Chapter 2: Guidelines for Successful Project Planning

Planning for an IT project covers coordination of management activities, phases, scheduling, timetables, and staffing. It includes the delegation of duties and responsibilities, exploration of modern technology, and system efforts in an organization. The plan focuses on integration of system hardware and software engineering and reengineering goals and principles throughout an organization. The plan also includes adoption of a reuse approach to a system's development and maintenance throughout the life cycle.

IT Project Planning

The IT project manager establishes a team that provides guidance in formalizing project planning. In Figure 1–5, only 8% of the total resources are allocated for the study and planning phase.

One of the guidance criteria is to establish system infrastructure and architecture and a reuse plan and standard at early stages. Most of the hardware components are industry standard and reusable. The manager must identify the domain and evaluate and procure a limited amount of hardware, software, and computer–aided software engineering (CASE) tools necessary to support the software reuse activities. The manager must establish a system reuse dialog among the practitioners and continue to educate them in system reuse that changes the mindset from stovepipe development to domain development. The project manager allocates separate resources for these phases.

Planning for an IT project covers coordination of management activities, phases, scheduling, timetables, and staffing. It includes the delegation of duties and responsibilities, exploration of modern technology, and system efforts in an organization. The plan focuses on integration of system hardware and software engineering and reengineering goals and principles throughout an organization. The plan also includes adoption of a reuse approach to a system's development and maintenance throughout the life cycle.

Project Book

The IT project manager generates and maintains the project book. The project book consists of clear definitions of the project and the steps taken to put all of the activities into action. The book contains all of the references used to inform decisions made in handling problems and contains limitations, meetings, reviews, checkpoints, and the overall outline of the progress of the project.

The purpose of the project book is to assist the project manager. The project book contains the following:

- A chronological record of events with dates
- A record of tasks and activities
- Organizational charts showing who controls and provides funding
- All correspondence in a chronological order
- Names of those with authority, executives, users, customers, and stakeholders controlling the project
- Plans and schedules for the project and its phases
- Standards by which to monitor the performance in each phase
- Reports to be reviewed
- Assessments of risk factors
- All recommendations for submission

> • A record of the implementation of necessary actions and changes that were undertaken for the project's success

The project book helps the manager in staffing each phase, scheduling, and projecting estimates. It is an ongoing record maintained during the course of the project, and the manager uses it as a critical document for evaluation of the project.

Establishing Project Objectives

As part of planning, the manager must establish the project objectives, which should include scope, constraints, and assumptions. The scope consists of boundaries and contours that shape the project. Constraints are the limitations of the project environment. Assumptions may be based on guarantees of assistance in completing the project.

The objectives included within management planning should be strategic, tactical, and operational. The strategy planning reflects the project goals and coincides with the corporate objectives. The project manager understands that the project goals are not achieved without determining, measuring, and completing the objectives.

The project manager properly records the objectives in the project book and openly discusses them with the concerned people. The objectives are clear, understandable, and followed by the members of the project team and should have the following characteristics:

- Objectives should be realistic.
- Management should make a firm commitment to them.
- Management should set up completion dates and costs to measure the achievement of committed objectives.
- Definite guidelines should show how to achieve the objectives.
- Manager should use effective communication to convey them.
- Objectives must be consistent with the available resources.
- Objectives must be clear, concise, and easy to understand and follow.

Setting Project Goals

The project manager sets the goal to make sure that the project is cost–effective; efficient; profitable; and completed within the time limit to the complete satisfaction of the users, customers, and stakeholders. The manager plans these goals on both short– and long–term bases. The project goals should include the following:

- Managerial effectiveness
- Efficiency
- Profits
- Quality products
- Effective communication
- Better services
- Maintenance of morale and positive attitudes
- Development of motivation
- Delegation of duties and responsibilities
- Establishment of controls, standards for raises and promotions, and status reporting
- Phases and completion schedules

- Project progress monitoring
- Realistic expectations

Reporting Schema

The project manager plans to set a schedule and a timetable for reporting. The manager identifies the personnel who are responsible for reporting to users, customers, stakeholders, and executives. The executives can be senior members of the organization, the Chief Information Officer, and financial executives. The manager also establishes interfaces with the Internet group and support teams. This kind of organization creates effective communication among the members of the team. This plan makes it easier for the manager to write status reports that are meaningful to the management and measure the project's progress efficiently.

