Software Project Management

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INTRODUCTION

Unit Structure:

Project management has been practiced since early civilization. Until the beginning of twentieth century civil engineering projects were actually treated as projects and were generally managed by creative architects and engineers. Project management as a discipline was not accepted. It was in the 1950s that organizations started to systematically apply project management tools and techniques to complex projects. As a discipline, Project Management developed from several fields of application including construction, engineering, and defense activity. Two forefathers of project management are commonly known: Henry Gantt, called the father of planning and control techniques who is famous for his use of the Gantt chart as a project management tool; and Henri Fayol for his creation of the five management functions which form the foundation of the body of

knowledge associated with project and program management. The 1950s marked the beginning of the modern Project Management era. Project management became recognized as a distinct discipline arising from the management discipline.

1.1 WHAT IS A PROJECT?

All of us have been involved in projects, whether they be our personal projects or in business and industry. Examples of typical projects are for example:

- Personal projects:
  - obtaining an MCA degree
  - writing a report
  - planning a party
  - planting a garden
- Industrial projects:
  - Construction of a building
  - provide electricity to an industrial estate
  - building a bridge
  - designing a new airplane

Projects can be of any size and duration. They can be simple, like planning a party, or complex like launching a space shuttle.

1.1.1 Project Definition:

A project can be defined in many ways :

A **project** is “a temporary endeavor undertaken to create a unique product, service, or result.” Operations, on the other hand, is work done in organizations to sustain the business. Projects are different from operations in that they end when their objectives have been reached or the project has been terminated.

A project is *temporary*. A project’s duration might be just one week or it might go on for years, but every project has an end date. You might not know that end date when the project begins, but it’s there somewhere in the future. Projects are not the same as ongoing operations, although the two have a great deal in common.

A project is an *endeavor*. Resources, such as people and equipment, need to do work. The endeavor is undertaken by a team or an organization, and therefore projects have a sense of

being intentional, planned events. Successful projects do not happen spontaneously; some amount of preparation and planning happens first.

Finally, every project creates a *unique product* or *service*. This is the **deliverable** for the project and the reason, why that project was undertaken.

1.2 PROJECT ATTRIBUTES

Projects come in all shapes and sizes. The following attributes help us to define a project further:

- *A project has a unique purpose.* Every project should have a well-defined objective. For example, many people hire firms to design and build a new house, but each house, like each person, is unique.
- *A project is temporary.* A project has a definite beginning and a definite end. For a home construction project, owners usually have a date in mind when they'd like to move into their new homes.
- *A project is developed using progressive elaboration or in an iterative fashion.*

  Projects are often defined broadly when they begin, and as time passes, the specific details of the project become clearer. For example, there are many decisions that must be made in planning and building a new house. It works best to draft preliminary plans for owners to approve before more detailed plans are developed.
- *A project requires resources, often from various areas.* Resources include people, hardware, software, or other assets. Many different types of people, skill sets, and resources are needed to build a home.
- *A project should have a primary customer or sponsor.* Most projects have many interested parties or stakeholders, but someone must take the primary role of sponsorship. The **project sponsor** usually provides the direction and funding for the project.
- *A project involves uncertainty.* Because every project is unique, it is sometimes difficult to define the project's objectives clearly, estimate exactly how long it will take to complete, or determine how much it will cost. External factors also cause uncertainty, such as a supplier going out of business or a project team member needing unplanned time off. This uncertainty is one of the main reasons project management is so challenging.

1.3 PROJECT CONSTRAINTS

Like any human undertaking, projects need to be performed and delivered under certain constraints. Traditionally, these constraints have been listed as scope, time, and cost. These are also referred to as the Project Management Triangle, where each side represents a constraint. One side of the triangle cannot be changed without impacting the others. A further refinement of the constraints separates product 'quality' or 'performance' from scope, and turns quality into a fourth constraint.

The time constraint refers to the amount of time available to complete a project. The cost constraint refers to the budgeted amount available for the project. The scope constraint refers to what must be done to produce the project's end result. These three constraints are often competing constraints: increased scope typically means increased time and increased cost, a tight time constraint could mean increased costs and reduced scope, and a tight budget could mean increased time and reduced scope.

The discipline of project management is about providing the tools and techniques that enable the project team (not just the project manager) to organize their work to meet these constraints.

Another approach to project management is to consider the three constraints as finance, time and human resources. If you need to finish a job in a shorter time, you can allocate more people at the problem, which in turn will raise the cost of the project, unless by doing this task quicker we will reduce costs elsewhere in the project by an equal amount.

1.3.1 Time:

For analytical purposes, the time required to produce a product or service is estimated using several techniques. One method is to identify tasks needed to produce the deliverables documented in a work breakdown structure or WBS. The work effort for each task is estimated and those estimates are rolled up into the final deliverable estimate.

The tasks are also prioritized, dependencies between tasks are identified, and this information is documented in a project schedule. The dependencies between the tasks can affect the length of the overall project (dependency constraint), as can the availability of resources (resource constraint). Time is not considered a cost nor a resource since the project manager cannot

control the rate at which it is expended. This makes it different from all other resources and cost categories.

1.3.2 Cost:

Cost to develop a project depends on several variables including : labor rates, material rates, risk management, plant (buildings, machines, etc.), equipment, and profit. When hiring an independent consultant for a project, cost will typically be determined by the consultant's or firm's per diem rate multiplied by an estimated quantity for completion.

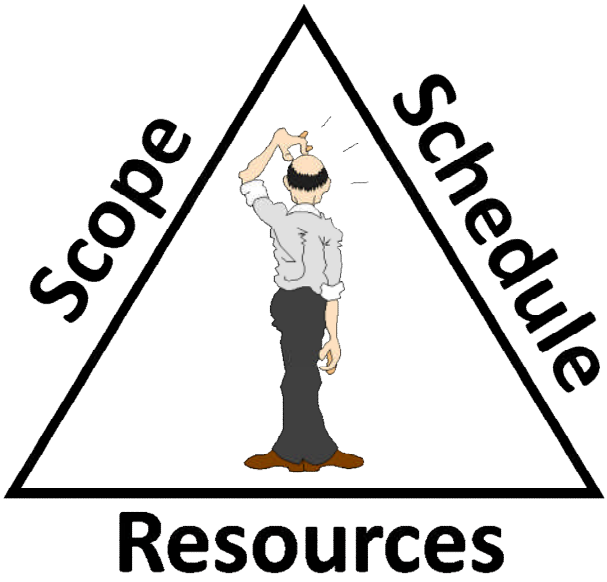

Figure 1.1 : The Project management Triangle

1.3.3 Scope:

Scope is requirement specified for the end result. The overall definition of what the project is supposed to accomplish, and a specific description of what the end result should be or accomplish can be said to be the scope of the project. A major component of scope is the quality of the final product. The amount of time put into individual tasks determines the overall quality of the project. Some tasks may require a given amount of time to complete adequately, but given more time could be completed exceptionally. Over the course of a large project, quality can have a significant impact on time and cost or vice versa.

Together, these three constraints viz. Scope, Schedule & Resources have given rise to the phrase "On Time, On Spec, On Budget". In this case, the term "scope" is substituted with "spec(ification)"

1.4 WHAT IS PROJECT MANAGEMENT

Project management is “the application of knowledge, skills, tools and techniques to project activities to meet the project requirements.” The effectiveness of project management is critical in assuring the success of any substantial activity. Areas of responsibility for the person handling the project include planning, control and implementation. A project should be initiated with a feasibility study, where a clear definition of the goals and ultimate benefits need to be determined. Senior managers' support for projects is important so as to ensure authority and direction throughout the project's progress and, also to ensure that the goals of the organization are effectively achieved in this process.

Knowledge, skills, goals and personalities are the factors that need to be considered within project management. The project manager and his/her team should collectively possess the necessary and requisite interpersonal and technical skills to facilitate control over the various activities within the project.

The stages of implementation must be articulated at the project planning phase. Disaggregating the stages at its early point assists in the successful development of the project by providing a number of milestones that need to be accomplished for completion. In addition to planning, the control of the evolving project is also a prerequisite for its success. Control requires adequate monitoring and feedback mechanisms by which senior management and project managers can compare progress against initial projections at each stage of the project. Monitoring and feedback also enables the project manager to anticipate problems and therefore take pre-emptive and corrective measures for the benefit of the project.

Projects normally involve the introduction of a new system of some kind and, in almost all cases, new methods and ways of doing things. This impacts the work of others: the "users". User interaction is an important factor in the success of projects and, indeed, the degree of user involvement can influence the extent of support for the project or its implementation plan. A project manager is the one who is responsible for establishing a communication in between the project team and the user. Thus one of the most essential quality of the project manager is that of being a good communicator, not just within the project team itself, but with the rest of the organization and outside world as well.

1.4.1 Features of projects:

- Projects are often carried out by a team of people who have been assembled for that specific purpose. The activities of this team may be co-ordinated by a project manager.
- Project teams may consist of people from different backgrounds and different parts of the organisation. In some cases project teams may consist of people from different organisations.
- Project teams may be inter-disciplinary groups and are likely to lie outside the normal organisation hierarchies.
- The project team will be responsible for delivery of the project end product to some sponsor within or outside the organisation. The full benefit of any project will not become available until the project as been completed.

1.4.2 Project Classification:

In recent years more and more activities have been tackled on a project basis. Project teams and a project management approach have become common in most organisations. The basic approaches to project management remain the same regardless of the type of project being considered. You may find it useful to consider projects in relation to a number of major classifications:

a) **Engineering and construction**
The projects are concerned with producing a clear physical output, such as roads, bridges or buildings. The requirements of a project team are well defined in terms of skills and background, as are the main procedures that have to be undergone. Most of the problems which may confront the project team are likely to have occurred before and therefore their solution may be based upon past experiences.

b) **Introduction of new systems**
These projects would include computerisation projects and the introduction of new systems and procedures including financial systems. The nature and constitution of a project team may vary with the subject of the project, as different skills may be required and different end-users may be involved. Major projects involving a systems analysis approach may incorporate clearly defined procedures within an organisation.

c) **Responding to deadlines and change**
An example of responding to a deadline is the preparation of an annual report by a specified date. An increasing number of projects are concerned with designing organisational or environmental changes, involving developing new products and services.

1.4.3 Project Management Tools and techniques:

Project planning is at the heart of project management. One can't manage and control project activities if there is no plan. Without a plan, it is impossible to know if the correct activities are underway, if the available resources are adequate or of the project can be completed within the desired time. The plan becomes the roadmap that the project team members use to guide them through the project activities. Project management tools and techniques assist project managers and their teams in carrying out work in all nine knowledge areas. For example, some popular time-management tools and techniques include Gantt charts, project network diagrams, and critical path analysis. Table 1.1 lists some commonly used tools and techniques by knowledge area.

Knowledge Area	Tools & Techniques
Integration management	Project selection methods, project management methodologies, stakeholder analyses, project charters, project management plans, project management software, change requests, change control boards, project review meetings, lessons-learned reports
Scope management	Scope statements, work breakdown structures, mind maps, statements of work, requirements analyses, scope management plans, scope verification techniques, and scope change controls
Cost Management	Net present value, return on investment, payback analyses, earned value management, project portfolio management, cost estimates, cost management plans, cost baselines
Time management	Gantt charts, project network diagrams, critical-path analyses, crashing, fast tracking, schedule performance measurements
Human resource management	Motivation techniques, empathic listening, responsibility assignment matrices, project organizational charts, resource histograms, team building exercises

Quality management	Quality metrics, checklists, quality control charts, Pareto diagrams, fishbone diagrams, maturity models, statistical methods
Risk management	Risk management plans, risk registers, probability/impact matrices, risk rankings
Communication management	Communications management plans, kickoff meetings, conflict management, communications media selection, status and progress reports, virtual communications, templates, project Web sites
Procurement management	Make-or-buy analyses, contracts, requests for proposals or quotes, source selections, supplier evaluation matrices

Table 1.1 : Project Management Tools and Techniques

1.4.4 Project Success Factors:

The successful design, development, and implementation of information technology (IT) projects is a very difficult and complex process. However, although developing IT projects can be difficult, the reality is that a relatively small number of factors control the success or failure of every IT project, regardless of its size or complexity. The problem is not that the factors are unknown; it is that they seldom form an integral part of the IT development process.

Some of the factors that influence projects and may help them succeed are

- Executive Support
- User involvement
- Experienced project managers
- Limited scope
- Clear basic requirements
- Formal methodology
- Reliable estimates

1.5 THE ROLE OF PROJECT MANAGER

The project manager is the driving force in the management control loop. This individual seldom participates directly in the activities that produce the end result, but rather strives to maintain the progress and productive mutual interaction of various parties in such a way that overall risk of failure is reduced.

A project manager is often a client representative and has to determine and implement the exact needs of the client, based on knowledge of the firm he/she is representing. The ability to adapt to the various internal procedures of the contracting party, and to form close links with the nominated representatives, is essential in ensuring that the key issues of cost, time, quality, and above all, client satisfaction, can be realized.

In whatever field, a successful project manager must be able to envisage the entire project from start to finish and to have the ability to ensure that this vision is realized.

When they are appointed, project managers should be given terms of reference that define their:

- Objectives;
- Responsibilities;
- Limits of authority.

1.5.1 Responsibilities of a Project Manager:

The objective of every project manager is to deliver the product on time, within budget and with the required quality. Although the precise responsibilities of a project manager will vary from company to company and from project to project, they should always include planning and forecasting. Three additional areas of management responsibility are:

- ·interpersonal responsibilities, which include:
  - leading the project team;
  - liaising with initiators, senior management and suppliers;
  - being the 'figurehead', i.e. setting the example to the project team and representing the project on formal occasions.
- informational responsibilities, which include:
  - monitoring the performance of staff and the implementation of the project plan;
  - disseminating information about tasks to the project team;
  - disseminating information about project status to initiators and senior management;
  - acting as the spokesman for the project team.
- decisional responsibilities, which include:
  - allocating resources according to the project plan, and adjusting those allocations when circumstances dictate (i.e. the project manager has responsibility for the budget);
  - negotiating with the initiator about the optimum interpretation of contractual obligations, with the

company management for resources, and with project staff about their tasks;

- handling disturbances to the smooth progress of the project such as equipment failures and personnel problems.

1.6 PROJECT LIFE CYCLE

The Project Life Cycle refers to a logical sequence of activities to accomplish the project's goals or objectives. Regardless of scope or complexity, any project goes through a series of stages during its life. There is first an Initiation or Starting phase, in which the outputs and critical success factors are defined, followed by a Planning phase, characterized by breaking down the project into smaller parts/tasks, an Execution phase, in which the project plan is executed, and lastly a Closure or Exit phase, that marks the completion of the project. Project activities must be grouped into phases because by doing so, the project manager and the core team can efficiently plan and organize resources for each activity, and also objectively measure achievement of goals and justify their decisions to move ahead, correct, or terminate. It is of great importance to organize project phases into industry-specific project cycles. Why? Not only because each industry sector involves specific requirements, tasks, and procedures when it comes to projects, but also because different industry sectors have different needs for life cycle management methodology. And paying close attention to such details is the difference between doing things well and excelling as project managers.

Diverse project management tools and methodologies prevail in the different project cycle phases. Let's take a closer look at what's important in each one of these stages:

1.6.1 Project Initiation:

The initiation stage determines the nature and scope of the development. If this stage is not performed well, it is unlikely that the project will be successful in meeting the business's needs. The key project controls needed here are an understanding of the business environment and making sure that all necessary controls are incorporated into the project. Any deficiencies should be reported and a recommendation should be made to fix them.

The initiation stage should include a plan that encompasses the following areas:

- Analyzing the business needs/requirements in measurable goals.
- Reviewing of the current operations.

- Conceptual design of the operation of the final product.
- Equipment and contracting requirements including an assessment of long lead time items.
- Financial analysis of the costs and benefits including a budget.
- Stakeholder analysis, including users, and support personnel for the project.
- Project charter including costs, tasks, deliverables, and schedule.

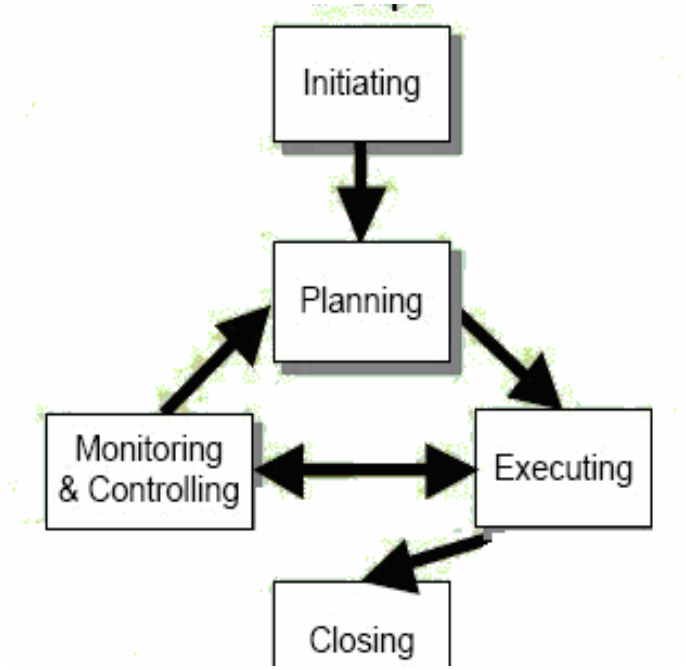

Figure 1.5 : Project Life Cycle

1.6.2 Planning & Design:

After the initiation stage, the system is designed. Occasionally, a small prototype of the final product is built and tested. Testing is generally performed by a combination of testers and end users, and can occur after the prototype is built or concurrently. Controls should be in place that ensures that the final product will meet the specifications of the project charter. The results of the design stage should include a product design that:

- Satisfies the project sponsor (the person who is providing the project budget), end user, and business requirements.

- Functions as it was intended.

- Can be produced within acceptable quality standards.

- Can be produced within time and budget constraints.

1.6.3 Execution & Controlling:

Monitoring and Controlling consists of those processes performed to observe project execution so that potential problems can be identified in a timely manner and corrective action can be taken, when necessary, to control the execution of the project. The key benefit is that project performance is observed and measured regularly to identify variances from the project management plan.

Monitoring and Controlling includes:

- Measuring the ongoing project activities (*where we are*);
- Monitoring the project variables (cost, effort, scope, etc.) against the project management plan and the project performance baseline (*where we should be*);
- Identify corrective actions to address issues and risks properly (*How can we get on track again*);
- Influencing the factors that could circumvent integrated change control so only approved changes are implemented

In multi-phase projects, the Monitoring and Controlling process also provides feedback between project phases, in order to implement corrective or preventive actions to bring the project into compliance with the project management plan.

Project Maintenance is an ongoing process, and it includes:

- Continuing support of end users
- Correction of errors
- Updates of the software over time

In this stage, auditors should pay attention to how effectively and quickly user problems are resolved.

Over the course of any IT project, the work scope may change. Change is normal and expected part of the process. Changes can be the result of necessary design modifications, differing site conditions, material availability, client-requested changes, value engineering and impacts from third parties, to name a few. Beyond executing the change in the field, the change normally needs to be documented to show what was actually developed. This is referred to as Change Management. Hence, the owner usually requires a final record to show all changes or, more specifically, any change that modifies the tangible portions of the

finished work. The record is made on the contract documents – usually, but not necessarily limited to, the design drawings. The end product of this effort is what the industry terms as-built drawings, or more simply, “as built.”

When changes are introduced to the project, the viability of the project has to be re-assessed. It is important not to lose sight of the initial goals and targets of the projects. When the changes accumulate, the forecasted result may not justify the original proposed investment in the project.

1.6.4 Closure:

Closing includes the formal acceptance of the project and the ending thereof. Administrative activities include the archiving of the files and documenting lessons learned.

This phase consists of:

- **Project close**: Finalize all activities across all of the process groups to formally close the project or a project phase.
- **Contract closure**: Complete and settle each contract (including the resolution of any open items) and close each contract applicable to the project or project phase.

Sample Questions

1. Why is there a new or renewed interest in the field of project management?

2. What is a project, and what are its main attributes? How is a project different from what most people do in their day-to-day jobs? What is the triple constraint?

3. What is project management? Briefly describe the project management framework, providing examples of stakeholders, knowledge areas, tools and techniques, and project success factors.

4. Discuss the relationship between project, program, and portfolio Management and their contribution to enterprise success.

5. What are the roles of the project, program, and portfolio managers? What are suggested skills for project managers? What additional skills do program and portfolio managers need?

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2

TECHNOLOGY CONTEXT

Unit Structure:

2.1 A SYSTEMS VIEW OF PROJECT MANAGEMENT

There are many aspects of project management that are important and worthy of comment. There are so many details that must be handled in order for a project to be successful. To be able to handle the day to day details while still keeping your eye of the strategic whole is a demanding task but one that can be learned and improved.

As the project is a temporary, one-time endeavor undertaken to solve a problem or take advantage of an opportunity, It usually has a customer or customers (either internal or external to the

organization that are doing the project), a budget or a set of scarce resources that must be managed and some kind of timeframe/constraint for completion or operation. Before one can undertake a project to solve a problem one must first understand the problem. Not only understand the details of the problem but also understand who has the problem and the context and environment that must be taken into consideration in addressing the problem.

A key practice in getting things clear is to look at the problem from the customers and users perspectives.

- What is important to the customer?

- How will the user actually be using the system.

- What does the world look like from their perspective?

- What do they value and what is the solution worth?

- Engineers tend to focus on features while customers are interested in benefits; how will this help them solve their problems.

One way to get this perspective is to spend time with the customers and users and enter into a dialog with them. If project managers run projects in isolation, these projects will never serve the needs of the organisation for which it is undertaken. Project managers thus should consider projects within the greater organizational context and take a holistic view of a project. Systems thinking describes this holistic view of carrying out projects.

A systems approach is an overall model for thinking about things as systems. Systems are sets of interacting components working within an environment to fulfill some purpose. System analysis is a problem-solving approach that requires defining the scope of the system, dividing it into its components, and then identifying and evaluating its problems, its opportunities constraints and needs. Once this is completed, the systems analyst then examines alternative solutions for improving the current situation, identifies an optimum, or at least satisfactory, solution or action plan, and examines that plan against the entire system. Systems management addresses the business, technological, and organizational issues associated with creating, maintaining, and making a change to a system.

Using a systems approach is critical to successful project management. Top management and project managers must follow

a systems philosophy to understand how projects relate to the whole organisation.

2.1.1 The Three Sphere model for Systems management:

The three-sphere model of systems management deals with the business, organizational and technological aspects and/or issues related to the project that should be defined and considered in order to select and manage projects effectively and successfully. In terms of addressing its advantage on the business side, a project should supplement or serve as an answer to the business goals; whereas, the technological sphere should state the proper hardware and software issues to be resolved. As for the organizational aspect, matters involving the stakeholders should be taken into full consideration. If the project manager would be able to point out as early as possible the aforementioned issues and integrate it to the project it would definitely aid in determining if an organization should invest and produce the project.

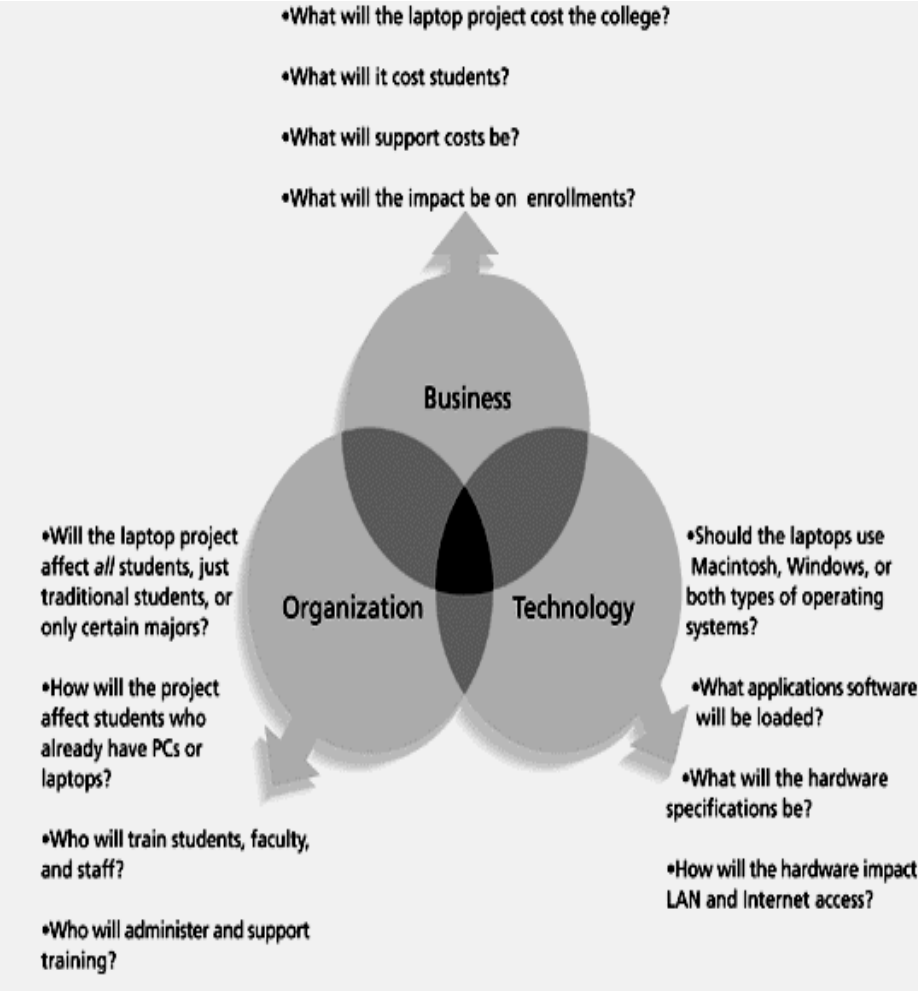


Figure 2.1 : Three Sphere model for systems management

2.1.2 A Case:

A programmer was given a task to convert a static website of a magazine into a dynamic PHP website; what prompts the management to engage into this project is the fact that the web has become more sophisticated and that there has been a major shift of "print" audience to the internet. You'll find below the business, organizational and technological issues of the said project.

Business issues:

1. Would the website be the medium in response to the impact of the internet in a publishing company?
2. Would the website supplement the magazine in terms of advertising?
3. What will the project cost the company?
4. What would be the impact of the website to the sales of the magazine?
5. What would be the cost of maintaining the whole system for the website?

Technological issues:

1. What operating system, server platform, scripting language and database should be used?
2. What will be the server and desktop specifications?
3. Does our current network setup allow employees to develop this project, or do we need an upgrade?
4. Do we have the right internet connection to support this project?

Organizational issues:

1. Do we have the existing manpower to develop the project?
2. What would be the impact of the website to the magazine's print division?
3. How will the website affect our print audience?

The most important issues are from the business and organization spheres, since these two primarily follows the business philosophy – it would definitely be pointless if a project fails to meet the endeavors either on the business or organizational

side – it's doomed to fail if that is the case. Among the three, I guess the technological issues are the easiest to resolve.

