Project Management Handbook

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Prepared for

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1.1   *Introduction*

The project inception phase is the first phase of the project management life cycle. It generally starts after the project sponsor decides to authorize the project. It can also encompass project pre-selection which involves the consideration of proceeding with a project. The project inception phase is the decision making process which sets the direction for the project, including defining project objectives, approaches, and constraints.

The inception phase is critical to project success. A poor project inception will result in negative impacts on the next three phases: development, implementation and closeout. The most important goals of this phase are to ensure a project manager is selected to lead the project and he or she clearly understands project objectives. The key outcome of the inception phase is the approved project charter describing the purpose and direction of the project.

Typical activities involved in the project inception phase include:

- Appoint project manager.
- Define stakeholders. Identify and analyze the potential stakeholders, consider the project risks and /or benefits for each stakeholder, and make sure the most influential stakeholders are involved in the project management process.
- Establish the scope. Determine the project scope by defining objectives, final deliverables, customers, and their requirements and needs.
- Understand resource requirements. Recognize deadlines, human resource limitations, and cost and quality constraints of the project. Determine project priorities by ranking the scope, schedule and cost of the project, which are referred to as triple constraints. Estimate required project resources, money and time.
- Produce the project charter. Outline project guidelines and constraints in a document called the project charter which is produced and signed by the project manager and project sponsor.

- Obtain approval of the project charter. The project can proceed to the development stage only upon the approval of the project charter.

The following sections discuss eleven critical aspects of the project management process and provide a step-by-step "how-to" guide to help the project manager implement these areas specifically during the project inception phase. Although following this guide does not guarantee project management success, we believe it certainly will improve the project manager's ability to achieve his or her management goals, and the client's objectives.

1.2   *Scope*

1.2.1   Introduction

Scope is what a project commits to delivering. Defining scope is the most important part of a project. Project Managers (PM) need to know what are delivering and what the expectations and desires are from their clients. The scope must capture the same vision that the client has for the end result.

The scope identifies descriptively the work to be complete. The scope is profoundly related to all project deliverables. The scope is what the PM needs to do to complete the overall project get will also include project boundaries and define what will be delivered and what will not. The goal is to know what the project will create.

The purpose of defining scope is to clearly describe and gain agreement on the logical project boundaries. Scopes are used to define what is within the boundaries of the project and what is outside those boundaries. The more aspects of scope that can be identified, the better off a project will be.

There are two different scopes in one single project. There is the "product scope", which is what the end result of the project will be, and there is the "project scope", which describes all the work to generate the product scope.

The product scope is what customers focus on and what they are envisioning. It describes the thing or service that will exist as a result of the project. The project scope includes all of the required work to complete the project deliverable. The project scope and the product scope support one another.

To create scopes, PM need to listen, query, research, and revisit the desired output of the project. PM need to work with their clients to ensure that the project will incorporate and develop the client's vision. The scope of work is to be clear about what needs to be done to satisfy the client. Only then can a scope be defined.

These are some recommendations to help incorporate the vision into the scope of the project:

- Identify the purpose of the project and if possible create simulations, samples, etc.
- Identify the client's needs and influences on the project.
- Obtain clear specifications and requirements.
- Identify resources (cost, time, etc.) and capabilities (skills, knowledge, etc.).
- Differentiate between and identify project constraints and assumptions.
- Identify decision makers and other parties that may influence the project.
- Always, communicate clearly and confirm in writing.

It is not recommended to begin a project until project requirements and their respective criteria for acceptance are established. PM need to emphasize the risks of not knowing the requirements before the commencement of the project. This is to be communicated to all project team members including clients. PM must have clear specifications of what the deliverables should be before commencement of the project. Without a clear vision of the deliverables, the project will not have a clear scope of work. An unclear scope of work only creates confusion and disorganization between parties involved in the project. Projects are likely to fail if the scope of work is not clear.

1.2.2   Scope of Work Documentation

Once you and your client are in agreement about what the project will create, you need to write the Scope(s) of Work. There will be one or probably a couple of scopes of work that are discussed with the client. This will constitute your "product scope". You will also have to create individual and multiple scopes of work for your internal processes. These will constitute the "project scopes". These are related to your WBS and Work Packages.

All these documents need to capture everything that is to be included and excluded from your Scope(s) of Work. These scopes serve as a guide for all current and future project decisions and actions. They also help to remind team members and your client about responsibilities and important deliverables.

- Recommendations when writing your Scope of Work:
- Confirm with your client that the proposed scope of work if what he/she wants.
- Define the objectives and be precise in task objectives.
- Explain in detail definition of requirements.
- Be specific, clear, and concise in your scope writing. Do not hide anything.
- Do not mix tasks, specifications, approvals, and special instruction.
- Refer to contract documents for further details of specifications and requirements.
- Include contingency and back-up plans if possible.

1.2.3   Scope of Work Changes

It is important to set up your management system to be prepared for the occurrence of scope changes. Scope of work changes are not likely to occur during the inception phase of the project. However, at this stage they should be considered uncertainty/changes and will need to be addressed, resolved, and incorporated into the base-line scope of work.

There is nothing wrong with scope changes. Clients typically cannot identify every requirement and feature that will be required for the final deliverable. You will need to assist and cooperate with them in their decisions. You need to know the project better than they do and incorporate changes to achieve their vision. Also, business changes over time, and therefore the requirements of the project may change as well.

If you cannot accommodate a change, the final solution may be less valuable than it should be, or it may in fact, be unusable. Therefore, you want the client to have the ability to make changes during the project when needed. The problem arises when you do not successfully manage changes to the project.

You need to establish a process in place to manage change effectively to keep the project on a successful track. The process should include:

- Identifying the change,

- Debating the value and worthiness of the proposed change,

- Determining the ramifications of the change,

- Determining the risk of accepting the change,

- Determining the impact on the project (cost, schedule, quality, etc.),

- Determining the effect of the change on:

  o Procurement decisions, contracts, and financials.

  o Project team's ability to complete the project on schedule.

  o Project team's morale.

- Present the resulting information to your client for evaluation.

Effective control of the scope of work, schedule, and budget is fundamental to quality projects. Understanding and managing the interrelationship of these three elements largely determine your success. Scope changes increase cost and some times carry time delays. Delays will affect your completion schedule. However, by organizing tasks, managing the level of effort, developing and monitoring a critical-path schedule, and comparing actual cost to planned cost at key milestones, you can still deliver your quality project on time and within budget.

1.3   *Schedule*

1.3.1   Introduction

"Schedule is a conversion of a project action plan into an operating timetable. As such, it serves as the basis for monitoring and controlling project activity and, taken together with the plan and budget, is probably the major tool for project management" (Meredith & Mantel, 2000).

Scheduling sets the time to coordinate execution of your future activities and events. It is the best tool you have to get your project done. You do not know with certainty how long your project will take, but you can control its future by managing the project's internal and external factors that will affect it positively or negatively.

1.3.2   Schedule Initiation

During the inception phase you will need to determine the rough estimate of time for your project deliverables. You will have to provide an estimate of your overall project duration including occurrence of all major milestones.

Start with breaking down your project into a number of tasks that have to be performed. Subsequently, your schedule will be based on a WBS. To prepare your schedule you will need to figure out what the tasks are, how long they will take, what resources they require, and in what order they should be done.

In the inception phase of the project there will be uncertainties that will make the initial schedule difficult to create with accuracy. The goal is to eliminate as many assumptions and uncertainties as possible. The schedule needs to be realistic.

Initially, to create the schedule you will need to:

- Create the activity list from the WBS.
- Sequence the activities in the order in which you think would happen.
- Determine your resources, capabilities, constraints, assumptions, and believes,
- Estimate the time of each activity based on the above,
- Assign your resources to each activity,
- Determine your milestones.
- Discuss, change, and make commitment dates with all parties involved.
- Distribute to all parties and start execution without delay.

Resources are the most important part of the schedule. You will be able to complete the work by employing and using resources. You need to obtain the most qualified and reliable resources. You will need to employ, level, and relocate them wisely. Time and productivity will determine your schedule and how you reach your milestones.

Milestones determine your progress. You will need to identify them and target all your efforts towards the accomplishment of your milestones. Most likely, you will be judged by the capability of reaching milestones successfully.