The reporting schema plan assists the manager in determining who effects the change of scope during the phase and where to receive assistance when problems occur in the phase. The plan coordinates the measurement of actual versus planned performance, completion of the phase task, and expenditure of the budget. This plan also determines a proper balance of project team assignments.

Planning Project Recovery

The project manager establishes various types of recovery procedures and controls to manage the recovery of the project in case the project strays from the schedule or budget. This plan consists of implementing activities from the start of the project until it is completed. The manager selects and establishes standards, methodology, techniques, and tools to develop the system. His or her goals are to produce quality products on time and within the allotted budget to the customer's satisfaction. The manager achieves these goals by doing the following:

- Planning
- Setting specific goals and objectives
- Developing milestones
- Developing a prototype of the system
- Setting up an efficient organization
- Scheduling
- Monitoring the progress of the project
- Acting immediately to remedy variance from the set goals
- Providing status reports and feedback

The project manager sets up independent sections, such as quality assurance (QA), configuration management (CM), and testers, to assist him or her in achieving the overall goal. The establishment of these sections depends on the customer's requirements and the size and scope of the IT project.

Project Modeling and Simulation

Project modeling and simulation is a technique used to help the manager understand IT systems that are complicated, involve new technology, are embedded, and involve multidepartmental interfaces. *Model* is defined as physical, mathematic, or logical representation of a system. *Simulation* is defined as software implementation and solution of a model over time within the context of a scenario. The use of models, including emulators, prototypes, simulators, and stimulators, helps the project manager develop data as a basis for making a managerial or technical decision.

The project modeling and simulation is a convenient way to understand a system and develops a proposed solution to satisfy requirements. The system prototype model simulates some of the key characteristics of the final solution.

Figure 2−1 illustrates a typical system model structure. An extension of modeling is a project in which a first−cut solution is initially developed. The solution is further refined until it fully meets the customer's requirements. Prototype modeling and simulation is a convenient tool used to present a quick overview to the customer concerning the requirements and the result.
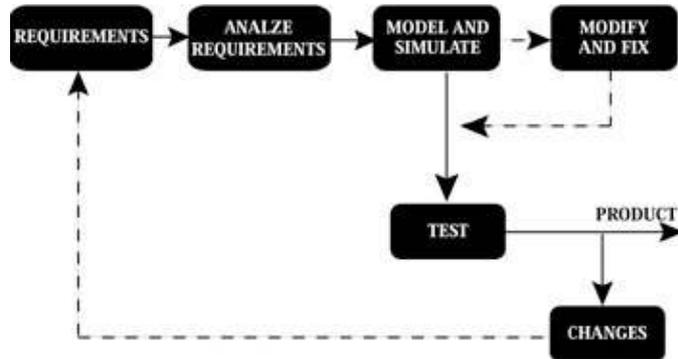

Figure 2−1: Modeling and simulation process

Modeling and simulation help the project manager understand systems that involve the following:

- Research
- Embedded programs
- Complicated requirements
- Multidepartmental interfaces
- New ventures

  - Scientific
  - Commercial
  - Business
  - Space applications
- Defense applications
- Government applications
- Academic research projects

The IT system's modeling and simulation process reduces time, resources, and risk. This process produces systems faster and cheaper and enhances quality. The modeling and simulation process also helps the manager do the following:

- Understand customers' requirements
- Analyze requirements graphically
- Manage tools
- Select hardware
- Select a system engineering methodology
- Select industry standards and best practices
- Outline the necessary documentation
- Describe test scenarios
- Allocate resources
- Define reusable assets
- Reduce the cost of development, testing, and maintenance

