

CHAPTER 51

Managing Professional Services Projects

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1. PROJECT MANAGEMENT IN THE PROFESSIONAL SERVICES CONTEXT	1333	4.3.6. High-Level Time/Cost Estimates	1336
1.1. Professional Services Defined	1333	4.3.7. Project Risks	1336
1.2. Project Management Defined	1333	5. PHASE II: PROJECT PLANNING	1338
1.3. Managing Professional Services Projects	1333	5.1. Project Planning Purpose	1338
2. THE PROJECT MANAGER	1334	5.2. The Project Planning Team	1338
2.1. The Project Manager's Role	1334	5.3. Project Planning Components	1338
2.2. Project Manager Characteristics	1334	5.3.1. Confirm Objectives and Scope	1338
2.3. Identifying Project Manager Candidates	1334	5.3.2. Develop Work Breakdown Structure	1338
3. OVERVIEW OF THE PROJECT MANAGEMENT PROCESS	1334	5.3.3. Develop a Task and Deliverables List	1339
3.1. The Phases of Project Management	1334	5.3.4. Assign Personnel to Tasks	1339
3.2. Relationship of Phases to the Delivery of Professional Services	1335	5.3.5. Develop Time Estimates and Preliminary Schedule of Tasks	1341
4. PHASE I: PROJECT DEFINITION	1335	5.3.6. Determine the Critical Path	1341
4.1. Project Definition Purpose	1335	5.3.7. Balance the Workplan	1341
4.2. The Project Definition Team	1335	5.4. Prepare the Project Budget	1343
4.3. Project Definition Components	1335	5.4.1. Determine Personnel Costs	1343
4.3.1. Project Objectives (Outcomes)	1336	5.4.2. Add Support, Overhead, and Contingency Factors	1344
4.3.2. Scope	1336	5.4.3. Compile and Reconcile the Project Budget	1346
4.3.3. Deliverables (Outputs)	1336	6. PHASE III: PROJECT MONITORING AND CONTROL	1346
4.3.4. Project Approach	1336	6.1. Organizing for Project Implementation	1346
4.3.5. Resource and Infrastructure Requirements	1336		

6.1.1.	The Project Steering Committee	1346	7.1.1.	Time, Cost, and Quality Performance	1348
6.1.2.	The Project Office	1346	7.1.2.	Lessons Learned	1348
6.2.	Project Monitoring	1347	7.2.	Final Status Reporting	1348
6.2.1.	Informal Monitoring	1347	7.3.	Performance Review of Project Team Members	1349
6.2.2.	Project Workplan and Budget Maintenance	1347	7.4.	Archiving Project Documentation	1349
6.2.3.	Project Status Reporting	1347	7.5.	Disbanding the Project Organization	1349
6.2.4.	Status Meetings	1347			
6.3.	Project Control	1347	8.	AVOIDING PROJECT-MANAGEMENT PROBLEMS	1349
6.3.1.	Identifying Out-of-Control Conditions	1347	8.1.	When and Why Project Management Problems Occur	1349
6.3.2.	Developing Corrective Actions	1348	8.2.	Tips for Avoiding Problems in Project Management	1349
6.3.3.	Following up on Corrective Action Measures	1348			
7.	PHASE IV: PROJECT CLOSE	1348		ADDITIONAL READING	1350
7.1.	Project Performance Assessment and Feedback	1348			

1. PROJECT MANAGEMENT IN THE PROFESSIONAL SERVICES CONTEXT

1.1. Professional Services Defined

Professional services are knowledge- and experience-based activities, performed by appropriately qualified individuals or teams, that are intended to result in predefined, desired outputs and/or outcomes. Such services can be performed for a fee by one professional enterprise for the benefit of another enterprise (the external client), such as accounting, management consulting, engineering, legal, and marketing services; or they can be performed within an enterprise for the benefit of that enterprise (the internal client), such as new product development, strategic analysis, operations improvement, and systems development/implementation (for example, an industrial engineering department in a manufacturing company or financial institution would be considered a professional services organization in this context). The delivery of a professional service typically is supported by the application of information technology and the use of appropriate data/knowledge bases.

1.2. Project Management Defined

Project management is the planning, organizing, guiding, and monitoring of organizational resources that are necessary to successfully produce one or more desired outputs or outcomes (often called deliverables). It encompasses management of project risks, issues, and changes, as well as product/deliverable configuration and quality.

A project is:

- A unique venture with a defined beginning and end
- Carried out by people to meet a specific objective or set of objectives
- Defined within the parameters of scope, schedule, cost, and quality

Project management does not include the management of ongoing tasks and/or repetitive functions.

1.3. Managing Professional Services Projects

Most of the work done by professional service organizations is performed as, and can be defined in terms of, projects. Often the desired deliverables and outcomes of a professional services project can be somewhat fuzzy, conceptual, and less tangible when compared to, say, a more concrete construc-

tion project. This causes project time and cost to be more difficult to estimate during project planning; accordingly, progress during project execution tends to be more difficult to measure.

Regardless, a project team is formed to produce a definite set of deliverables within a certain time frame for a specified cost (budget). The project team is led by a project manager, who is responsible for ensuring that the objectives of the project are achieved on time and within budget.

2. THE PROJECT MANAGER

A project manager typically is someone who has a wide breadth and depth of knowledge and experience in a number of areas. He or she also is someone who is skilled in working with teams, leverages relationships judiciously, and is knowledgeable in the use of tools and techniques that aid in accomplishing his or her role.

2.1. The Project Manager's Role

The project manager facilitates the team-building process and collaborates with the project team to create and execute the project plan. The project manager also acts as the liaison between the team and the client. He or she continually monitors the progress of the project and reports project status periodically to both the client and other interested stakeholders. The project manager works to ensure that the client is satisfied and that the project is completed within the parameters of scope, schedule, cost, and quality.