2.2 UNDERSTANDING ORGANISATIONS

Every project must have its own management structure define d at the start and dismantled at the end. The definition of the management roles, responsibilities, relationships and accountabilities and authorities provides the basis of the governance arrangements for the project. Note that it is unlikely that an existing line management structure will be sufficient or appropriate to use as a project management organisation, except perhaps where a small task is being run within a single business unit with no external impact.

A typical organisation structure is depicted in the figure below

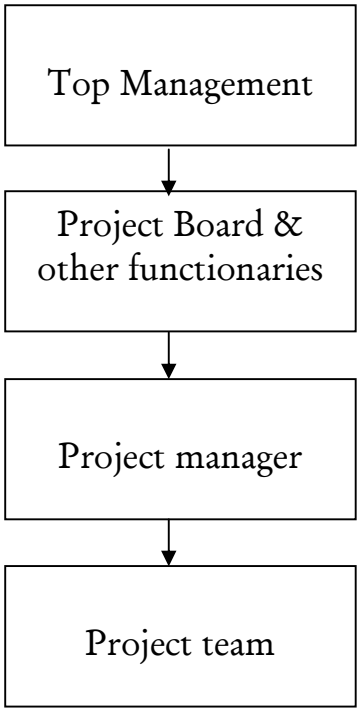


Figure 2.2 Organizational Structure

A well-designed organisation will involve the right people with the right skills and the right levels of authority so that, once approved, the project may proceed with minimal requirements to refer outside the project organisation other than to deal with

exception situations outside authority of the project's Senior Responsible Owner.

There is not a 'one-size fits all' model for the project organisation; you must design it to suit such things as a project's:

- Criticality to the business
- Size/complexity
- Degree of impact within the parent body
- Degree of impact on external bodies (OGDs, Private Sector)
- Cost
- Staff resources required
- Types/levels of interested parties

Designing the structure and getting people to agree to take on roles takes time and may require many discussions/negotiations with management at appropriately senior levels.

2.2.1 The key roles:

2.2.1.1 Top management: (in certain circumstances/environments known as Project Sponsor(PS) or Programme Director).

The management is the project's owner and champion and is ultimately accountable for delivery of the project and so must:

- provide leadership and direction to other members of the Project Board and to the Project Manager
- ensure that all key stakeholders are committed to the project and adequately represented in the project's organisation structure
- ensure that budget holders and resource owners are committed to the proj ect and that the necessary funds and other resources are made available when required
- ensure that project governance arrangements of appropriate rigour are put in place
- brief senior stakeholders on the current and forecast status of the project
- receive, consider and act on regular frequent reports/briefings from the Project Manager
- chair meetings of the Project Board
- ensure that all members of the Project Board understand their roles the commitments they must make in order that the required outcomes/benefits from the project are achieved
- ensure that the Project Manager is empowered to lead the project on a day to day basis

- ensure that the Project Manager is aware of the limits of her/his authority and understands that issues outside those limits must be escalated to the PS at the earliest opportunity.
- negotiate with senior stakeholders to broker solutions to project issues that are outside the level of authority of the Project Manager

As you can see, the PS is not just a figurehead, it is an active role as a key member of the project management team. If the project involves a number of organisations working together and/or has a cross cutting impact, it may require more than one person to be the decision-making authority. If this is the case, you may wish to set up a Project Board with the PS as Chair.

2.2.1.2 The Project Board:

The Project Board should include:

- the Top Management representing the 'business' interests of the sponsoring organisation as a whole
- senior representative(s) from areas that will be impacted by the outcome and must adopt changes ;
- senior representative(s) from the organisation(s) that will design, build and implement the solution to meet the business need, (Senior Supplier role).

The Project Board must jointly:

- create an environment where the project can succeed in delivering the changes necessary for the benefits to be realised
- set the direction for the project and to approve key milestones
- approve the Project Initiation Document
- ensure the appropriate resources required by the projects within the project are made available in accordance with the latest agreed version of the Project Plan
- take decisions as necessary throughout the life of the project
- give the Project Manager the authority to lead the project on a day to day basis.

Members of the Project Board should decide how they will assure themselves that the integrity of those aspects of the project for which they are accountable is being maintained.

2.2.1.3 Project Manager:

The Project Manager will be responsible on behalf of the PS for day to day execution of the project plan and for dealing with issues that might affect achievement of the plan. The Project Manager must:

- prepare the Project Initiation Document(PID)
- submit the PID to the Project Board for approval
- submit any revised versions of the Project Plan and Business Case to the Project Board for approval
- monitor progress of the project and identify and take action to deal with any potential/actual exceptions that might jeopardise achievement of the project's objectives,
- maintain a Risk Register/Log and actively manage risks using resources and approaches within limits of delegated authority
- escalate to the Project Board recommendations for risk mitigations actions outside the scope of delegated authority limits
- report progress to, and take advice from, the PS at regular intervals as agreed between PS and Project Manager during Project Initiation
- manage stakeholder relationships and communications (in accordance with an agreed Communications Plan);
- liaise with any nominated Project Assurance staff throughout the project.

2.3 STAKEHOLDER MANAGEMENT

The importance of stakeholder management is to support an organization in achieving its strategic objectives by interpreting and influencing both the external and internal environments and by creating positive relationships with stakeholders through the appropriate management of their expectations and agreed objectives. Stakeholder Management is a process and control that must be planned and guided by underlying Principles.

Stakeholder Management, within business or projects, prepares a strategy utilising information (or intelligence) gathered during the following common processes:

- **Stakeholder Identification -** Interested parties either internal or external to organisation/project.

- **Stakeholder Analysis -** Recognise and acknowledge stakeholder's needs, concerns, wants, authority, common relationships, interfaces and align this information within the Stakeholder Matrix.

- **Stakeholder Matrix -** Positioning stakeholders according to the level of influence, impact or enhancement they may provide to the business or it's projects.

- **Stakeholder Engagement -** Different to Stakeholder Management in that the engagement does not seek to develop the project/business requirements, solution or problem creation, or establishing roles and responsibilities. It is primarily focused at getting to know and understand each other, at the Executive level. Engagement is the opportunity to discuss and agree expectations of communication and, primarily, agree a set of Values and Principles that all stakeholders will abide by.

- **Communicating Information -** Expectations are established and agreed for the manner in which communications are managed between stakeholders - who receives communications, when, how and to what level of detail. Protocols may be established including security and confidentiality classifications.)

2.3.1 Stakeholder Agreements: A collection of agreed decisions between stakeholders. This may be the lexicon of an organisation or project, or the Values of an initiative, the objectives, or the model of the organisation, etc. These should be signed by key stakeholder representatives.

Contemporary or modern business and project practice favours transparent, honest and open stakeholder management processes.

2.4 THE CONTEXT OF INFORMATION TECHNOLOGY PROJECTS

2.4.1. Software Projects:

Software development is a complex process involving such activities as domain analysis, requirements specification, communication with the customers and end-users, designing and producing different artifacts, adopting new paradigms and technologies, evaluating and testing software products, installing and maintaining the application at the end-user's site, providing customer support, organizing end-user's training, envisioning

potential upgrades and negotiating about them with the customers, and many more.

In order to keep everything under control, eliminate delays, always stay within the budget, and prevent project runaways, i.e. situations in which cost and time exceed what was planned, software project managers must exercise control and guidance over the development team throughout the project's lifecycle. In doing so, they apply a number of tools of both economic and managerial nature. The first category of tools includes budgeting, periodic budget monitoring, user chargeback mechanism, continuous cost/benefit analysis, and budget deviation analysis. The managerial toolbox includes both long-range and short-term planning, schedule monitoring, feasibility analysis, software quality assurance, organizing project steering committees, and the like.

All of these activities and tools help manage a number of important issues in the process of software development. Figure 1.1 illustrates some of the issues, but definitely not all of them.

2.4.2 Software Development Process:

One of the primary duties of the manager of a software development project is to ensure that all of the project activities follow a certain predefined *process*, i.e. that the activities are organized as a series of actions conducing to a desirable end . The activities are usually organized in distinct *phases*, and the process specifies what artifacts should be developed and delivered in each phase. For a software development team, conforming to a certain process means complying with an appropriate *order* of actions or operations. For the project manager, the process provides means for control and guidance of the individual team members and the team as a whole, as it offers criteria for tracing and evaluation of the project's deliverables and activities.

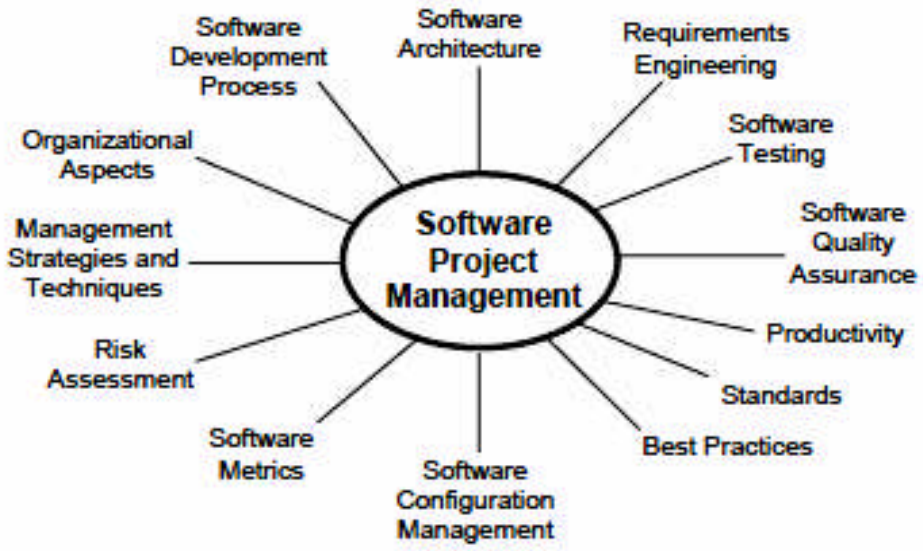


Figure 2.3: Certain important issues in Software Project Management

Software development process encompasses many different tasks, such as domain analysis and development planning, requirements specification, software design, implementation and testing, as well as software maintenance. Hence it is no surprise at all that a number of software development processes exist.

Generally, processes vary with the project's goals (such as time to market, minimum cost, higher quality and customer satisfaction), available resources (e.g., the company's size, the number, knowledge, and experience of people -- both engineers and support personnel -- and hardware resources), and application domain.

However, every software developer and manager should note that processes are *very* important. It is absolutely necessary to follow a certain predefined process in software development. It helps developers understand, evaluate, control, learn, communicate, improve, predict, and certify their work. Since processes vary with the project's size, goals, and resources, as well as the level at which they are applied (e.g., the organization level, the team level, or the individual level), it is always important to define, measure, analyze, assess, compare, document, and change different processes.

There are several well-known examples of software development processes. Each process relies on a certain *model* of software development. The first well established and well-documented software development process has followed the *waterfall model*. One of its variants is shown in Figure 1.2. The model assumes that the process of software development proceeds through several phases in a more-or-less linear manner. The phases indicated in Figure 1.2 are supposed to be relatively independent.

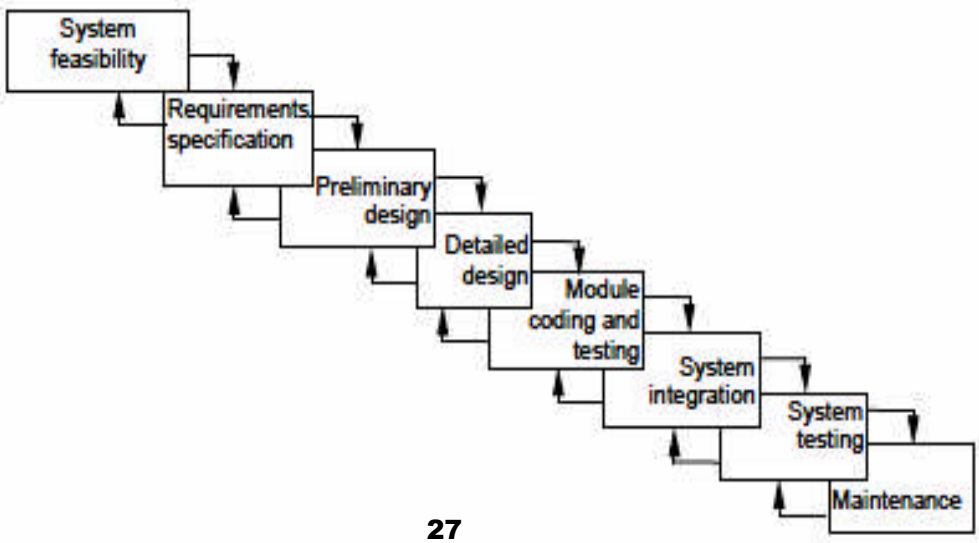


Figure 2.4 : Waterfall Model for Software Development

There is not much feedback and returning to previous phases other than the one directly preceding the phase in focus. In other words, once a certain phase is finished it is considered closed, and the work proceeds with the next phase. Many developers have criticized the waterfall model for its rigidity in that sense, and for its failure to comply with the reality of everchanging requirements and technology. However, the waterfall model is at least partially present in most of the other models as well, simply because of its natural order of phases in software development.

There have been many attempts to overcome the limitations of the waterfall model. Two common points in all such attempts are introduction of *iterations* in software development activities and *incremental* development. Iterative and incremental software development means going through the same activities more than once, throughout the product's lifecycle, each time producing new deliverables and/or improving the old ones. The main advantage of working in that way is that each individual developer works on a small ``work packet'' at any given moment, which is much easier to control.

A classical example of iterative and incremental models is the *spiral model* , sketched in Figure 1.3. In the spiral model, there are five core tasks: planning and design (largely corresponding to the classical analysis phase), approval (requirements specification), realization (design and implementation), revision (testing and modification), and evaluation (integration and system-level testing). The process iterates through these tasks, getting closer and closer to the end by adding increments (e.g., new functions, new design, new modules, new or improved testing procedures, new or improved parts of the user interface, new integration and testing certificates, and so on) to the product in each iteration.

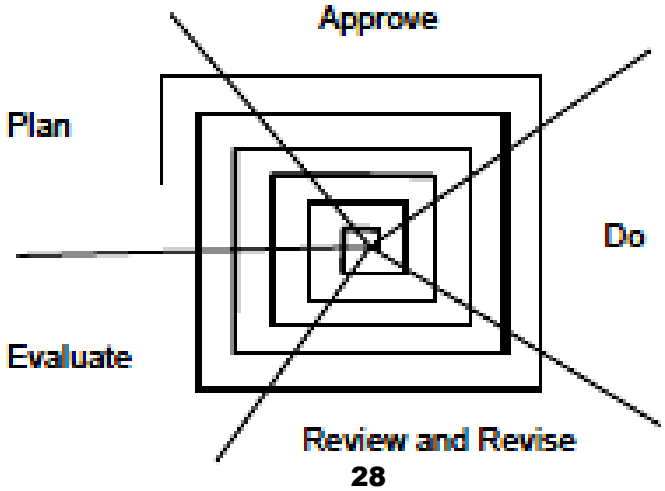


Figure 2.5 : Spiral Model for Software Development

The spiral model underlies many processes, such as DBWA (Design By Walking Around), and PADRE (Plan-Approve-Do-Review-Evaluate). The DBWA process combines the spiral model with multiple design views, flexible structuring of development teams, and dynamic changes in modes of working (e.g., working individually, working in pairs, or working in small teams), in order to improve the process efficiency and parallelism. The PADRE process uses the spiral model at multiple levels - the project level, the phase level, and the individual software module level - thus creating the ``spiral in a spiral in a spiral'' effect.

2.4.3 Requirements Engineering:

Requirements engineering is the discipline of gathering, analyzing, and formally specifying the user's needs, in order to use them as analysis components when developing a software system . Requirements *must* be oriented towards the user's real needs, not towards the development team and the project managers.

Almost all software development processes one way or another stress requirements analysis and specification as one of their core workflows. The reasons are simple. It is necessary to manage requirements as well as possible because a small change to requirements can profoundly affect the project's cost and schedule, since their definition underlies all design and implementation . Unfortunately, in most practical projects it is not possible to freeze the requirements at the beginning of the project and not to change them. Requirements develop over time, and their development is a learning process, rather than a gathering one. The intended result of this process is a structured but evolving set of agreed, well understood, and carefully documented requirements . This implies the need for requirements *traceability*, i.e. the ability to describe and follow the life of a requirement, in both a forward and backward direction, ideally through the whole system's life cycle.

The importance of constantly involving the users in the process of requirements analysis and specifications cannot be overemphasized. Only the users know their domain properly, and for that reason they should certainly participate in defining the system's functions, designing them, and evaluating their implementation and testing. The users should also participate in creating, verifying, and updating the requirements specification

document for the project. The users should share with the developers the responsibility for the requirements' completeness and consistency. It is the project managers' duty to establish and maintain good relations with the users throughout the development process, as well as to consult them whenever the project gets stuck due to the development team's lack of domain understanding.

It is essential to make as explicit as possible all the requirements that reflect the user's work and the tasks that the software system under development is supposed to automate. Any situation in which users can find themselves when doing their job is the context that must be taken into account through requirements engineering. It is equally important not to concentrate on a single user's task, but to cover communication between users when the task requires collaboration.

There is a wide spectrum of techniques for requirements engineering. Whatever technique is applied, it is always desirable to involve the user to increase the correctness of the requirements specification. Some of the techniques are:

- Structured interviews and questionnaires that the user fills in (inquiry based requirements gathering); diagram-based requirements analysis (using multiple diagrams to sketch relevant parts of the user's.
- Work process and describe the requirements graphically).
- Using metaphors of the user's work process (e.g., the office metaphor, or the agent/agency metaphor);
- Scenario analysis (scenario is a typical sequence of activities characterizing the user's work process, hence it reflects what the user will do with the system and helps define the test procedures).
- Using special-purpose software tools for requirements gathering (some of them can be simulation-based)
- Requirements completeness and consistency checks (some of them can be automated, others must be performed manually).
- Using special-purpose requirements-specification languages in order to describe requirements more formally and hence provide more automated requirements tracing.
- Prototype system development, in order to make the requirements clear and to establish better mutual understanding with the users.

3

PROJECT SCHEDULING

Unit Structure:

3.7.1 Project Status Report

3.1 DEVELOPING THE PROJECT SCHEDULE

Can you imagine starting a long car trip to an unfamiliar destination without a map or navigation system? You're pretty sure you have to make some turns here and there, but you have no idea when or where, or how long it will take to get there. You may arrive eventually, but you run the risk of getting lost, and feeling frustrated, along the way.

Essentially, driving without any idea of how you're going to get there is the same as working on a project without a schedule. No matter the size or scope of your project, the schedule is a key part of project management. The schedule tells you when each activity should be done, what has already been completed, and the sequence in which things need to be finished.

Luckily, drivers have fairly accurate tools they can use. Scheduling, on the other hand, is not an exact process. It's part estimation, part prediction, and part 'educated guessing.'

Because of the uncertainty involved, the schedule is reviewed regularly, and it is often revised while the project is in progress. It continues to develop as the project moves forward, changes arise, risks come and go, and new risks are identified. The schedule essentially transforms the project from a vision to a time-based plan.

Schedules also help you do the following:

- They provide a basis for you to monitor and control project activities.
- They help you determine how best to allocate resources so you can achieve the project goal.
- They help you assess how time delays will impact the project.
- You can figure out where excess resources are available to allocate to other projects.
- They provide a basis to help you track project progress.

Project managers have a variety of tools to develop a project schedule - from the relatively simple process of action planning for small projects, to use of Gantt Charts and Network Analysis for large projects. Here, we outline the key tools you will need for schedule development.

2.2 3.1.1. Schedule Inputs:

2.3

You need several types of inputs to create a project schedule:

- **Personal and project calendars** - Understanding working days, shifts, and resource availability is critical to completing a project schedule.
- **Description of project scope** - From this, you can determine key start and end dates, major assumptions behind the plan, and key constraints and restrictions. You can also include stakeholder expectations, which will often determine project milestones.

- **Project risks** - You need to understand these to make sure there's enough extra time to deal with identified risks - and with unidentified risks (risks are identified with thorough Risk Analysis).

- **Lists of activities and resource requirements** - Again, it's important to determine if there are other constraints to consider when developing the schedule. Understanding the resource capabilities and experience you have available - as well as company holidays and staff vacations - will affect the schedule.

A project manager should be aware of deadlines and resource availability issues that may make the schedule less flexible.

2.4 3.1.2. Scheduling Tools:

Here are some tools and techniques for combining these inputs to develop the schedule:

- **Schedule Network Analysis** - This is a graphic representation of the project's activities, the time it takes to complete them, and the sequence in which they must be done. Project management software is typically used to create these analyses - Gantt charts and PERT Charts are common formats.

- **Critical Path Analysis** - This is the process of looking at all of the activities that must be completed, and calculating the 'best line' - or critical path - to take so that you'll complete the project in the minimum amount of time. The method calculates the earliest and latest possible start and finish times for project activities, and it estimates the dependencies among them to create a schedule of critical activities and dates.

- **Schedule Compression** - This tool helps shorten the total duration of a project by decreasing the time allotted for certain activities. It's done so that you can meet time constraints, and still keep the original scope of the project. You can use two methods here:

- **Crashing** - This is where you assign more resources to an activity, thus decreasing the time it takes to complete it. This is based on the assumption that the time you save will offset the added resource costs.

- **Fast-Tracking** - This involves rearranging activities to allow more parallel work. This means that things you would normally do one after another are now done at the same time. However, do bear in mind that this approach increases the risk that you'll miss things, or fail to address changes.

3.2 PROJECT MANAGEMENT SOFTWARE TOOLS

There are many project scheduling software products which can do much of the tedious work of calculating the schedule automatically, and plenty of books and tutorials dedicated to teaching people how to use them. However, before a project manager can use these tools, he should understand the concepts behind the work breakdown structure (WBS), dependencies, resource allocation, critical paths, Gantt charts and earned value. These are the real keys to planning a successful project.

2.5 3.2.1. Allocate Resources to the Tasks:

The first step in building the project schedule is to identify the resources required to perform each of the tasks required to complete the project. A resource is any person, item, tool, or service that is needed by the project that is either scarce or has limited availability.

Many project managers use the terms “resource” and “person” interchangeably, but people are only one kind of resource. The project could include computer resources (like shared computer room, mainframe, or server time), locations (training rooms, temporary office space), services (like time from contractors, trainers, or a support team), and special equipment that will be temporarily acquired for the project. Most project schedules only plan for human resources—the other kinds of resources are listed in the resource list, which is part of the project plan.

One or more resources must be allocated to each task. To do this, the project manager must first assign the task to people who will perform it. For each task, the project manager must identify one or more people on the resource list capable of doing that task

and assign it to them. Once a task is assigned, the team member who is performing it is not available for other tasks until the assigned task is completed. While some tasks can be assigned to any team member, most can be performed only by certain people. If those people are not available, the task must wait.

2.6 3.2.2. Identify Dependencies:

Once resources are allocated, the next step in creating a project schedule is to identify dependencies between tasks. A task has a dependency if it involves an activity, resource, or work product that is subsequently required by another task. Dependencies come in many forms: a test plan can't be executed until a build of the software is delivered; code might depend on classes or modules built in earlier stages; a user interface can't be built until the design is reviewed. If Wideband Delphi is used to generate estimates, many of these dependencies will already be represented in the assumptions. It is the project manager's responsibility to work with everyone on the engineering team to identify these dependencies. The project manager should start by taking the WBS and adding dependency information to it: each task in the WBS is given a number, and the number of any task that it is dependent on should be listed next to it as a predecessor. The following figure shows the four ways in which one task can be dependent on another.

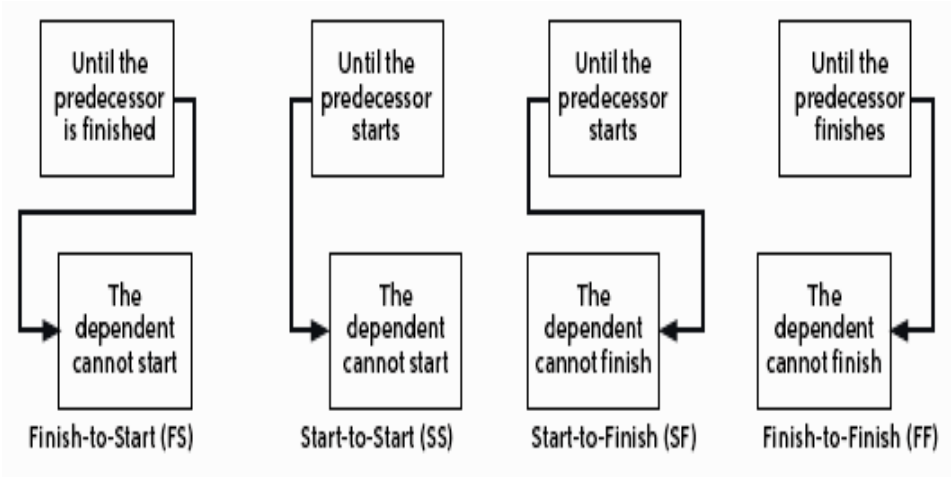


Figure 3.1: Task Dependency

2.7 3.2.3 Create the Schedule:

Once the resources and dependencies are assigned, the software will arrange the tasks to reflect the dependencies. The software also allows the project manager to enter effort and duration information for each task; with this information, it can calculate a final date and build the schedule.