- Increase efficiency
- Use reusable components effectively
- Simulate training

Work Breakdown Structure

The work breakdown structure (WBS) model depends on the customer's requirements as analyzed by the project manager. The system model provides a clear picture that enables the manager to understand the customer's requirements and define the WBS. This model includes the major events, activities, and tasks necessary for dealing with the IT system engineering product throughout the life cycle. The manager must plan the budget, schedule, estimate, and organization to achieve success for the WBS. Figure 2–2 illustrates a WBS model.
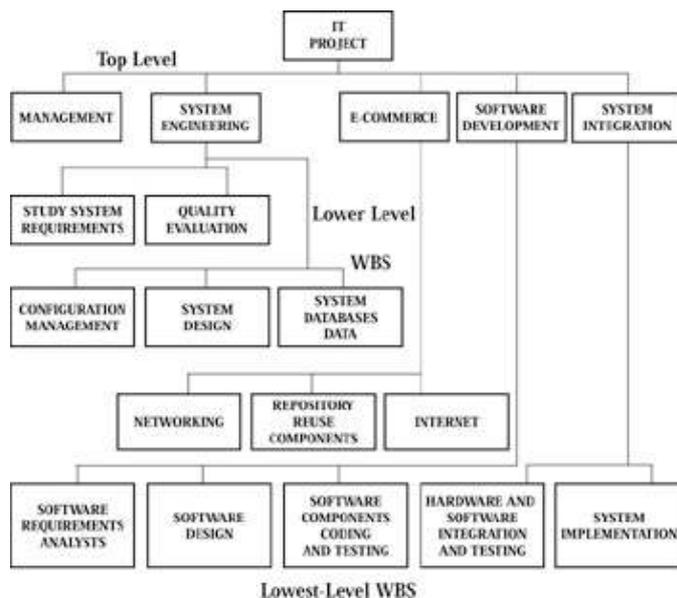

Figure 2–2: Sample WBS model

The system development center assists professionals by sharing insights learned by developing other system development products. This center maintains Internet access for reusable assets. In addition, an organization maintains a repository that can be accessed by other professionals.

Scheduling the Work Breakdown Structure

The project manager plans the schedule model for each WBS. This process establishes a schedule for the completion of activities and tasks. The project manager reviews and updates the schedule periodically. Some of the activities and tasks are completed in parallel, and others are achieved serially.

Scheduling helps the project manager maintain control over the progress of the system's development. The manager can update or modify schedules depending on the activity being delayed or successfully completed in a phase. The manager must take proper action in response to delayed activities to avoid such occurrences in the future.

The project manager develops a master schedule model to provide a comprehensive graphic picture of the priorities of various functions that must be completed. Figure 2–3 illustrates a sample master schedule. This figure shows WBS activities, tasks, and duration.

IT Project	Assign To	2000 IFMAMJJASOND	2001 IFMAMJJASOND	2002 IFMAMJJASOND
Project A	Jack G.	Requirements Analysis System design	Modeling Reuse Software requirements	Coding testing Integration testing
Project B	Linda S.	Analysis and Design	Requirements Analysis and design	Modeling Reuse System design
Project C	Dan K.	Requirements Analysis System design	Modeling Reuse Software requirements Analysis and design	Coding testing Integration testing
Project M	Alice	Coding testing	Integration testing	

Figure 2–3: Sample master schedule

Model scheduling assists the manager in comparing the work achieved against the expected time frame, which creates better management control. The manager monitors deviation from the proposed schedule and corrects it more quickly. This helps the manager complete the system's development on schedule and within budget.

Milestone Model

The project manager develops a milestone model to accomplish a schedule. The milestone chart develops a graphic representation of a WBS effort organized according to time. The project manager documents this chart in the project book along with the analysis of the WBS, schedule, tracking of completion of activities, and tasks versus plan.

> The earned value (EV) technique uses a milestone model:
> EV = [ATD/EAC] X 100
> where ATD = actual to date and EAC = estimate at completion.