2.2. Project Manager Characteristics

A project manager's characteristics differ from those of the typical functional manager. For example, functional managers usually:

- Are specialists
- Function as technical supervisors
- Are skilled at analysis and analytical approaches
- Maintain line control over team members

Project managers, on the other hand, typically:

- Are generalists with wide experience and knowledge
- Coordinate teams of specialists from a variety of technical areas
- Have technical expertise in one or two areas
- Are skilled at synthesis and the systems approach
- Do not have line control over the project team members

2.3. Identifying Project Manager Candidates

Project managers can be persons working for the professional enterprise who are reassigned to the project manager position for the life of a given project or for a specified period of time. Project manager candidates may also come from outside the organization. For example, they may be contracted by the organization to serve as the project manager for a specific project.

Project managers may come from almost any educational background, although the industrial engineering curriculum is probably the most relevant. In any case, a successful project manager candidate should be able to demonstrate significant experience in the position. Additional qualifications might include project manager certification, which is awarded to qualified persons by organizations such as the Project Management Institute.

3. OVERVIEW OF THE PROJECT MANAGEMENT PROCESS

3.1. The Phases of Project Management

The project management process includes four phases:

- Phase I: project definition
- Phase II: project planning
- Phase III: project monitoring and control
- Phase IV: project close

Each phase has its purpose and the phases are linked in order. In fact, Phases I through III tend to be iterative. For example, some level of project planning is required to develop reasonably accurate,

high-level estimates of project time and cost during project definition. Likewise, during project execution, the monitoring and control process may identify situations that will require changes in the project plan and possibly even in the project definition.

3.3. Relationship of Phases to the Delivery of Professional Services

In the professional services context, the project definition serves as the proposal to the client or the statement of work (SOW) issued by the client. Subsequent to any negotiations, the client formally accepts the proposal (or the firm formally accepts the SOW); in many cases a formal contract is executed, often incorporating the proposal or SOW. Detailed project planning then begins.

The project plan sets out the work steps, schedule, resources, and budget necessary to successfully conduct the project. The plan then becomes the basis for routinely monitoring and measuring progress during project execution and applying appropriate controls, when necessary, to make sure the project stays on track.

The project close phase seeks to determine whether the client is satisfied with the results of the work and ensures that the client understands and agrees that the project has been completed.

4. PHASE I: PROJECT DEFINITION

4.1. Project Definition Purpose

Project definition is arguably the most important phase of a project. It entails defining the objectives, scope, and deliverables of the project; selecting the most appropriate approach; developing high-level estimates of time and cost; defining the project-management process; and identifying and addressing potential problems and risks. The project-definition phase ensures that the stakeholders and project team have a common understanding of the project's purpose, objectives, and benefits. Many failed projects have been linked to inadequate development of a project definition.

A sound project definition enables the organization to begin the project in a systematic manner; it sets the tone and establishes the project's direction, opens channels of communication, forms a basis for client and stakeholder trust, and tends to bring to the surface any client concerns or challenges. The risks of not having a sound project definition include false starts, inadequate communication, confusion among the participants, and failure to meet the client's and other stakeholders' expectations.

4.2. The Project Definition Team

A core team is established to prepare the project definition (and usually the subsequent project plan). The core team may include the project manager, functional personnel, technical personnel, and possibly other professionals drawn from outside the firm.

Expectations need to be communicated clearly to the core team members, including their accountability for the project deliverables and outcomes as well as their required time commitment throughout the life of the project. The time commitment, which might be full time during the development of the project definition and the project plan, should also be explained to the core team members' supervisors (performance managers).

The specific technical expertise required of the core team members is dependent upon the nature of the project. However, at a minimum, they should have a sufficient top-level understanding of the technical issues to be able to define and plan the project effectively as well as to manage the resources that may be recruited to work on the project.

4.3. Project Definition Components

A project definition should contain at least the following components:

- Project objectives (outcomes)
- Scope
- Deliverables (outputs)
- Approach
- Resource and infrastructure requirements
- High-level time and cost estimates
- Project risks

Each of these components is described below. Examples are provided based on a typical project to identify, evaluate, and select a manufacturing business planning and control software system. Software evaluation and selection assistance is a fairly common professional service provided by consulting

firms to clients (in this example, ABC Manufacturing, Inc.). This example project will be carried throughout this chapter to illustrate the various aspects of professional services project management.

4.3.1. Project Objectives (Outcomes)

Objectives are the destination, target, or aim of the project. They are needed to clarify the client's and other stakeholder's expectations. They also help to:

- Establish a common vision
- Guide the team during project plan development and execution
- Keep the team focused as the project progresses
- Provide a basis for communications during the project
- Establish a means for assessing success at the completion of the project

Good objectives state what will be achieved and/or the results sought, not how the team will get there. They are specific, unambiguous, and measurable, containing a time frame for the intended achievements. Examples of outcome-oriented objectives include: select a business planning and control software system in six months; implement the selected business planning and control software system in 18 months; increase product throughput by 50% in two years; decrease inventory investment by 75% by year end.

4.3.2. Scope

The statement of scope sets the boundaries of the project, in that it defines the confines, the reach, and/or the extent of the areas to be covered. It clarifies what will be included in the project and, if necessary, states specifically what will *not* be included.

Scope may be defined in terms such as geographical coverage, range of deliverables, quality level, and time period. The statement of scope must be clear, concise, and complete, as it will serve as the basis for determining if and when out-of-scope work is being conducted during project execution. In the professional services field, performance of unauthorized, out-of-scope work on a project usually will result in a budget overrun, unrecovered fees and expenses from the client, and unsatisfactory project financial results. Potential out-of-scope work should be identified *before* it is performed and negotiated as additional work, along with its attendant cost and schedule requirements.

An example of a scope statement is: "Assist ABC Company in selecting an appropriate business planning and control software and hardware system and implementing the selected system. The assistance will include defining business system requirements, evaluating system alternatives, making a selection that will support manufacturing and accounting functions, and facilitating the implementation of the selected system."

4.3.3. Deliverables (Outputs)

A deliverable is anything produced on a project that supports achievement of the project objectives. It is any measurable, tangible, verifiable outcome, result, or item that is produced to complete a task, activity, or project. The term is sometimes used in a more narrow context when it refers to an external deliverable (handed over to a stakeholder or client and subject to approval).