The most common form for the schedule to take is a Gantt chart. The following figure shows an example:

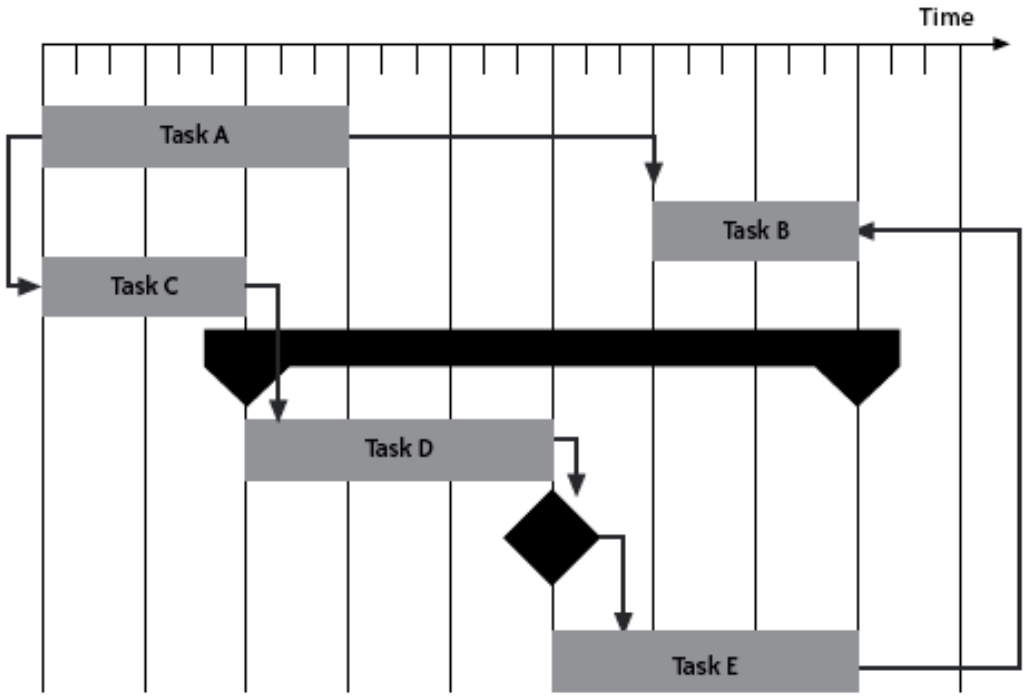
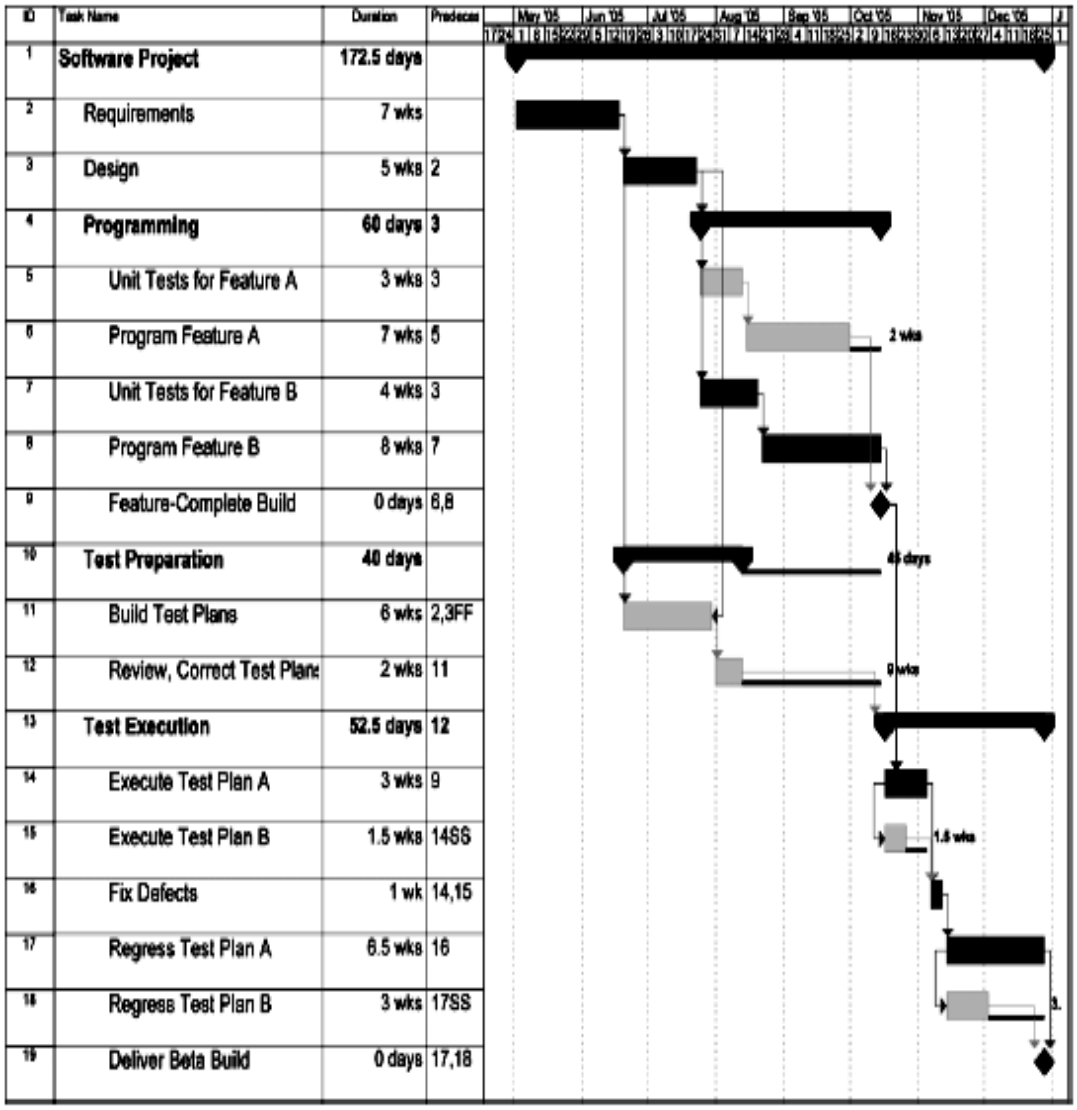


Figure 3.2: Gantt Chart

Each task is represented by a bar, and the dependencies between tasks are represented by arrows. Each arrow either points to the start or the end of the task, depending on the type of predecessor. The black diamond between tasks D and E is a milestone, or a task with no duration. Milestones are used to show important events in the schedule. The black bar above tasks D and E is a summary task, which shows that these tasks are two subtasks of the same parent task. Summary tasks can contain other summary tasks as subtasks. For example, if the team used an extra Wideband Delphi session to decompose a task in the original WBS into subtasks, the original task should be shown as a summary task with the results of the second estimation session as its subtasks.

The following figure shows an example of a Gantt chart created in Microsoft Projects :



ID	Task Name	Duration	Predecessors
1	**Software Project**	172.5 days	
2	Requirements	7 wks	
3	Design	5 wks	2
4	**Programming**	60 days	3
5	Unit Tests for Feature A	3 wks	3
6	Program Feature A	7 wks	5
7	Unit Tests for Feature B	4 wks	3
8	Program Feature B	8 wks	7
9	Feature-Complete Build	0 days	6,8
10	**Test Preparation**	40 days	
11	Build Test Plans	6 wks	2,3FF
12	Review, Correct Test Plans	2 wks	11
13	**Test Execution**	52.5 days	12
14	Execute Test Plan A	3 wks	9
15	Execute Test Plan B	1.5 wks	14SS
16	Fix Defects	1 wk	14,15
17	Regress Test Plan A	6.5 wks	16
18	Regress Test Plan B	3 wks	17SS
19	Deliver Beta Build	0 days	17,18

6 3.2.4 RISK PLAN

A *risk plan* is a list of all risks that threaten the project, along with a plan to mitigate some or all of those risks. Some people say that uncertainty is the enemy of planning. If there were no uncertainty, then every project plan would be accurate and every project would go off without a hitch. Unfortunately, real life intervenes, usually at the most inconvenient times. The risk plan is an insurance policy against uncertainty.

Once the project team has generated a final set of risks, they have enough information to estimate two things: a rough estimate of the probability that the risk will occur, and the potential impact of that risk on the project if it does eventually materialize. The risks

must then be prioritized in two ways: in order of probability, and in order of impact. Both the probability and impact are measured using a relative scale by assigning each a number between 1 and 5.

These numbers are arbitrary; they are simply used to compare the probability or impact of one risk with another, and do not carry any specific meaning. The numbers for probability and impact are assigned to each risk; a priority can then be calculated by multiplying these numbers together. It is equally effective to assign a percentage as a probability (i.e. a risk is 80% likely to occur) and a real duration for impact (i.e. it will cost 32 man-hours if the risk occurs). However, many teams have trouble estimating these numbers, and find it easier to just assign an arbitrary value for comparison.

Many people have difficulty prioritizing, but there is a simple technique that makes it much easier. While it's difficult to rank all of the risks in the list at once, it is usually not hard to pick out the one that's most likely to occur. Assign that one a probability of 5. Then select the one that's least likely to occur and assign that one a probability of 1. With those chosen, it's much easier to rank the others relative to them. It might help to find another 5 and another 1, or if those don't exist, find a 4 and a 2. The rest of the probabilities should start to fall in place. Once that's done, the same can be done for the impact.

After the probability and impact of each risk have been estimated, the team can calculate the priority of each risk by multiplying its probability by its impact. This ensures that the highest priority is assigned to those risks that have both a high probability and impact, followed by either high-probability risks with a low impact or low-probability risks with a high impact. This is generally the order in which a good project manager will want to try to deal with them: it allows the most serious risks to rise to the top of the list.

This can be very easily done using tools like Microsoft Project or even by using any spreadsheet package that provides some basic statistical functions.

3.3 DEVELOPING THE PROJECT BUDGET.

If scheduling is an art then costing could be considered a black art. Some projects are relatively straightforward to cost but most are not. Even simple figures like the cost per man/hour of labour can be difficult to calculate.

Accounting, costing and budgeting are extensive topics in themselves. Some fundamental principles to keep in mind are derived from accounting practices:

• The concept of 'prudence' – you should be pessimistic in your accounts ("anticipate no profit and provide for all possible losses").Provide yourself with a margin for error and not just show the best possible financial position. It's the old maxim: promise low-deliver / high once again

• The 'accruals' concept- revenue and costs are accrued or matched with one another and are attributed to the same point in the schedule. For example if the costs of hardware are in your budget at the point where you pay the invoice, then ALL the costs for hardware should be "accrued" when the invoice is received.

• The 'consistency' concept. This is similar to accruals but it emphasises consistency over different periods. If you change the basis on which you count certain costs you either need to revise all previous finance accounts in line with this or annotate the change appropriately so people can make comparisons on a like-for-like basis.

Note that the principles are listed in order of precedence. If the principle of consistency comes into conflict with the principle of prudence, the principle of prudence is given priority.

3.3.1 Costing:

At a basic level the process of costing is reasonably simple. You draw up a list of all your possible expenditure and put a numerical value against each item; the total therefore represents the tangible cost of your project. You may also however need to consider "intangible" items.

Tangible costs:

• **Capital Expenditure –** any large asset of the project which is purchased outright. This usually includes plant, hardware, software and sometimes buildings although these can be accounted for in a number of ways.

• **Lease costs –** some assets are not purchased outright but are leased to spread the cost over the life of the project. These should be accounted for separately to capital expenditure since the project or company does not own these assets.

• **Staff costs –** all costs for staff must be accounted for and this includes (but is not limited to): salary and pension (superannuation)

costs; insurance costs; recruitment costs; anything which can be tied directly to employing, training and retaining staff.

• **Professional services –**all large-scale projects require the input of one or more professional groups such as lawyers or accountants. These are normally accounted for separately since a close watch needs to be kept upon expenditure in this area. Without scrutiny the costs of a consultant engineer, accountant or lawyer can quickly dwarf other costs.

• **Supplies and consumables –** regular expenditure on supplies is often best covered by a single item in your budget under which these figures are accrued. They are related to overhead below.

• **One-off costs –** one-off costs apply to expenditure which is not related to any of the above categories but occurs on an irregular basis. Staff training might be an example. While it might be appropriate to list this under staff costs you might wish to track it independently as an irregular cost. The choice is yours but the principles of prudence and consistency apply.

• **Overheads –** sometime called indirect costs, these are costs which are not directly attributable to any of the above categories but never-the-less impact upon your budget. For example it may not be appropriate to reflect the phone bill for your project in staff costs, yet this still has to be paid and accounted for. Costing for overheads is usually done as a rough percentage of one of the other factors such as “staff costs”.

Intangible costs

It has become fashionable to account for “intangible” assets on the balance sheets of companies and possibly also projects. The argument goes like this: some contributions to a project are extremely valuable but cannot necessarily have a tangible value associated with them. Should you then account for them in the budget or costing? The “prudence” principle says yes but practicality says “no”. If you are delving this murky area of accountancy you should seek professional help and advice.

Typical things you might place in the budget under intangibles are “goodwill” and “intellectual property”. Personnel-related figures are a frequent source of intangible assets and so you might find things like “management team”, “relationships” and “contacts” on an intangibles balance sheet.

3.3.2 Budgeting:

Once you have costed your project you can then prepare an appropriate budget to secure the requisite funds and plan your cash

flow over the life of the project. An accurate cost model will of course entail a fairly detailed design or at the very least requirement specification so that you can determine your scope of work. This is normally completed well into the design phase of the project.

You must be extremely careful with initial estimates and always follow the “promise low / deliver high” commandment.

Costing and budgeting follow the iterative life cycle as do other tasks within the project. As you refine your design, so you will need to refine the costing which is based upon it.

As in scheduling, you need to build in adequate contingency (reserves) to account for unexpected expenditure. For example, if due to a failure in the critical path a task is delayed and a milestone (like software purchase) falls due in the month after it was scheduled. This can wreck your carefully planned cash flow. But if you have carefully budgeted your project then variations should be relatively easy to spot and cope with as they arise.

Just as in scheduling you should have regular budget reviews which examine the state of your finances and your expenditure to date and adjust the planned budget accordingly.

Regardless of circumstance, a number of basic philosophies can help your budgeting immensely by protecting it from subjective review. By understanding concepts, and making sure that everyone involved understands them, you’ll be on the right track to an accurate projection:

- Project costs and project budgets are two different things. Always start by identifying project costs.
- Project costs are not defined solely in monetary amounts. Include actual amounts, with shipping and taxes, for software or hardware purchases that must be made. If you’re pro-rating the costs of using pre-existing hardware and software tools, include it in number of hours. Likewise, developer effort costs are recorded in hours, not dollars.
- Once you’ve laid out your costs, identify your risks and assign a percentage reflecting how much each risk factor may affect the project as a whole, or a portion of the project. Each development team should have a risk value assigned to it, to cover reasonable costs such as hiring the occasional contractor to get a timeline under control, unforeseen overtime, and so on.
- Your budget, then, is the total of the costs, as transcribed into a monetary figure, plus the total risk percentage of that

cost. Define conversion values that you use to represent equipment pro-rating and development times.

- Your budget is not an invoice. Once you've determined the hard figures involved, leave it up to your company's business representatives to make adjustments for profits. Make sure they understand your figures reflect actual costs.
- A budget should always be labeled as an estimate, until it is finalized and approved. This helps to manage expectations and prevent miscommunications from being written in stone.
- A single person does not create a budget. At the very least, all of the following should be consulted: lead developer, project manager, and a business-side driver.

3.4 MONITORING AND CONTROLLING THE PROJECT

To appreciate how project control works you must first understand that, despite all the effort devoted to developing and gaining commitment to a plan, there is little chance that the resulting project will run precisely according to that plan.

This doesn't mean that you will fail to achieve the objectives of the plan – on the contrary, you must have a very high level of confidence that you can achieve those objectives and deliver the full scope, fit for purpose, on time and to budget.

The plan describes what you would like to do but it models just one of the infinite number of routes from where you are now to where you want to be. In practice your project will follow a different route to the one shown in your plan, you don't know which one, but you will need control to make sure it is a route that takes you to where you need to be, when you need to be there, and at a cost you can afford.

The power of the plan is that it gives you a baseline against which you can compare actual achievement, cost and time and determine the amount of deviation from plan and hence take corrective action if required.

The essential requirement for control is to have a plan against which progress can be monitored to provide the basis for stimulating management action if the plan is not being followed. Control then becomes a regular, frequent iteration
of: Creating the right environment for control.

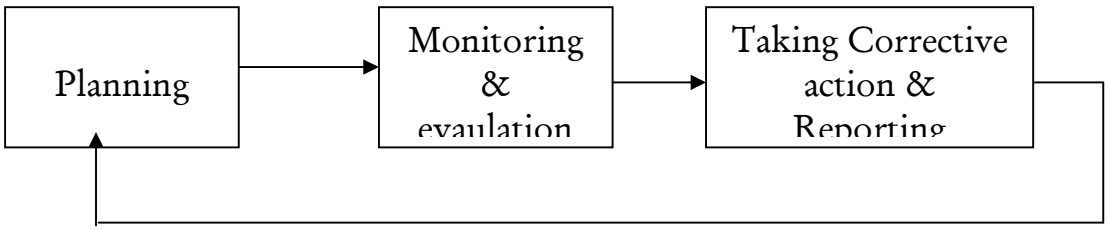


Figure 3.4 : Project Control

The basic requirements for control are:

a plan that is:

- realistic

- credible

- detailed enough to be executed

- acceptable to those who must execute it (Project Manager and Project Teams)

- approved by those who are accountable for its achievement (the SRO/ Project Board);

- a process for monitoring and managing progress and resource usage;
- a project management organisation of appropriately skilled people with sufficient authority and time to plan, monitor, report, take decisions and deal with exceptions;
- a process to make minor corrections and adjustments to deal with minor deviations and omissions from the plan;
- the commitment of those who will provide the resources indicated in the plan (SRO, Project Board, Stakeholders and resource 'owners' in the parent organisation and its related agencies);
- explicit authority to proceed granted by those who are accountable for the project.

In all but the smallest or shortest projects you should think about how to break your project into manageable 'chunks' called stages. Every project will have a minimum of two stages – the first being Project Initiation. A large project may have a number of stages, each of which has its own stage plan. When designing your project's stage structure look for points where the Project manager should:

- review achievements to date and assess project viability
- take key decisions outside the level of authority of the Project Manager

- approve a more detailed plan for the next phase of work commit resources in accordance with the project or stage plan
- assess the impact of some significant external event that will influence the project (eg: legislation, decision point in other project, review of business operation).

The Project Manager will also be able to identify stage boundaries by thinking about how far ahead is it sensible to plan in the fine detail needed for day to day control. In practice, the detailed plan for a stage will be produced towards the end of the preceding stage, when the information needed for planning is available.

3.4.1 Checkpoints:

Checkpoint reports are produced by team managers / leaders for the Project Manager who needs to have early warning of deviations from plan and other problems affecting the project team. Checkpoints provide regular, frequent comparison of actual progress, resource usage and forecasts against plans. They provide information for the Project Manager to apply control, eg by correcting small deviations from the plan. The basic purpose of a checkpoint is to answer the questions:

- 'What is going according to plan?'
- 'What is not going to plan?'
- 'What is likely not to go to plan?'

Checkpoints are essential controls – missed checkpoints are usually an early sign of a failing project. The information gathered at checkpoints should be documented in Checkpoint Reports and used in the preparation of Highlight Reports.

3.4.1.1 Checkpoint design:

There are many different ways of conducting Checkpoints - they might be, but do not have to be, achieved through written reports and meetings. Each project must use an approach that balances the need for communication and control against too much management interference in work in progress. Checkpoint design will cover:

- Frequency of reporting
- Timing (eg: time and day of week)
- Information required from team members (oral reports, timesheets, written reports)
- Method of conducting checkpoint (eg informal chats, formal meetings, phone, fax, email)

- Participation (Project Manager? Project Assurance? Team Members? Suppliers?)
- Content of a report to be used to communicate the findings of the Checkpoint.

The Project Manager should set Checkpoint frequency depending on the intensity of activity. Checkpoint frequencies ranging from fortnightly (eg during procurement phases) down to daily (eg during implementation and training) are possible within the same project.

3.4.2 Handling significant deviations from plan:

Project Board members are usually senior managers with limited time to devote management of the project. In order to achieve 'management by exception' the Project Manager should be given authority to deal with the inevitable small deviations from plan. For larger deviations, such as those resulting from requests for change, poor estimation, delays in deliveries by external agencies. The Project Manager will require an agreed exception handling process. This will involve:

- Setting delegated limits (eg. cost and time 'Tolerances'): The Project Board should set limits to the allowable deviations from planned cost and schedule so that the Project Manager knows how much delegated authority is available to manage deviations from plan;

- Exception reporting: The Project Manager may use an exceptional Highlight Reports to notify any forecast (or actual) deviations from plan beyond delegated limits. Positive sorts of exception should also be reported in this way eg: finishing work early or using less resource than planned.

- Exception planning and decision making: The management may wish the Project Manager to create a new plan to replace the current one if it is no longer viable. This plan would b e submitted for a decision to proceed.

3.4.3 Monitoring System Performance:

A potential problem when software systems are involved is the potential of the systems not being able to handle increased volumes of data in the future. To take care of this, performance monitoring should be a part of all softwares that are likely to grow in size, identifying potential future bottlenecks in the system, including lack of disk space, lack or processing power, approaching transaction limits, long before they become a problem, so corrective action can be taken.

This process is very complex because softwares will grow in size due to systems being installed incrementally (e.g., they may be installed at a pilot location first) and due to future increases in number of customers over time. It is also complex because new technology may become available that handles greater capacity but that will incur additional costs to the organization to implement. It is proposed that information required for this planning be kept in a Performance and Adaptability Plan document that identifies future projections of increases in number of customers handled by the software, bottlenecks identified so far, and contingency plans for resolving anticipated future performance problems. The Performance and Adaptability Plan document would be used by business planners who would project increases in numbers of customers, performance monitors who identify bottlenecks in systems, and capacity planners who would identify requirements for changes to hardware and or system software.

3.5. THE PROJECT COMMUNICATION PLAN

Good communications among all stakeholders is key for the success of a project. It's important to ensure your project team develops a communication plan so that lack of communication does not derail your goals.

Even though you may have identified and analyzed your stakeholders and determined the most effective communications vehicles – without a well developed and implemented communication plan, you may have a recipe for disaster. So how do you develop a communication plan to ensure your project's success?

Following are the two types of communication plans to support and enhance communications throughout your project. As discussed in previous installments, the first step in building your plan is to identify your project stakeholders and determine the best communications vehicle. Next, you build your plan.

3.5.1 Two Types of Communications Plans for Your Project:

For all sized projects, a well-structured communications plan is a must from the beginning. Projects offer multiple opportunities for communications to your key stakeholders, and we recommend exploring two types of communication plans for your project to exploit these opportunities.

1. Regular or Ongoing Communication Plan
2. One-time or Event-driven Communication Plan

3.5.2 Building Your Plan:

Regular or Ongoing Communications:

Regular, or ongoing, communications include those opportunities you have to communicate to your project team members, sponsors, steering committee members, and other key stakeholders on a regular basis. These types of communication could include your regular status reports, scheduled project team meetings, monthly updates with the steering committee, or regularly scheduled campus updates on a project. Use your stakeholder analysis to develop these routine and ongoing communications for the project.

Review this plan at regular intervals (quarterly) to ensure that you are adequately communicating to those stakeholders who are closest to the project. The chart on the next page provides an example of the types of communications to consider for your regular and ongoing communications. Don't forget to include your regular meetings and even one-on-ones that you may have with your sponsor.

Communications	Purpose	Audience	Author	Communication vehicle location	Frequency
Monthly status reports to management	To keep senior leadership informed about the projects progress	Steering committee Executive committee	Project Manager	- E-mails - Website postings	Monthly
Weekly schedule	Monitor the progress and report.	Project management team	Project Manager	-E-mails - postings on website - meetings	Weekly
Project Team calendar	Keep project participants aware of the key project deadlines to help them manage their schedule	Project participants Steering committee	Project coordinator	Postings in the respective members folder	As and when needed.

Figure 3.5 : Sample communication plan

One-time or Event-driven Communications:

During the life of any project, opportunities arise for one-time or event-driven communications. Work with your project team to identify those opportunities, like the example timeline. This plan could also include critical issues sessions, vendor meetings, training schedules, and roll-out schedules.

To gain the most advantage from the communications opportunities for your project, review this portion of your communication plan every month with your project team. Review the past month, and then look forward at least six months to ensure that as your project plan changes, you are able to capitalize on every communication opportunity.

When developing your communications plan keep in mind that the key is to always have the receiver as the focal point—not the sender. Make your communications deliberate and focused. By making sure that your plan is clear and thoroughly outlined, you can help reduce the number of problems and surprises that pop-up and have a project as successful as a perfect soufflé.

3.6 PROJECT METRICS

Metrics are a set of quantifiable parameters which are used to measure the effectiveness of a project or undertaking. Values are obtained for the parameters for multiple instances of the same entity and they are compared and interpreted as to the change in the effectiveness. For example, if there are multiple versions of a product, one metric could be the user satisfaction level (say 1 to 5, 1 being least happy and 5 being very happy)with the user interface for each of the versions. The effectiveness of the changes in the user interface can be measured by the satisfaction level of the users with each of the versions.

Project metrics are in-process or project execution measures that are collected, analysed and used to drive project process improvement.

6.1.1 3.6.1 Reasons for Project Metrics:

Project metrics require time and effort and so that work is done for usually one of these reasons:

- To provide clear and tangible project status information about project schedule and cost
- To identify areas for project process improvement
- To demonstrate the results of process improvement efforts

- To collect a database of project metrics to analyse trend information or provide historic comparators and perhaps used for parametric estimates

To collect project metrics without a clear plan of future action to use those metrics is simply wasting time and effort. In short, only collect project metrics that will be used to drive project process improvements.

6.1.2 3.6.2 Key Project Metrics:

Senior management will often wish to see regular reports of project progress against time and cost measures. Some project management methodologies go into some detail with these metrics including planned versus forecast, cost variance, schedule variance and earned value. However, more generally, key project management metrics include:

- Schedule - delivery date and slippage in days from original delivery date
- Cost - actual budget versus original budget
- Resource - effort, how much time people have used on the project
- Scope - changes to project as measured through number and type of controlled changes made
- Quality - quality defects and documentation
- Software - a specialised subject with many potential measures such as lines of code, code complexity and function point
- Defects - number and type of problems or issues recorded for the technology project during its test stage and warranty period or a defined time period

Other metrics associated with normal operation such as availability, performance or support call resolution properly belong with service metrics rather than project metrics.

Project metrics selected should reflect the voice of the customer (customer needs), as well as ensure that the internal metrics selected by the organization are achieved. Metrics selected should be simple and straightforward and meaningful. Metrics selected should create a common language among diverse team members.

When drafting metrics for a particular project one should consider how the metrics are connected and related to key

business metrics. Typically there is no one metric that fits all the requirements for a particular situation.

3.6.3 Developing Project Metrics:

The most common approach used by teams is to understand the problem statement, brainstorm metrics, and finally decide what metrics can help them achieve better performance. The team then reviews these metrics with executive management to ensure that they are in synergy with the overall strategy of the business, and an iterative approach may be utilized.

Care should be exercised in determining what is measured. Metrics should be based on what, in fact, needs to be measured to improve the process, rather than what fits the current measurement system. Metrics need to be scrutinized from the value they add in understanding a process.

3.7 REPORTING PERFORMANCE & PROGRESS

Performance reporting involves collecting, processing and communicating information to key stakeholders, regarding the performance of the project. Performance reporting can be conducted using various tools and techniques, most of which have been already described in the previous paragraphs. The most widely used techniques for performance reporting are:

Performance review meetings that take place to assess the project's progress or/and status

Variance analysis which is about comparing actual project results (in terms of schedule, resources, cost, scope, quality and risk) against planned or expected ones.

Earned Value Analysis (EVA) used to assess project performance in terms of time (schedule) and cost (or resources).

Financial and Output Performance Indicators used to measure financial and physical progress of the project

Information of project's performance is usually communicated via **Progress Reports** and **Project Status Reports** which are described in the paragraphs below.