EV represents the percentage of completion of a project in terms of effort accomplished as a portion of total effort required. EV should not be identified in excess of 85% until the milestone is completed (i.e., 100%). This protects the project manager from the '99% complete syndrome' (the percentage of completion increases but never moves from 99% to 100% despite unlimited resources). For large, real–time IT systems, it is better to graphically represent cumulative EV in relationship to planned EV. EV is discussed further in Chapter 3.

Budgeting

A budgeting model estimates the cost of accomplishing a WBS as scheduled. The assigned budget allows expenditures so that the project manager can perform the different tasks, activities, system training, and phases effectively (Figure 2–4). The project manager determines the cost and schedule status and compares them with what is required to remain within the budget and schedule.
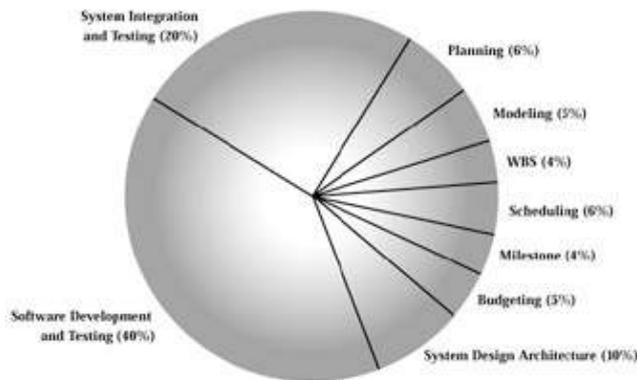
Figure 2–4: Budget model

The budget allows for expenditures such as the following:

- Hardware costs
- Networking
- Internet access
- Travel
- Material procurements
- Temporary living expenses
- Reuse assets
- Databases
- Contingency plans
- Resource procurements
- Commercial items
- Software development
- Support groups
- System testing
- Administrative expenses
- Personnel salaries and benefits

Many models are available to help the manager compute the cost estimation. Some of these are discussed in later chapters.

Normally a project manager agrees to a budget when he or she accepts duties and responsibilities for the phase. His or her duty is to manage the phase successfully within the time, schedule, and budget. The manager's expenditures should be consistent with the overall project budget and the assigned phase budget.

Project Organization

A manager plans the project organization model so that it conforms to the WBS, schedule, level of efforts (LOE), and budget. The manager hires human resources to meet the requirements and objectives at various phases during the system's development and maintenance.

The structure of an organization establishes relationships among members of the professional team, managers, stakeholders, users, and customer. The organizational structure distributes specific duties and responsibilities among the team members so they can function effectively.

The manager selects the right structure for his or her organization depending on his or her experiences. The most popular types of organization are the following:

- Functional
- Pure
- Matrix
- Hybrid

Functional

The functional organizational model defines hierarchy, technical competence, responsibilities, and duties (Figure 2–5). Personnel remain strictly within their assigned positions in the hierarchy. The project manager is ultimately responsible for decision making. The project manager assigns middle– and lower–level managers and supervisors to departments and sections, which are further subdivided into functional units headed by team leaders.
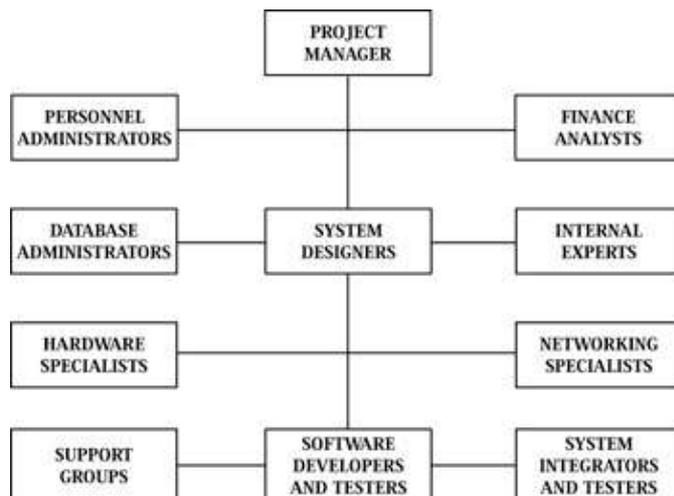

Figure 2–5: Functional organizational model

The advantages of functional organization include the following:

- Specialists in a field are grouped together.
- Control is centralized.
- Computer specialists are easier to manage.
- Training is improved.
- Morale improves.
- Mutual support is fostered.
- Professionals gain a variety of experiences from one another.
- Professionals are motivated to work.
- Policies and procedures are standardized and uniform.
- Productivity increases.