Examples of deliverables are system requirements definition document; request for proposal (RFP) document; systems-evaluation criteria; software and hardware configuration design; system-implementation project plan; and facilitation assistance during the system-implementation process.

4.3.4. Project Approach

The project approach defines the general course of action that will be taken to accomplish the project objectives. For example, the project approach may be defined in such terms as the methodology to be used, the timing/phases of the project, and/or the types of technology and human resources to be applied. The approach section of the project definition explains, in general, how the project will be carried out.

An example of an approach statement for developing a system requirements definition document is: "We will conduct interviews with personnel in each functional area to develop and define the system requirements, based on a system requirements profile. We will provide advice in the definition of critical system requirements, such as system performance (timing, volumes, and the like). This phase will culminate with the development of a system requirements definition document."

4.3.5. Resource and Infrastructure Requirements

Resource and infrastructure requirements for professional service projects typically fall into any of three categories: human resources, facilities and equipment, and information technology (including knowledge bases). Human resource requirements, often the major cost of a project, should be defined

in terms of the roles, responsibilities, and skills that are needed for the project to be successful. The roles and responsibilities then are translated into a depiction and/or description of the planned organization structure for the project.

Arguably the most important role in the project is that of the project sponsor, the person who authorizes or “legitimizes” the project (often referred to simply as “the client”). If the sponsor is not committed to the project, the chances of successful completion are reduced. Sponsorship often can be extended by the formation of a project steering committee, which, if constructed properly, can be particularly useful in clearing barriers that are likely to come up during project execution.

An example of a resource and infrastructure requirements statement might be: “We will require designation of a project team leader to assist in scheduling interviews; arranging for the collection of information, reports, and documentation; and assisting in the coordination of administrative support. Knowledge of existing systems is also important to provide valuable background information. In addition, office space with a telephone and computer access to the internet is required.”

4.3.6. High-Level Time/Cost Estimates

The purpose of high-level time/cost estimates is to gauge and validate project size. A high-level estimate sets out resource and staffing levels by project phase or activity and elapsed time by activity.

High-level time/cost estimates are top-down estimates made while developing the project definition. A high-level estimate can be developed by reviewing and drawing upon estimates from previous similar projects and any estimates developed in project definition work sessions. Assumptions, initial estimates, and associated calculations should be documented. During project planning (Phase II), detail calculations are summed and compared to the high-level figures as a way of validating the estimates.

An example of a high-level time/cost estimate is: “It is estimated that it will take 14 weeks to reach the point at which software has been selected. Once the hardware and software are installed, it will take approximately 10 months to implement the system. Based on the scope of work and the approach, it is estimated that the project will cost \$350,000 to \$375,000.”

4.3.7. Project Risks

A project risk is any factor that challenges the project team’s ability to manage the budget, resources, time, and quality of the project deliverables and acceptance of the deliverables. Risks would include any factors that could disrupt the project. They are uncertainties or vulnerabilities that could cause the team to deviate from the project plan.

Risks may be managed through a risk management plan. Establishment of such a plan entails identifying the risks, determining the potential impacts, defining preventive actions, estimating the costs (both monetary and nonmonetary) required to reduce the risks to acceptable levels, developing contingency plans, and obtaining management’s commitment to the risk management plan.

Risk management is valuable in that it minimizes the unfavorable impact of unplanned incidents on a project. It enhances the probability of successful project implementation, creates a sense of urgency when unplanned incidents occur, and facilitates their timely and effective resolution.

Risk management typically involves assessing a number of dimensions of each identified risk. These dimensions include:

- The impact of the risk if it were to occur
- The likelihood that the risk will occur
- How difficult it would be to detect the risk

Each of these dimensions can be assessed separately for a specific area of risk and assigned a numerical low-to-high rating. The three dimension ratings then can be combined (e.g., averaged or added) to produce a relative risk value for the area, which can be compared with the ratings of other identified project risk areas to determine where emphasis needs to be placed in the risk management plan.

One way of judging overall project risk is through a constraint matrix, where three levels of flexibility (low, medium, high) are charted against the elements of schedule, scope, and cost. The purpose of a constraint matrix is to assess the degree of relative flexibility within a given project and the related risk. For example, a project profile that exhibits low flexibility in all three elements (schedule, scope, and cost) is a profile associated with high-risk projects and one that will demand extra careful management.

An example of a project risk management statement is: “A mechanism is provided for identifying and assessing any adverse consequences of a tentative system selection so their effects can be controlled during implementation. A structured approach will be used for developing relative priorities of individual requirements. Shortfalls in the functionality of a tentative selection will be evaluated. Alternative solutions to providing the functionality will be considered and the impact on the effect-

iveness of the overall system will be evaluated prior to making a final selection. Additionally, arrangements for holding the source code in escrow will ensure the availability of the source code in the event the software company cannot sustain ongoing viability.”

5. PHASE II: PROJECT PLANNING

5.1. Project Planning Purpose

The purpose of project planning is to confirm the project scope and objectives; develop the project organization, schedule, and budget; secure the necessary resources; and create clear expectations about the project organization, timing, budget, and resources.

The project workplan should clearly identify the deliverables that will be prepared and the tasks that need to be performed in order to prepare them. The project planning team uses the project definition as the beginning point for preparing the project workplan. The workplan is typically broken down into phases, activities, and tasks. Deliverables and resources are usually defined at the task level.

5.2. The Project Planning Team

A key member of the project planning team is the project manager because he or she will have primary responsibility for executing the project plan. The project planning team may also include one or more members of the project definition team to ensure that the thinking that went into defining the project is reflected in the project plan. If the project definition team is not represented on the project planning team, a draft of the project plan should be reviewed by one or more project definition team members.

Other members of the project planning team might include appropriate technical specialists and others who may be team members during project execution.

5.3. Project Planning Components

There are seven main steps in creating a project workplan:

1. Confirm objectives and scope.
2. Develop work breakdown structure.
3. Develop a detail task list.
4. Assign personnel to tasks.
5. Develop time estimates and a preliminary schedule of tasks.
6. Determine the critical path.
7. Balance the detailed workplan.

Each of these steps is described below.