The Progress Report is a document prepared by the Project Team members (in case of in-house production) or by the Management Team of the Contractor (in case that the implementation of the project is totally outsourced) to provide

regular feedback to the Project Manager regarding the progress of the project. Progress reports should be submitted on a regular basis to enable the Project Manager to update the Activities Schedule, identify any schedule problems or potential problems and act proactively for their resolution. Progress Reports are usually asked to be submitted every two weeks or every month, when the project is implemented with own resources. However, in case that the project is implemented by a Contractor, the progress reports are usually asked every three or six months. Generally, a Progress Report should include the following information:

- Reporting period to which it refers
- Project Title
- Project Manager's name
- Authors of the report
- Date of submission
- Project synopsis (i.e. project goals and objectives, expected results, project activities, duration, etc.)

Project progress in the reporting period (i.e. activities/ tasks executed, actual work accomplished, deliverables submitted, deviations for baseline schedule, estimation of the effort required to complete activities/ tasks)

Work programme for the following reporting period (i.e. activities/ tasks to be executed, deliverables to be submitted, schedule estimates for key milestones, etc.)

Updated/ revised Activities Schedule showing the percentage of work completed so far and the estimated start or finish dates for activities/ tasks.

It should be noted that in case of small projects with only few team members, the Progress Report can be substituted by personal judgment and observations of the Project Manager or by day-to-day discussions with the team members on the progress of the deliverables. On the contrary, in case of large and complex projects, where progress reporting is an important aspect of communication management, the Progress Reports should be formally submitted to the Project Manager by the Team Manager(s) (or by the Contractor), who have to prepare them by collecting the relative progress information from individual team members.

3.7.1 Project Status Report:

The **Project Status Report** is a document prepared by the Project Manager - using the information provided by the Progress Reports - to present the status of the project to key stakeholders, including the Project Steering Committee, the Project Owner and

the Funding Agency. Depending on the duration and size of the project, as well as on specific communication requirements of the Project Owner or/and the Funding Agency, the Status Report can be prepared monthly, quarterly or biannually. Usually, Status Reports are prepared with the same or less frequency than Progress Reports since they require input from them.

The aim of the Project Status Report is to:

-Provide an overview of project's progress up to date

- Ensure that the key stakeholders are regularly informed on the progress of the project

- Inform the key stakeholders about issues that require immediate action or resolution

Normally the Status Report becomes the point of discussion for the Status Meeting, which is a regularly scheduled event, where the Project Manager presents the status of the project to the Steering Committee (and maybe to the Project Owner or /and the Funding Agency). In these meetings the Project Manager can invite members of the Project Team who have expertise in a certain area of the discussion. It is, however recommended that the Project Manager invites periodically the Project Team to review the status of the project, discuss their accomplishments and communicate any issues or concerns in an open, honest and constructive forum. On large projects where gathering the entire team is not always possible, the Project Team members can be represented in the meeting by the respective Team Manager(s), who can communicate the status of their team work since they have a better insight into the day-to-day activities of their team members.

4

PROJECT RISK MANAGEMENT

Unit Structure:

4.0 OBJECTIVES

After reading this chapter you will be able to:

1. Understand what risk is and the importance of good project risk management

2. Discuss the elements involved in risk management planning and contents of a risk management plan.
3. List common sources of risks on information technology projects
4. describe the risk identification process, tools and techniques to help identify project risks and the main output of risk identification-risk register
5. Discuss the qualitative risk analysis process and explain how to calculate risk factors, create probability impact matrixes, apply the top ten risk item tracking techniques, and use expert judgment to rank risks
6. Explain quantitative risk analysis process and how to apply decision trees, simulation, and sensitivity analysis to quantify risks
7. Provide examples of using different risk response planning strategies to address both negative and positive risks
8. Discuss the components of risk monitoring and control
9. Describe how software can assist in project risk management

4.1 INTRODUCTION

Managing risk is an integral part of good management and is something many managers do already in one form or another.

Project risk is an uncertain event or condition that, if it occurs, has a positive or a negative effect on at least one project objective. A risk may have one or more causes and, if it occurs, one or more impacts. Risk management is the systematic process of planning for, identifying, analyzing, responding to, and monitoring project risks. It involves processes, tools, and techniques that will help the project manager maximize the probability and results of positive events and minimize the probability and consequences of adverse events as indicated and appropriate within the context of risk to the overall project objectives of cost, time, scope and quality. Project risk management is most effective when first performed early in the life of the project and is a continuing responsibility throughout the project's life cycle.

4.2 THE IMPORTANCE OF PROJECT RISK MANAGEMENT

The project risk management process helps project sponsors and project teams make informed decisions regarding

alternative approaches to achieving their objectives and the relative risk involved in each, in order to increase the likelihood of success in meeting or exceeding the most important objectives (e.g. time) sometimes at the expense of other objectives (e.g. cost).

Risk Management provides a structured way of identifying and analyzing potential risks, and devising and implementing responses appropriate to their impact. These responses generally draw on strategies of risk prevention, risk transfer, impact mitigation or risk acceptance. Within a single project or proposal each of these strategies may have application for different individual risks.
Risk management encourages the project team to take appropriate measures to:

1. Minimize adverse impacts to project scope, cost, and schedule (and quality, as a result).
2. Maximize opportunities to improve the project's objectives with lower cost, shorter schedules, enhanced scope and higher quality.
3. Minimize management by crisis.

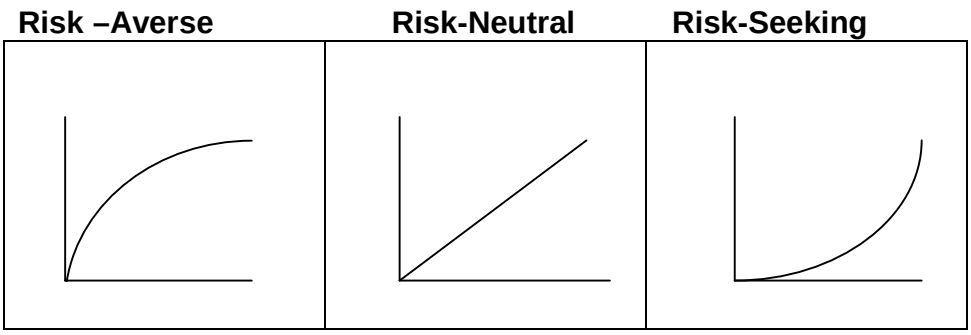
Project risk management is the art and science of identifying, analyzing and responding to risk throughout the life of a project and in the best interest of meeting the project objectives. A frequently overlooked aspect of project management, risk management can often result in significant improvements in the ultimate success of projects .Risk management can have a positive impact on selecting projects, determining scope of projects and developing realistic schedules and cost estimates. It helps project stakeholders understand the nature of the project, involves team members in defining the strengths and weakness , and helps to integrate the other project management knowledge areas.

Before you can improve project risk management, you must understand what risk is .A basic dictionary definition says that risk is "the possibility of loss or injury". This definition highlights the negativity often associated with risk and suggests that uncertainty is involved. Project risk management involves understanding potential problems that might occur on the project and how they might impede project success. The *PMBOK Guide 2004* refers to this type of risk as a negative risk. However, there are also positive risks, which can result in good things happening on a project. A general definition of a project risk , therefore , is an uncertainty that can have a negative or positive effect on meeting project objectives.

Some organizations or people have a neutral tolerance for risk, some have an aversion to risk, and others are risk seeking. These three preferences for risk are part of the utility theory of risk.

Risk utility or risk tolerance is the amount of satisfaction or pleasure received from a potential payoff. The following figure shows the basic difference between risk averse, risk neutral, and risk seeking preferences. The y-axis represents utility, or the amount of pleasure received from taking a risk. The x-axis shows the amount of potential payoff, opportunity, or dollar value of the opportunity at stake.

Utility rises at a decreasing rate for a risk averse person. That is when more payoff or money is at stake ,a person or organization that is risk averse gains less satisfaction from risk, or has lower tolerance for the risk. Those who are risk seeking have a higher tolerance for the risk, and their satisfaction increases when more payoff is at stake. A risk seeking person prefers outcomes that are more uncertain and is often willing to pay penalty to take risk. A risk neutral person achieves balance between risk and payoff..



Risk utility function and risk preference

The goal of project risk management can be viewed as minimizing potential negative risks while maximizing potential positive risks. The term known risks is some times used to describe risks that the project team has identified and analyzed .

4.2.1 Processes and outputs:

This matrix shows the six main processes and all of the deliverables associated with project risk management

Process	Output(deliverables)
Risk management planning	Risk management plan(RMP)

Risk identification	Risk Register (Register)
Qualitative risk analysis	Risk Register (updates) Prioritized list of risks classified as high, moderate, or low
Quantitative risk analysis	Quantitative Risk Analysis Reports Numerical analysis of the project's likelihood of achieving its overall objectives (Risk Register updates)
Risk response planning	1- Risk Register (updates) 2- Project Management Plan (updates) 3- Project Risk Management Plan (updates) 4- Risk-related contractual agreements The outcome may result in one or more of the following: residual risks, secondary risks, change control, contingency reserve (amounts of time or budget needed).
Risk monitoring and control	Risk Register (updates) The outcome may result in workaround plans, corrective actions, programming change request (PCR), and updates to risk identification checklists for future projects

4.3 RISK MANAGEMENT PLANNING

Risk management planning is the process of deciding how to approach and plan for risk management activities for a project, and the main output of this process is a risk management plan A risk management plan documents the procedure for managing risk throughout the project.

The project team should hold several planning meeting early in the project's life cycle to help develop the risk management plan. The project team should review the project documents as well as corporate risk management policies, risk categories, lessons learned reports from past projects and templates for creating risk management plan.

Careful and explicit planning enhances the possibility of success of the other risk management processes. Risk Management Planning is the process of deciding how to approach

and conduct the risk management activities for a project. Planning of risk management processes is important to ensure that the level, type, and visibility of risk management are commensurate with both the risk and importance of the project to the organization, to provide sufficient resources and time for risk management activities, and to establish an agreed-upon basis for evaluating risks. The Risk Management Planning process should be completed early during project planning, since it is crucial to successfully performing the other processes described in this handbook.

The result of Risk Management Planning is a Risk Management Plan. The risk management plan identifies and establishes the activities of risk management for the project in the project plan (RMP)

A risk management plan summarizes how risk management will be performed on a particular project. Like other specific knowledge area plans it becomes a subset of project management plan The following table lists the general topics that a risk management plan should address It is important to clarify roles and responsibilities, prepare budget and schedule estimates for risk-related work, and .identify risk categories for consideration. It is also important to describe how risk management will be done, including assessment of risk probabilities and impacts as well as creation of risk related documentation.

Methodology: How will risk management will be performed on this project?. What tools and data sources are available and applicable?
Roles and responsibilities: who are the individuals responsible for implementing specific tasks and providing deliverables related to risk management
Budget and schedule: What are the estimated costs and schedules for performing risk related activities?
Risk Categories: What are the main categories of risk that should be addressed on this project?. Is there a risk breakdown structure for the project
Risk Probability and Impact: How will the probabilities and impacts of risk items be assessed?. What scoring and interpretation methods will be used for the qualitative and quantitative analysis of risks?
Risk Documentation: What reporting formats and processes will used for risk management activities?

In addition to risk management plan many projects also include contingency plans, fallback plans, and contingency reserves. Contingency plans are predefined actions that the project team will take if an identified risk event occurs. For example ,if the project team knows that a new release of a software package may not be available in time for them to use it for their project, they might have a contingency plan to use the older version of the software.

Fallback plans are developed for risks that have a high impact on meeting project objectives and are put in to effect if attempts to reduce risks are not effective. For example , a new college graduate might have a main plan and several contingency plans on where to live after graduation, but if none of the plans work out a fallback plan might be to live at home for a while. Sometimes contingency plans and fallback plans are used interchangeably.

Contingency reserves or contingency allowances are provisions held by the project sponsor or organization to reduce the risk of cost or schedule overruns to an acceptable level. For example if a project appears to be off course because the the staff is inexperienced with some new technology and the team had not identified it as a risk ,the project sponsor may provide additional funds from contingency reserves to hire an outside consultant to train and advise the project staff in using the new technology.

4.4 COMMON SOURCES OF RISK IN INFORMATION TECHNOLOGY PROJECTS

Several studies show that IT projects share some common sources of risk. The Standish Group developed an IT success potential scoring sheet based on potential risks. Other broad categories of risk help identify potential risks.

Information Technology Success Potential Scoring Sheet

Success Criterion	Relative Importance
User Involvement	19
Executive Management support	16
Clear Statement of Requirements	15
Proper Planning	11
Realistic Expectations	10
Smaller Project Milestones	9
Competent Staff	8

Ownership	6
Clear Visions and Objectives	3
Hard-Working, Focused Staff	3
Total	100

The Standish Group provides specific questions for each success criterion to help decide the number of points to assign to a project. For example the five questions related to user involvement include the following
Do I have the right user(s)?
Did I involve the users early and often?
Do I have a quality relationship with user(s)?
Do I make involvement easy
Did I find out what the user(s) need(s)?

The number of questions corresponding to each success criterion determines the number of points each positive response is assigned. For example in the case of user involvement there are five questions . For each positive reply , you would get(19/5) 3.8 points . !9 represents the weight of the criterion and five represents the number of questions. Therefore ,you would assign a value to the user involvement criterion by adding 3.8 points to the score for each question you can answer positively.

4.4.1 Categories of Risk:

A broad categories of risks are described on the questionnaires developed by many organizations. Some of them are given below.

 Market risk: If the information technology project is to produce a new product or service will it be useful to the organization or marketable to others?. Will user accept the product or service?. Will someone else make a better product or service faster, making the project a waste of time and money.

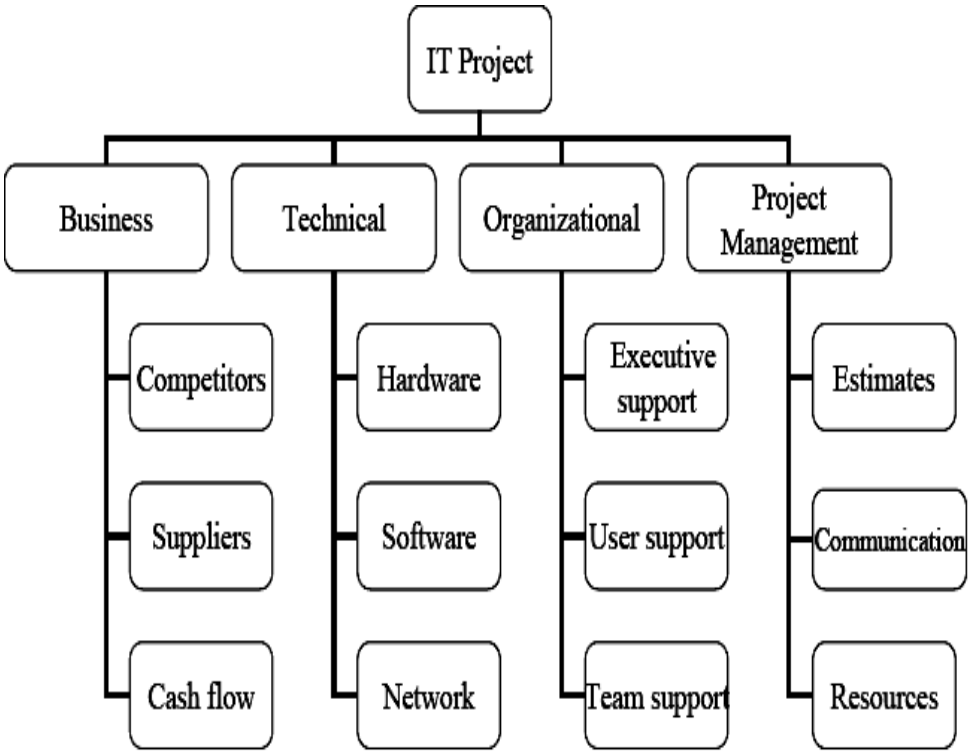
 Financial risk: Can the organization afford to undertake the project?. How confident are the stakeholders in the financial projections?. Will the project meet NPV,ROI, and payback estimates?. If not van the organization afford to proceed the project?. Is this project the best way to use the organization's financial resources?

 Technology risk: Is the project technically feasible?. Will it use mature, leading edge or bleeding edge technologies? When will decisions be made on which technology to use? Will H/w, S/w and network function properly?. You can also breakdown the technology risk into h/w, s/w, and network technology if required.

 People risk: Does the organization have or can they find people with appropriate skills to complete the project successfully?. Do they have enough experience?. Does senior management support the project?. Is the organization familiar sponsor/customer for the project?. How good is the relationship with the sponsor/customer?
 Structure/process risk: What is the degree of change the new project will introduce into user areas and business procedures? How many distinct user groups does the project need to satisfy? With how many other systems does the project need to interact? Does the organization have processes in place to complete the project successfully?

4.4.2 Risk Breakdown Structure:

 A **risk breakdown structure** is a hierarchy of potential risk categories for a project. Similar to a work breakdown structure but used to identify and categorize risks. A sample shown below.



A risk break down structure is a useful tool that can help project managers consider potential risks in different categories. The highest level categories are business, technical, and organizational and project management. Competitors suppliers, and cash flow are categories that fall under business risks. Under technical risk are the categories h/w, s/w, and network.

A risk break down structure provides a simple, one page chart to help ensure a project team is considering important risk categories related to all information technology projects.

The following table shows the potential negative risk conditions that can exist within each knowledge area.

Potential Risk Conditions Associated With Each Knowledge Area

Knowledge Area	Risk Conditions
Integration	Inadequate planning; poor resource allocation; poor integration management; lack of post-project review
Scope	Poor definition of scope or work packages; incomplete definition of quality requirements; inadequate scope control
Time	Errors in estimating time or resource availability; poor allocation and management of float; early release of competitive products
Cost	Estimating errors; inadequate productivity, cost, change, or contingency control; poor maintenance, security, purchasing, etc.
Quality	Poor attitude toward quality; substandard design/materials/workmanship; inadequate quality assurance program
Human Resources	Poor conflict management; poor project organization and definition of responsibilities; absence of leadership
Communications	Carelessness in planning or communicating; lack of consultation with key stakeholders
Risk	Ignoring risk; unclear assignment of risk; poor insurance management
Procurement	Unenforceable conditions or contract clauses; adversarial relations

4.5 RISK IDENTIFICATION

Risk identification involves identifying potential project risks. Risk Identification produces a deliverable — the project Risk Register – where risks are identified that may affect the project's ability to achieve its objectives. Risk Identification documents which risks might affect the project and documents their characteristics. The Risk Register is subsequently amended with the results from qualitative risk analysis and risk response planning, and is reviewed and updated throughout the project.

Participants in risk identification activities can include the following, where appropriate: project manager, project team members, risk management team (if assigned), subject matter experts both from the project and from outside the project team, customers, end users, other project managers, stakeholders, and risk management experts. While these personnel are often key

participants for risk identification, all project personnel should be encouraged to identify risks.

4.5.1 Suggestions For Identifying Risks:

The assigned team members identify the potential risks (threats and opportunities), using

- The risk breakdown structure, suitably tailored to the project.
- The sample risk list
- Their own knowledge of the project or similar projects.
- Consultation with others who have significant knowledge of the project or its environment.
- Consultation with others who have significant knowledge of similar projects.

There are several other tools and techniques also for identifying risks Five common information gathering techniques for risk identification include brainstorming ,Delphi technique ,interviewing ,root cause analysis, and SWOT analysis.

1. Brain Storming:

It is a technique by which a team attempt to generate ideas or find solutions for a specific by amassing ideas spontaneously and with out judgment . This approach can help the group create a comprehensive list of risks to address later in the qualitative and quantitative risk analysis process. An experienced facilitator should run the brainstorming session and introduce new categories of potential risks to keep the ideas flowing . After the ideas are collected ,the facilitator can group and categorize the ideas to make them more manageable

2. Delphi Technique:

The Delphi Technique is used to derive a consensus among a panel of experts who make predictions about future developments. It Provides independent and anonymous input regarding future events. Uses repeated rounds of questioning and written responses and avoids the biasing effects possible in oral methods, such as brainstorming.

3. Interviewing:

Interviewing is a fact-finding technique for collecting information in face-to-face, phone, e-mail, or instant messaging discussions. Interviewing people with similar project experience is an important tool for identifying potential risks.

4. SWOT Analysis:

- SWOT analysis (strengths, weaknesses, opportunities,and threats) can also be used during risk identification.

- Helps identify the broad negative risks that apply to a project.

Applying SWOT to specific potential projects can help identify the broad risks and opportunities that apply in that scenario Some other techniques for risk identification are

5. Use of checklists :

The list of risks that have been encountered in previous projects provide meaningful template for understanding risks in current projects.

It is important to analyze project assumptions to make sure that they are valid. Incomplete, inaccurate or inconsistent assumptions might lead to identifying more risks.

6. Diagramming Technique:

This method include using cause and effect diagrams or fishbone diagrams ,flow charts and influence diagrams .Fishbone diagrams help you trace problems back to their root cause. Process flow charts are diagrams that show how different parts of the system interrelate.

4.5.2 The Risk Register:

The main output of the risk identification process is a list of identified risks and other information needed to begin creating a risk register.

A risk register is:

- A document that contains the results of various risk management processes and that is often displayed in a table or spreadsheet format.
- A tool for documenting potential risk events and related information.

Risk Register Contents

- An identification number for each risk event.
- A rank for each risk event.
- The name of each risk event.
- A description of each risk event.
- The category under which each risk event falls.
- The root cause of each risk.

- Triggers for each risk; triggers are indicators or symptoms of actual risk events.
- Potential responses to each risk.
- The risk owner or person who will own or take responsibility for each risk.
- The probability and impact of each risk occurring.
- The status of each risk.

Sample Risk Register

No.	Rank	Risk	Description	Category	Root Cause	Triggers	Potential Responses	Risk Owner	Probability	Impact	Status
R44	1										
R21	2										
R7	3										

4.6 QUALITATIVE RISK ANALYSIS

- Assess the likelihood and impact of identified risks to determine their magnitude and priority.
- Risk quantification tools and techniques include:
- Probability/impact matrixes
- The Top Ten Risk Item Tracking
- Expert judgment

4.6.1 Using Probability/Impact Matrix To Calculate Risk Factors:

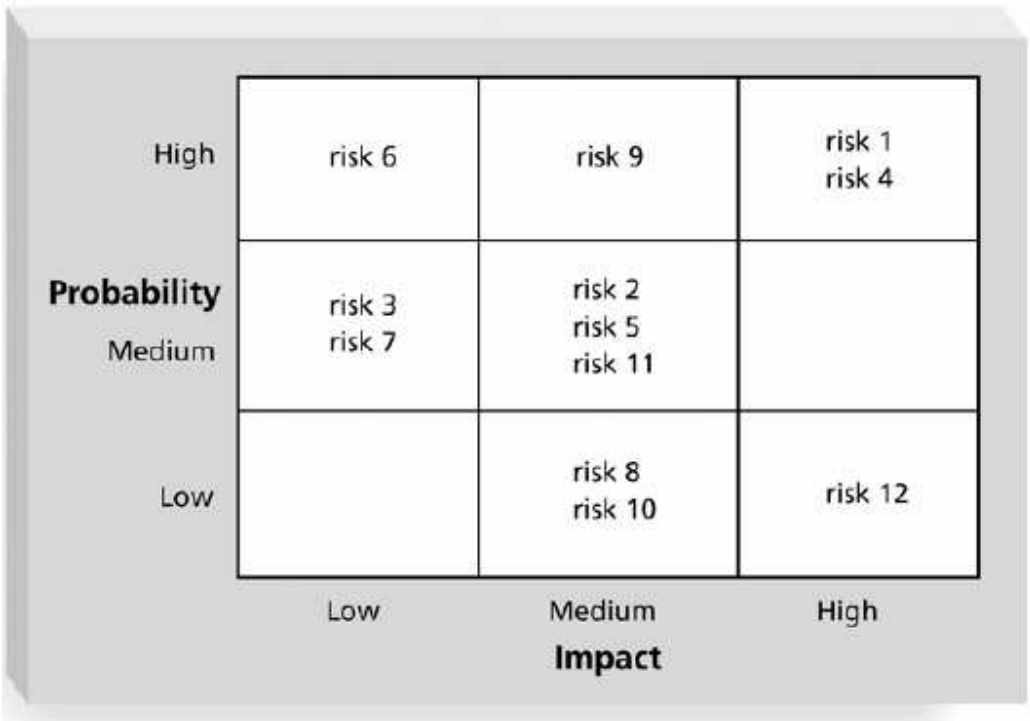
- A probability/impact matrix or chart lists the relative probability of a risk occurring on one side of a matrix or axis on a chart and the relative impact of the risk occurring on the other.

- List the risks and then label each one as high, medium, or low in terms of its probability of occurrence and its impact if it did occur.

It may be useful to create separate Probability/Impact Matrix or chart for negative risks and positive risks to make sure both types of risks are adequately addressed. Qualitative analysis is normally done quickly so that the project team has to decide what type of approach makes the most sense for their project. To quantify risk probability and consequence, the Defense Systems Management College developed a technique for calculating risk factors – the numbers that represent the overall risk of specific events ,based on their probability of occurring and consequences to the project if they do occur. The technique makes use of Probability/Impact Matrix that shows the probability of risks occurring and the impact or consequences of the risks.

Probability of a risk occurring can be estimated based on several factors as determined by the unique nature of each project . For example factors evaluated for potential H/W or S/W technology risks could include the technology not being mature, the technology being too complex, and an inadequate support base for developing the technology. The impact of a risk occurring could include factors such as availability of fallback solutions or the consequences of not meeting performance , cost and schedule estimates

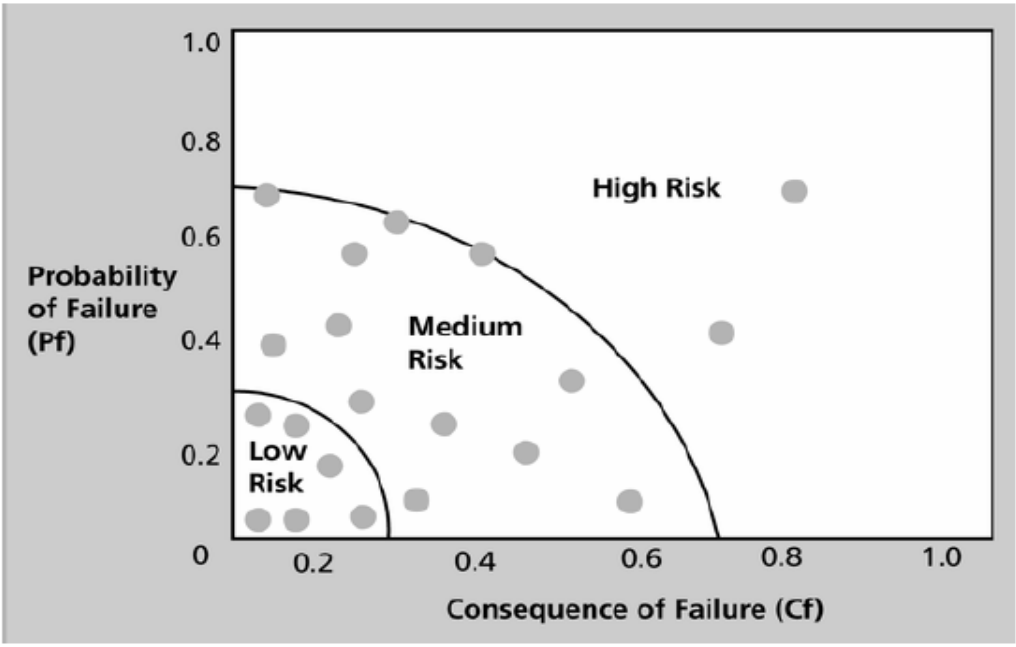
Sample Probability/Impact Matrix



The following figure gives an example of how the risk factors were used to graph the probability of failure and consequence of failure for proposed technologies. The figure classifies potential

technologies (dots on the charts) as high, medium, or low risk based on the probability of failure and consequence of failure. The researchers for this study highly recommended that the US Air Force invest in the low to medium risk technologies and suggested that it not pursue the high risk technologies. It can be seen that the rigor behind using Probability/Impact Matrix and risk factors provides a much stronger argument than simply stating the risk probabilities or consequences are high, medium, or low

Chart Showing High-, Medium-, and Low-Risk Technologies



4.6.2 Top Ten Risk Item Tracking:

Top Ten Risk Item Tracking is a qualitative risk analysis tool that helps to identify risks and maintain an awareness of risks throughout the life of a project. Establish a periodic review of the top ten project risk items.