The disadvantages of functional organization include the following:

- Lack of coordination
- Competition
- Lack of individual responsibility

Pure

The pure organizational model encourages a straightforward management style (Figure 2–6). The project manager assigns all practitioners to a system project as one organizational unit. This structure model is also called a direct or vertical organization. The project manager is given authority over the system project and acquires resources from within and outside the organization as needed. The manager assigns practitioners to only one system project until it is complete. Although the system project organization promotes teamwork and a sense of unity, it can also lead to duplication of effort, problems with 'empire building,' and a tendency for project management to retain practitioners longer than necessary. In addition, competent practitioners move on when the system project is complete.
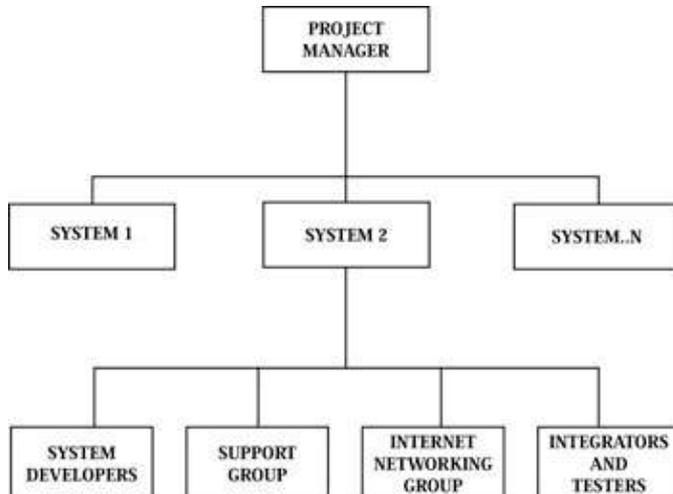
Figure 2–6: Pure organizational model

The advantages of pure organization include the following:

- It is easy to manage.
- Responsibilities lie upon one individual.
- It provides good control over resources.
- It encourages mutual communication.
- It is flexible to a project's orientation.

The disadvantages of pure organization include the following:

- Duplication of efforts
- Temptation to retain practitioners unnecessarily long
- Difficulties in keeping practitioners when the project is expired

Matrix

The matrix organizational model combines the best of functional and pure organizational styles (Figure 2–7). The matrix model is a multidimensional structure that tries to maximize the strengths and minimize the weaknesses of the pure and functional models. It balances objectives and provides coordination across functional departments and sections. The matrix model combines the popular hierarchic structure with a superimposed lateral or horizontal structure involving a project manager.
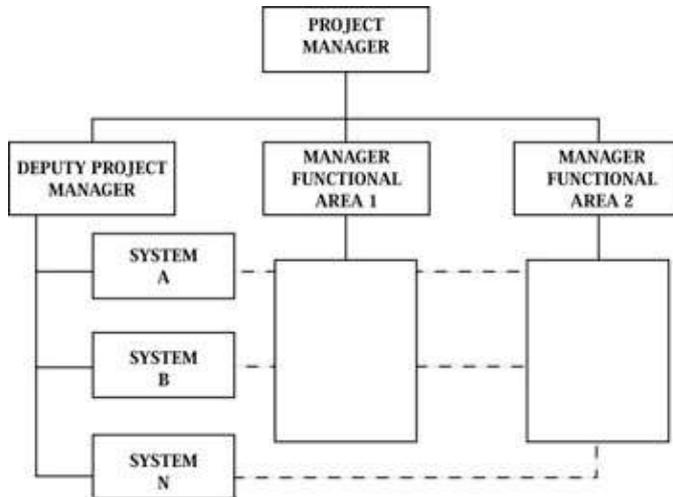
Figure 2–7: Matrix organizational model

The advantages of matrix organization include the following:

- Responsibility lies upon one practitioner.
- Professional experts are available from each of the functional departments.
- Project manager need not deal directly with personnel problems.
- Lower and middle managers solve project problems easily and quickly.
- Project personnel have job security.
- Personnel have job placement when a project is over.