Meeting your project schedule will help you to stay within your budget. Your schedule is indispensable for planning and controlling the project. Because of that, it is

important that you make an extraordinary effort to make sure your schedule is inclusive of some particular characteristics (See Appendix A of this Chapter).

At the end of your inception phase you will need to have a base line schedule to start your project. This schedule will need to be discussed and agreed upon by all stakeholders in your project. This is the base of your deliverables and you will need to obtain commitment from all parties involved to achieve your estimated completion dates.

1.4   *Cost*

Project Cost Management is a key element in the Inception Phase of a project. It consists of planning and estimating costs. This area is mainly concerned with the cost of resources needed to complete the scheduled activities determined previously in the work breakdown structure.

The first step in carrying out the process is to produce a Cost Management Plan. This plan outlines the 'format and establishes the criteria for planning, structuring, estimating, budgeting, and controlling project costs (PMI 2004).   Cost Management Plan also includes analysis of options and issues to determine the potential effect on the project's budget and operations. It identifies the processes and procedures used to manage costs throughout the project's life. For example, the plan covers who is responsible for tracking expenditures, how variances will be addressed, and the cost tracking and reconciliation between the state and project management cost processes. The plan briefly describes the cost management tool that will be used.

Essentially, the 'cost management planning effort occurs early in project planning and sets the framework for each of the cost management processes, so that performance of the processes will be efficient and coordinated (PMI 2004). Once the plan is complete the project estimate process can begin.

Estimating is the process of determining the expected costs of the project. Estimates are derived from factors such as historical information, organizational policies, environmental factors, project scope, work breakdown structure and the previously discussed cost management plan. During the inception phase of the project very little project specific information is available and, therefore, the estimate is not very accurate. The estimated inaccuracy is that the probability of occurrence of undesirable project events is very high during the early stages of the project. There are overall strategies to

determining the cost of the overall project, as well as individual methods of estimating costs of specific types of activity. Your choice of approach will depend on the time, resources, and historical project data available to you. Two commonly used methods at this stage of the project are parametric and analogous.

Parametric uses mathematical models, rules of thumb, and relationships between cost and measurements of work, such as the cost per line of code, to calculate a cost estimate for a schedule activity resource. Parametric estimating is usually faster and easier to perform than bottom-up methods but it is only accurate if the correct model or relationship is used in the appropriate manner.

Analogous estimating, also known as top-down estimating, uses historical cost data from a similar project or activities to estimate the overall project cost. It is often used where information about the project is limited, especially in the early phases. Analogous estimating is less costly than other methods but it requires expert judgment and true similarity between the current and previous projects to obtain acceptable accuracy.

Many companies try to standardize their estimating procedures by developing an estimating manual. A manual works best for repetitive tasks that can use a previous estimate adjusted by a degree of difficulty factor.   Most estimating manuals provide accuracy limitations by defining the types of estimates (Kerzner 2006). Keep in mind, not all types of companies can use estimating manuals.   Below is an Estimating Manual table of contents:

The outputs of the estimating process include the activity cost estimates, as well as the activity cost estimates supporting detail. Details should include, but are not limited to, description of the schedule activity's project scope of work, documentation of how it was developed, assumptions made constraints made, and an indication of range of possible estimates. Other outputs are any requested changes to be processed for review as well as the updates of the cost management plan.

The inception phase of the Cost Management area is a large factor if a project is a success or failure. Projects that go significantly over budget are often terminated without achieving the project goals.

Summary:

Cost Management Plan outlines the format and establishes the criteria for planning, structuring, estimating, budgeting, and controlling project.

Largely concerned with the cost of resources needed to complete the scheduled activities determined previously in the work breakdown structure.

1.5   *Quality*

The inception phase calls for plans to be in place to define standards, auditing and monitoring project results on a continuous basis. The PMBOK recommends the approach that project managers, when implementing or administering Project Quality Management (PQM) could be compatible with that of the International Organization for Standardization (ISO). The uses of proprietary and non-proprietary approaches are recommended as well i.e. Six-Sigma and Continuous improvement.

Quality Management: Is a method for ensuring that all activities necessary to design, develop and implement a production or service are effective and efficient with respect to the system and its performance. (Wikopedia, 2006) In this section, we will focus on the inception phase of quality management.

1.5.1   Meeting Customer Requirements

One thing is clear, when implementing Project Quality Management (PQM) the ultimate guide to quality processes is to "always strive to see quality through the eyes of the customer." (Ward, 1998) "Being sensitive to customer requirements," goes beyond merely meeting specifications." (Ward, 1998) In the inception phase it is important to evaluate quality procedures and prepare to train project personnel on the specific standards that the project is expected to operate under.

Depending on the project, getting the customer to clearly articulate the requirements can be very challenging. As the project manager, it is important to understand what your limitations are and the limitations of the team assigned to work on the project. Often, during the requirements definition phase, the project team is not

familiar with the customer's business purpose for the project and totally depends on the customer to define what they want from the project.

As the project manager, you are ultimately responsible for the successful delivery of the project, whether or not the customer defines upfront the requirements. Your ability to probe; as it relates to the clients project, will significantly improve the chances of meeting customer requirements. We are not saying to promise the Moon, but build a system that facilitates high quality standards.

1.5.2   The Role of Management

The quality policies specific to the project should coincide with the policies practiced by management. The communication of Project Quality Management (PQM) should be thoroughly done during the inception phase. For example, clear examination of any customer documentation and terms, a review of work plans related to "volume and work justifiability" (Big Huntress, 2006) and review any security and safety requirements. "This phase involves maximal cooperation with the customer whom we take as a possible expert." (Big Huntress, 2006) Most importantly, the application of PQM should follow a model where continuous improvement can be achieved. Not all organizations have PQM in place. An assessment to the organizations maturity should be done in order to engage management appropriately, as it pertains to, quality management. (See Appendix B on Attributes of different maturity levels)

Typically, when one thinks of quality, it is falsely construed as primarily being an inspection process. By thinking that the process is primarily for inspection, the cost to repair mistakes can lead to significant increases and missed project requirement targets. By incorporating quality standards at the product level, it enables the project to be aligned with the requirements of the customer and further, it brings mistakes to a minimum. Quality management in a nutshell is a "system of prevention" (Ward, 1998) as stated in the quote below.

> "Quality guru Philip Crosby said that quality improvement is a system of prevention. We must do the job right the first time and every time. The way we accomplish this is to focus on continuous improvement of processes through simplification and reduction of variability. Processes must be stable, repeatable, visible and measurable. We cannot control what we can't measure." (Ward, 1998)

> ***Inception – Quality Nuggets***
>
> ***Consider the "performance criteria" (McGannon, 2005) that your product or service must meet to control project quality.***
>
> ***Investigate whether there are any regulatory requirements or standards that may have an impact on the project.***
>
> ***Train/review quality management with project members and stakeholders to the project.***

1.6   *Teamwork*

1.6.1   Introduction

Teamwork during the inception phase is critical to overall project success. Many projects fail due to lack of planning during this phase. Teamwork is not only for the project team; it is integrated with the client, project sponsor, management and end-user. This is a time when collaboration should be at its peak and the goal for meeting overall project objectives should be a priority. Team effectiveness shares certain characteristics that define how a team should function. Some of those characteristics are an "informative and comfortable environment, participative discussion, attentive listening, consensus decision making and freely expressed ideas." (Wyrick, Pinkus, & Caenepeel, 2003) These characteristics are essential for a team's work to translate into project success.

Organizations operate under three types: Functional, Matrix and Projectized (see Appendix C for description). It is important to identify the structure that your organization operates under. It will dramatically effect you project plan and resource potential resource availability.

1.6.2   Management Role

Management above all plays an integral role in the development of teamwork throughout the organization. Their commitment to collaboration and teambuilding sets the tone to give the project manager the credibility to foster cohesive and successful teams. The management usually plays the role as the project sponsor. They assist with the funding of the project, clarify scope issues and provide overall backing to the project.

1.6.3   Project Manager Role

The project team's responsibility ultimately falls on the project manager. The PM once the project has been approved is responsible for "ensuring that the human resources selected will be able to achieve the project requirements." (Wyrick, Pinkus, Caenepeel, 2003) The PM interviews and handles the selection process of the team. The PM negotiates with resources throughout the organization in order to achieve project objectives. The PM would look at the resource breakdown structure of the organization and review which resources are available for the project and decide/recommend whether the resources would have to be acquired outside of the organization.

