into developing your initial schedule, the better your chances for meeting deadlines, both for phases and the

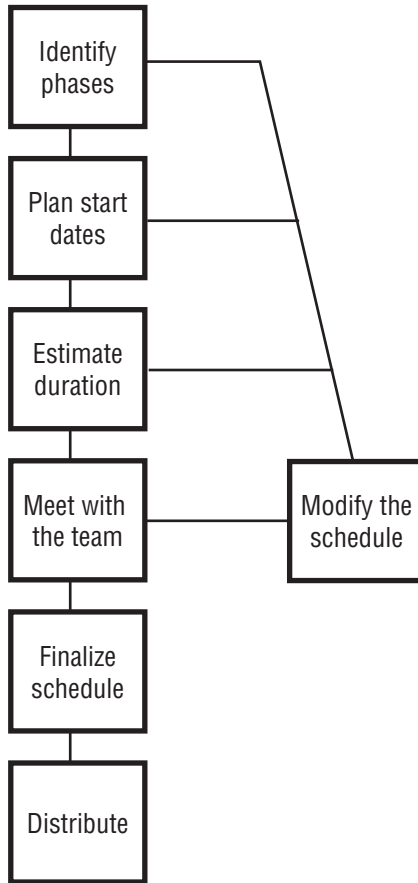## Guidelines for Selecting Project Scheduling Software

Can software for project scheduling save time and effort? An investment in well-designed scheduling software is worthwhile as long as it saves time for you and your team. In comparing available products, consider these guidelines:

- ■ *Cost*. It is possible to find effective and efficient software without buying the highest-priced products. However, going for the cheapest software usually means you lose some desirable features. Seek out the best possible midrange software, a product that offers all of the features you need to track schedules.

- ■ *Ease of Use*. It is worth paying a little more to get a product you can learn quickly. Compare tutorials, wizards, and interface design. Visit websites for the major software suppliers and try out demo software if available.

- ■ *Charting Resources*. Remember that scheduling is best managed visually. Choose software that includes Gantt charting and enables you to customize fields. Drag-and-drop graphical features save time and improve the quality of your visual presentations.

- ■ *Integration Features*. Does the software enable you to transfer scheduling and other project management features into text documents such as reports? A project management software product that also supports preparation of a final report serves multiple purposes.

final project. Plan to review your proposed schedule with each and every core team member. Make sure that each member agrees that the schedule is reasonable and that deadlines can be met.

Follow these steps (summarized in Figure 6-2) to create your project schedule:

1. *Identify phases.* Break down your project into logical and sequential phases. Definable areas of effort and team responsibility should distinguish each phase. Each phase should also be characterized

Figure 6-2. Creating the schedule.

```
┌──────────┐
│ Identify │────────────┐
│  phases  │            │
└────┬─────┘            │
     │                  │
┌────┴─────┐            │
│Plan start│──────┐     │
│  dates   │      │     │
└────┬─────┘      │     │
     │            │     │
┌────┴─────┐      │     │
│ Estimate │────┐ │     │
│ duration │    │ │     │
└────┬─────┘    │ │     │
     │          └─┴─────┤
┌────┴─────┐        ┌───┴──────┐
│ Meet with│────────│Modify the│
│ the team │        │ schedule │
└────┬─────┘        └──────────┘
     │
┌────┴─────┐
│ Finalize │
│ schedule │
└────┬─────┘
     │
┌────┴─────┐
│Distribute│
│          │
└──────────┘
```

by a result, its dependence on prior phase completion, and its necessity for phases yet to come.

   2. *Plan start dates.* Decide which phases must be executed consecutively and which can be executed concurrently. In some cases, a phase cannot begin until a previous phase has been completed. In others, two or more different phases can proceed at the same time.

   3. *Estimate the duration of each phase.* Next, decide how many days will be needed to complete each phase. Basing your schedule on a preliminary estimate of labor hours is an acceptable prelimi-

nary method; however, before finalizing the schedule, convert hours to days, keeping in mind the probability that team members will have to split time between project and departmental duties.

4. ***Meet with the team.*** Involve your team members in schedule planning to ensure that they will work together cooperatively and that each member believes the schedule is practical, given the restraints of time and other duties.

5. ***Modify the schedule as needed.*** Listen to what your team tells you. If members believe that a phase deadline is unrealistic, look for solutions. Modify the schedule according to the team's response.

6. ***Prepare the schedule.*** Construct a Gantt chart for your final schedule, and plan to use it to track your progress. As the project moves along, actual start and finish dates for each phase are entered on the chart.

7. ***Distribute the schedule.*** Upon finalizing your schedule and Gantt chart, provide copies of both to each team member. As the project moves ahead, pass out revised and updated copies periodically to remind team members of the schedule and to help them visualize progress. If you are also required to report to upper management on the schedule of the progress, include the Gantt chart in your report.