The disadvantages of matrix organization include the following:

- Conflict of bosses
- Lack of management uniformity
- Limited authority for the project manager
- Low personnel morale
- Suffering productivity
- High turnover rate

Hybrid

The hybrid organizational model is a combination of everything that suits a manager's style (Figure 2–8). This organizational model does not have a formal format. The manager believes in the saying 'nothing succeeds like success.' No single approach is perfect for all IT project situations, especially for a complex system's development and maintenance. The best practices solution is contingent upon the key factors in the environment surrounding the IT project system's development and maintenance. The following are some of these key factors:

- New IT projects
- Conversion from the existing IT projects
- Maintenance of IT systems
- Prototyping of IT systems
- Complex IT projects
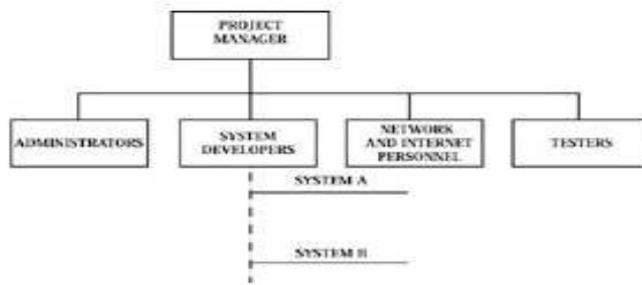- IT projects for research and development

Figure 2–8: Hybrid organizational model

The advantages of hybrid organization include the following:

- It provides a hierarchic, structured approach.
- A maximum of five to seven practitioners supervise.
- It allows open–door communication.
- It allows management interfaces.
- It fosters encouragement of professional achievements.
- It allows individual responsibility for a function.
- It fosters encouragement of the team concept.
- It allows flexibility to suit the size of a project.
- It allows orientation toward domain–specific professionals.
- It allows an increase in productivity.
- It allows high morale.

The disadvantages of hybrid organization include the following:

- Lack of discipline
- Formation of cliques

Table 2–1 suggests criteria for selecting an organizational model.

Table 2–1: Criteria For Selecting An Organization Model

System Criteria	Functional	Pure	Matrix	Hybrid
Uncertainty	Low	High	High	Low
Importance	Low	Large	Medium	Medium
Technology	Standard	Complicated	New	New
Duration	Short	Long	Medium	Medium
Size	Small	Large	Medium	Medium
Time	Low	High	Medium	Medium
Complexity	Low	High	Medium	High

Staffing

Staffing is a management plan to establish a team suitable to the size of the IT project. Staffing and selecting personnel is a process that requires reviews of the IT system model, hardware and software development, and maintenance phases. A project manager is selected at the initiation of the IT project. He or she selects other

personnel in the team gradually, depending on the WBS, schedule milestones, and budget.

The staffing model, as illustrated in Figure 2–9, consists of a plan to hire a set number of professionals in phases depending on the skills, duration, and degree of involvement in the project. The project manager assigns responsibilities and duties after careful consideration of each person's qualifications, experience, and motivation. The manager plans to provide the necessary training to suitable personnel to enable them to be efficient in their duties and responsibilities. The manager usually has difficulty finding the right professional for the right job within the budget. In the current competitive market, to find such professionals and retain them is a great challenge. The IT manager should prefer personnel who are loyal and have stayed with the organization for a long time.
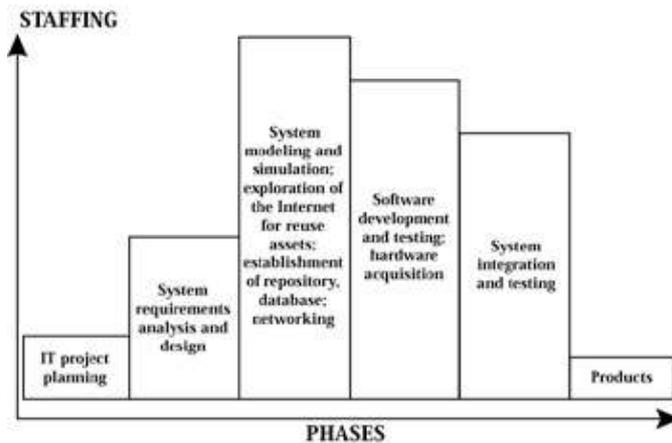