As the PM there are basic principles that must be communicated for effective team dynamics. The PM must be able to communicate the work that they are responsible for and the work that they assign to team members. The PM defines roles and how they relate to each other on the project. If roles are not well defined team members may feel that their territories are being infringed by other team members which may lead to "unnecessary conflicts that undermine teamwork." (MacCoby, 2003)

The PM should communicate and facilitate communication often. The PM is the leader of the project and team members look to him/her to create an atmosphere that trust can flourish. Being able to receive constructive and logical criticism from those who are doing the work is necessary for project success through all phases of the project.

1.6.4   Large Teams

Kerzner (2006) suggests three major questions should be answered when preparing to staff large and complex engineering projects. These can be adopted for any project. They are:

What people resources are required?

Where will the people come from?

What type of project organizational structure will be best?

The requirements will come from the work packages and critical path (priorities). The project manager can use several formats to document roles and responsibilities needed by the team.

If the organization does not possess the staff in-house, then the project manager needs to look outside the company to acquire new staff. Organizational forms will differ

in response to projects. Increasingly, organizations are using virtual teams. Tips specific to building virtual teams are listed in Appendix D.

> ***Teamwork Nuggets***
>
> ***When establishing the team watch out for "extreme dependence on specific individuals." (McGannon, 2005)***
>
> ***Review if training of team members would be necessary for the project or just a minor overview of project management methodology.***
>
> ***Investigate/review staffing management plan with Human Resources***
>
> ***Review resource breakdown structure and organizational breakdown structure to identify who will be recruited to the project.***
>
> ***Identify "internal reporting relationships" with potential team members in order to negotiate availability to the project.***

1.7   *Communications*

1.7.1   Introduction

One of the most critical roles of the project manager is that of the communicator. Communications has long been one of the greatest challenges facing managers. As 21st century managers strive to succeed in the "information age", effective communications is as important as ever. For example, communications transcends every aspect of business operations. It is continuous and comes in all shapes and sizes in today's business world (e.g. phone, e-mail, voice mail, meetings, one-on-one discussions, etc.). Along the way, any number of things can go wrong such as, misinterpretation, selective listening, filtering, overload, etc., resulting in ineffective or even debilitating communications, and ultimately leading to sub-optimal performance (Ivancevich, Konopaske, & Matteson, 2005).

As challenging as communications may appear to the "normal" supervisor, for the project manager who generally speaking, has a myriad of communication responsibilities including to the client, the project team, senior management, and outside interested parties, the task can seem monumental. This chapter of the project management

handbook is designed to help get the project manager off on the right "communications foot" during the project inception phase. Project managers who communicate successfully with the "greater project team" will increase their ability to optimally achieve project objectives by maximizing awareness of project information, status, requirements, etc. which in turn will minimize conflict.

1.7.2   The Communications Process

Project communications focuses on generation, collection, sharing, and storage of information necessary to achieve project objectives and meet project stakeholder information requirements. However, before examining the communication requirements for successful project management, it is first beneficial to understand how the communication process works. An overview of the communications process, a summary of communications pitfalls, and helpful hints to overcome barriers to communication that the project manager can employ in all phases of project management, are provided in Appendix E.

1.7.3   Project Communications

Having discussed the communications process and highlighted some general techniques to improve the effectiveness and efficiency of the process (see Appendix E); we will now examine the communications specifically required during the inception phase of a project. The first *formal* step in the project communications process is *communications planning*, which involves determining the information and communications needs of the project stakeholders (PMI, 2004). We will briefly discuss communications planning momentarily, however, prior to the communications planning process, there are a couple of critical project milestones early in the inception phase in which success depends upon the project manager being an effective communicator:

The Project Proposal – Typically, projects are selected by companies based on the information contained in the project proposal and how well the project meets the company's selection criteria. In some cases the project manager assists in proposal development, however, in most cases the project manager is identified after a project has been selected. In either case, the project proposal is a key form of communication that can be extremely helpful to the project manager. If the project manager is involved in

drafting the proposal, he or she should be familiar with the company's desired proposal format and content requirements, and ensure the proposal links the project objectives to the company's strategic goals and published selection criteria. If the project manager is not involved in the generation of the proposal, he or she should become familiar with the document prior to meeting with the project sponsor as it can often provide insight as to the benefit of the project, why it was selected, and the sponsor's expectations for success.

The Project Sponsor Meeting – In most cases the first task for the project manager is to meet with senior management (typically the project sponsor) to ensure a complete understanding of why the project was selected and the project's scope and objectives. Considering that senior management is often extremely busy, the project manager must use this limited time wisely, asking the "right" questions to ensure he/she understands senior management expectations and any ancillary goals of the project (Mantel, Meredith, Shafer, & Sutton, 2001).

The Project Launch Meeting – Typically, the project planning process, and thus the communications planning process, is kicked off with the project launch meeting. The meeting serves as an outstanding opportunity for the project manager to commence the planning process as all key players in the project are usually present. The project manager typically chairs the launch meeting with attendees including managers from the functional disciplines that will be involved in the project, certain highly specialized technical experts if required, and at least one representative from senior management (usually the project sponsor).

To best convey the firm's commitment to a project, senior management should introduce the project to the group, discuss the benefits to the organization, and highlight any important milestone/completion dates if known (Mantel et al., 2001). The meeting should then be turned over to the project manager to facilitate group discussion concerning the project. During this discussion, it is not necessary to come up with a preliminary plan but rather the focus should be on developing a general understanding of the functional requirements. The end goals of the project launch meeting should be (Mantel et al., 2001):

- The project scope is understood by all involved parties, and

- The contributing functional managers understand their roles and have agreed to develop an initial plan. *To ensure the communications planning process is conducted thoroughly, the project manager must make clear that the functional manager's plans include any communications requirements, including frequency and content of reports, schedules, status updates, etc.*

Communications Planning – As functional managers begin to develop initial plans that include communications requirements, the project manager has, at least informally, commenced the communications planning process. The end product of the communications planning process is a project communications plan, that is a part of the overall project management plan and details the how, what, where, and why of project stakeholder communications requirements. Communications planning will be discussed in detail in the Development Chapter of this Handbook as this largely takes place during the planning or development phase of the project.

1.7.4   Communications Management – An Iterative Process

Finally, as with overall project planning and management, communications planning and management are iterative processes. As the project progresses from the inception phase to development, implementation, and finally to close-out, the project manager must review his or her communications management tools and techniques and make adjustments accordingly. For example, if during project implementation the client feels they are not receiving adequate status reports, the project manager must work to accommodate the client's needs by adjusting the status report content and/or frequency.

The project manager should always strive to conduct two-way communications to enable feedback from the receiver to help ensure the message is received accurately.

Critical communications venues during the inception phase include the project proposal, sponsor meeting, and project launch meeting.

During the inception phase the project manager should begin formulating a communications planning strategy that will ultimately lead to the development of the communications plan.

1.8   *Risk*

1.8.1   Introduction

Risk is exposure to the consequence of uncertainty. It has two elements: the likelihood or probability of something happening, and the consequences or impact if it does (Copper, Grey, Raymond and Walker, 2005).

Managing risk is an integrated part of good management, and fundamental to achieving good business and project outcomes. Project risk management includes the process concerned with conducting risk management planning, identification, analysis, response, and monitoring and control on a project (PMI, 2004). The risk management process applies across all project phases, defined by the PMBOK as: initiation, planning, executing, controlling, and closing, -- the inception, development, implementation, closeout phases in our handbook, as shown in Figure 1-1 PMBOK Links among Process Groups

Figure 1-1 PMBOK Links among Process Groups
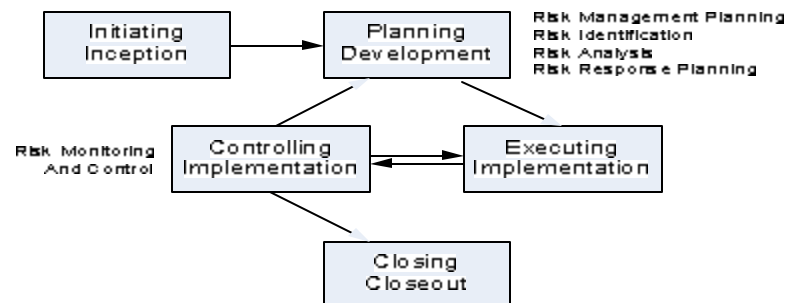
(Kendrick, 2003)

This section discusses risk management at the project selection and initiation stage. In this stage, risk management efforts focus on "defining" risks. It may be a rather subjective process but should always involve a structured and analytic approach (Webb, 2003).