The review begins with a summary of the status of top ten sources of risk on the project. The summary includes each item's current ranking previous ranking, number of times it appears on the list over a period of time, and a summary of progress made in resolving the risk item since the previous review.

List the current ranking, previous ranking, number of times the risk appears on the list over a period of time, and a summary of progress made in resolving the risk item.

The following figure provides an example of Top Ten Risk Item Tracking chart that could be used at a management review meeting for a project. This includes only the top five negative risk events. Each risk event is ranked based on the current month, previous month, and how many months it has been in the top ten. The last column briefly describes the progress for resolving each particular risk item

Example of Top Ten Risk Item Tracking

	Monthly Ranking			
Risk Item	**This Month**	**Last Month**	**Number of Months**	**Risk Resolution Progress**
Inadequate planning	1	2	4	Working on revising the entire project plan
Poor definition of scope	2	3	3	Holding meetings with project customer and sponsor to clarify scope
Absence of leadership	3	1	2	Just assigned a new project manager to lead the project after old one quit
Poor cost estimates	4	4	3	Revising cost estimates
Poor time estimates	5	5	3	Revising schedule estimates

4.6.3 Expert Judgment:

Many organizations rely on the intuitive feelings and past experience of experts to help identify potential project risks. Experts can categorize risks as high, medium, or low with or without more sophisticated techniques.

The main output of qualitative risk analysis is updating the risk register .The ranking column of the risk register should be filled in along with numeric value or high, medium, low for the probability and impact of the risk event. Additional information is often added for risk events, such as identification of risks that need more attention in the near term or those that can be placed on a watch list. A watch list is a list of risks that are low priority , but are still

identified as potential risks. Qualitative analysis can also identify risks that should be evaluated on a quantitative basis.

4.7 QUANTITATIVE RISK ANALYSIS

Often follows qualitative risk analysis, but both can be done together.

Large, complex projects involving leading edge technologies often require extensive quantitative risk analysis.
Main techniques include:

- Decision tree analysis
- Simulation
- Sensitivity analysis

Quantitative risk analysis is a way of numerically estimating the probability that a project will meet its cost and time objectives. Quantitative analysis is based on a simultaneous evaluation of the impact of all identified and quantified risks. The result is a probability distribution of the project's cost and completion date based on the identified risks in the project.

Quantitative risk analysis involves statistical techniques, primarily Monte Carlo simulation that is most widely and easily used with specialized software.

Quantitative risk analysis starts with the model of the project, either its project schedule or its cost estimate depending on the objective. The degree of uncertainty in each schedule activity and each line-item cost element is represented by a probability distribution. The probability distribution is usually specified by determining the optimistic, the most likely and the pessimistic values for the activity or cost element – this is typically called the "3-point estimate." The three points are estimated during an interview with subject matter experts who usually focus on the schedule or cost elements one at a time. The risks that lead to the three points are recorded for the quantitative risk analysis report and for risk response planning. For each activity or cost element a probability distribution type is chosen that best represents the risks discussed in the interview. Typical distributions usually include the triangular, beta, normal and uniform.

4.7.1 Decision Trees and Expected monetary Value:

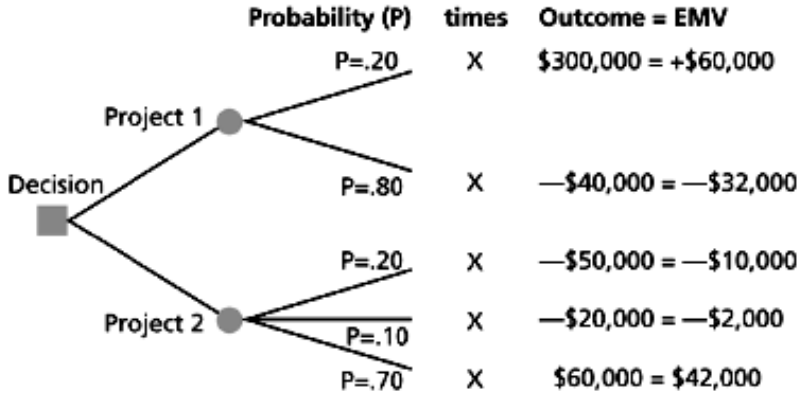
A decision tree is a diagramming analysis technique used to help select the best course of action in situations in which future outcomes are uncertain.

- Estimated monetary value (EMV) is the product of a risk event probability and the risk event's monetary value.

 You can draw a decision tree to help find the EMV.

To create a decision tree and to calculate expected monetary value specifically, you must estimate the probabilities, of certain events occurring. For example in the following figure there is a 20 percent probability(P=.20) that Cliff's firm will win the contract project1, which is estimated to be $300,000 in profits- the outcome of the top branch in the figure. There is an 80 percent probability that it will not win the contract for the project, and the outcome is estimated to be -$40,000 meaning that the firm has to invest $40,000 into project1with no reimbursement if it is not awarded the contract.

To calculate EMV for each project, multiply the probability by the outcome value for each potential outcome for each project .
The EMV for project 1 is 0.2($300,000)+0.8(-40,000)=$60,000-$32000=28,000



Project 1's EMV = $60,000 —32,000 = $28,000
Project 2's EMV = —$10,000 —2,000 + 42,000 = $30,000

4.7.2 Simulation:

A specialized Monte Carlo simulation software program runs (iterates) the project schedule or cost estimate many times, drawing duration or cost values for each iteration at random from the probability distribution derived from the 3-point estimates and probability distribution types selected for each element. The Monte Carlo software develops from the results of the simulation a probability distribution of possible completion dates and project costs. From this distribution it is possible to answer such questions as:

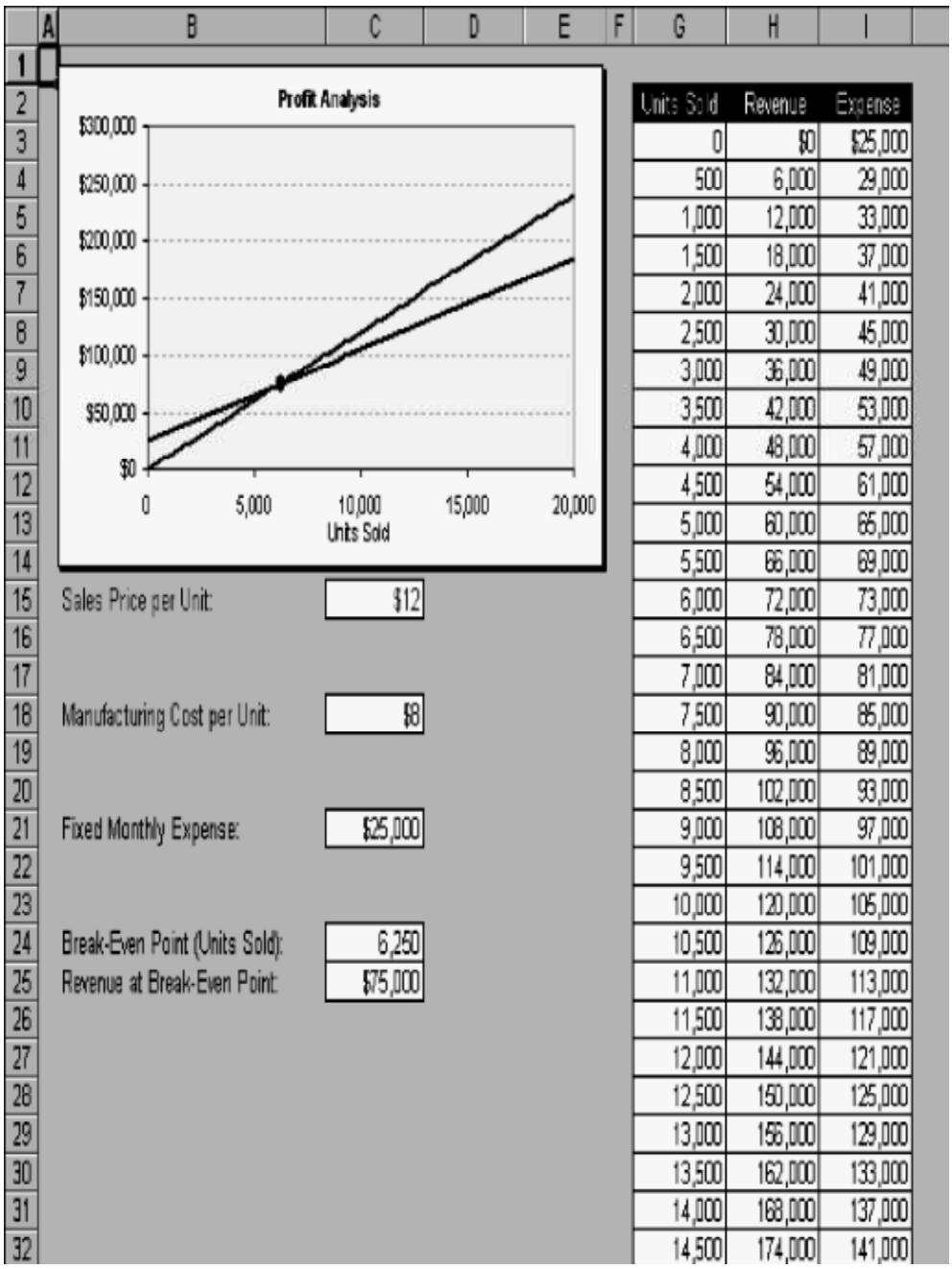
- How likely is the current plan to come in on schedule or on budget?
- How much contingency reserve of time or money is needed to provide the agency with a sufficient degree of certainty?

• Using sensitivity analysis, which activities or line-item cost elements contribute the most to the possibility of overrunning schedule or cost targets?

4.7.3 Sensitivity Analysis:

- Sensitivity analysis is a technique used to show the effects of changing one or more variables on an outcome.
- For example, many people use it to determine what the monthly payments for a loan will be given different interest rates or periods of the loan, or for determining break-even points based on different assumptions.
- Spreadsheet software, such as Excel, is a common tool for performing sensitivity analysis.

The following figure shows an example Excel file created to quickly show the break-even point for a product based on various inputs-the sales price per unit, manufacturing cost per unit, and fixed monthly expenses. The current inputs result I a break-even point of 6,250 units sold. Users of this spreadsheet can change inputs and see the effects on the break-even point in chart format. Project teams often create similar models to determine the sensitivity of various project variables.



The main outputs of quantitative risk analysis are updates to the risk register, such as revised risk rankings or detailed information behind those rankings. The quantitative analysis also provides high level information in terms of the probabilities of achieving certain projects objectives. This information might cause the project manager to suggest changes in contingency reserves .

4.8 RISK RESPONSE PLANNING

Risk Response Planning is the process of developing options, and determining actions to enhance opportunities and reduce threats to the project's objectives. It focuses on the high-risk items evaluated in the qualitative and/or quantitative risk analysis. In Risk Response Planning parties are identified and assigned to take responsibility for each risk response. This process ensures that each risk requiring a response has an owner monitoring the responses, although a different party may be responsible for implementing the risk handling action itself.

The project manager and the PDT identify which strategy is best for each risk, and then design specific action(s) to implement that strategy.

Strategies for Negative Risks or Threats include:

 Avoid: Risk avoidance involves changing the project plan to eliminate the risk or to protect the project objectives (time, cost, scope, quality) from its impact. The team might achieve this by changing scope, adding time, or adding resources (thus relaxing the so-called "triple constraint").

These changes may require a Programming Change Request (PCR). Some negative risks (threats) that arise early in the project can be avoided by clarifying requirements, obtaining information, improving communication, or acquiring expertise.

 Transfer: Risk transference requires shifting the negative impact of a threat, along with ownership of the response, to a third party. An example would be the team transfers the financial impact of risk by contracting out some aspect of the work.

Transference reduces the risk only if the contractor is more capable of taking steps to reduce the risk and does so. Risk transference nearly always involves payment of a risk premium to the party taking on the risk.

Transference tools can be quite diverse and include, but are not limited to the use of: insurance, performance bonds, warranties, guarantees, incentive/disincentive clauses, A+B Contracts, etc.

 Mitigate. Risk mitigation implies a reduction in the probability and/or impact of an adverse risk event to an acceptable threshold. Taking early action to reduce the probability and/or impact of a risk is often more effective than trying to repair the damage after the risk has occurred.

Risk mitigation may take resources or time and hence may represent a tradeoff of one objective for another. However, it may

still be preferable to going forward with an unmitigated risk. Monitoring the deliverables closely, increasing the number of parallel activities in the schedule, early involvement of regulatory agencies in the project, early and continuous outreach to communities/advocacy groups, implementing value engineering, performing corridor studies, adopting less complex processes, conducting more tests, or choosing a more stable supplier are examples of mitigation actions.

General Risk Mitigation Strategies for Technical, Cost, and Schedule Risks

TECHNICAL RISKS	COST RISKS	SCHEDULE RISKS
Emphasize team support and avoid stand-alone project structure	Increase the frequency of project monitoring	Increase the frequency of project monitoring
Increase project manager authority	Use WBS and CPM	Use WBS and CPM
Improve problem handling and communication	Improve communication, project goals understanding, and team support	Select the most experienced project manager
Increase the frequency of project monitoring	Increase project manager authority	
Use WBS and CPM		

Strategies for Positive Risks or Opportunities include:

 Exploit. The organization wishes to ensure that the opportunity is realized. This strategy seeks to eliminate the uncertainty associated with a particular upside risk by making the opportunity definitely happen. Examples include securing talented resources that may become available for the project.

 Share. Allocating ownership to a third party who is best able to capture the opportunity for the benefit of the project. Examples include: forming risk-sharing partnerships, teams, working with elected officials, special-purpose companies, joint ventures, etc.

 Enhance. This strategy modifies the size of an opportunity by increasing probability and/or positive impacts, and by identifying and maximizing key drivers of these positive-impact risks. Seeking to facilitate or strengthen the cause of the opportunity, and proactively targeting and reinforcing its trigger conditions, might increase probability. Impact drivers can also be targeted, seeking to increase the project's susceptibility to the opportunity.

 Acceptance. A strategy that is adopted because it is either not possible to eliminate that risk from a project or the cost in time or money of the response is not warranted by the importance of the risk. When the project manager and the project team decide to accept a certain risk(s), they do not need to change the project plan to deal with that certain risk, or identify any response strategy other than agreeing to address the risk if and when it occurs. A workaround plan may be developed for that eventuality.

There are two types of acceptance strategy:

1. Active acceptance. The most common active acceptance strategy is to establish a contingency reserve, including amounts of time, money, or resources to handle the threat or opportunity.

2- Passive acceptance. Requires no action leaving the project team to deal with the threats or opportunities as they occur.

i. **Workaround**:

Workaround is distinguished from contingency plan in that a workaround is a recovery plan that is implemented if the event occurs, whereas a contingency plan is to be implemented if a trigger event indicates that the risk is very likely to occur.

As with risk identification process, the team should also consider residual risks, secondary risks, and risk interaction in the risk response planning process. See page 10 for details.

4.9 RISK MONITORING AND CONTROL

Risk monitoring and control keeps track of the identified risks, residual risks, and new risks. It also monitors the execution of planned strategies on the identified risks and evaluates their effectiveness.

Risk monitoring and control continues for the life of the project. The list of project risks changes as the project matures, new risks develop, or anticipated risks disappear.

Typically during project execution there should be regularly held risk meetings during which all or a part of the Risk Register is reviewed for the effectiveness of their handling and new risks are discussed and assigned owners. Periodic project risk reviews repeat the process of identification, analysis, and response planning. The project manager ensures that project risk is an agenda item at all PDT meetings. Risk ratings and prioritization commonly change during the project lifecycle.

If an unanticipated risk emerges, or a risk's impact is greater than expected, the planned response may not be adequate. The project manager and the PDT must perform additional response planning to control the risk.

Risk control involves:

- Choosing alternative response strategies
- Implementing a contingency plan
- Taking corrective actions
- Re-planning the project, as applicable

The individual or a group assigned to each risk (risk owner) reports periodically to the project manager and the risk team leader on the status of the risk and the effectiveness of the response plan. The risk owner also reports on any unanticipated effects, and any mid-course correction that the PDT must consider in order to mitigate the risk.

4.10. USING SOFTWARE TO ASSIST IN PROJECT RISK MANAGEMENT

Most organizations use software to create , update , and distribute informations in their risk registers.The risk register is often a word or excel file but it can also be part of a more sophisticated database. Spreadsheets can aid in tracking and quantifying risk , preparing charts and graphs , and performing sensitivity analysis. Software can be used to create decision trees and estimated monitary values.

More sophisticated risk management software such as Monte Carlo Simulation s/w can help you develop models and use simulations to analyze and respond to various risks. There are also several s/w packages created specifically for project risk management . If a risk is not identified.

Software should be used as a tool to help make good decisions in project risk management, not as a scapegoat for when things go wrong.

4.11 SUMMARY

Risk Management is always forgotten when managing projects but the irony is that all projects have risk. People in general think that risk management is just a blaming session to uncover flaws in a particular project. This perception has to be abolished.

Management and Project managers have to understand that Risk Management is the one of the few practical way to manage uncertainties and doubts towards a particular project.

Risk can never be abolished, but can only be reduced to an acceptable level. Risk Management is a must for any projects and it has to be done from the initiation phase throughout the project lifecycle. Risk Management is not free, and it isn't cheap. There may need to have third party audits which incur cost. There must always be continual management support and commitment to ensure the success of projects.

This chapter we discussed the importance of risk management in the projects and also were able to understand the different processes in the risk management, which consists of the following actions

 Project risk management is the art and science of identifying, analyzing, and responding to risk throughout the life of a project and in the best interests of meeting project objectives.

Main processes include:

- Risk management planning
- Risk identification
- Qualitative risk analysis
- Quantitative risk analysis
- Risk response planning
- Risk monitoring and control

Sample Questions

1. Discuss the common sources of risk on information technology projects and suggestions for managing them**. (Ans:section 4.4)**

2. Explain how to use decision trees and Monte Carlo analysis for quantifying risk. **(Ans Hint: section 4.7.1)**

Suggested Readings:

1. Boehm ,Barry W. " Software Risk management: Principles and practices"
2. Kathy Schwalbe : Information Technology project management
3. Hillson , David. : The risk breakdown structure as an aid to effective risk management
4. DeMarco,Tom and Timothy Lister: Managing Risk on software projects
4. www.risksig.com

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5

PROJECT PROCUREMENT MANAGEMENT

Unit Structure:

5.0 OBJECTIVES

- To understand the importance of project procurement Management
- To describe project procurement management processes
- Procurement planning
- Solicitation planning
- Solicitation
- Source selection
- Contract administration
- Contract close-out

5.1 INTRODUCTION

Project Procurement Management includes the processes required to acquire goods and services from outside the performing organization. For simplicity, goods and services, whether one or many, will generally be referred to as a "product." **Figure 5.1** provides an overview of the following major processes:

5.2 Procurement Planning—determining what to procure and when.

5.3 Solicitation Planning—documenting product requirements and identifying potential sources.

5.4 Solicitation—obtaining quotations, bids, offers, or proposals as appropriate.

5.5 Source Selection—choosing from among potential sellers.

5.6 Contract Administration—managing the relationship with the seller.

5.7 Contract Close-out—completion and settlement of the contract, including resolution of any open items.

These processes interact with each other and with the processes in the other knowledge areas as well. Each process may involve effort from one or more individuals or groups of individuals based on the needs of the project. Although the processes are presented here as discrete elements with well-defined interfaces, in practice they may overlap and interact in ways not detailed here.

Project Procurement Management is discussed from the perspective of the buyer in the buyer-seller relationship. The buyer-seller relationship can exist at many levels on one project. Depending on the application area, the seller may be called a contractor, a vendor, or a supplier.

The *seller* will typically manage their work as a project. In such cases:

- The *buyer* becomes the customer and is thus a key stakeholder for the seller.
- The *seller's* project management team must be concerned with all the processes of project management, not just with those of this knowledge area.
- The terms and conditions of the contract become a key input to many of the seller's processes. The contract may actually contain the input (e.g., major deliverables, key milestones, cost objectives) or it may limit the project team's options (e.g., buyer approval of staffing decisions is often required on design projects).

This chapter assumes that the seller is external to the performing organization.

Most of the discussion, however, is equally applicable to *formal* agreements entered into with other units of the performing organization. When informal agreements are involved, the processes described in Project Human Resource Management,, and Project Communications Management, are more likely to apply.

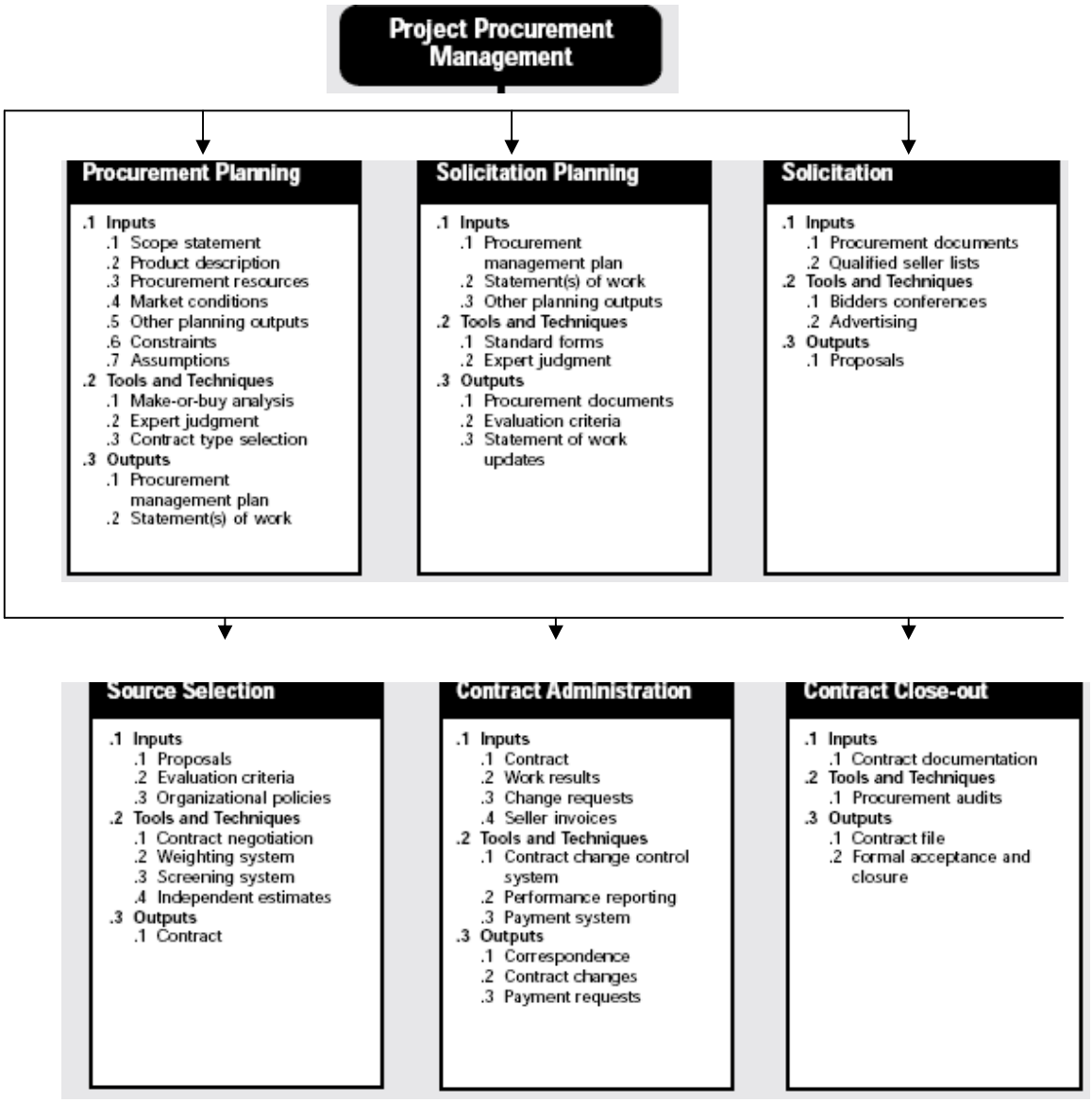


Figure 5.1

5.2 PLANNING PURCHASES AND ACQUISITIONS (PROCUREMENT PLANNING)

Procurement planning is the process of identifying which project needs can be best met by procuring products or services outside the project organization. It involves consideration of whether to procure, how to procure, what to procure, how much to procure, and when to procure it.

When the project obtains products and services from outside the performing organization, the processes from solicitation

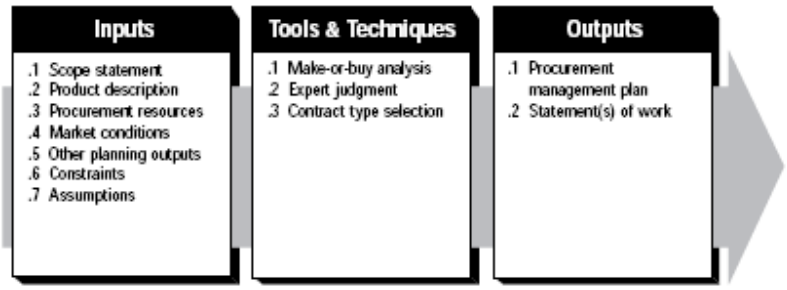
planning through contract close-out would be performed once for each product or service item.

The project management team should seek support from specialists in the disciplines of contracting and procurement when needed.

When the project does not obtain products and services from outside the performing organization, the processes from solicitation planning through contract close-out would *not* be performed. This often occurs on research and development projects when the performing organization is reluctant to share project technology, and on many smaller, in-house projects when the cost of finding and managing an external resource may exceed the potential savings.