Figure 2–9: Staffing concept for a typical IT project

Shannon Brandon of MATRIX, an Atlanta–based firm that specializes in IT staffing, describes today's job market as 'frenzied.' With many more open IT positions than qualified candidates to fill them, the industry is rife with delayed projects, rising salaries, and frustrated IT managers. David Stum, president of Aon's Loyalty Institute, which researches levels of employee commitment and customer loyalty, points out that 'retaining employees is now a bottom–line proposition for American business.' The cost of finding, hiring, and training a new employee equals 6 months of annual salary and continues to increase (Wakin, 1999).

An education and training center helps the manager provide specific system and domain–related training. The manager should be a part of the team that provides training for his or her team members. The manager also should hire novice qualified people and have the center provide suitable training. Training of the professional is an ongoing effort; as the project progresses, suitable professionals should be trained to fulfill the requirements. This guarantees the creation of a team of professionals at less expense and with proper skills and disciplines for each phase of the system's development and maintenance. These trained personnel are knowledgeable and may stay longer with the organization, which helps an organization grow and helps the personnel grow in terms of raises and promotions.

The project manager carefully assesses the strengths and weaknesses of the personnel, especially for the assignments of phase, section, system, and task manager. These personnel have decision–making responsibilities and should be selected carefully to fulfill suitable roles. This is especially true for large IT projects in which the project manager needs to have a few phase managers who assist the project manager in management.

Revisiting Case Study 1–1

Planning is the most fundamental function of the project manager and includes decisions concerning the following:

- What to do
- How to do it
- When to do it
- Who will do it

As the 'Generating Air Ticket' project manager, Bob knows that project planning involves the following:

- Setting objectives
- Breaking the work into tasks
- Establishing schedules and budgets
- Allocating resources
- Setting standards
- Selecting a course of action
- Controlling and monitoring the project's progress

Bob knows that measuring and evaluating the project's progress is the key to success. He also knows how to identify problems early while there is still time to take corrective action. He establishes the project book to record all of the activities for future reference. Bob establishes controls, such as quality evaluation, CM, support groups, and a system development center. He involves users, customers, and stakeholders early in the project by establishing an integrated product team (IPT). He plans to set up tracking schema and establishes milestones for all deliverables. He keeps track of estimates and actual performance. He understands risk factor management.

Bob also understands the cost and schedule constraints imposed externally upon the IT system's development. He defines schedules and identifies milestones to monitor costs and assess quality.

Bob selects the matrix organization as best suited for his project. He sets up a team of consultants to start the system development center. The objective is to establish a modern technology mindset and educate personnel for the system development team. The team can accomplish a successful project if the manager and project team understand the design of the system with modern technology (e.g., reuse [plug in and play], Internet, networking, CASE tools, and commercial items).

Bob appoints three senior consultants to spend 2 months collecting data for understanding the system requirement analysis and project planning. They study other existing related systems by accessing the Internet. They prototype and build the system model as shown in Figure 2–10. They establish the task breakdown and the baseline for the project analysis.
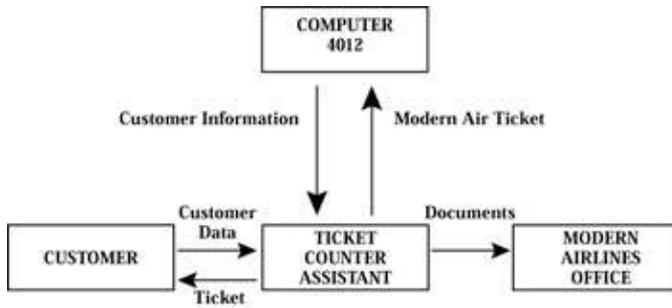
Figure 2–10: Generating ticket system's prototype model