1.8.2   Project Selection

Risk is a significant factor that must be considered prior to selecting a project, and in fact, can be minimized in several instances via a robust selection process. Appropriate

project selection methods can minimize several problems which are frequent causes of project failure: too many projects; project priorities misaligned with business and technical strategies; and overestimated resources and resource capabilities. Inadequate analysis during project selection creates these risks. (Kendrick, 2006)

Risk management looms large throughout the entire selection decision making process. To consider and decide what to do, it is necessary to weigh the risk of doing something before taking the action. Appendix F provides a list and brief description of some tools and techniques that are available to organizations and their project managers to support the risk assessment and decision making process.

1.8.3   Project Initiation

The chances of a risk event occurring are greatest in the concept, planning and start-up phases of the project. Similarly, the early stages of the project represent the best opportunity for minimizing the impact of a potential risk, or identifying an alternate strategy to avoid a risk altogether.

Project initiation starts after project selection decisions have been made. During this stage, it is important to establish the organizational and project environment and develop a structure for the risk identification and assessment tasks to follow.

At this stage, the documents, such as project charter, which are critical for the risk management process to start, are still being developed for submission and approval. However, a certain amount of risk management homework is suggested including the following three steps to help prepare for the planning phase (Rosenau & Githens, 2005):

Step 1 – Prepare. There are four recommended tasks at this step.

- Review some fundamental questions. Ask questions such as: Do you have a real project? Do you have access to the right people? How is success defined and measured?

- Define risk attitude. This can help ensure your actions are consistent with the company's prevailing risk posture.

- Identify stakeholders and perform stakeholder analysis. This analysis ensures that risk assessments encompass all legitimate stakeholders' objectives and expectations.

- Research past projects. The goal is to avoid repeating past mistakes so that the project team can focus on innovating.

Step 2 – Build risk communications

- *Create risk culture.* Risk culture is the degree to which management recognizes the need for risk management competency within the organization. Organizations with high competency levels generally learn from previous failures.
- *Conduct risk training.* Risk management is the responsibility of the entire project team.

Step 3 – Anticipate threats to success by generating a list of the team's "concerns". By recognizing hazards, the project team can take steps to avoid them, react more quickly and effectively, or turn threats into opportunities. The risk identification techniques listed below can be used to assist in the development of these concerns.

- Brainstorming, the cross functional team generates ideas about project risks, often done with the support of a facilitator.
- Check-listing, based on historical information and knowledge of the system, helps to make sure past mistakes are not repeated.
- Interviewing, an analyst elicits knowledge from others with applicable experience through guided questions and probes.
- Diagramming, techniques to make models and assumptions more explicit.
- Triggers, a list of symptoms or warning signs that indicate a risk event has occurred or is likely to occur.

> *Every project has risk.*
>
> *Risk is a significant factor that must be considered prior to selecting a project.*
>
> *During project initiation, the project manager should follow three key steps: Prepare; build risk communications; and generate a list of the team's concerns.*

1.9   *Contracts*

1.9.1   Introduction

All projects involve agreements, in other words, contracts. The contracting process basically consists of three phases: pre-award, award and post-award, and five lifecycles: requirement, requisition, solicitation, award and contract administration. The phases are keyed to contract award.

The exact relationship of contracting to the project life cycle will depend on the project strategy. In many cases, the project starts with contract award; in other cases, contract award coincides with the project implementation phase (PMI, 2004). In either case, contract management shall be conducted throughout all phases of the project.

Assuming the contracting process starts in the project inception phase, this chapter will focus on the discussion of first three lifecycles: requirement, requisition and solicitation. The two remaining lifecycles, contract award and administration, will be discussed in later chapters of the Handbook.

1.9.2   Contract Types vs. Risk

There is a variety of possible contractual forms. The common forms are fixed-price (FP) or firm-fixed-price (FFP) contracts, cost plus a fixed fee (CPFF), cost plus an incentive fee (CPIF), and time-and-material (T&M) contracts. The amount of profit on a contract is most frequently based upon how the risks are to be shared between contractor and the customer (Kerzner, 2006). Figure 3 shows the relative degree of risk between the customer and contractor for a variety of contracts.   The project manager often has no influence over the type of contract selected, however, must be cognizant of the management risk implications of each type, and adjust the project's risk management strategies accordingly (see section 1.7 for specifics regarding risk management). If the project manager can influence the selection of contract method, he or she should do so consistent with the overall risk posture of the organization.

Figure 1-2 Contract Type and Risk Type
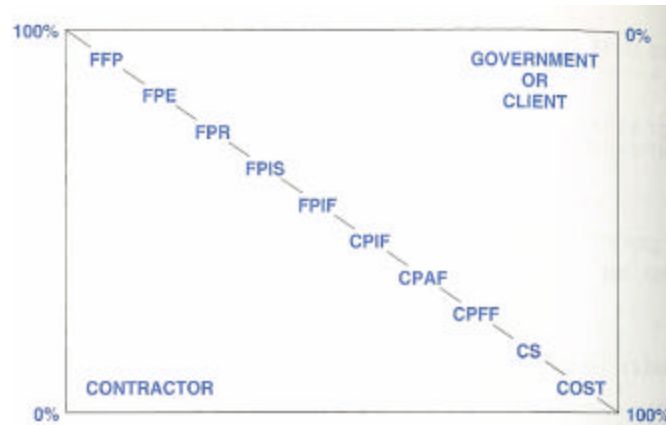
(Kerzner, 2006, p 818)

1.9.3   Contracting Process

A brief discussion of the first three contracting lifecycles is below:

- *Requirement Cycle*. This is basically the responsibility of the project
  manager who controls the project budget and knows when and where the
  goods and services in support of his or her project will be needed.
  (Cavendish & Martin, 1982, p.17) This cycle shall include the following
  (Kerzner, 2006):

  o Defining the need for the project;

  o Developing the statement of work, specifications, and work
    breakdown structure;

  o Performing a make or buy analysis;

  o Laying out the major milestones and the timing/schedule;

  o Cost estimating; and

  o Obtaining authorization and approval to proceed.

- *Requisition Cycle*. This cycle includes:

  o Evaluating/confirming specifications;

  o Confirming sources;

  o Determining the contract type and strategy; and

    o   Producing the solicitation package, which includes bid documents, list of qualified vendors, proposal evaluation criteria, bidding conference, change management procedures, and supplier payment plan?

- *Solicitation Cycle.* Selection of acquisition method is the critical element in this cycle. There are two common methods:
  - o Advertising. This is when a company goes out for sealed bids. There are no negotiations. Competitive market forces determine the price and the award typically goes to the lowest bidder; and
  - o Negotiation. It should be planned for. The typical activities shall include: develop objectives, evaluate the opponent, define strategy and tactics, gather facts, perform complete price/cost analysis and arrange "hygiene" factors.

The contracting process basically consists of three phases: pre-award, award and post-award, and five lifecycles: requirement, requisition, solicitation, award and contract administration.

The exact relationship of contracting to the project life cycle will depend on the project strategy.

The following contracting lifecycles are typically carried out during the project initiation phase:

Requirement Cycle – Defining project and contract requirements.

Requisition Cycle – Determining project contracting strategy.

Solicitation Cycle – Defining acquisition approach.

1.10   *Project Management Office (PMO)*

1.10.1   Introduction

Despite the tireless efforts of project staff to keep projects flowing within time, budget, quality and scope constraints, many projects fail to achieve desired objectives. Further, there is often no easily identifiable cause for these common failures. Typical problems that arise in such cases include: inconsistency across functional and project organizational entities with regard to communications, planning, monitoring and controlling of project status. Most managers would agree that a reasonably structured method for managing projects is needed. In other words the company needs to establish a Project Management Office (PMO) to organize and standardize information flows within project management environment of a company.