5.3.1. *Confirm Objectives and Scope*

Often there can be a significant time period between the completion of project definition and the initiation of detailed project planning, which may result in divergent views as to the purpose of the project. It is important that there be full agreement regarding the objectives and scope of the project before the workplan is prepared. The project manager should seek confirmation of the objectives and scope based on input from the sponsor and/or the steering committee as well as the project-definition team members. If there are differences, the project manager should rely on the sponsor to settle them.

5.3.2. *Develop Work Breakdown Structure*

Developing a work breakdown structure entails expanding the project phases or deliverables into the major activities that need to occur to complete each phase and defining the tasks that need to occur to complete each activity.

Steps for developing a work breakdown structure and examples are presented in Table 1.

The work breakdown structure can encompass more than the three levels shown in Table 1, depending on the nature and complexity of the work to be done. For example, if the work effort has been done many times previously and/or is routine, it may not require more than three levels of detail (phase/activity/task). Conversely, work that is less familiar or more complex may require additional levels of detail to gain a full understanding of the work that must be done.

A work statement (often called a work package) then is prepared to describe the effort for each task or subtask at the lowest level of the work breakdown structure. Each work statement should be designed to ensure that the related task or subtask:

TABLE 1 Developing a Work Breakdown Structure

Steps in Developing a Work Breakdown Structure	Examples
1. Draw out the phases of the project or organize it by major project deliverables.	Phases: <ul style="list-style-type: none"> • Analysis and implementation preparation • Coordination of required disciplines and controls • Training of personnel • Implementation tailoring • Online implementation • New system break-in
2. Detail the major activities that need to occur to complete each phase.	Activities within the “Analysis” phase: <ul style="list-style-type: none"> • Define system requirements. • Develop a request for proposal document. • Develop evaluation criteria and evaluate alternatives. • Select a software and hardware configuration. • Develop an implementation project plan.
3. Detail all the tasks that will need to occur to complete each activity.	Tasks within the “Define systems requirements” activity: <ul style="list-style-type: none"> • Define and document business system objectives. • Document performance objectives. • Define and document anticipated benefits. • Document functional requirements. • Conduct interviews. • Document special considerations and constraints. • Assemble requirements documentation.

- Is measurable
- Has tangible results/outputs (deliverables)
- Has identifiable and readily available inputs
- Is a finite, manageable unit of work
- Requires a limited number of resources
- Fits into the natural order of work progression

A completed work breakdown structure will include the assembled detail tasks and their relationship to respective activities. A work breakdown structure may be displayed according to Figure 1 (in the figure, level 1 corresponds to “phase,” level 2 to “activity,” and level 3 to “task”).

5.3.3. Develop a Task and Deliverables List

The different levels of the work breakdown structure should be documented in a task list that identifies each phase, activity, and task (and subtask, as appropriate). Next, the name of the person to be responsible for each task (the task “owner”) and a description of the deliverable(s) associated with each task can be added. An example of a detailed task and deliverables list is shown in Figure 2.

When the task and deliverables list is complete, the logical order in which tasks should be performed is defined. This is done by first determining task dependencies at the lowest level of the work breakdown structure. These dependency relationships can be portrayed in the form of a project network diagram. An example of task dependencies is shown in Figure 3.

5.3.4. Assign Personnel to Tasks

Each task must be assigned personnel resources to perform the work. The steps for assigning personnel to tasks include:

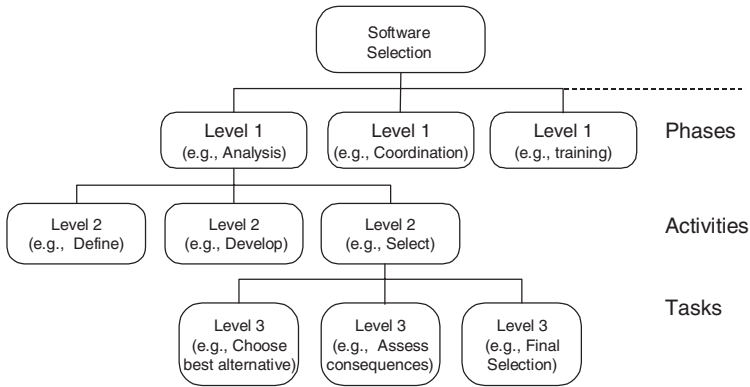


Figure 1 Partial Work Breakdown Structure.

- List the skills required to complete each task.
- Identify candidate team members whose skills meet the task requirements.
- Develop a rough estimate of the time that will be required to complete each task, based on the experience of the candidates.
- Negotiate roles and responsibilities of candidate team members relative to each task.

Project Name: Software Selection and Implementation		Project Manager: Joan Ryan	
Date Prepared: 5/31/2000			
Table of Detail Tasks and Deliverables Description List			
ID	Detail Tasks List	Task Owner	Deliverable
2.0	Define system requirements		
2.1	Define and document business system objectives	Jim B.	Business system objectives documentation
2.2	Document performance objectives	Mary P.	Performance objectives documentation
2.3	Define and document anticipated benefits	Joan R.	Anticipated benefits documentation
3.0	Develop Evaluation Criteria		
3.1	Identify alternative systems or supplements	Bob S.	List of software solutions
3.2	Prioritize requirements according to importance	Guy R.	Priorities assigned
3.3	Evaluate each alternative against the absolute requirements	Marie S.	Go/no go decision
3.4	Calculate scores for each alternative	Bob S.	Score sheet
3.5	Assess each alternative's functions against requirements	Henry B.	Evaluation sheet
4.0	Select an Alternative		
4.1	Choose the best alternative as a tentative decision	Guy R.	Tentative selection
4.2	Assess adverse consequences and decide if an alternative should be selected	Marie S.	Adverse consequences list
4.3	Make final selection	Team	System selected
5.0	Develop Implementation Project Plan		
5.1	Meet with project team members	Team	Committee assignments
5.2	Develop detail tasks to be performed within each activity	Wendy L.	Detail tasks

Figure 2 Detailed Task and Deliverables List.