Procurement planning should also include consideration of potential subcontracts, particularly if the buyer wishes to exercise some degree of influence or control over subcontracting decisions.

Steps in procurement planning



5.2.1 Inputs to Procurement Planning:

1 Scope statement: The scope statement describes the current project boundaries. It provides important information about project needs and strategies that must be considered during procurement planning.

2 **Product description*:*** The description of the product of the project provides important information about any technical issues or concerns that would need to be considered during procurement planning.

The product description is generally broader than a statement of work. A product description describes the ultimate end-product of the project; a statement of work describes the portion of that product to be provided by a seller to the project. However, if the performing organization chooses to procure the

entire product, the distinction between the two terms becomes moot.

3 Procurement resources: If the performing organization does not have a formal contracting group, the project team will have to supply both the resources and the expertise to support project procurement activities.

4 Market conditions: The procurement planning process must consider what products and services are available in the marketplace, from whom, and under what terms and conditions.

5 Other planning outputs: To the extent that other planning outputs are available, they must be considered during procurement planning. Other planning outputs which must often be considered include preliminary cost and schedule estimates, quality management plans, cash flow projections, the work breakdown structure, identified risks, and planned staffing.

6 Constraints: Constraints are factors that limit the buyer's options. One of the most common constraints for many projects is funds availability.

***7* Assumptions:** Assumptions are factors that, for planning purposes, will be considered
to be true, real, or certain.

5.2.2 Tools and Techniques for Procurement Planning:

1. Make-or-buy analysis: This is a general management technique which can be used to determine whether a particular product can be produced cost-effectively by the performing organization. Both sides of the analysis include indirect as well as direct costs. For example, the "buy" side of the analysis should include both the actual out of- pocket cost to purchase the product as well as the indirect costs of managing the purchasing process.

A make-or-buy analysis must also reflect the perspective of the performing organization as well as the immediate needs of the project. For example, purchasing a capital item (anything from a construction crane to a personal computer) rather than renting it is seldom cost effective. However, if the performing organization has an ongoing need for the item, the portion of the purchase cost allocated to the project may be less than the cost of the rental.

Make-or-Buy Example:

 Assume you can lease an item you need for a project for $150/day. To purchase the item, the cost is $1,000 plus a daily operational cost of $50/day.

 How long will it take for the purchase cost to be the same as the lease cost?
 If you need the item for 12 days, should you lease it or purchase it?

Make-or Buy Solution:

- Set up an equation so the “make” is equal to the “buy”
- In this example, use the following equation. Let d be the number of days to use the item.

  $150d = $1,000 + $50d
- Solve for d as follows:
- Subtract $50d from the right side of the equation to get

  $100d = $1,000
- Divide both sides of the equation by $100

  d = 10 days
- The lease cost is the same as the purchase cost at 10 days
- If you need the item for 12 days, it would be more economical to

  purchase it

2 Expert judgment: Expert judgment will often be required to assess the inputs to this process. Such expertise may be provided by any group or individual with specialized knowledge or training and is available from many sources including:

- Other units within the performing organization.
- Consultants.
- Professional and technical associations.
- Industry groups.

3 Contract type selection: Different types of contracts are more or less appropriate for different types of purchases. Contracts generally fall into one of three broad categories:

- Fixed price or lump sum contracts—this category of contract involves a fixed total price for a well-defined product. To the extent that the product is not well-defined, both the buyer and seller are at risk—the buyer may not receive the desired product or the seller may need to incur additional costs in order to provide it. Fixed price contracts may also include incentives for meeting or exceeding selected project objectives such as schedule targets.

- Cost reimbursable contracts—this category of contract involves payment (reimbursement) to the seller for its actual costs. Costs are usually classified as *direct* costs or *indirect* costs. Direct costs are costs incurred for the exclusive benefit of the project (e.g., salaries of full-time project staff). Indirect costs, also called overhead costs, are costs allocated to the project by the performing organization as a cost of doing business (e.g., salaries of corporate executives). Indirect costs are usually calculated as a percentage of direct costs. Cost reimbursable contracts often include incentives for meeting or exceeding selected project objectives such as schedule targets or total cost.

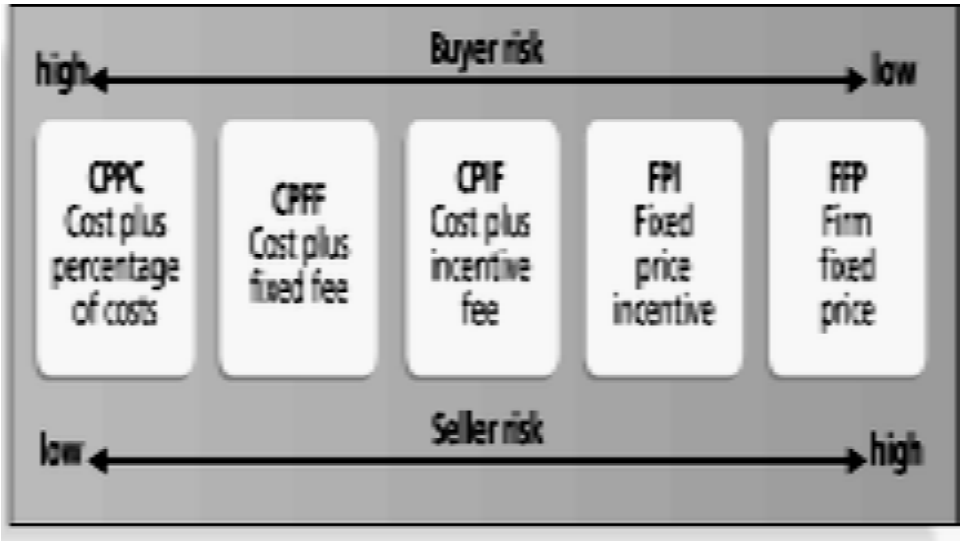
Three types of cost reimbursable contracts in order of lowest to highest risk to the buyer include cost plus incentive fee, cost plus fixed fee, and cost plus percentage of costs With a cost plus incentive fee (CPIF) contract the buyer pays the supplier for allowable performance cost along with a predetermined fee and an incentive bonus.if the final Cost is less than the expected cost, both the buyer and the supplier benefit from the cost saving.

With a cost plus fixed fee (CPFF) contract the buyer pays the supplier for the allowable performance cost plus a fixed fee payment usually based on a percentage of estimated costs.

With a cost plus percentage of costs(CPPC) contract the buyer pays the supplier for allowable performance costs along with a predetermined percentage based on the total costs.

- Unit price contracts—the seller is paid a preset amount per unit of service (e.g., $70 per hour for professional services or $1.08 per cubic yard of earth removed), and the total value of the contract is a function of the quantities needed to complete the work.

Contract Types Versus Risk



5.2.3 Outputs from Procurement Planning:

1. Procurement management plan. The procurement management plan should describe how the remaining procurement processes (from solicitation planning through contract close-out) will be managed. For example:

- What types of contracts will be used?
- If independent estimates will be needed as evaluation criteria, who will prepare them and when?
- If the performing organization has a procurement department, what actions can the project management team take on its own?
- If standardized procurement documents are needed, where can they be found?
- How will multiple providers be managed?
- How will procurement be coordinated with other project aspects such as scheduling and performance reporting?

A procurement management plan may be formal or informal, highly detailed or broadly framed, based on the needs of the project. It is a subsidiary element of the overall project plan.

2 Statement(s) of work: The statement of work (SOW) describes the procurement item in sufficient detail to allow prospective sellers to determine if they are capable of providing the item. “Sufficient detail” may vary based on the nature of the item, the needs of the buyer, or the expected contract form.

Some application areas recognize different types of SOW. For example, in some government jurisdictions, the term SOW is reserved for a procurement item that is a clearly specified product or service, and the term Statement of Requirements (SOR) is used for a procurement item that is presented as a problem to be solved. The statement of work may be revised and refined as it moves through the procurement process. For example, a prospective seller may suggest a more efficient approach or a less costly product than that originally specified. Each individual procurement item requires a separate statement of work. However, multiple products or services may be grouped as one procurement item with a single SOW.

The statement of work should be as clear, as complete, and as concise as possible.

It should include a description of any collateral services required, such as performance reporting or post-project operational support for the procured item. In some application areas, there are

specific content and format requirements for a SOW. The following figure shows a template of statement of work.

Statement of Work (SOW) Template

I.	**Scope of Work:** Describe the work to be done to detail. Specify the hardware and software involved and the exact nature of the work.
II.	**Location of Work:** Describe where the work must be performed. Specify the location of hardware and software and where the people must perform the work
III.	**Period of Performance:** Specify when the work is expected to start and end, working hours, number of hours that can be billed per week, where the work must be performed, and related schedule information.
IV.	**Deliverables Schedule:** List specific deliverables, describe them in detail, and specify when they are due.
V.	**Applicable Standards:** Specify any company or industry-specific standards that are relevant to performing the work.
VI.	**Acceptance Criteria:** Describe how the buyer organization will determine if the work is acceptable.
VII.	**Special Requirements:** Specify any special requirements such as hardware or software certifications, minimum degree or experience level of personnel, travel requirements, and so on.

5.3 SOLICITATION PLANNING (PLANNING CONTRACTING)

Solicitation planning involves preparing the documents needed to support solicitation

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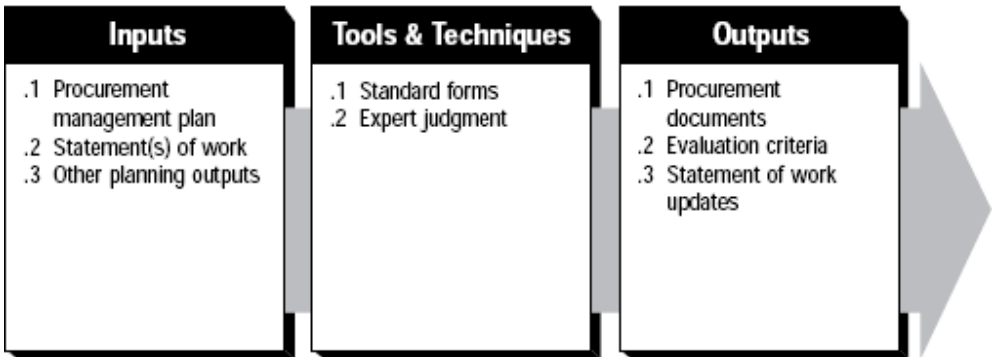


Steps in solicitation planning

5.3.1 Tools and Techniques for Solicitation Planning:

1. Standard forms: Standard forms may include standard contracts, standard descriptions of procurement items, or

standardized versions of all or part of the needed bid documents. Organizations that do substantial amounts of procurement should have many of these documents standardized.

2. Expert judgment: Expert judgment is described in Section 5.2.2.

5.3.2 Outputs from Solicitation Planning:

1. Procurement documents: Procurement documents are used to solicit proposals from prospective sellers. The terms "bid" and "quotation" are generally used when the source selection decision will be price-driven (as when buying commercial items), while the term "proposal" is generally used when non-financial considerations such as technical skills or approach are paramount (as when buying professional services).

However, the terms are often used interchangeably and care should be taken not to make unwarranted assumptions about the implications of the term used.

Common names for different types of procurement documents include: Invitation for bid (IFB), Request for Proposal (RFP), Request for Quotation (RFQ), Invitation for Negotiation, and Contractor Initial Response.

Procurement documents should be structured to facilitate accurate and complete responses from prospective sellers. They should always include the relevant statement of work, a description of the desired form of the response, and any required contractual provisions (e.g., a copy of a model contract, non-disclosure provisions).

Some or all of the content and structure of procurement documents, particularly for those prepared by a government agency, may be defined by regulation.

Procurement documents should be rigorous enough to ensure consistent, comparable responses, but flexible enough to allow consideration of seller suggestions for better ways to satisfy the requirements. The following figure shows a template for RFP

Request For proposal Template

I. Purpose of RFP
II. Organization's Background
III. Basic Requirements
IV. Hardware and Software Environment
V. Description of RFP Process
VI. Statement of Work and Schedule Information
VII. Possible Appendices

A. Current System Overview
B. System Requirements
C. Volume and Size Data
D. Required Contents of Vendor's Response to RFP
E. Sample Contract

2. Evaluation criteria. Evaluation criteria are used to rate or score proposals. They may be objective (e.g., "the proposed project manager must be a certified Project Management Professional") or subjective (e.g., "the proposed project manager must have documented, previous experience with similar projects"). Evaluation criteria are often included as part of the procurement documents.

Evaluation criteria may be limited to purchase price if the procurement item is known to be readily available from a number of acceptable sources ("purchase price" in this context includes both the cost of the item and ancillary expenses such as delivery). When this is not the case, other criteria must be identified and documented to support an integrated assessment. For example:

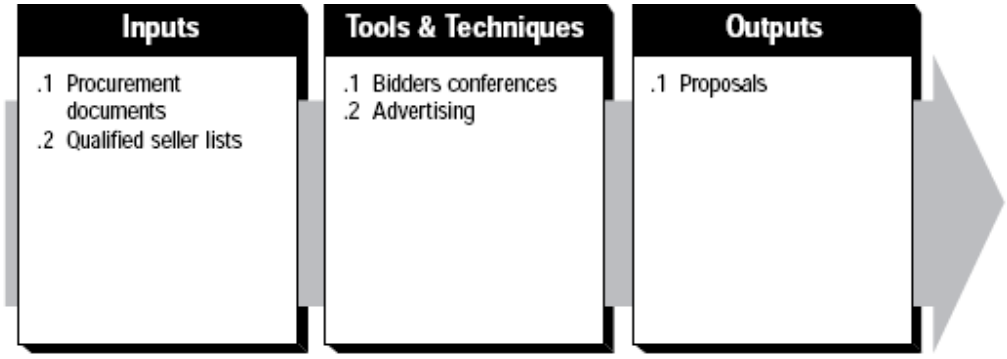
- Understanding of need—as demonstrated by the seller's proposal.
- Overall or life cycle cost—will the selected seller produce the lowest total cost (purchase cost plus operating cost)?
- Technical capability—does the seller have, or can the seller be reasonably expected to acquire, the technical skills and knowledge needed?

3. Statement of work updates. The statement of work is described in Section 12.1.3.2.

Modifications to one or more statements of work may be identified during solicitation planning.

5.4 REQUESTING SELLER RESPONSES (SOLICITATION)

Solicitation involves obtaining information (bids and proposals) from prospective sellers on how project needs can be met. Most of the actual effort in this process is expended by the prospective sellers, normally at no cost to the project.



Steps in solicitation

5.4.1 Inputs to Solicitation:

1. Procurement documents: Procurement documents are described in previous section.

2. Qualified seller lists: Some organizations maintain lists or files with information on prospective sellers. These lists will generally have information on relevant experience and other characteristics of the prospective sellers.

If such lists are not readily available, the project team will have to develop its own sources. General information is widely available through library directories, relevant local associations, trade catalogs, and similar sources. Detailed information on specific sources may require more extensive effort, such as site visits or contact with previous customers.

Procurement documents may be sent to some or all of the prospective sellers.

5.4.2 Tools and Techniques for Solicitation:

1. Bidder conferences: Bidder conferences (also called contractor conferences, vendor conferences, and pre-bid conferences) are meetings with prospective sellers prior to preparation of a proposal. They are used to ensure that all prospective sellers have a clear, common understanding of the procurement (technical requirements, contract requirements, etc.). Responses to questions may be incorporated into the procurement documents as amendments.

2. Advertising: Existing lists of potential sellers can often be expanded by placing advertisements in general circulation publications such as newspapers or in specialty publications such as professional journals. Some government jurisdictions require public advertising of certain types of procurement items; most

government jurisdictions require public advertising of subcontracts on a government contract.

5.4.3 Outputs from Solicitation:

1. Proposals: Proposals are seller-prepared documents that describe the seller's ability and willingness to provide the requested product. They are prepared in accordance with the requirements of the relevant procurement documents.

5.5 SOURCE SELECTION (SELECTING SELLERS)

Source selection involves:

- Evaluating proposals or bids from sellers.
- Choosing the best one.
- Negotiating the contract.
- Awarding the contract.
- Organizations often do an initial evaluation of all proposals and bids and then develop a short list of potential sellers for further evaluation.

Source selection involves the receipt of bids or proposals and the application of the evaluation criteria to select a provider. This process is seldom straightforward:

• Price may be the primary determinant for an off-the-shelf item, but the lowest proposed *price* may not be the lowest *cost* if the seller proves unable to deliver the product in a timely manner.

• Proposals are often separated into technical (approach) and commercial (price) sections with each evaluated separately.

• Multiple sources may be required for critical products.

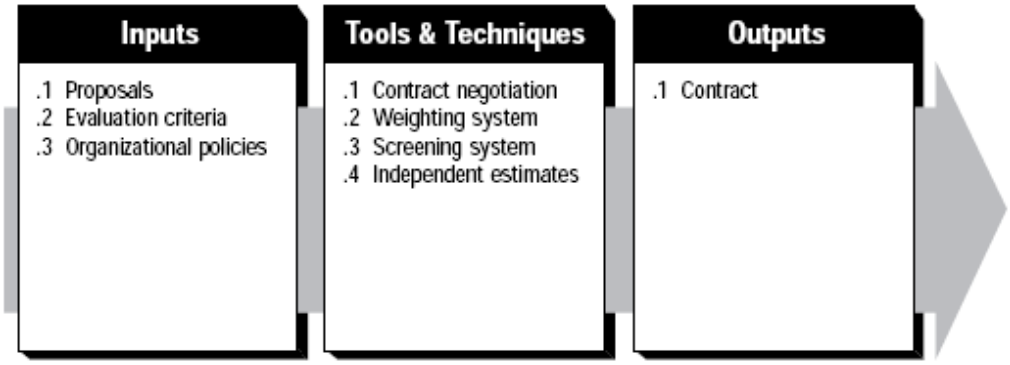
The tools and techniques described below may be used singly or in combination.

For example, a weighting system may be used to:
• Select a single source who will be asked to sign a standard contract.
• Rank order all proposals to establish a negotiating sequence.

On major procurement items, this process may be iterated. A short list of qualified sellers will be selected based on a preliminary

proposal, and then a more detailed evaluation will be conducted based on a more detailed and comprehensive proposal.

Steps in source selection



5.5.1 Inputs to Source Selection:

1. Proposals. Proposals are described in Section 5.2.2.

2. Evaluation criteria. Evaluation criteria are described in Section 5.2.2(2)

3. Organizational policies. Any and all of the organizations involved in the project may have formal or informal policies that can affect the evaluation of proposals.

5.5.2 Tools and Techniques for Source Selection:

1. Contract negotiation: Contract negotiation involves clarification and mutual agreement on the structure and requirements of the contract prior to the signing of the contract. To the extent possible, final contract language should reflect all agreements reached. Subjects covered generally include, but are not limited to, responsibilities and authorities, applicable terms and law, technical and business management approaches, contract financing, and price.

For complex procurement items, contract negotiation may be an independent process with inputs (e.g., an issues or open items list) and outputs (e.g., memorandum of understanding) of its own. Contract negotiation is a special case of the general management skill called “negotiation.”

Negotiation tools, techniques, and styles are widely discussed in the general management literature and are generally applicable to contract negotiation.

2. Weighting system: A weighting system is a method for quantifying qualitative data in order to minimize the effect of personal prejudice on source selection. Most such systems involve (1) assigning a numerical weight to each of the evaluation criteria, (2) rating the prospective sellers on each criterion, (3) multiplying the weight by the rating, and (4) totaling the resultant products to compute an overall score.

3. Screening system: A screening system involves establishing minimum requirements of performance for one or more of the evaluation criteria. For example, a prospective seller might be required to propose a project manager who is a Project Management Professional (PMP) before the remainder of their proposal would be considered.

4 Independent estimates: For many procurement items, the procuring organization may prepare its own estimates as a check on proposed pricing. Significant differences from these estimates may be an indication that the SOW was not adequate or that the prospective seller either misunderstood or failed to respond fully to the SOW. Independent estimates are often referred to as "should cost" estimates.

5.5.3 Outputs from Source Selection:

1.Contract: A contract is a mutually binding agreement which obligates the seller to provide the specified product and obligates the buyer to pay for it. *A contract is a legal relationship subject to remedy in the courts.* The agreement may be simple or complex, usually (but not always) reflecting the simplicity or complexity of the product. It may be called, among other names, a contract, an agreement, a subcontract, a purchase order, or a memorandum of understanding

5.6 CONTRACT ADMINISTRATION

Contract administration is the process of ensuring that the seller's performance meets contractual requirements. On larger projects with multiple product and service providers, a key aspect of contract administration is managing the interfaces among the various providers. The legal nature of the contractual relationship makes it imperative that the project team be acutely aware of the legal implications of actions taken when administering the contract.

Contract administration includes application of the appropriate project management processes to the contractual relationship(s) and integration of the outputs from these processes into the overall management of the project. This integration and

coordination will often occur at multiple levels when there are multiple sellers and multiple products involved. The project management processes which must be applied include:

- Project plan execution, authorize the contractor's work at the appropriate time.
- Performance reporting, is, to monitor contractor cost, schedule, and technical performance.
- Quality control, is to inspect and verify the adequacy of the contractor's product.
- Change control, is , to ensure that changes are properly approved and that all those with a need to know are aware of such changes.

5.6.1 Inputs to Contract Administration:

1. Contract. Contracts are described in previous Section

2. Work results. The seller's work results—which deliverables have been completed and which have not, to what extent are quality standards being met, what costs have been incurred or committed, etc.—are collected as part of project plan execution

3. Change requests. Change requests may include modifications to the terms of the contract or to the description of the product or service to be provided. If the seller's work is unsatisfactory, a decision to terminate the contract would also be handled as a change request. Contested changes, those where the seller and the project management team cannot agree on compensation for the change, are variously called claims, disputes, or appeals.

4. Seller invoices. The seller must submit invoices from time to time to request payment for work performed. Invoicing requirements, including necessary supporting documentation, are usually defined in the contract.

5.6.2 Suggestions for Change Control in Contracts:

- Changes to any part of the project need to be reviewed, approved, and documented by the same people in the same way that the original part of the plan was approved.
- Evaluation of any change should include an impact analysis. How will the change affect the scope, time, cost, and quality of the goods or services being provided?
- Changes must be documented in writing. Project team members should also document all important meetings and telephone phone calls.

Project managers and teams should stay closely involved to make sure the new system will meet business needs and work in an operational environment.

- Have backup plans.
- Use tools and techniques, such as a contract change control system, buyer conducted performance reviews, inspections and audits, and so on.

Contract administration also has a financial management component. Payment terms should be defined within the contract and should involve a specific linkage between progress made and compensation paid.

5.6.3 Tools and Techniques for Contract Administration"

1. Contract change control system: A contract change control system defines the process by which the contract may be modified. It includes the paperwork, tracking systems, dispute resolution procedures, and approval levels necessary for authorizing changes. The contract change control system should be integrated with the overall change control system .

2. Performance reporting: Performance reporting provides management with information about how effectively the seller is achieving the contractual objectives. Contract performance reporting should be integrated with the overall project performance reporting.

3. Payment system: Payments to the seller are usually handled by the accounts payable system of the performing organization. On larger projects with many or complex procurement requirements, the project may develop its own system. In either case, the system must include appropriate reviews and approvals by the project management team.

5.6.4 Outputs from Contract Administration:

1. Correspondence: Contract terms and conditions often require written documentation of certain aspects of buyer/seller communications, such as warnings of unsatisfactory performance and contract changes or clarifications.

2. Contract changes: Changes (approved and unapproved) are fed back through the appropriate project planning and project procurement processes, and the project plan or other relevant documentation is updated as appropriate.

3. Payment requests: This assumes that the project is using an external payment system. If the project has its own internal system, the output here would simply be "payments."

5.7 CONTRACT CLOSE-OUT

Contract close-out is similar to administrative closure in that it involves both product verification (Was all work completed correctly and satisfactorily?) and administrative close-out (updating of records to reflect final results and archiving of such information for future use). The contract terms and conditions may prescribe specific procedures for contract close-out. Early termination of a contract is a special case of contract close-out.

5.7.1 Inputs to Contract Close-out:

Contract documentation: Contract documentation includes, but is not limited to, the contract itself along with all supporting schedules, requested and approved contract changes, any seller-developed technical documentation, seller performance reports, financial documents such as invoices and payment records, and the results of any contract-related inspections.

5.7.2 Tools and Techniques for Contract Close-out:

Procurement audits: A procurement audit is a structured review of the procurement process from procurement planning through contract administration. The objective of a procurement audit is to identify successes and failures that warrant transfer to other procurement items on this project or to other projects within the performing organization.

5.7.3 Outputs from Contract Close-out:

1 Contract file: A complete set of indexed records should be prepared for inclusion with the final project records.

2 Formal acceptance and closure: The person or organization responsible for contract administration should provide the seller with formal written notice that the contract has been completed. Requirements for formal acceptance and closure are usually defined in the contract.

5.8 USING SOFTWARE TO ASSIST IN PROJECT PROCUREMENT MANAGEMENT

Word processing software helps write proposals and contracts, spreadsheets help evaluate suppliers, databases help

track suppliers, and presentation software helps present procurement-related information. E-procurement software does many procurement functions electronically. Organizations also use other Internet tools to find information on suppliers or auction goods and services.

Established companies such as Oracle ,SAS, and Baan have developed new software products to assist in procurement management .As with information or software tool, organization must focus on using the information and tools to meet the project and organizational needs. Organizations should often develop partnerships and strategic alliances with other organizations to take advantage of potential cost savings.

5.9 OUT SOURCING

Outsourcing software development and other information technology, or I.T. services continues to grow in popularity. There are several important reasons for this. Many companies that have not traditionally considered outsourcing may be surprised to learn of the benefits that it could bring them. Even organizations with large software teams may be candidates for outsourcing some of their projects.

5.9.1 Benefits of outsourcing

- To allow the client organization to focus on its core business
- To access skills and technologies
- To reduce both fixed and recurrent costs
- To provide flexibility
- To increase accountability

Information technology is rapidly becoming more complex and is constantly changing. At the same time, many companies are finding that they increasingly need to focus their attention on the areas of their strength due to rapidly increasing market competition. For many of these companies, outsourcing I.T., at least projects that are outside their area of expertise, can greatly strengthen their competitive advantage. It also brings new energy to the organization to have projects that were causing ongoing frustration, cost, and risk to now be in the hands of another organization with the specialized skills and experience needed.

Organizations that only have budget to hire a few individuals often find that by outsourcing their projects, they are still able to obtain access to a wide range of high level skills. Outsourced development companies can apply the best skill for each phase of a project. This flexibility and the availability of a larger talent pool provides optimum results at the lowest cost.

Selecting the right outsourcing partner is key to realizing these benefits. Selecting an organization of an appropriate size is important. An organization that is too large for your project brings unnecessary costs and overhead. Selecting an organization with the appropriate level of skills is also important. For projects that provide significant business value and which you expect to be used long term, it is important to select an organization whose people have true enterprise level experience. The organization's vision, high-level design skills, and ability to understand and support your business goals are also very important. This is often the greatest challenge with outsourcing overseas. It takes more than technical skills for project success. The ideal outsource organization will provide local individuals with these skills as well as overseas teams that they have established relationships with.