Without a standardized approach to managing projects, which is developed, implemented, and enforced by the PMO, an organization is left with an "ad-hoc" and oftentimes chaotic management environment, which commonly proves to be ineffective and debilitating to its strategies and objectives. Establishing a PMO has proven to be overwhelmingly successful in a wide breadth of organizations, industries, as well as numerous research initiatives.

The purpose of this section of the handbook is to define the PMO, describe its roles and responsibilities, discuss how the project manager should interface with the PMO during the inception phase of a project, and lastly, provide a phased approach to establishing a PMO in the event the user of this guide finds himself/herself in an organization lacking this organizational framework.

1.10.2   PMO Defined

There are several practical definitions used to describe the PMO that vary in degree of responsibility and function. We have included three commonly used definitions, however, specific roles and responsibilities of the PMO depend upon company policies and processes:

- The unit responsible for continued support of standards, processes, and information systems that define project management for the organization (Gray and Larson, 2002).

- Organizational unit to centralize and coordinate the management of projects under its domain. A PMO oversees the management of projects, programs, or a combination of both. The PMO focuses on the coordinated planning, prioritization and execution of projects and subprojects that are tied to the parent organization's or client's overall business objectives (PMI, 2004).

- Organization developed to support the project manager in carrying out his or her duties (Kerzner, 2006).

The major benefit of the PMO is managing multiple projects in a coordinated way. Standardization among the projects is a cornerstone and the essential objective of the whole idea. The PMO acts as an integration unit for initiation, planning, execution and termination of the projects and is an integrative technical support hub for a company.

1.10.3   Roles of PMO

Again, specific roles of the PMO vary depending on individual company policies, however, common roles of the PMO include:

- **As a clearing house of the organization,** the PMO is the center for communication and conflict resolution between project or program stakeholders.

- **As developer, documenter and bank of a standard organizational methodology** (a consistent set of tools and procedures), the PMO provides a common terminology and set of practices. This standardization increases productivity and individual achievement potential, while decreasing the possibility of conflict and misunderstanding.

- **As a hub for the collection of data regarding the availability, pricing, evaluating, and scheduling of organizational resources,** the PMO establishes a manageable means for governing projects with regard to people, costs, and time.

- **As a project management consulting center,** the PMO advises the entire organization on all project management related matters, including project manager selection decisions. As a center for project management

expertise, the PMO implements an organized, consistent, and pertinent professional development program that consists of focused training that directly relates to the real-world project environment.

- **As the project management advocate,** the PMO is responsible for rewarding team members who contribute significantly to outstanding project management results, a practice that is in contrast to common individual award programs focused on functional areas.

- **As a competency center for project management**, the PMO acts as a knowledge accumulation archive with a focus not only on common project management knowledge but on data regarding previous organizational projects as well. The PMO establishes a bank of business cases with actual plans, budgets, schedules and formal reports; maintains information about formal and informal pools of people who have participated in projects completed by the company; and accumulates and creates new intellectual assets.

- **As a unit that directly manages projects,** the PMO should receive necessary authority to make decisions for the projects. For example, the PMO should be able to initiate or terminate projects based on revised expectations of a project's ability to meet organizational goals and objectives. Making necessary modifications during the execution phase of a project to adjust for delays or unforeseen circumstances is also a common function of the PMO.

1.10.4   Responsibilities of PMO

The roles of the PMO described above include various functions that the PMO may perform, however, there are some critical responsibilities that the PMO *must* perform, at a minimum, in order to effectively standardize and oversee the management of projects within an organization:. These include:

- Control and monitoring of all organizational projects.
- Proper, precise work documentation and necessary document distribution among stakeholders.

- Control of adherence of actual work to contractual requirements, in other words quality control.

1.10.5   Project Inception and the PMO

Based on its extensive roles and responsibilities, clearly the PMO is heavily involved during all phases of a project, beginning first during project inception. Key interfaces with the PMO during project inception include:

- *Project Proposals* – The PMO likely manages the project proposal process. PMO guidelines on format, content, and submission should be consulted during development of the project proposal.

- *Project Selection* – It is also common for the PMO to facilitate the project selection process. Prior to drafting a project proposal for selection consideration, the drafter should consult the PMO to ensure selection criteria are properly considered within the proposal.

- *Project Management Staffing* – At a minimum, the PMO will typically provide a recommendation for the assignment of project managers to individual projects at the request of senior management. However, in some organizations the PMO has standing authority to issue project management assignments based on personal qualifications, experience, and the nature of a project.

1.10.6   Establishing the PMO

Not all organizations have a PMO, however, all project-based organizations can benefit from having one. Appendix G offers a step-by-step process to assist an organization in establishing a PMO, in the event you are a project manager in an organization that lacks one.

> ***The PMO acts as an integration unit for initiation, planning, execution and termination of projects.***
>
> ***The roles of the PMO can vary based on each organization's policies, however, there are some critical responsibilities that the PMO must perform, at a minimum:***
>
> - ***Control and monitoring of all organizational projects.***
> - ***Proper, precise work documentation and necessary document distribution among stakeholders.***
> - ***Quality control.***
>
> ***Key interfaces with the PMO during project inception occur during project proposal development, project selection, and project management staffing.***

1.11 *Ethics and the Project Manager*

1.11.1   Introduction

To put it plainly, ethical and professional behavior is a must for all project managers. For example, according to the Project Management Institute's (PMI) member code of ethics, "In the pursuit of the project management profession, it is vital to earn and maintain the confidence of team members, colleagues, employees, employers, customers/clients, the public, and the global community." (PMI, 2006). As anyone who has worked in a professional setting can attest, it is impossible to earn and maintain the trust of co-workers, seniors, or subordinates by acting unethically. And once trust is lost or damaged, it is nearly impossible to get it back.

As important as personal integrity is for all members of the project team, it is even more critical for project managers. The project manager is the team leader, looked to by team members to set the example. If the project manager fails in this regard, he or she is

condoning unethical and unprofessional behavior and a tone of irresponsibility and unaccountability is likely to permeate throughout the team.

One only has to look to today's headlines to see the devastating affects of unethical behavior. Recent examples in the private sector include the collapses of Enron and Worldcom. In the public sector the recent scandal between an Air Force acquisition executive (Ms. Darlene Druyun) and Boeing was perhaps one of the most widely publicized scandals in recent project and program management history. The devastating affects on Ms. Druyun's career, the careers of those around her, the Air Force, and Boeing irrefutably prove the consequences of unethical behavior are far worse than that of any imaginable failure based on merit.   Ultimately, Ms. Druyun was removed from her post, fined, sentenced to 9 months in prison, and a cloud of doubt still lingers over the Air Force's procurement and program management (Baker, 2005).

In the wake of these, and other public and private ethic lapses, professional integrity has never been so important. The purpose of this section is to review the code of ethics prescribed to members of the PMI to help them instill ethics and integrity in their approach to project management, introduce some of the most common ethical challenges faced by project managers, and highlight some resources project managers can use to navigate safely past the ethical dilemmas that inevitably arise throughout the project lifecycle. Although it is critical for the project manager to act with a high sense of personal integrity during the entire project, ethics is addressed in the inception phase chapter of the handbook to ensure the project manager is armed with this information early on in the project.

1.11.2   Ethical Challenges Facing the Project Manager

The characteristics of projects alone present many ethical issues for the project manager, regardless of industry. Whether it is the opportunity to exaggerate the benefits of a project during project initiation and selection, pad estimates during development and planning, use materials that do not meet specifications during implementation, or falsify reports during close-out, the project manager faces many temptations to sacrifice his or her and the company's integrity in return for short-term gain. Common ethical dilemmas faced by project managers include (Rutland, 2002 and Kerzner, 2006):

- Being offered gifts from contractors or vendors;

- Pressuring to alter status reports with backdated signatures to mask reality of project status;

- Compromising quality below specifications;

- Falsifying reports of charges for time and expenses;

- Lowering the quality of communication with co-workers, management, and clients;

- Abusing power and openness of information afforded the position;

- Pressuring to lie to a customer in a proposal in order to win the contract;

- Pressuring to withhold bad news from senior management or a customer;

- Being ordered to violate ethical accounting practices to make "numbers look good" for senior management;

- Being asked to cover up acts of embezzlement or use the wrong charge numbers; and

- Pressuring to violate the confidence of a private personal decision by a team member.