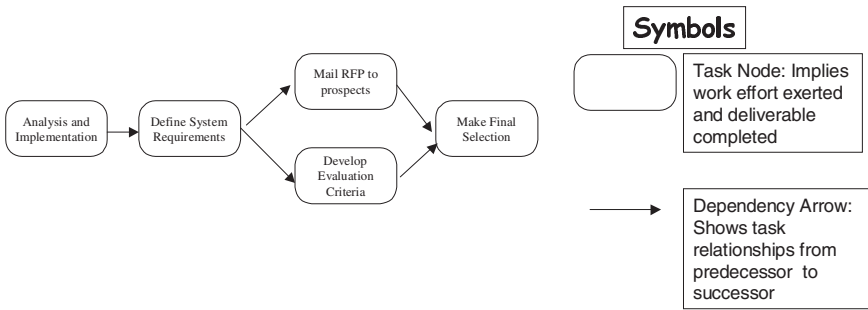


Figure 3 Task Dependencies.

- Gain commitment from the departments, performance managers, and candidates involved, particularly regarding the team members’ availability to participate.
- Document the team members’ project roles and responsibilities.

The project task assignments can be documented by extending the task and deliverables list (see Figure 2) to include an additional column entitled “Task Team Members.”

5.3.5. Develop Time Estimates and Preliminary Schedule of Tasks

The next step is to develop time estimates for each task. The time estimates take two forms:

1. *Effort*: the actual work time required to complete each task, typically in terms of hours
2. *Duration*: the elapsed time between the start and finish of a task, typically in terms of days or weeks.

The effort estimates are used to determine the amount of time each team member is expected to spend on the project, as well as the related cost of their services. The task-duration estimates, when combined with the project network diagram (see Figure 4), provide the basis for setting a project schedule (i.e., task start and completion dates).

The effort and duration estimates should be developed from the bottom up, preferably by the persons responsible for their execution, in contrast to the top-down, high-level estimates prepared during the project definition phase. They should take into account past experiences with similar, standard processes, to the extent possible. As predictions, the estimates should be equally likely to be above or below the actual results rather than represent the minimum or maximum time. Figure 4 provides an example of task time estimates.

Size comparability of tasks can be achieved by applying the following rule of thumb: combine a task requiring less than seven hours of effort with another task; subdivide tasks that require more than 70 hours.

5.3.6. Determine the Critical Path

The critical path is the path in the project network diagram that consumes the longest elapsed time. It is the path in which there is no extra time available to accommodate delays. This is in contrast to other paths, where float exists and can be used to accommodate delays. A delay in the critical path will result in a delay of the entire project.

The critical path is identified for two reasons. First, if unexpected issues or changes occur to a given task after the project begins, the impact, if any, on the overall project schedule can be determined quickly. Second, knowing the critical path enables the project manager and team to consider quickly where the schedule can be compressed to accommodate project imperatives and unexpected changes.

Table 2 shows some schedule-compression options that can be considered, along with the associated caveats.

5.3.7. Balance the Workplan

Resource loading follows the critical path analysis. Resource loading specifies the resources that will be needed for each planning period (typically one week) on the project timeline. The benefit of resource loading is that it identifies conflicts in the schedule (i.e., resources assigned to different

Project Name: Software Selection and Implementation		Project Manager: Joan Ryan		
Date Prepared: 5/31/2000				
Table of Time Estimates and Schedule of Tasks				
ID	Detail Tasks List	Task Owner	Effort (hours)	Duration (weeks)
2.0	Define system requirements			
2.1	Define and document business system objectives	Jim B.	40	4
2.2	Document performance objectives	Mary P.	8	1
2.3	Define and document anticipated benefits	Joan R.	4	1
3.0	Develop Evaluation Criteria			
3.1	Identify alternative systems or supplements	Bob S.	16	1
3.2	Prioritize requirements according to importance	Guy R.	8	1
3.3	Evaluate each alternative against the absolute requirements	Marie S.	32	3
3.4	Calculate scores for each alternative	Bob S.	32	3
3.5	Assess each alternative's functions against requirements	Henry B.	16	3
4.0	Select an Alternative			
4.1	Choose the best alternative as a tentative decision	Guy R.	8	2
4.2	Assess adverse consequences and decide if an alternative should be selected	Marie S.	16	2
4.3	Make final selection	Team	4	1
5.0	Develop Implementation Project Plan			
5.1	Meet with project team members	Team	40	1
5.2	Develop detail tasks to be performed within each activity	Wendy L.	32	2

Figure 4 Task Time Estimates.

tasks simultaneously). It may reveal resources that are overcommitted or underutilized. It helps the project manager to determine whether tasks need to be rescheduled, work reprioritized, or additional time or resources renegotiated.

The workplan is balanced when all appropriate resources are confirmed and an acceptable completion date is determined. The preliminary schedule, resource availability, and required project-completion date all need to be brought into balance.

TABLE 2 Schedule-Compression Options

Compression Option	Caveat
Overlap tasks by using partial dependencies.	<ul style="list-style-type: none"> • If resource loading indicates there are enough resources available • If the interim deliverable is sufficiently complete
Break dependencies and resequence tasks.	<ul style="list-style-type: none"> • If the associated risk is acceptable
Break tasks into subtasks that can be done in parallel.	<ul style="list-style-type: none"> • If resource loading indicates there are enough resources available
Reallocate resources from paths with float to the critical path.	<ul style="list-style-type: none"> • If the task is resource driven • If the resources have the correct skills and available time • If the noncritical path(s) have not become critical.
Authorize overtime, add shifts, increase staffing, subcontract jobs.	<ul style="list-style-type: none"> • If there is approval for the additional budget expense
Remove obstacles.	<ul style="list-style-type: none"> • If priority is high enough
Reduce project scope.	<ul style="list-style-type: none"> • If the project sponsor approves

5.4. Prepare the Project Budget

The primary purpose of preparing a project budget is to estimate the total cost of accomplishing the project. If the budget amount is not acceptable to the project sponsor (the client), then the project workplan will need to be reworked or the project redefined until an acceptable figure is achieved. When cast in time intervals, such as biweekly or monthly, the budget serves as one basis for project monitoring during execution of the workplan.