Bob starts staffing the project in phases. He knows that it will take about 3 to 4 months to educate personnel in modern system development. It will take at least 1 year for a person to become an expert in the field. He lets his selected staff attend suitable regular classes that are conducted by the members of the system development center in the following areas:

- Microsoft Office software
- Internet
- Networking
- System engineering requirements analysis
- Software engineering design
- Object–oriented design methods
- Evolutionary design methods
- Modeling and simulation
- Testing
- Quality evaluation
- CM

Bob also establishes the precedent that the personnel need proper training before they can be considered productive and effective members of the project team. He initiates a monthly system development newsletter.

Bob develops WBS as shown in Figure 2–11. The WBS represents a sample of the task to be performed in a hierarchic structured form. The manager takes special care to not exclude any portion of the WBS that is of prime importance. The manager also avoids duplication of any portion of the WBS effort. The WBS also provides the work force and a budget allocated to different activities.
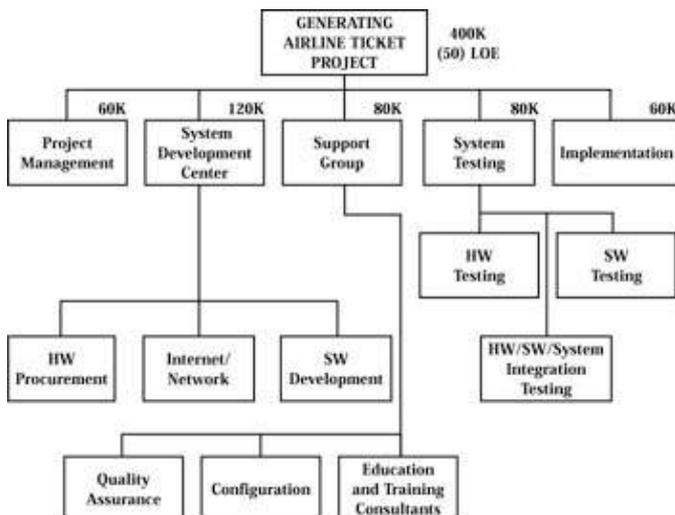

Figure 2–11: WBS, manpower, and budget allocation

Project Planning Checklist

Project planning is critical; the success of an IT project starts with structured planning. Success includes understanding requirements; selecting quality personnel; and using the correct methodology, hardware and software, and tools. Success also depends on achieving performance goals and reducing risk while implementing strategic objectives.

Technical professionals and managers must learn to communicate effectively. The project manager must try to establish a realistic schedule and goals. The manager builds in flexibility and contingency plans to save bogged–down projects. The manager sets up plans to gauge the project's progress, detect early warning signs, and determine how to handle them. The success of the project requires the manager to keep the IT project on schedule and budget. The project planning checklist includes the following:

- Set up a project book for future references.
- Establish project objectives, goals, and reporting schema.
- Establish a project recovery plan.
- Develop a project model to understand requirements.
- Get support from senior executives.
- Involve users, customers, and stakeholders early.
- Develop a WBS, schedule, and milestone models.
- Procure and allocate the budget properly.
- Select a suitable organizational chart.
- Hire appropriate staffing as the project progresses.
- Hire domain experts and share their knowledge and experiences.
- Use reliable technology that is matured.
- Establish a training center. Training is also a key to attracting and keeping IT professionals.
- Create a process to not only attract professionals but to keep them. The less appreciation an organization shows for a professional contribution, the greater the depreciation in staff loyalty.
- Establish an IT work force improvement program. What counts is not how long a professional has been with the organization, but how much he or she has learned and continues to learn.
- Remember that top performers know what they can do for an organization. They want to know what the organization can do for them.