1.11.3   Tools and Resources for Ethical Project Management

At first glance the list of ethical challenges facing the project manager appears daunting. However, there is hope! There are many tools available to the project manager to help him or her ensure they make the right decision when confronted with these types of situations. First and foremost, it is critical that the project manager adopt a code of ethics and morals to generally guide his or her behavior. The PMI Ethical Standards member code of ethics provides an outstanding example of general ethical guidelines, and is provided below (PMI Code of Ethics, 2006):

PMI Member Code of Ethics

As a professional in the field of project management, PMI members pledge to uphold and abide by the following:

- I will maintain high standards of integrity and professional conduct;

- I will accept responsibility for my actions;

- I will continually seek to enhance my professional capabilities;

- I will practice with fairness and honesty; and
- I will encourage others in the profession to act in an ethical and professional manner.

Additionally, the PMI Ethical Standards highlights several professional obligations that are extremely helpful in assisting the project manager in determining the "right" course of action when confronted with an ethical dilemma. A summary of these professional obligations is provided in Appendix H.

In addition to the ethical guidance provided by professional organizations such as PMI, the project manager should consult their company specific guidance on ethics. In many cases, individual companies publish their own code of ethics, which should be strictly adhered to by the project manager.

Lastly, if the aforementioned resources are not sufficient in guiding ethical behavior, many professionals apply a less formal test known as "The Washington Times Test" or "The Mom Test" when confronted with an ethical dilemma. They simply ask themselves, "Would I like to see what I'm doing published on the cover of The Washington Times?", or "Would I like my Mom to know what I'm doing?" If the answer is, "no", then they have clear guidance to desist from there current course of action as it is unethical, or so the theory goes.

1.11.4   Instilling Ethics in the Entire Project Team

Ethical behavior from the project manager alone is not enough. He or she must also ensure the entire project team acts with integrity. But the project manager can take heart in that acting ethically is the most effective way to instill ethical behavior amongst subordinates. Other helpful tactics include:

- Developing a project team code of ethics;
- Including the code of ethics in the team charter;
- Posting this code of ethics in the "war room" and on key documents; and
- Rewarding ethical behavior (e.g. rewarding the person who bears bad news)

> ***Ethical behavior is a must for the project manager. By acting ethically, he or she sets the tone for the project team to follow.***
>
> ***Throughout the project lifecycle there are opportunities to realize short term gains through unethical behavior. These must be avoided.***
>
> ***The project manager must instill a code of ethics within himself/herself and his/her team to prevent unethical behavior.***
>
> ***There are many good resources available to the project manager to promote ethical behavior (PMI code of ethics, PMI professional obligations, company policy/guidance, "The Washington Times"/"Mom" test.***

1.12   *Leadership*

1.12.1   Introduction

Perhaps more so than in any industry or profession, good leadership is tantamount to success in the project environment. In this setting, by definition, the project team invariably faces many unique technical challenges in a time, quality, and resource constrained atmosphere. Furthermore, the team is responsible for communicating information and coordinating activities across a multi-dimensional framework of reporting relationships. It becomes quickly evident to even the most casual observer, that in this complex environment, a leader is needed to simplify the monumental tasks at hand into manageable segments with clearly assigned responsibilities.

"Great leaders are expert simplifiers."

Mr. N. R. Narayana Murthy, Chairman of the Board and Chief Mentor, Inofsys Technologies, 2006 Robert P Maxon Lecture, February 6th, 2006.

So who is looked to, to fill this void of project leader, or "project simplifier" in the words of Mr. Murthy? It is the project manager. Project management is all about leading the effort to achieve project objectives by working with all parties within the greater project team (e.g. external stakeholders such as client and regulators, and internal

stakeholders including senior management, functional managers, and the project staff). It includes conflict negotiation, task management, and making trade-offs/decisions based on information provided by the project team.   Obviously not everyone is gifted with the qualities necessary to lead, but as researchers point out, these qualities can be learned and developed. Thus, it is necessary for project managers to be aware of applicable leadership theories and to harness proven methods to acquire skills necessary to become more effective leaders and recognize key leadership attributes that will help in the selection of employees for critical positions on the project team.

1.12.2   Leadership Defined

If you ask ten different people what leadership is, you are apt to get ten different responses. For example, consider the two definitions provided below. Although they share similarities, there are some distinct differences.

- Using influence in an organizational setting or situation, producing effects that are meaningful and have a direct impact on accomplishing challenging goals (Ivancevich, Konopaske, & Matteson, 2005).
- Style of behavior designed to integrate both the organizational requirements and one's personal interests into the pursuit of some objective (Kerzner, 2006).

For the purposes of our discussion, *we will define leadership as the effective and responsible guiding of an organization toward its objectives*. In short, without effective leadership there is no guiding force working to focus the efforts of a group toward ethical achievement of it's mutually agreed to goals.

But how does a project manager go about recognizing a leader from all the people he or she meets in the business setting? How will he or she determine if, for example, the person they are recruiting for a key position on the project team is a leader and will serve the project company well? The project manager can attempt to identify some of the below listed qualities that are typically found in leaders:

- Leaders provide direction. They make a meaning of the business they are managing.
- Leaders have risk taking personalities.

- Leaders generate the feeling of trust.

- Leaders convey the idea of what they are striving to achieve in the way that people want to follow them.

- Leaders have courage in their convictions.

1.12.3   **Leadership Models**

Through many years of research, the academic community has developed several leadership models. Of the many different approaches to framing leadership, situational models are highly recognized for their robustness and application flexibility. There are four commonly accepted situational approaches:

- Fiedler's Contingency Model

- Vroom, Yetton, and Jago Model

- House's Path-Goal Model

- Hersey-Blanchard Situational Leadership Model

We will not describe in depth all of these models, however, the Hersey-Blanchard Situational Leadership Model (SLM) deserves more attention as we believe that this model best reflects the leadership behavior in the project management environment.

SLM is based on the amount of direction (task behavior) and amount of socio-emotional support (relationship behavior) a leader must provide given the situation and the "level of maturity" of the followers. Refer to Figure 4 for a graphical representation of this model.

Task Behavior and Relationship Behavior have the following definitions (Kerzner, 2006):

TASK BEHAVIOR – the extent to which the leader engages in the defining roles, i.e. telling what, how, when, where and if more than one person, who is to do what in:

- Goal setting;

- Organizing;

- Establishing time lines;

- Directing;

- Controlling.

RELATIONSHIP BEHAVIOR – the extent to which a leader engages in two-way (multi-way) communication, listening, facilitating behaviors, socio-emotional support:

- Giving support;

- Communicating;

- Facilitating interactions;

- Active listening;

- Providing feedback.

Figure 1-3 Situational Leadership Model
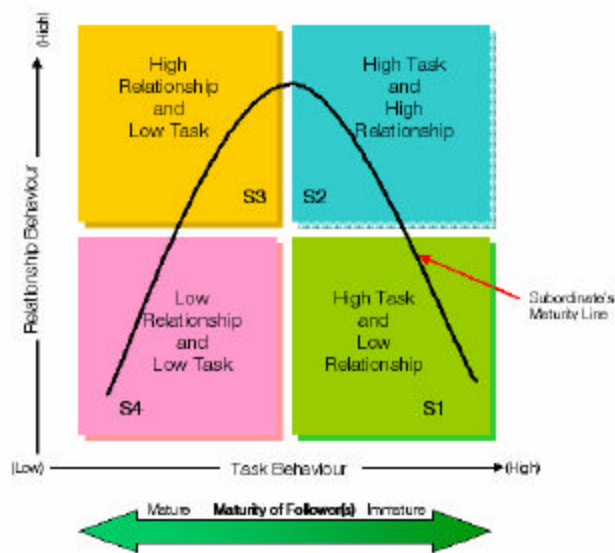
Within the SLM there are four steps in which the leadership styles change with respect to the readiness (e.g. maturity) of the followers (employees), as shown in the Figure 1-3 Situational Leadership Model, above:

1. Leadership style is task-oriented with an autocratic approach. Main concern of the leader is accomplishment of a task. Concern about the feelings of the employees is low. Leader is self decision-making oriented. Generally at this stage interaction is ineffective. This is a common approach when subordinates are relatively inexperienced or immature.

2. Leader tends to develop behavioral relationships with employees. Focus is made on trust and understanding.

3. Leader is more concerned about developing relationships than about completing objectives. Participative management and group decision-making are of value. Employees assume more responsibility as their maturity level increases.