There are three steps to preparing a project budget:

1. Determine personnel costs.
2. Add support, overhead, and contingency factors.
3. Compile and reconcile the project budget.

This process is not necessarily linear, and some tasks related to these steps may need to be performed as part of the development of high-level cost estimates during the project-definition phase (see Section 4).

5.4.1. Determine Personnel Costs

Project personnel costs are determined by totaling the hours required by each person to perform his or her work on all the tasks to which he or she has been assigned. The person's total project hours then are multiplied by their hourly billing or compensation rate, as determined by management, to

Project Name: Software Selection and Implementation		Project Manager: Joan Ryan		
Date Prepared: 5/31/2000				
Table of Personnel Costs				
ID	Detail Tasks List	Joan R. (\$365/hr)	Hours Mary P. (\$215/hr)	Bob S. (\$150/hr)
2.0	Define system requirements			
2.1	Define and document business system objectives	4	16	40
2.2	Document performance objectives	1	8	8
2.3	Define and document anticipated benefits	1	4	4
3.0	Develop Evaluation Criteria			
3.1	Identify alternative systems or supplements	1	8	16
3.2	Prioritize requirements according to importance	1	4	8
3.3	Evaluate each alternative against the absolute requirements	4	16	32
3.4	Calculate scores for each alternative	1	16	32
3.5	Assess each alternative's functions against requirements	4	8	16
4.0	Select an Alternative			
4.1	Choose the best alternative as a tentative decision	4	8	8
4.2	Assess adverse consequences and decide if an alternative should be selected	1	16	16
4.3	Make final selection	4	4	4
5.0	Develop Implementation Project Plan			
5.1	Meet with project team members	4	40	40
5.2	Develop detail tasks to be performed within each activity	1	32	32
Totals		31	180	256
Personnel Budget		\$11,315.00	\$38,700.00	\$38,400.00
Total Personnel Budget			\$88,415.00	

Figure 5 Personnel Costs.

calculate his or her direct project cost. The costs for all personnel assigned to the project then are totaled to determine the project's personnel budget. Figure 5 provides an example of how personnel costs might be determined.

5.4.2. Add Support, Overhead, and Contingency Factors

Support tasks and overhead should be included in the detail workplan to account for their impact on project cost and duration. Support refers to all those tasks that facilitate production of the deliverables through better communication, performance, or management. It could be project-related training, meetings, administration, project and team management, report production, and quality assurance reviews.

Overhead is nonproductive time spent on tasks that do not support execution of the project workplan or production of the deliverables but can have considerable impact on the project schedule, the resource loading, and potentially the budget. Overhead could include travel time, holidays, vacation, professional development, or personal/sick time.

Nonpersonnel costs associated with the project are identified and estimated. Such costs may include travel expense, technology/knowledge acquisition, and contractor assistance.

Finally, contingency factors are considered to compensate for project risks and other potential project issues as well as to accommodate personnel learning curves. Contingency factors may be applied at the phase or activity level of the workplan/budget, although accuracy may be improved if applied at the detail task level.

Figure 6 extends the example from Figure 5 with nonpersonnel costs to arrive at a total project cost.

Project Name: Software Selection and Implementation		Project Manager: Joan Ryan		
Date Prepared: 5/31/2000				
Table of Personnel and Other Costs				
ID	Detail Tasks List	Joan R. (\$365/hr)	Hours Mary P. (\$215/hr)	Bob S. (\$150/hr)
2.0	Define system requirements			
2.1	Define and document business system objectives	4	16	40
2.2	Document performance objectives	1	8	8
2.3	Define and document anticipated benefits	1	4	4
3.0	Develop Evaluation Criteria			
3.1	Identify alternative systems or supplements	1	8	16
3.2	Prioritize requirements according to importance	1	4	8
3.3	Evaluate each alternative against the absolute requirements	4	16	32
3.4	Calculate scores for each alternative	1	16	32
3.5	Assess each alternative's functions against requirements	4	8	16
4.0	Select an Alternative			
4.1	Choose the best alternative as a tentative decision	4	8	8
4.2	Assess adverse consequences and decide if an alternative should be selected	1	16	16
4.3	Make final selection	4	4	4
5.0	Develop Implementation Project Plan			
5.1	Meet with project team members	4	40	40
5.2	Develop detail tasks to be performed within each activity	1	32	32
	Totals	31	180	256
	Personnel Budget	\$11,315.00	\$38,700.00	\$38,400.00
	Total Personnel Budget		\$88,415.00	
	Administration Support		15,000.00	
	Overhead		30,000.00	
	Contractor		12,000.00	
	subtotal		\$145,415.00	
	Contingency @ 10%		14,540.00	
	Total Phase I Project		\$159,955.00	

Figure 6 Total Project Cost.

Project Name: Software Selection and Implementation						
Time-phased Budget						
ID	Detail Task List	Feb	Mar	Apr	May	Total
2.0	Define system requirements					
2.1	Define and document business system objectives	\$10,900				\$10,900
2.2	Document performance objectives		\$3,285			\$3,285
2.3	Define and document anticipated benefits		\$1,825			\$1,825
3.0	Develop Evaluation Criteria					\$0
3.1	Identify alternative systems or supplements	\$4,485				\$4,485
3.2	Prioritize requirements according to importance		\$2,425			\$2,425
3.3	Evaluate each alternative against the absolute requirements		\$9,700			\$9,700
3.4	Calculate scores for each alternative			\$8,605		\$8,605
3.5	Assess each alternative's functions against requirements			\$5,580		\$5,580
4.0	Select an Alternative					\$0
4.1	Choose the best alternative as a tentative decision				\$4,380	\$4,380
4.2	Assess adverse consequences and decide if an alternative should be selected				\$6,205	\$6,205
4.3	Make final selection				\$2,920	\$2,920
5.0	Develop Implementation Project Plan					\$0
5.1	Meet with project team members				\$16,060	\$16,060
5.2	Develop detail tasks to be performed within each activity				\$12,045	\$12,045
Totals		\$15,385	\$17,235	\$14,185	\$41,610	\$88,415

Figure 7 Time-Phased Budget.