This can provide small outsourced projects with the advantage of international cost savings combined with the ease of management and all the other potential advantages that outsourcing has to offer.

Outsourcing can provide tremendous benefit to organizations. It can reduce complexity and cost while increasing project success. Selecting an organization with the necessary level of skills and experience locally and who have their own established international team provides an ideal formula for success. Together, this provides your organization with the maximum efficiency and effectiveness.

5.10 SUMMARY

Project procurement management involves acquiring goods and services for a project from outside the performing organization. Procurement, purchasing or outsourcing is acquiring goods or services from outside source. Organizations outsource to reduce costs, focus on their core business access skills and technologies, provide flexibility and increase accountability. In this chapter we could discuss the various steps involved in the procurement management process needed for a project.

Processes include:

- Planning purchases and acquisitions
- Planning contracting
- Requesting seller responses
- Selecting sellers
- Administering contracts
- Closing contracts

Sample questions

1. What is involved in the process of requesting seller responses?. How do organizations decide whom to send RFPs or RFQs?.(ANS: See section 5.3)

2. Explain the make or buy decision process and describe how to perform the financial calculations involved in the lease or buy example.(ANS: See section 5.1.2)

Suggested Readings.

1. Flemming, Quentin: Project procurement management , contracting, subcontracting ,teaming.
2. Kathy Schwalbe : Information Technology project management
3. Jack T.Marchewka: Information Technology project management
4. www. Informationweek.com
5. www.cio.com

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6

CHANGE MANAGEMENT

Unit Structure:

6.0 OBJECTIVES

After reading this chapter, you will be able to

- Describe the ADKAR model for change management allowing change management teams to focus their activities on specific business results.
- Describe creating change within an organization takes hard work and structure around what must actually take place to make the change happen.
- Implement control change, through change approvals and reviews
- Define the standardized methods and procedures are used for efficient and prompt handling of all changes to controlled IT infrastructure.
- To develop a change management plan. The plan focus on assessing organization's willingness and ability to change,

developing a change strategy and evaluating whether the change was successful or not.

- Discuss the nature of resistance and conflict and apply techniques for dealing with resistance and conflict.

6.1 INTRODUCTION

``TO IMPROVE is to change, to be perfect is to change often"- Winston Churchill

Nothing can better emphasize the need for change. Every organization needs to change with time; failing which, it stands the risk of being pushed into oblivion and being labeled as obsolete by the more enterprising competitors in the market.

Change management enables planning, controlling and coordinating all changes to an IT environment using standardized methods and procedures. Maximize process efficiency. Minimize change risk. Information Technology projects are planned organizational change. An IT project has an impact on the organization and organization has an impact on the IT projects.

The change you must, at the needed intervals. Change could be effected in the overall policy and procedure, in the infrastructure, in the structuring of staff, etc To implement successful change, as a manager, you need an overall leadership force that is greater than the combined force of resistance. By understanding the most common ways that people respond to change and learning how to convince the ones who are resistant to change, you can overcome these types of problems in the organization. (ASPM O'reilly)

According to Leslie Jaye Goff, the change management is about helping people deal with their emotions. IT professionals should be willing to put themselves in their user's shoes in order to understand how change will affect them.

The central theme of this chapter has been the concept of measurable organization value. The project's MOV provides a means for determining which project should be funded and drives many of the decisions.

6.2 THE NATURE OF CHANGE

This section focus on the ADKAR result-oriented model of change management, impact of change that allows change management teams to focus their activities on specific business

results. To understand impact of change, change is a process and the emotional behavior of change.

6.2.1 The ADKAR model – a model for change management:

The ADKAR change model was first published by Prosci in 1998, an independent research company specializing in the areas of change management, business process reengineering, they developed the ADKAR model. The model was initially used as a tool for determining if change management activities like communications and training were having the desired results during organizational change.

Change management, a critical component of business, can be achieved successfully using the ADKAR procedure. Change often brings high levels of stress and agitation to people. It is used as a resistance management tool, an assessment device and to help change management teams organize their work. This model, if applied completely, should result in a successful transition from former procedures to new procedures without fail or regardless of the complexity of the change.

The five key goals as shown in figure 7.1 form the basis of the ADKAR model.

Awareness - making employees at every level understand why change is necessary. They must understand that change does not come from the desire to do things differently but in order to improve on business activities and stay ahead of your competition, and/or increase the bottom line, is not only wise, but also necessary for success.
E.g., Customer input, Market changes etc.,

Desire: After making employees aware about the change, the next step will be making them have the desire to support and actively participate in the forthcoming changes.
E.g., fear of job loss, incentive or compensation, career advancement.

Knowledge: Management must provide the training and education to its staff of the methods of changing to the new procedures, or organization. High levels of awareness and desire will prove useless if they lack the necessary knowledge of how to change to accomplish the goals.
E.g., training and education, examples and role models.

Ability: Along with the knowledge of how to affect successful change, everyone involved needs to be given the specific training and information to achieve success in implementing the details of the changes to be made.

E.g., Practice applying new skills, mentoring and so on.

Reinforcement: to retain the change once it has been made, reinforcing the new "habits" of the staff typically improve the success of the changes made.
E.g., Personal recognition, celebrations.

An organization's culture, history, values and capacity for change are potential obstacles for change management teams. Consultants and change management teams often address these potential barriers with assessments. This relatively simple, logical method of implementing change management has proven to work well. It is not surprising or mysterious. This model, if applied completely, should result in a successful transition from former procedures to new procedures without fail or regardless of the complexity of the change.

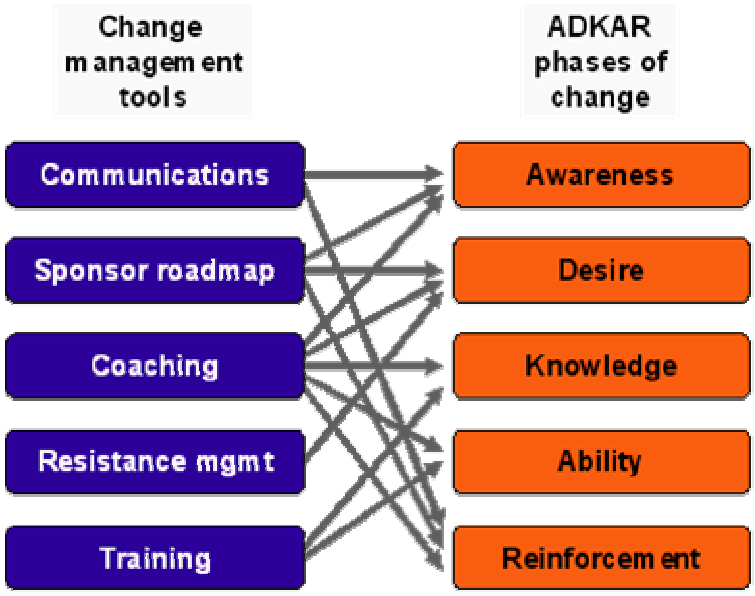


Figure 6.1

6.2.2 Change is a process:

Kurt Lewin emigrated from Germany to America during the 1930's. Lewin is recognized as the "founder of social psychology" which immediately points to his interest in the human aspect of change. Lewin's change management model is linked to force field analysis. Force field analysis is used extensively for purposes of organizational and human resource development, to help indicate when driving and restraining forces are not in balance, so that change can occur.

Lewin proposed a three stage basic theory of change includes Unfreeze, Change, Freeze (or Refreeze) as shown in diagram. The present state represents equilibrium, to change from the current state; there must be driving forces both to initiate and to motivate the change.

Figure 6.2 depicts a transition from present state to the desired state, it is also referred as neutral zone. Problems arise when managers do not understand, expect the neutral zone.

Stage 1 – becoming motivated to change (unfreezing)

This phase of change is built on the theory that human behavior is established by past observational learning and cultural influences that human behavior is established by past observational learning and cultural influences. Change requires adding new forces for change or removal of some of the existing factors that are at play in perpetuating the behavior.

Stage 2 – change what needs to be changed (unfrozen and moving to a new state)

Once there is sufficient dissatisfaction with the current conditions and a real desire to make some change exists, it is necessary to identify exactly what needs to be changed. A concise view of the new state is required to clearly identify the gap between the present state and that being proposed. Activities that aid in making the change include imitation of role models and looking for personalized solutions through trial-and-error learning.

Stage 3 – making the change permanent (refreezing)

Refreezing is the final stage where new behavior becomes habitual, which includes developing a new self-concept & identity and establishing new interpersonal relationships.

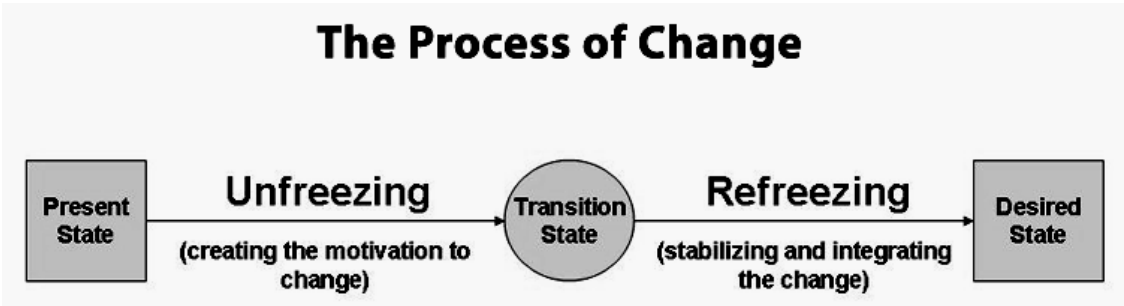


Figure 6.2

6.2.3 Change can be Emotional:

Change can also bring out emotional responses. An individual may have an emotional response to a change when the change is perceived as a loss a well-established equilibrium. In the book On Death and Dying author Elizabeth Kubler-Ross provides depicts the emotions.

The model has five stages, if people are not allowed to suffer and go through the first four stages, then going to fifth stage is extremely difficult. The human being we have a mechanism we do use grief counselors to varying extent in our day to day life. If we as change agents know this we can make sure that people we do experience some of these stage have information readily available to enable to progress. The Kubler-Ross model is a useful for understanding people's emotional reaction to personal trauma and change, irrespective of cause. The six stages include:

- Immobilization: The initial reaction to the announcement of the change is shock. The change is so alien to the participant's frame of reference that he or she is often unable to relate what is happening, resulting in temporary confusion or complete disorientation.
- Denial – It is a conscious or unconscious refusal to accept facts, information, reality, etc., relating to the situation concerned. For e.g., when a person is informed that she is being fired by organization, the initial response may be, Are you serious?
- Anger – The anger is a more active emotional response. People dealing with emotional upset can be angry with themselves, and/or with others, especially those close to them. There is a difference between feeling anger and acting out in anger.
- Bargaining – In this stage the person may be cooperative and may try to make deals to avoid change. People facing less serious trauma can bargain or seek to negotiate a compromise. For e.g., the person who is fired from the organization may promise the management that she will take a cut in pay to avoid being let go.
- Depression – It is also referred to as preparatory grieving. This stage occurs when there is an overwhelming sense of the loss of the status escape. It's a sort of acceptance with emotional attachment and also it shows that the person has at least begun to accept the reality.

- Acceptance – This stage varies according to the person's situation, in this stage a person comes to grips with the change. Acceptance is an important part of ending the status escape and getting on with a new state.

6.3 THE CHANGE MANAGEMENT PLAN

Change Management doesn't need to be "just another thing on your project management checklist." Instead, use the change management methodology to guide how you deal with change in your projects. Often, just having a set of rules by which you and all involved team members and stakeholders can follow makes it easier for you to deal with the change that will inevitably crop up in your projects. This way, you can focus more energy on planning and monitoring and less energy on fighting fires.

Once the change management plan has been developed it should be integrated with the project plan and can be included at any point after start up. Figure 7.3 provides a framework for developing a change management plan.

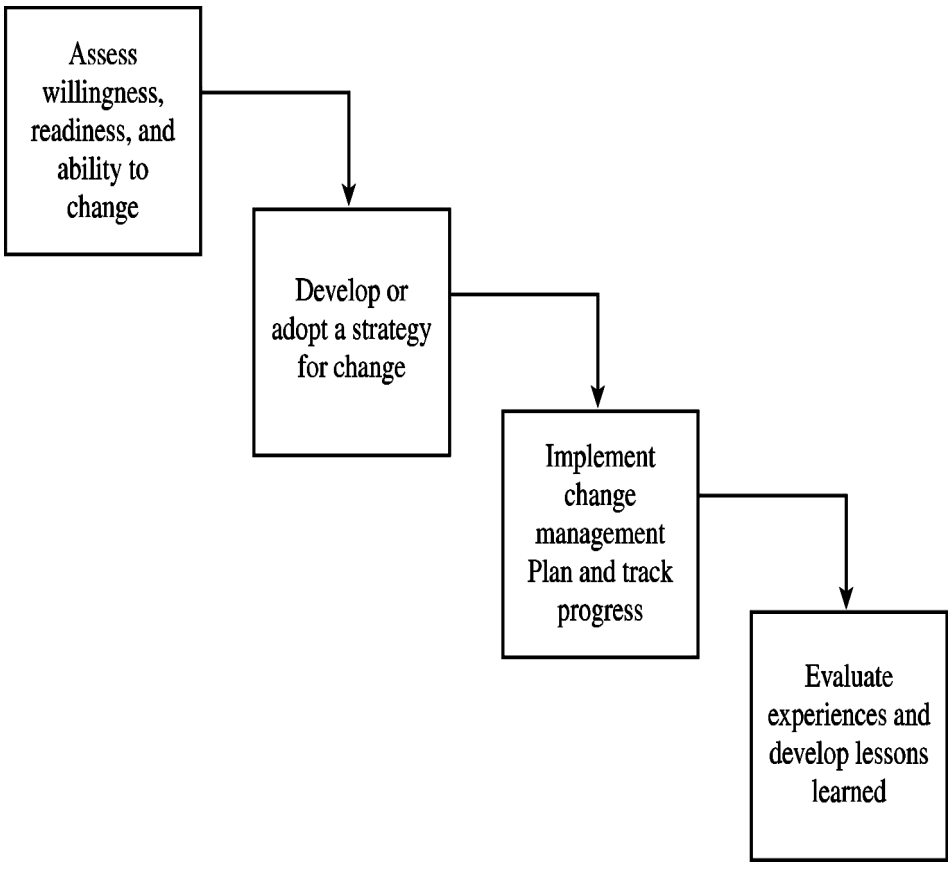


Figure 6.3

Ready, Willing, and Able to Change:

This is the first step for developing a change management plan that is to assess the organization's readiness, willingness and ability to change. This assessment defines several roles involved in a change management – the sponsor, change agents, change advocate and targets.

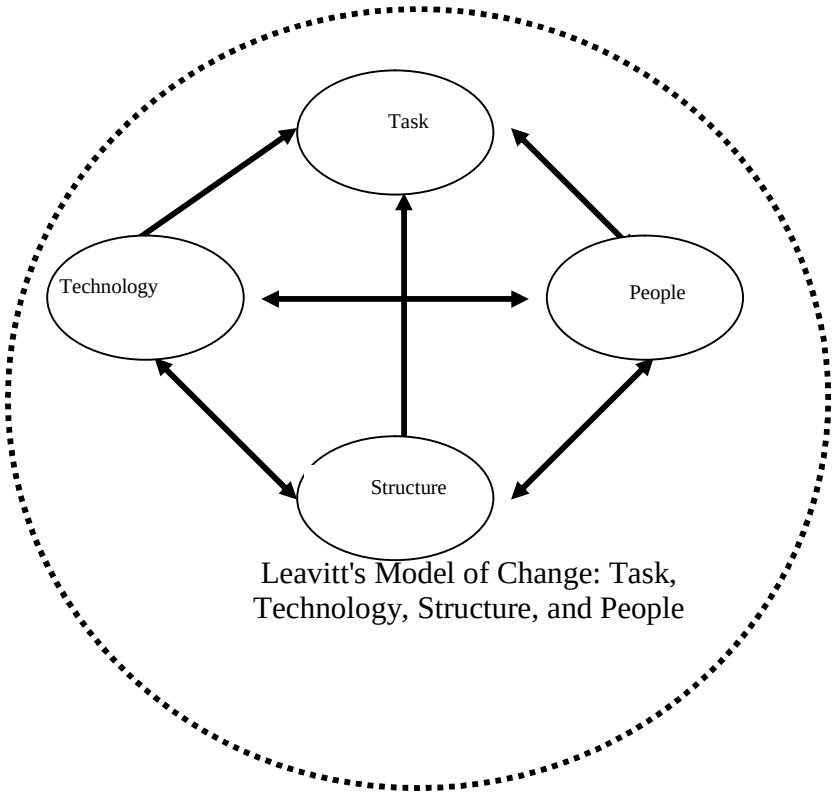
Sponsor A sponsor is the individual (or group) with the power to determine that change will occur. This person or group of project sponsor, an initiating sponsor has the authority to make resources available and support the project, then this person may handoff the project to a sustaining sponsor. A major portion of the organization's ability and willingness to support the change rests with the sponsor's commitment to the project. If the project fails because the organization cannot adapt to the change, the project's envisioned value to the organization is lost and the sponsor's credibility is reduced.

Change Agents An agent is the individual (or group) responsible for seeing that a previously determined change occurs to achieve project's goals. They design and implement or help to implement the change. Change agents report to the sponsor and must diagnose problems, plan to deal with these issues. The ability to sustain the change with the IT projects rests with the change agents.

Change Advocate An advocate is the individual (or group) who want to achieve a change but lacks the power to sanction it and require support from the appropriate sponsor who can approve the change. Any individual within an organization who has a good idea and the ability to communicate it can be a change advocate.

Targets A target is the individual or group that must change. They may be the users of the new system or those will be directly involved with final product of the project. The dynamics associated with the targets of change become most critical for supporting and carrying out the change effort.

Leavitt suggests that the effectiveness of any change program can only be achieved through a balance of four organizational subsystems: technology, structure, tasks and people. The model shown in Figure 7.4 illustrates how all four of these items are interrelated.



Leavitt's Model of Change: Task, Technology, Structure, and People

Structure - levels of hierarchy, spans of authority, centralization.

Technology - complexity, degree of employee usage, operator control & responsibility.

People - values, beliefs, attitudes, motives, drives, competencies.

Task - job design, repetitiveness, physical & cognitive demands, autonomy & discretion.

Change at any one point will impact some or all of the others. Thus, a changed task will necessarily affect the people involved in it, the structure in which they work, and the technology that they use. Failure to manage these interdependencies at critical times of change can create problems.

As a result of the planned change, people will go through a variety of emotions. So it is important that a boundary be defined in a way that allows the change to happen as planned, but also allows individual “to take something with them” by giving something familiar to hold on to so as to ease the transition. This allows the past to be remembered with reverence and can also mark the end and the new beginning.

People become confused and disoriented when the rules for success change are no longer clearly defined. Lets say that you have been working at a company for several years. Over that time, you have become part of that culture and you know that, in our company promotions is based on seniority and the layoff's will begin with the employees with the least seniority. What if the company you work for has been acquired by some other organization? The acquiring company has decided to make a few changes and start downsizing the workforce in your company and only top performance will be invited to stay. The rules for success have changed.

6.3.1 Develop a Strategy for Change:

The developing a strategy for change is the step after the change is assessed. Davidson provides four approaches to change management.

Rational-Empirical Approach

The Rational-Empirical strategy suggests that most people are rational, so they will accept change that will benefit the overall organization. People are rational beings and will follow their self-interest once it is revealed to them.

It is important that the individuals affected by the change be provided with consistent and timely information. Mixed messages can lead to confusion and suspicion. When people are not given enough information, they tend to seek information from other sources; these messages might be rely on suggestions, misinformation and opinions. Successful change is based on the communication of information and the proffering of incentives.

The change management plan based on this strategy should provide each individual with the purpose, a picture and a part to play. Often individuals within organization have a narrow view of their job and its relationship to the rest of the organization. It may be useful to provide people with a chance to experience the problem or opportunity first-hand. A picture provides a vision in the individual's mind as to how the organization will look or operate in the future. If done effectively, this procedure can help the individual buy into the proposed change. A part can be effective in helping the individual become involved in the proposed change. It is important for the individual to understand and visualize the part she will play once the change is instituted.

Normative-Reeducation Approach:

The normative-Reeducation strategy suggests that people are social beings and will adhere to cultural norms and values. Successful change is based on redefining and reinterpreting existing norms and values, and developing commitments to new ones.

Change strategy here focuses squarely on culture – what people believe about their world, their work and themselves and the ways in which people behave so as to be consistent with these beliefs. Ordinarily, culture doesn't change quickly and certainly not overnight. This, then, is not the strategy of choice in a turnaround situation on short deadlines. Moreover, an organization's culture is as much in the grip of the informal organization as it is the formal organization. For this reason, this strategy works only when the relationships between the formal and informal organizations are at least cordial and hopefully harmonious.

This approach can be very difficult and time-consuming because the change agents and sponsor must study the existing values and beliefs of a group. It requires unfreezing the current norms so that change can take place so that a new set of norms can be refrozen to solidify the acceptance of the new way of doing things by the group. Some key principles include:

- Capacity for change is directly related to a person's participation in a group.
- Effective change requires changing something not only about the individual's values and belief's, but also the values and beliefs that make up the existing group's culture.
- Bias and prejudice towards guarding one's closely held belief and values diminishes one's ability to think rationally.

Power-Coercive Approach:

The Power-Coercive strategy attempts to gain compliance from the change targets through the exercise of power, authority, rewards or threat for non-conformance.

Two major factors influencing the choice of this strategy are time and the seriousness of the threat faced. If the organization sits astride the fabled "burning platform," the threat is grave and the time for action is limited. The metaphor of a burning platform is useful but only if all concerned can in fact see that the platform is on fire. This is rarely the case in an organization. Few companies are filled with people who understand the way the business works and fewer people still appreciate the threats it faces or the opportunities it encounters.

As Davidson observes, People's dependency on an organization dictates how effective the power-coercive approach and use of sanctions can be. If the people are highly dependent on the organization; live paycheck to paycheck; have few job alternatives; are not financially, mentally prepared to walk, you are on relatively safe ground using power-coercive approach judiciously (90-91)

The objective is to change the behavior of the targets so that their new behavior supports the change effort. Davidson points out that sanctions should be imposed on an individual level and should focus on what an individual values and what they dread losing – a bonus, a paycheck or a position within the organization. A change agent or sponsor can lose credibility, if they issue a warning or sanction that they do not fully intend to carry out.

Environmental-Adaptive Approach:

People oppose loss and disruption but they adapt readily to new circumstances. Change is based on building a new organization and gradually transferring people from the old one to the new one.

Following this approach, the change agent attempts to make the change permanently by abolishing the old ways and instituting the new structure as soon as possible. A much less drastic example would be upgrading everyone's word processing software over the weekend so that when everyone returned to work on Monday, they would have no choice but using the new software package.

Time frames are not a factor. This strategy can work under short time frames or longer ones. However, under short time frames, a key issue will be that of managing what could be explosive growth in the new organization and, if it is not adequately seeded with new folks, the rapid influx of people from the old culture can infuse the new organization with the old culture.

Although this approach may be effective in certain situations, it is important that the targets of change assimilate the change as quickly as possible in order to adapt to the change as soon as possible. Some ways may include helping the targets of change see the benefits and showing them how the new way is similar to their old one.

A single strategy however, may not be effective in every situation. A more useful approach may be combining the different strategies, depending on the impact of the change and the organization.

6.3.2 Implement the Change Management Plan and Track Progress:

Once the strategies for the change management plan have been defined, the next step entails implementing the plan and tracking its progress. Although tracking progress should be integrated into the overall project plan using the tools, such as Gantt chart, PERT chart and so on.

The effective line of communication is the critical issue for ensuring that the change takes place as planned. The project team and project sponsor create and open channels of communication. It is important especially when delivering certain type of news. For example a richer media, such as face-to-face communication, is generally preferable when delivering important news.

The open channels of communication should be both ways. The project team and sponsor must communicate effectively with the various groups within the organization affected by the change, and in turn these groups must be able to communicate effectively with the project team and sponsor. Web sites, e-mails, memos and newsletters can be mediums for effective communication.

Evaluate Experience and Develop Lessons Learned:

As the project team carries out the change management plan, they will learn from their experiences. These experiences should be documented and made available to other team members and other projects. At the end of the project, the overall success of the change management plan is evaluated.

6.4 DEALING WITH RESISTANCE AND CONFLICT

Resistance and conflict are a natural part of change. In this section, we will look at the nature of resistance and conflict and several approaches for dealing with these.

Resistance:

With change, comes resistance. Regardless of how clear and concise your change management plan is, you will find varying levels of resistance and people questioning the motive for change.

Resistance to change comes for many valid reasons. For example, someone may resist for genuine interest – someone may

resist an IS because the response time is too slow or because it does not provide the feature that were specified as part of the requirements. Resistance like this is healthy and should be encouraged early in the change initiative. On the other hand, resistance due to cultural or behavioral reasons is harder to rationalize.

Kotter and Schlesinger set out the following six change approaches to deal with resistance to change:

- Education and Communication - Where there is a lack of information or inaccurate information and analysis. One of the best ways to overcome resistance to change is to educate people about the change effort beforehand.
- Participation and Involvement - Where the initiators do not have all the information they need to design the change and where others have considerable power to resist. When employees are involved in the change effort they are more likely to buy into change rather than resist it.
- Facilitation and Support - Where people are resisting change due to adjustment problems. Managers can head-off potential resistance by being supportive of employees during difficult times.
- Negotiation and Agreement - Where someone or some group may lose out in a change and where that individual or group has considerable power to resist. Managers can combat resistance by offering incentives to employees not to resist change. This can be done by allowing change resistors can be offered incentives to leave the company through early buyouts or retirements in order to avoid having to experience the change effort.
- Manipulation and Co-option - Where other tactics will not work or are too expensive. Kotter and Schlesinger suggest that an effective manipulation technique is to co-opt with resisters.
- Explicit and Implicit Coercion - Where speed is essential and to be used only as last resort. Managers can explicitly or implicitly force employees into accepting change by making clear that resisting to change can lead to losing jobs, firing, transferring or not promoting employees.

Conflict:

Closely associated with resistance is the concept of conflict. Conflict arise when people perceive that their interests and values are challenged or not being met. It is important to identify potential conflicts as early as possible so that the conflict can be addressed.

There are 3 different views of conflict, these are

(i) Traditional view – According to this conflict leads to poor performance, aggression and devastation if left escalate. Therefore, it is important to manage conflict by suppressing it before it occurs as soon as possible.

(ii) Contemporary view – This view suggests that conflict is inevitable and natural. Depending on how conflict is handled, conflict can be either positive or negative. The positive conflict should be encouraged and negative conflict in check.