4. Followers are experienced, confident about themselves. Leader is low task-oriented and demonstrates low interest in relationship development.

The SLM is considered the most adapted to the project management field since it is very flexible with regard to the constantly changing project environment and variance of staff attitudes and maturity level. During the project inception phase, the project manager must assess the project environment and the capabilities of his/her project team, and then select the appropriate leadership approach. For example, if the project manager determines that his/her team is made up primarily of relatively immature personnel who require a great deal of specific direction, he or she may elect a high task oriented approach (e.g. stage 1). As the team develops throughout the course of the project, the project manager can shift to a less task oriented style that builds relationships with the team and relies more on the team's experience (e.g. stage 2 or 3). If on the other hand, the project manager is assigned a highly proficient team that has worked together effectively in the past and demonstrated a high maturity level, he or she may approach the project with a low task orientation (e.g. stages 3 or 4). In any case, it is impossible to prescribe a "one-size-fits-all" leadership approach. Instead, the project manager must assess the situation, and choose an approach that best meets his or her objectives given the nature of the project and the characteristics of the project team.

Leadership has different meanings to different people but can be thought as in the project management context as the effective and responsible guiding of an organization toward its objectives.

There are many leadership models available to assist the project manager, however, the Hersey-Blanchard Situational Leadership Model (SLM) best reflects the leadership behavior in the project management environment.

The project manager should continually assess the environment, including his or her team's maturity level, and choose an approach within the SLM that best fits the situation.

APPENDIX – A: Initial Schedule Inclusions/Characteristics

- Do not set yourself up for unrealistic deadlines,
- Do not omit tasks. You will need to show all activities to be able to visualize, track, and complete them.
- Do not underestimate the length of time or the resources required for a task,
- Obtain enough resources and enough time as possible,
- Try to have flexibility in your schedule. Activities will need to be added or removed from the schedule as changes occur during the project
- Interview and consult with experience people in the area of your activities and also scheduling,
- Use records in industry standards as benchmarks if possible.
- Beware of all external dependency relationships. Uncertain resources of talent, equipment, or data will likely result in extending the project schedule.
- Consistency of framework for planning, scheduling, monitoring, and controlling the project,
- Deterministic duration and completion date,
- Deterministic dates on which tasks must be started,
- Identification of critical activities that if delayed will delay the completion,
- Illustration of all interdependence of all tasks, work packages, and work elements,
- Denotations of when specific individuals must be available for work,
- Aids in ensuring that the proper communications take place between parties,
- Identification of activities with slack that can be delayed for specific periods without penalty, or from which resources may be borrowed without harm,

- Illustration of tasks that must be coordinated to avoid resource or time conflicts,

- Illustration of tasks that must be run in parallel to achieve a predetermined date,

- Be aggressive in the execution of the schedule. Make sure everybody understands how important commitment dates are. Do not be a passive executioner.

- Include contingency time by all means possible. There will always be unforeseen problems or things overlooked in the plan that will impact your schedule.

APPENDIX – B: Attributes of Different Maturity Levels

Below is a chart of a recommended tool for assessing the maturity of the organization. The ideal level conducive to quality management is level three formal to level four cultural processes.

Don't need process

Level 4 - Cultural
Managed, enterprise wide involvement, continuously improving performance and seen as fundamentally important to success. Ingrained. Proactive. Measured. Repeatable

Defined consistent process

Level 3 - Formal
Managed and performed well, normally by a X-functional team. Repeatable. Not ingrained Still room for improvement

Process, but...

Level 2 - Partial
Performed, but functionally focused and not repeatable or managed

No process

Level 1 - None
None. Not performed, Anarchy, Not aware of the benefits - Individual Heroics

Maturity Level

Adoption of "Good Practice'

Attributes of different maturity levels (Moultrie, 2002)

APPENDIX – C: Organizational Descriptions

Matrix Organization (PMI, 2004)

(Black boxes represent staff engaged in project activities.)
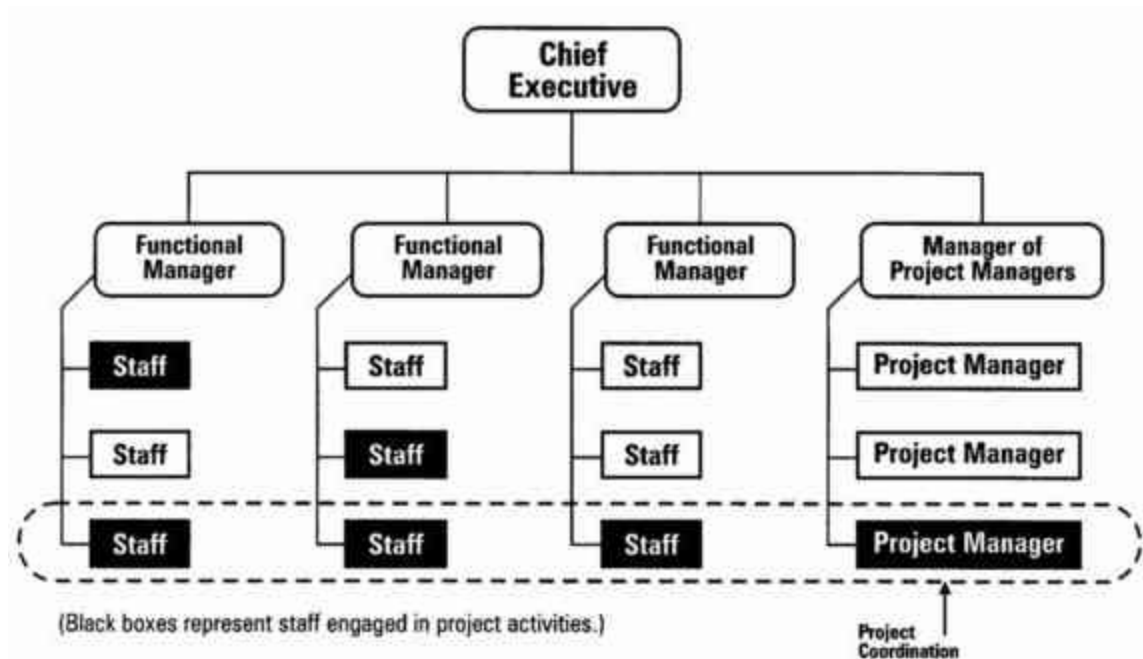
Functional Organization (Hawaii University, 2006)
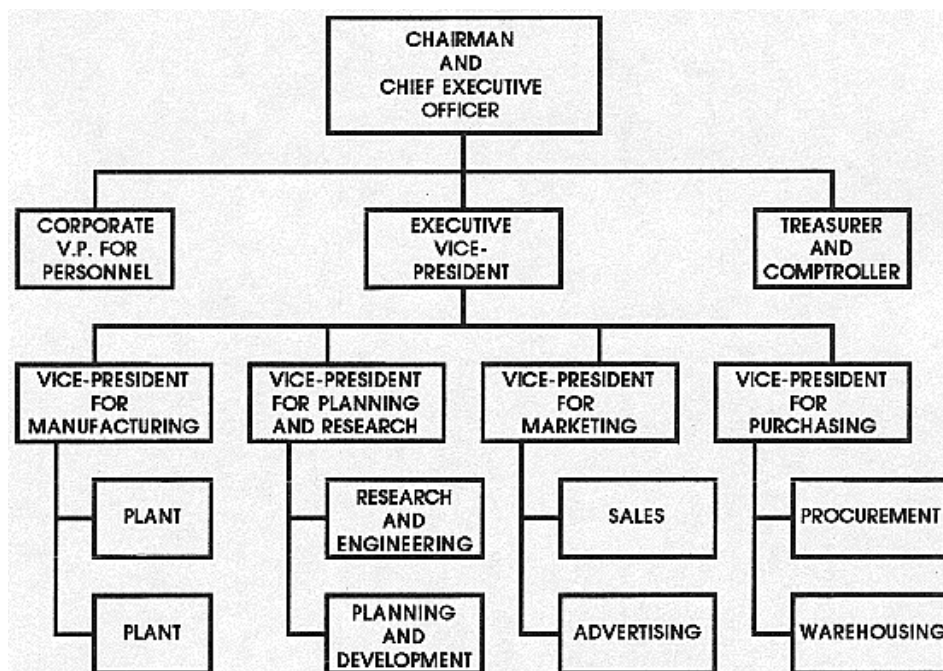
APPENDIX – D: Virtual Teams

Project Organization (Hawaii University, 2006)

A few tips for building and managing a virtual project team (Rosenau & Githens, 2005)

- Meet face to face at least once preferably early in the project and most effectively at the kickoff meeting.