5.4.3. *Compile and Reconcile the Project Budget*

The budget is compiled by adding personnel costs and all other costs (including contingencies) to arrive at a total budget number. The budget is subdivided into time increments (weekly, biweekly, or monthly) for the expected life of the project, based on the expected allocation of resources and related costs to the time periods in the project schedule. An example of a time-phased budget is shown in Figure 7.

Because the budget is a projection of project costs, it is based on many assumptions. The compiled budget should be accompanied by a statement of the assumptions made regarding schedules, resource availability, overhead, contingency factors, nonpersonnel costs, and the like.

If the project budget is materially different from the high-level cost estimate in the project definition, a reconciliation process may need to occur. This may result in the need to rework/rebalance the project definition, the workplan, and the budget before the sponsor will approve execution of the project.

6. PHASE III: PROJECT MONITORING AND CONTROL

The project workplan and budget (see Section 5) are used as the basis for project monitoring and control. The three main purposes of project monitoring and control are to:

1. Manage the project within the constraints of budget, time, and resources
2. Manage changes that will occur
3. Manage communications and expectations

Project monitoring helps the project manager balance constraints, anticipate/identify changes, and understand expectations. A well-designed project monitoring process provides:

- Timely information regarding actual vs. planned results
- An early warning of potential project problems
- A basis for assessing the impact of changes
- An objective basis for project decision making

Project monitoring also is used to set up ongoing channels of communication among project stakeholders. The major deliverables are project progress reports and status updates; detailed workplans (updated as necessary); and cost and schedule performance reports.

6.1. Organizing for Project Implementation

An important element of project monitoring and control is the organization that is put in place to support it. Typically the project-implementation structure consists of at least two entities: the project steering committee and the project office.

6.1.1. *The Project Steering Committee*

The project steering committee is made up of the key stakeholders in the project. It usually is chaired by the project sponsor, and the membership is made up of individuals who are in a position to help move the project along when barriers are encountered or changes are necessary. The committee members typically are project supporters, although antagonists may also be included to ensure that their views are heard and, to the extent possible, accommodated. The project manager is often a member of the committee.

The steering committee has a number of roles. It provides direction to the project; reviews deliverables, as appropriate; receives periodic reports regarding project progress, status, difficulties, and near-future activities; helps clear roadblocks as they occur; and provides final approval that the project has been completed satisfactorily.

6.1.2. *The Project Office*

The project office is led by the project manager. Depending on the size and complexity of the project, the office may be staffed by appropriate technical and administrative personnel to provide assistance to the project manager.

The primary role of the project office is to ensure that the project is proceeding according to plan and that the deliverables are of acceptable quality. This is accomplished by periodic (e.g., weekly or biweekly) review of project progress with respect to plan, as well as review of deliverables as they are produced. The project office maintains and updates the master project workplan and budget and routinely reports progress and difficulties to interested stakeholders, including the steering committee.

The office also takes the lead in ensuring that any actions necessary to correct project problems are effected in a timely manner.

6.2. Project Monitoring

Project monitoring takes a number of forms, including:

- Informal monitoring
- Project workplan and budget maintenance
- Project status reporting
- Status meetings

6.2.1. Informal Monitoring

Informal project monitoring entails “walking the project” on a periodic basis, daily if possible. It may involve observing deliverables; holding ad hoc meetings with team members; and communicating informally and frequently with stakeholders. Much can be learned about how the project is doing simply by talking with project team members and other stakeholders.

6.2.2. Project Workplan and Budget Maintenance

Maintenance of workplans and budgets is a routine and ongoing activity. Project plans should be updated on a regular basis to reflect corrective actions and proactive strategies being implemented. Plan maintenance involves updating the detailed workplan’s latest estimate to reflect current status *and* the time/cost necessary to complete the project. Plan maintenance should occur at least biweekly and should not alter the baseline workplan and budget—unless variances have become large and persistent or the scope of the project has changed. If rebaselining is necessary, it should only be done with sponsor/steering committee approval and may require approval by the person who approved the original project workplan and budget if he or she is other than the sponsor/steering committee.

6.2.3. Project Status Reporting

Status reports provide project leaders and other interested parties with an objective picture of progress, variances, and trends, as well as an audit trail and record of project progress. These reports provide leaders with an opportunity to understand and rectify variances and formulate appropriate actions to identified strengths, vulnerabilities, and risks.

Status reports may be assembled in a variety of configurations, depending on the audience being served. Typical configurations of status report packages include project team leader reports, project manager reports, and steering committee reports.

6.2.4. Status Meetings

Status report packages typically are delivered at status meetings. Team leader report packages are delivered on a regular basis to the project manager to cover completed, current, and planned work. The team leader reports are consolidated by the project office and the overall project status report is presented by the project manager to the steering committee at its regular meeting. The report to the steering committee focuses on overall project status and specific issues or roadblocks that need to be cleared. A key role of the steering committee is to take the lead in resolving issues and clearing roadblocks so the project can proceed as planned.

6.3. Project Control

Project control involves three main activities:

1. Identifying out-of-control conditions
2. Developing corrective actions
3. Following up on corrective action measures

6.3.1. Identifying Out-of-Control Conditions

An activity or task is in danger of going out of control when its schedule or budget is about to be exceeded but the deliverable(s) are not complete. Adequate monitoring of project schedule and budget will provide an early warning that a potential problem exists. An activity or task that is behind schedule and is on the critical path requires immediate attention because it will impact the overall timetable for project completion, which ultimately will adversely impact the budget for the task, the activity, the phase, and the project. Oftentimes, exceeding the budget or missing the scheduled completion date for a particular task or activity may be an early warning sign that a significant problem

is developing for the project. Either of these signs requires an immediate investigation on the part of the project manager to determine the underlying reasons.

6.3.2. *Developing Corrective Actions*

Once the project manager determines the cause of an overage in the budget or a slippage in the schedule, he or she must determine an appropriate response and develop a specific corrective action plan. Sometimes a problem is caused by an impediment that the project manager alone can not resolve. In these instances, the project manager should engage the help of the steering committee. One of the responsibilities of the steering committee is to provide “air cover” for a project manager when he or she encounters complex difficulties.