(iii) Interactionist View – Interactionist view holds suggests that conflict is an important and necessary ingredient for performance. The project manager should occasionally stir the pot in order to encourage conflict to an appropriate level so that people engage in positive conflict.

For the project manager and project team, the seeds of resistance can easily lead to negative conflicts. Blake and Mouton (1964) and Verma (1998) describe five approaches for dealing with conflict.

- Avoidance – Avoiding conflict focuses on retreating, withdrawing conflict. It may be appropriate when you can't win, the stakes are low, or gaining time is important. Avoidance may not be useful when the immediate, successful resolution of an issue is required.
- Accommodation – This approach is useful when trying to reach an overall goal, when the goal is important than the personal interests of the parties involved.
- Forcing – This approach is useful when a person uses his or her dominant authority to resolve the conflict. Forcing results in a win-lose situation in which one gains at the other's expense.
- Compromise – It includes both forcing and accommodation approaches, compromising is bargaining. In this case, no party actually wins and none actually loses.
- Collaboration – This approach requires confronting and attempting to solve the problem by incorporating different ideas, viewpoints and perspectives.

Collaboration is the best approach when the risks and benefits are high.

Each conflict situation is unique and the choice of an approach to resolve conflict depends on:

- Type of conflict and its relative importance to the project.
- Time pressure to resolve the conflict.
- Position of power or authority of the parties involved.
- Whether the emphasis is on maintaining the goals or objectives of the project or maintaining relationships.

6.4.1 Polarity Management:

The project manager or project team is faced with a conflict situation that appears to have no solution. When two sides (i.e. advocates of change and those resisting change) end up in a polarity where each side can only see the upsides or advantages of their pole and the downsides or disadvantages of the other. For many, this is difficult dilemma that can create even more resistance and conflict.

According to Barry Johnson, the problem is that we often frame a problem as something that can be solved by choosing one side over another. Crusading is the activity people engage in when they want to make things better by moving away from the downside of one pole to the upside of the opposite pole. Tradition-Bearing is the activity people engage in to defend the upside of the status quo and to point out the necessity of avoiding the downside of the opposite point of view. Crusaders are those who want to change the status quo and are supporters of change. They contribute by identifying the downsides of the current pole and provide the energy to move away from the current pole. Tradition Bearers - are at the opposite end of the pole and wish to preserve the best of the past and present and help identify things that should be preserved. Using a tool Polarity mapping, we can see the upsides and downsides that each side is advocating. Figure **6.5** provides an example of a polarity map for implementing a new word processing application.

In this figure the upper left quadrant is the Traditional Brearers' view of the upsides for keeping the current word processing software package are listed, while the Crusaders' view of the upsides for upgrading to a new word processing package are listed in the upper right quadrant.

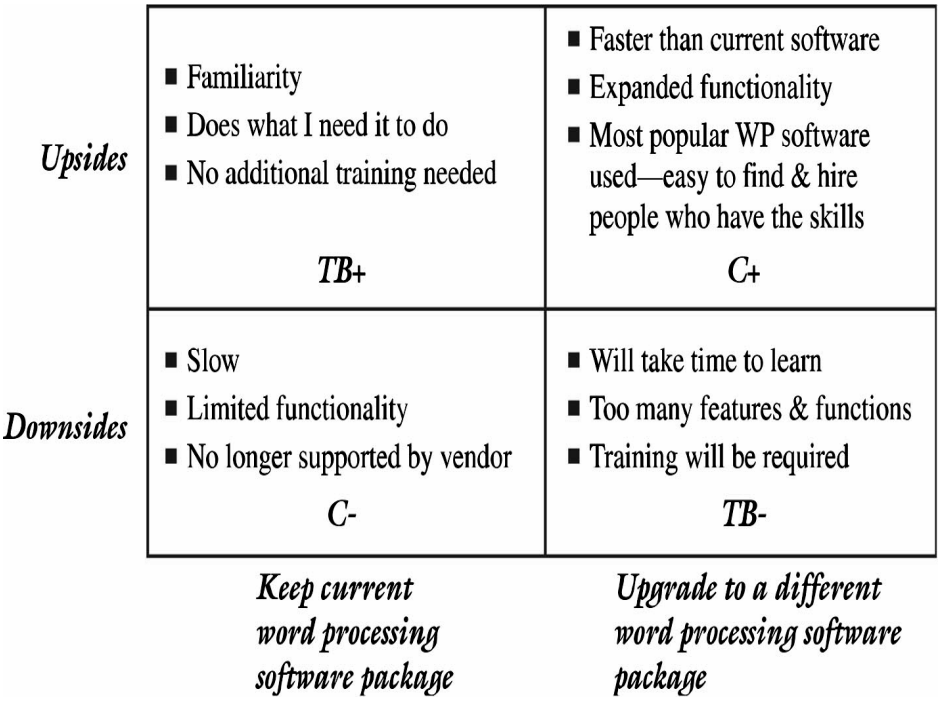


Figure 6.5

The conflicts occur in the lower two quadrants, for example people who advocates upgrading to a new word processing package may focus on the upsides of the upper right quadrant (C+). Similarly those in favor of maintaining the status quo will focus on the quadrants TB+ and TB-. Often the upside of one quadrant (i.e., familiarity) becomes a downside in the opposite quadrant (i.e., will take time to learn). Subsequently resistance and conflict escalate unless both sides see the entire picture.

Johnson suggests that before using polarity management, both sides should:

- Clarify what you value and what you do not want to lose.
- Let the other side know that you are aware of the downsides of the pole.
- Assure the other side that you want to maintain the upsides of their pole.

Polarity mapping helps people “get away” from seeing their current initiative as being the only “solution to the problem” and not a case of choosing one idea over another.

The key to polarity management is recognizing that both polarities must be managed simultaneously. In the previous example of word processing, if upgrading to a new word processing package both groups may try to come up with training plan flexible enough so that both groups get what they want.

6.5 SUMMARY

In this chapter, we saw the critical component of business, can be achieved successfully using the ADKAR procedure. We looked at change as a process. Kurt Lewin introduced the concept of Force Field Analysis, in which we try to understand the driving and resisting forces that push and repel the change. Lewis model of change helps us to understand that we must unfreeze the current state until the desired new state is reached.

In this chapter we understood how to develop effects change management plan. The change management should focus on adopting a strategy to support the change. The plan should center on implementing the plan and tracking its progress. The polarity management was introduced as a tool that provides a collaborative approach for dealing with conflict and resistance.

Sample Questions:

1. Define change management. Describe the stages of Lewin's model for change.
For solution Refer 7.2.2

2. Describe any two approaches to develop a strategy for change.
For Solution Refer 7.3.1

3. In your own words, describe polarity management.
Refer 7.4.1

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7

PROJECT IMPLEMENTATION

Unit Structure:

7.0 OBJECTIVES

After reading this chapter, you will be able to:

- Describe the approaches to information system implementation and installation. (i) direct cutover (ii) parallel (iii) pilot (iv) phased
- Describe the process associated with project closure to ensure that the project is closed in an orderly manner.
- Identify the different types of project evaluations.

7.1 INTRODUCTION

In this last chapter we will focus on implementation of a project, closure and the project review or evaluation. The Project implementation focuses on installing or delivering the project's major deliverables in the organization. Implementation is the stage where all the planned activities are put into action. Examples for

information system project implementation would be the installation of new databases and application programs, and the adoption of new manual procedures etc.,

In general, implementing the product of an IT project can follow one of the four approaches. These approaches are direct cutover, parallel, phased or pilot. Each approach has unique advantages and disadvantages that make a particular approach appropriate for a given situation.

As you know a project has a definite beginning and a definite end. Once the project is implemented, the project manager and his team must prepare for closing the project. A project is properly closed for two reasons. Firstly, there is a tendency for projects to drift on and become, or develop into, other projects. Secondly, it is important to ensure that the work of the project team is acknowledged and that the lessons to be learned from the project are formally investigated and recorded for use on the next project.

Once the project is closed, the project manager should evaluate each project team member individually in order to provide feedback to the individual about his performance on the project. In addition, the project should be reviewed by an impartial outside party. An audit or outside review can provide valuable insight on how well the project was managed and on how well the project members functioned as a team.

The project's overall goal was defined as the MOV, or Measurable Organizational Value. It is clearly defined and agreed upon in the early stages of the project that whether the project is successful, as defined by its MOV.

7.2 PROJECT IMPLEMENTATION

After developing the project, the IS is transferred successfully from the development and test environment to the operational environment of the customer. Choosing an inappropriate implementation approach can negatively impact the project's remaining schedule and budget. In general, the project team can take one of three approaches for implementing the IS. These approaches are (i) direct cutover (ii) parallel (iii) pilot and (iv) phased

7.2.1 Direct Cutover:

The direct cutover approach, as illustrated in figure 7.1 produces the changeover from old system to the new system instantly.This approach can be effective when quick delivery of the

new system is critical and this approach may also be appropriate when the system's failure will not have a major impact on the organization i.e., the system is not mission critical.

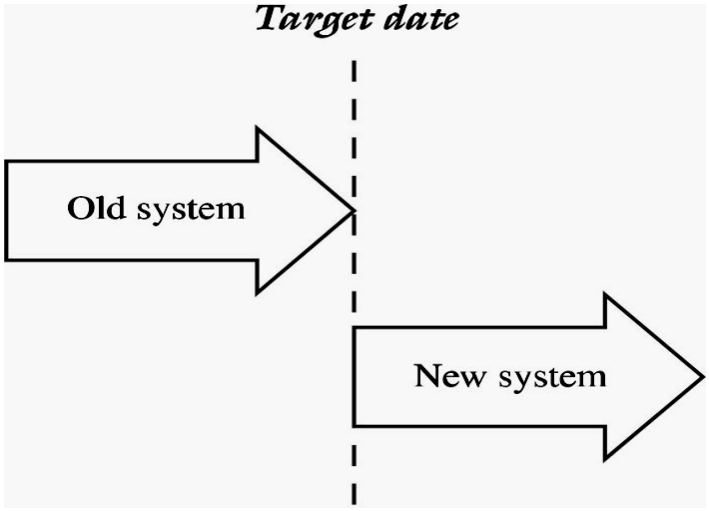

Figure 7.1

Companies often choose the direct cutover approach for implementing commercial software package. Although there are some advantages to using the approach, there are also a number of risks involved that generally make this the least favored approach. Using this approach you may think as walking a tightrope without a safety net. You may get from one end of the tightrope to other quickly, but not without a great deal of risk. Subsequently, there is no going back to the old system to the new system. As a result, the organization could experience major delays, lost revenues and missed deadlines. The pressure of assuring that everything is right can create a great deal of stress for the project team.

7.2.2 Parallel:

Parallel approach as shown in figure 7.2 is the method in which both the new system and the old system will operate at the same time, for a specified period of time, in order to check the new system for complexities.

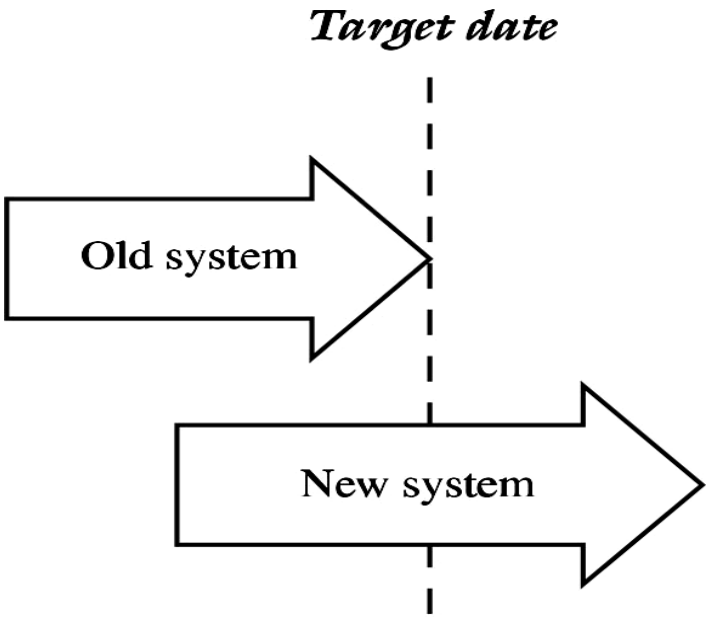

Figure 7.2

Data is input in both system and the results are verified. This approach is impractical if the systems are dissimilar or does not support each other. The cost using this approach is relatively high, because both systems are operating requiring more man power in terms of management. Using this approach provides confidence that the new system is functioning and performing properly before relying on it entirely. It is also impractical to use this approach as the new system and old system technically incompatible.

7.2.3 Pilot:

It is the combination of both direct cutover and parallel approach. The pilot method involves implementing the new system at a selected location like a branch office, one department in a company, etc. – called pilot site, and the old system continues to operate for the entire organization.

Risk and cost, associated in this method are relatively less, because only one location runs the system and the new system is only installed and implemented at pilot sites; reducing the risk of failure. After the new system proves that the system is successfully at the pilot site, it is implementing in the rest of the organization, usually using the direct cutover method.

7.2.4 Phased:

The Phased approach allows implementing the new system in phases or modules or stages in different parts of the organization incrementally as shown in the figure 7.3. E.g., an organization may

implement an accounting information system package by first implementing the general ledger component, then accounts payable etc.

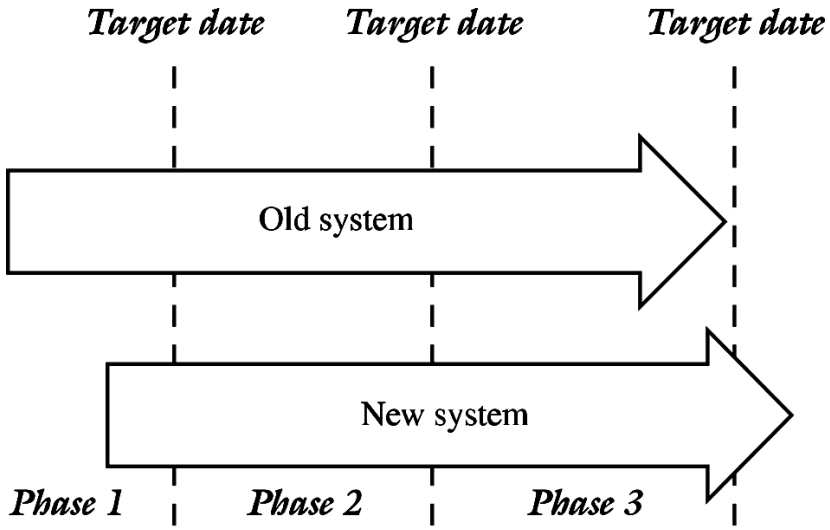

Figure 7.3

This method is one of the least risky because implementation only takes effect in part, incase an error goes wrong with the new system, only that particular affected part is at risk. A phased approach may also allow the project team to learn form its experiences during the initial implementation so that the later implementations run smoothly.

Although the phased approach may take more time than the direct cutover approach, it may be less risky and much manageable. After all the modules have been tested independently it is possible to implement the new system in the organization, which would be error free. Also, overly optimistic target dates or problems experienced during the early phases of implementation may create a chain reaction that pushes back the scheduled dates of the remaining planned implantations.

7.3 ADMINISTRATIVE CLOSURE

Although all projects come to an end, a project can be terminated for any number of reasons. Gray and Larson (2000) define five circumstances for ending a project: normal, premature, perpetual, failed and changed priorities.

- **Normal** – A project that completed as planned. The project scope is achieved within cost, quality and schedule objectives with some modification and variation along the way. The project is transferred to the project sponsor and the

end of the project is marked with a celebration, awards for a good job.

- **Premature** – A project team may be pushed to complete a project early even though the system may not include all of the envisioned features or functionality.

- **Perpetual** – These projects never seem to end. These projects may result from delays or a scope or MOV that was never clearly defined. Then the project sponsor may attempt to add on various features to the system, which results in added time and resources that increase the project schedule and drain the project budget. Attention to defining and agreeing to the project's MOV, the project scope processes, and timely project reviews can reduce the risk of perpetual projects.

- **Failed** – Sometimes projects are just unsuccessful. In general an IT project fails if insufficient attention is paid to the people, processes or technology.

- **Changed Priority –** In some cases, a project may be terminated as a result of a change in priorities. Financial or economic reasons may dictate that resources are no longer available to the project. This change happens when the original importance of the project was misrepresented.

Ideally a project is closed under normal circumstances. Unfortunately, closing a project does not often happen. As J. Davidson Frame (1998) points out, the project manager and team should be prepared to deal with the following realities:

- **Team members are concerned about future jobs.** Often the team members of the project team are borrowed from different departments. Once the project is finished, they will return to their previous jobs. Regardless as the project nears its end, these project team members may begin to wonder what they will do next. For some, there will be rewarding life after the project and for some other looking for the new job. As a result, the project team members may not focus on what has to be done to close the project, and wrapping up the project may be a challenge.

- **Bugs still exist.** Software quality testing may not find all the defects, and certain bugs may not become known until after the system has been implemented. Unless these defects and bugs are promptly addressed and fixed, the project sponsor's satisfaction with the project team and the information system may become an issue.

- **Resources are running out.** Resources and the project schedule are consumed from the project's earliest inception. At the end of the project, both resources and time remaining are usually exhausted. So the project manager may find adequate resources to deal with problems effectively are not available.

- **Documentation attains paramount importance.** The IT projects require system, training and user documentation. Many times, however documentation is put off until the end of the project. As a result, documentation becomes increasingly important at the end of the project and may require more time and resources to complete.

- **Promised delivery dates may not be met.** Most projects experience schedule slippage due to poor project management, implementation risks, and overly optimistic estimates. Any misjudgment concerning what has to be done, what is needed to complete the job and how long will it take will result in a variance between the planned and actual schedule and budget.

- **The players may posses a sense of panic.** The project stakeholders may experience panic as schedule begins to slip and the resources become exhausted. The sponsor may worry that the IS will not be delivered on time and within the budget. As the sense of panic increases, the chances for an orderly closeout grow dim.

A good closeout allows the team to wrap up the project in a neat, logical manner. From an administrative view, this procedure allows for all loose ends to be tied up. From a psychological perspective, it provides all of the project stakeholders with a sense that the project was under control form the beginning through to its end (Frame 1998)

7.3.1 Project Sponsor Acceptance:

The most important requirement for closure under normal circumstances is obtaining the project sponsor's acceptance of the project. Since acceptance depends heavily on the fulfillment of the project's scope, the project manager becomes responsible for demonstrating that all project deliverables have been completed according to the specification.

Rosenau (1998) observes that there are two basic types of project sponsors. Shortsighted sponsors and knowledgeable sponsors. Shortsighted sponsors – view the project as a short-term

buyer-seller relationship in which getting the most for their money is the most important criteria for accepting the project.

Knowledgeable sponsors – they have an important stake in the outcome of the project. They will be actively involved throughout the project in a constructive manner.

Regardless of whether the sponsor is shortsighted or knowledgeable, the project manager and team can improve the likelihood that the project will be accepted if they

(i) Acceptance criteria clearly defined in the early stages of project.
(ii) Completion of all project deliverables and milestones thoroughly documented.

A clearly definition of the project deliverables is an important concern for project scope management. Defining and verifying that the project scope and system requirements are accurate and complete is only one component.

Project milestones ensure that the deliverables are complete. Documenting each deliverables and milestone throughout the project provides confidence to the project sponsor that the project has been completed fully.

7.3.2 The Final Project Report:

The project manager and team should develop a final report and presentation for the project sponsor and other key stakeholders to ensure that the project has been completed as outlined in the business case, project charter and project plan.

The report may be circulated to key stakeholders before the presentation in order to get feedback and to identify any open items that need to be scheduled for completion. Once finalized, the final project report provides a background and history of the project. The report should include:

(i) Project summary
  - Project Description
  - Project MOV
  - Scope, Schedule, Budget and Quality Objectives

(ii) Comparison of Planned versus Actual
  - Original Scope and history of any approved changes
  - Original scheduled deadline versus actual completion date
  - Original budget versus actual cost of completing the project
  - Test plans and test results

(iii) Outstanding Issues
- Itemized list and expected completion
- Any ongoing support required and duration

(iv) Project Documentation List
- Systems Documentation
- User Manuals
- Training Materials
- Maintenance Documentation

7.3.3 The Final Meeting and Presentation:

If the project has been diligent in gaining the confidence of the project sponsor, the final meeting and presentation should be simple, straightforward. Buttrick (2000) suggests that the final meeting is useful for:

- **Communicating that the project is over.** By inviting key stakeholders to the meeting, the project manager is formally announcing that the project is over.

- **Transferring the information system from the project team to the organization.** Although the system may have been implemented and is being used by the organization, the final meeting provides a formal exchange of the project's product from the project team to the organization.

- **Acknowledging contribution.** The meeting provides a forum for the project manager to acknowledge the hard work and contributions of the project team and other key stakeholders.

- **Getting formal signoff.** The meeting can provide a ceremony for the sponsor or client to formally accept the IS by signing off on the project.

7.3.4 Closing the Project:

After the project is accepted by the client, a number of administrative closure processes remain. Administrative closure is a necessity because once the project manager and team are officially released from the current project, getting them to wrap up the last of the details will be difficult. The requirements for administrative closure include:

- Verifying that all deliverables and open items are complete.
- Verifying the project sponsor or customer's formal acceptance of the project.
- Organizing and archiving all project deliverables and documentation.

- Planning for the release of all project resources
- Planning for the evaluation and reviews of the project team members and the project itself
- Closing of all project accounts
- Planning a celebration to mark the end of a project.

7.4 Project Evaluation:

There are many views concerning to a project success. For the team members, it may be gaining valuable experience and for the project manager, it may be leading a project that will be profitable to the firm or a promotion. On the other hand the client may view project success in terms of organizational value received after the project is implemented.

There are four types of project evaluations to be conducted.

(i) an individual review of each team member's performance

(ii) a postmortem review by the project manager and project team

(iii) an audit of the project by an objective and respected outside party and

(iv) an evaluation sometime after the project is implemented to determine whether the project achieved its envisioned MOV.

Individual Performance Review

The project manager should conduct an individual performance review with each project team member. The project manager should focus on the following points:

- **Begin with the individual evaluation his/her performance.** Evaluating someone's performance can be emotional experience. Instead of beginning an evaluation with a critique of the individual's performance, it is usually effective to begin by asking how that person would evaluate her performance. This system creates a useful dialog that provides the individual with more useful feedback.
- **Avoid "why can't you be more like//?**" People are different and should be evaluated as individuals; comparison can have a counter effect. First, the person you praise may not be the shining star. Second, others may become jealous and look for ways to discredit the individual.
- **Focus on specific behaviors, not the individual.** When discussing opportunities for improvement with a person, it is important to focus on specific behavior.

- **Be consistent and fair.** The person conducting the evaluation should be aware of how decisions concerning one person may affect the entire group and be aware of people talk to one another and often compare notes.
- **Reviews should provide a consensus on improving performance.** The purpose of conducting review with each team member is to provide constructive feedback for them. The individual and the evaluator should agree on what areas the individual needs to improve upon and how the organization can support this endeavor.

The meeting can serve to help prepare the individual to move on and accept the psychological fact that the project will end (Gray and Larson 2000).

Postmortem Review:

The postmortem review should be done before the project team is released from the current project. Phillips says. For most projects, the post-mortem review should be done at final acceptance of the project, as soon as possible to the final sign-off. The reasons for this are simple: members of the team are going to move on to other projects; and the experience of working on the project will be fresh in everyone's mind soon after it's done. Exactly what goes into a post-mortem varies greatly from organization to organization.

The value of conducting Postmortem review is to - (i) Learn what went wrong, so you can avoid it in the future and (ii) Learn what worked so that it can transferred to other projects. The focus of this review should include the following:

- *Review the initial project's MOV.* Was the project's MOV clearly defined and agreed upon? Did it change over the course of the project? What is the probability that it will be achieved?
- *Review the project scope, schedule, budget and quality objectives.* How well was the scope defined? How close were the project schedule and cost estimates to the actual deadline and budget of the project? Was the quality objective met?
- *Review each of the project deliverables.* How effective were the business case, the project charter, the project plan? How could these deliverables be improved?
- *Review the various project plans and Project Management Body of Knowledge areas.* The team should review its effectiveness in all the nine Project management body of knowledge areas.

After the investigation is completed, a report should be drafted and that the project manager and the project team can share this with others in the organization. The best practices should be identified and become part of the organization's IT project methodology.

Project Audit:

The individual view and postmortem review provide an important view of the internal working of the project. To provide a more objective view of the project, an audit by an outside party may be good for uncovering problems, issues or opportunities for improvement. An audit means scrutiny, coordination and time is required when the project manager's is often already full. There are concerns about the outcome and its effects on the team and current work as well as careers and advancement. To overcome this apprehension is proper planning and preparation.

As Gray and Larson (2000) suggest, the depth of the audit depends on the organization's size, the importance and size of the project, the risks involved and the problems encountered. The audit may involve the project manager and the project team, as well as the project sponsor and other key project stakeholders. In addition, the third party auditor should:

- Have no direct involvement or interest in project.
- Be respected and viewed as impartial and fair.
- Be willing to listen.
- Present no fear of recrimination from special interests.
- Act in the organization's best interest.

The findings of the project audit should be documented, as well as any lessons learned and best practices.

Evaluating Project Success – The MOV

The MOV – measurable organization value provided the basis for taking on the project and supported many of the decision points throughout the project life cycle. Although the different project stakeholders and players may have different views as to whether the project was a success, it is important to assess the value that the project provides the organization. This review may be conducted by several people from both the project sponsor and the organization or area responsible for carrying out the project. This review should focus on answering the following questions:

- ❖ Did the project achieve its MOV?
- ❖ Was the sponsor/customer satisfied?
- ❖ Was the project managed well?

- Did the project manager and team act in a professional and ethical manner?
- What was done right?
- What can be done better next time?

The evaluation of the project's MOV may be intimidating – it can be the moment of truth as to whether the project was really a success. However, a successful IT project that brings measurable value to an organization provides a foundation for organizational success.

7.5 SUMMARY

In this chapter, you looked four approaches to implementation. Choosing and implementing the correct implementation approach can have a significant impact on the project schedule and budget.

Once the IS has been implemented, the project manager and team must plan for an orderly end to the project. Projects must be properly closed, regardless of whether the project ends successfully or not. Delivery or installation of the IS does not mean that the project's sponsor or customer will accept the project. Therefore closure must focus on providing both proof and confidence that the project team has delivered everything according to the business case, project charter and project plan.

Several processes for closing a project were discussed in this chapter. Before a project is completely terminated, several reviews are conducted. Lessons learned should be documented and best practices identified. The performance reviews and postmortem review should provide preparation for the project audit. The auditor should focus on the specific challenges the project manager and his tem faced and review all the project deliverables.

Sample questions:

1. Describe some of the steps for administrative closure.
   For solution refer 7.3

2. What is implementation? Describe the approaches to implementing an information system.
   For solution refer 7.2

3. What is the difference between a shortsighted and a knowledgeable project sponsor? How can making this distinction help the project manager during project closure?
   For solution refer 7.3.1

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