The Scheduling Solution

Even the most efficient, experienced, and capable project manager will be faced with serious schedule delays. The delay itself is not a failure of the process; it simply is part of the team dynamic. The real test is found in how the manager solves the problem when it does occur.

Problems often can be spotted in advance of a delay, and action taken to prevent it. For example, if a team member tells you before a phase begins that it will be impossible to meet the deadline, the task needs to be shifted to someone else. It often occurs that departmental demands prevent team members from putting in the time they originally thought they would have available for the project. As long as team

members keep you updated when such problems occur, you can shift work to other team members and avoid the delay.

Once a delay has occurred, you need to take one of these steps to fix the problem:

■ *Execute phases concurrently when possible, even if your original schedule called for consecutive completion.* Some phases, or segments of phases, can be started early. Get your team working together to do as much advance work as possible, saving time later and absorbing a delay.

■ *Double up the team's efforts to absorb a previous delay.* If team members have time available today, a schedule can be accelerated to speed up completion time. A day or two saved on subsequent phases can do away with earlier delays.

■ *Look for ways to speed up future phases.* It may be possible to shorten time requirements in future phases in several ways. You can recruit additional employee help for especially time-consuming phases; shorten test phases; or abbreviate a research phase without compromising quality. On some projects, parts of a final report can be drafted in advance so that the final phase can be completed in less time than originally planned.

Gantt Limitations

The Gantt chart is a useful visual tool for tracking your project and anticipating delay problems before the final deadline is compromised. However, it will be of limited use when you have to deal with a relatively large project team. In those instances, there is likely to be a high volume of interaction and the need for cooperation between individuals on your core team. The more complex the team structure, the higher the likelihood of schedule delays. And the longer the term of the project, the more problems you are likely to encounter keeping on schedule.

Remember, charting phases and monitoring progress is only a tool,

not the solution itself. The chart reveals where problems are occurring. For more complex projects, the Gantt chart has a few limitations:

    ■ *It does not identify potential weak links between phases.* Whenever the flow of work transfers from one person to another, there is the potential for delay. This is especially true when a phase ends and another is about to begin. These are the weak links in your schedule. You can control your schedule by identifying the transfer points within phases and from one phase to another, then ensuring that the flow of work continues without a break.

    ■ *The chart does not reveal team problems due to unexpected delays.* The Gantt chart only shows the planned and actual status for your schedule and for actual timing. In other words, it is a convenient overview of the schedule as planned and as executed, but you may need more. The chart does not show how a delay during one phase affects the completion of a subsequent phase. One of the most effective steps you can take as project manager is to work to spot problems before they occur and counteract them before a delay results. This requires that you check regularly with team members to make sure that upcoming schedules remain practical and possible.

    ■ *The chart does not coordinate resources and networking requirements needed at critical phases of the schedule.* Many projects can proceed only when forms, documents, reports, outside help, and other outcomes are developed by the team or supplied by someone else. Some projects involve the development of basic forms, for example, to be used in a new procedure. It is possible that subsequent phases will not be able to begin until a single outcome is produced in the current phase. This is critical to your schedule. A delay brings the entire project to a complete halt in such cases. Identify the outcomes that are needed throughout the project to keep phases moving, and step in at those points to make sure your team members are on course.

    ■ *It does not show degrees of completion for each phase.* The Gantt chart is not practical for tracking completion progress within

each phase. Because it is designed for overall tracking, you need to devise a method for keeping each phase on course, too. For especially complex phases or those requiring greater team participation and time, you may need to institute additional tracking methods, abbreviated charting, or direct participation and supervision. Once delays occur, it is too late to prevent them. However, if you monitor phases while they are progressing, you can spot and avoid emerging trends. Being aware of where the weak links and critical points exist will help you to keep on track.

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The Gantt chart is a useful tool for monitoring the big picture, working out modifications with your team, and keeping overall goals in sight. For more detailed monitoring, you need to be involved directly with team members and use more advanced techniques. The next chapter deals with these methods.

WORK PROJECT

1. Explain three or more points concerning delays in project phases and how they affect the final deadline and your management task.

2. You have been appointed as manager of a newly formed department. One of your first projects is to develop a one-year budget. You have defined the following phases. Which of these phases can be executed concurrently and which must be done consecutively?

Phase	Description
1	Identify assumptions for each expense category.
2	Develop initial budgets for each expense.
3	Cross-reference the budget summary to assumption worksheets.
4	Submit your initial budget for review.
5	Enter revisions.

      6   Revise assumptions worksheets.

      7   Prepare the final departmental budget.

      8   Submit the final budget report.

3. Explain three or more possible ways to eliminate delays you might encounter during your project.