In other cases, the impediment may have been anticipated and a corrective action plan formulated as part of the project’s risk-management plan. In these cases, all that may be required is to execute the corrective action specified in the plan.

6.3.3. *Following up on Corrective Action Measures*

To ensure that the desired outcome of the corrective action is being achieved, it is important to employ project monitoring techniques when executing a corrective action plan. The walking-the-project technique mentioned earlier is an example of an effective follow-up technique. More complex corrective actions may require a more formal status-reporting approach.

7. PHASE IV: PROJECT CLOSE

Successful completion of all the deliverables set out in the workplan does not, by itself, conclude the project. Several activities need to be accomplished before the project can be brought to a formal close, including:

- Project performance assessment and feedback
- Final status reporting
- Performance review of project team members
- Project documentation archiving
- Disbanding of the project organization

The primary purpose of the project close phase is to ensure that the expectations set throughout the project have been met.

7.1. Project Performance Assessment and Feedback

Project performance should be assessed in a structured manner, addressing the extent to which the objectives set out in the project definition and workplan have been achieved. Obtaining objectivity requires that the client’s views be considered in the assessment.

7.1.1 *Time, Cost, and Quality Performance*

Time, cost, and quality performance are three key project parameters that should be subject to assessment. Time performance can be assessed by comparing the originally planned completion dates of deliverables, both interim and final, with the actual completion dates. Causes of any material schedule slippage should be determined and means for precluding them in future projects developed. A similar assessment of project cost can be conducted by comparing budgeted to actual expenditures and then examining any material favorable and unfavorable variances.

Quality-performance assessment, however, tends to be less quantitative than time and cost assessment. It usually relies on solicited or unsolicited input from the client and other stakeholders regarding how they view the project deliverables (e.g., did they receive what they expected?). Quality performance can also relate to how well the project team has communicated with the stakeholders and perceptions of how well the project has been managed and conducted.

7.1.2. *Lessons Learned*

The opportunity to identify and capture lessons learned from having done a particular project should not be missed. Lessons learned should be documented and any best practice examples relating to the project captured. Documentation of lessons learned and best practice examples should be made available to others in the organization who will be involved in future project design and execution efforts.

7.2. Final Status Reporting

A final project status report should be prepared and issued to at least the project steering committee, including the sponsor. The report does not need to be extensive, but should include:

- A statement of the project objectives and deliverables
- A recap of the approach and key elements of the workplan
- A brief discussion of any open matters that need to be addressed
- A statement that the project has (or has not) achieved its objectives
- A list of suggested next steps, if any
- Acknowledgment of any special contributions by personnel involved

Typically, the final status report is prepared by the project manager and presented at the final steering committee meeting.

7.3. Performance Review of Project Team Members

Individual performance reviews of team members should be conducted on a one-to-one basis by the project manager. Project staff should be evaluated against defined roles and expectations, with the focus on strengths and areas for improvement. Individual contributions to the project should be recognized. The information should be transmitted to each team member's performance manager in order to update developmental needs and provide helpful information for annual performance reviews. Likewise, subcontractors and vendors also should be provided with feedback on their performance.

7.4. Archiving Project Documentation

Archiving entails compilation and organization of appropriate project documentation and submitting it for filing in a designated repository. The project file should include at least the project definition, the project workplan/budget, copies of key deliverables, the final project status report, and the results of the project performance assessment.

7.5. Disbanding the Project Organization

Disbanding the project organization includes notifying the appropriate offices of the future availability of the participants who had been assigned to the project; returning the space and equipment to the issuing offices; and establishing a mechanism for following up and maintaining any deliverables, if necessary.

A project team close-out meeting should be held to reflect on the team members' interaction and identify areas for improvement in working with an extended project team. It also provides an opportunity to identify and discuss any areas of potential improvement in the project management process.

Consideration should also be given to celebrating the success of the project with the project team and extended team members. This would be a positive way to mark the end of the project, celebrate its success, and acknowledge the professional ties developed throughout the course of the work.

8. AVOIDING PROJECT MANAGEMENT PROBLEMS

8.1. When and Why Project Management Problems Occur

Project management problems typically don't manifest themselves until the project is well underway. But the basis for most problems is established early on, during the project definition and planning phases. In particular, unclear and poorly communicated statements of project objectives, scope, and deliverables will almost always result in a project workplan that, when implemented, does not fulfill the expectations of the client and other stakeholders. In the absence of clear project definition, the stakeholders will set their own expectations, which usually won't match those of the project manager and his or her team members.

During project implementation, regular and clear communication between the project participants and the project manager, as well as between the project manager and the sponsor/steering committee, will help raise issues to the surface before they become time, cost, or quality problems.

8.2. Tips for Avoiding Problems in Project Management

The following are some suggestions for avoiding problems on professional services projects:

- Invest time up front in carefully defining and communicating the project objectives, scope, and deliverables. This will save time and reduce frustration in later stages of the project.
- Know the subject matter of the project and stay within your professional skills. Seek help before you need it.
- Avoid overselling and overcommitting in the project definition. Include risk-reducing language when necessary and appropriate.
- Always be clear on project agreements and other matters. Do what you say you will do and stay within the parameters of the project definition.

- Be flexible. A project workplan documents the expected route and allows you to communicate the expected deliverables and path to the stakeholders. Make adjustments as necessary and use the plan and related expectations as the basis for explaining how the changes will affect the project.
- Effective project management is as critical as the tasks and milestones in the project. It keeps the team's efforts focused and aligned. Budget time for the project manager to perform the necessary project management tasks, including, but not limited to, frequent quality, schedule, and budget reviews.
- In large projects, consider the use of a project administrator to take responsibility for some of the crucial but time-consuming administrative tasks.
- Communicate informally and frequently with the client. Identify and communicate risks and problems as early as possible.
- Make sure the project is defined as closed at an appropriate time, typically when the objectives have been met, to avoid having the project drift on in an attempt to achieve perfection.

ADDITIONAL READING

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