- Develop ground rules about use of the different technologies.

- Spend relatively more time on agenda building and dissemination before meetings.

- When using teleconferencing or videoconferencing, have each person announce himself or herself before speaking.

- When working across multiple time zones, "spread the pain." Don't repeatedly ask the same group to be available at 2 A.M. to participate in meetings.

- Remember that body language also communicates substantial amount of information. It may be useful to say, "tell me what you are feeling"

- Summarize and document your discussion. Take advantage of the various web-postings to keep "everyone on the same page."

Director

Accounting   Personnel

Section Chief Urban Planning | Section Chief Transportation | Section Chief Housing | Section Chief Public Works | Section Chief Human Services | Section Chief Evaluation

Manager Project A: Planner | Appraiser | Engineer | Social Worker | Statistician

Manager Project B: Planner | Mass Transit Specialist | Surveyor | Engineer | Educator | Statistician

Manager Project C: Planner | Clerk | Counselor | Statistician

APPENDIX – E: Communications Process and Common Pitfalls

Communications, derived from the Latin *communis*, meaning common, seek to establish commonness between the communicator and receiver. One of the most widely used models of the communications process was created by Claude Shannon and Warren Weaver and is summarized in Figure 1 below (Shannon & Weaver, 1948). The basic elements include:

- *Communicator* – person with ideas, intentions, information, and a purpose for communicating.
- *Encoding* – process that must take place that translates the communicator's ideas into a systematic set of symbols.
- *Message* – result of the encoding process, or what the communicator intends to communicate.
- *Medium* – the mode of transport of the message. This includes face-to-face communications, telephone, meetings, e-mail, memos, schedules, reports, etc.
- *Decoding-Receiver* – the interpretation and thought process of the person receiving the message. This is often affected by the receiver's background or frame of reference.
- *Feedback* – the process of the receiver communicating back with the communicator. <u>Feedback is only possible in a two-way communication processes and is desirable as it affords the communicator the ability to determine if the message has been received and interpreted accurately</u>.
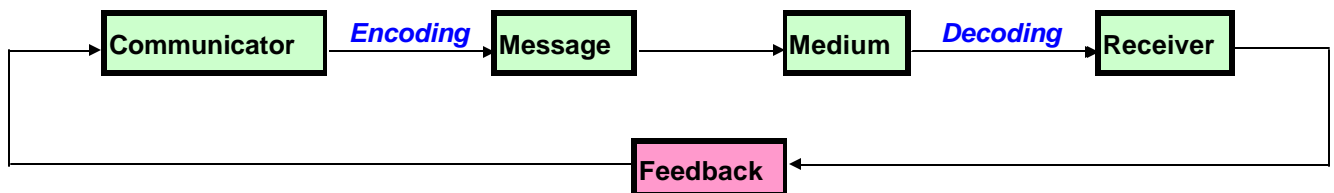
Figure 1-4 - The Communication Process

Common Communications Pitfalls

Communications experts commonly cite several obstacles leading to ineffective communications. These obstacles create "noise" that disrupts the message. These obstacles include (Ivancevich et al., 2005):

- *Frame of reference* – different individuals may interpret the same communication differently because of varying frames of reference developed through past experiences.
- *Selective Listening* – occurs when an individual blocks out new information. This is especially common if the new information conflicts with his/her beliefs.
- *Value Judgments* – receivers often assign worth to the message affecting how well the message is received.
- *Source Credibility* – if the receiver does not trust or have confidence in the communicator, this will adversely impact the message.
- *Filtering* – when the communicator filters out portions of the applicable information when formulating the message. For example, subordinates often manipulate information to deliver positive messages when communicating to seniors, however, this can be sometimes misleading.
- *In-Group Language* – the use of technical jargon such as acronyms can inhibit effective receipt of a message.
- *Status Differences* – Different levels of status in hierarchical organizations can disrupt the free flow of information.
- *Time Pressures* – impending deadlines may cause personnel to curtail necessary communications, or even cut someone out of a reporting loop.
- *Communications Overload* – occurs when subordinates inundate managers with unnecessary levels of information that is often too detailed than required.

Methods to Improve Communications

Above we discussed the critical importance of communications to successful project management, we provided an overview of the communications process, and cited many barriers to effective communications. There are however, steps the project

manager (e.g. the communicator) should take to improve communications, avoid some of the pitfalls discussed above, and thus increase his/her effectiveness. These include (Ivancevich et al., 2005):

- *Following Up* – To ensure the message is accurately received the project manager can follow-up with the receiver. For example, if after a meeting the project manager feels there is ambiguity to the selected course of action and assigned responsibilities, he/she could significantly reduce the chance of a misunderstanding by transmitting a summarizing e-mail to all attendees.

- *Regulating Information Flow* – The project manager can regulate information flow to help prevent communications overload by structuring a hierarchical organization or deploying techniques such as "management by exception" where only items that do not occur per expectations or plans are communicated to managers.

- *Utilizing Feedback* – Two-way communications is a must in avoiding costly miscommunications. The project manager should encourage open communications by affording his or her team the opportunity to communicate back to management. This enables management to determine how well the message was received, and promotes the free flow of potentially innovative ideas.

- *Empathy* – the project manager can improve the likelihood of accurate message receipt in his or her team members by being more team-oriented and anticipating how the message will be decoded.

- *Repetition* – by repeating the message in different forums the communicator can ensure that if one part of the message is not understood, other parts will convey the intended message.

- *Encouraging Mutual Trust* – trust and confidence between communicator/receiver fosters open communications.

- *Effective Timing* – messages, especially new ideas/changes, are better received when they are not competing with other messages.

- *Simplifying Language* – messages will be generally better understood if not conveyed in complex language or technical jargon.

APPENDIX – F: Risk Identification Tools & Techniques

Below is a list and brief description of some tools and techniques that are available to organizations and their project managers to support the risk assessment and decision making process.

- *Scenario planning* is one of the best ways to identify the strategic risks an organization might face. It attempts to understand the future and what it might mean for the organization in terms of risks and how it might respond. Scenario planning can be counterintuitive as it begins in the future and projects back to the present. It is a macro approach that considers demographics, environmental changes, economics, government and international legislation and control, science and technology change, customers, competitors and people in general. Scenario planning takes considerable time and requires a significant amount of research; therefore, if it is going to be used, it is most effective if incorporated into the strategic planning process.

- *Decision trees* are used to assess the implications of alternative decisions and situations involving making financial or number-based decisions. It starts with the decision that is to be made, which is represented by a square on the left-hand side of the tree. Straight lines are drawn from the square box, each representing one possible solution. At the end of solution line consider the result: if it is uncertain, draw a circle; if another decision has to be made, draw another square; if a solution is reached, draw a triangle. Continue the process and assign a monetary value to each of the triangles, meanwhile assign the probability value to each of the lines that extend from the circles. The cumulative probabilities must sum up to 1. The expected value of the scenario is arrived at by multiplying the value assigned to each triangle by the probability assigned to the line and adding the result together and subtracting the cost. The decision with the highest expected benefit should be chosen.

- *Monte Carlo simulation* is used for conducting sensitivity analysis and applied to wide-ranging problems. This method randomly selects values to create scenarios for a given problem. The values are taken from a fixed range and are selected to fit a particular probability distribution, such as the normal distribution. The simulation involves repeating the selection process many times to derive a distribution of potential results. The more times the simulation is run, the more accurate the results. The derived distribution is then used to estimate an expected value.

- *SWOT analysis* is an excellent way to assess the internal and external dynamics of the organization, situation or project, and identify the aspects of strength, weakness, opportunity and threat (SWOT). It is carried out by involving a related group of people in a workshop environment to answer questions which ensure a balanced assessment of anticipated upsides (strengths and opportunities) as well as downsides (weaknesses and threats) associated with a project.

- *Influence modeling* allows organizations to capture and model the way its business and the markets work. The basic modeling is usually conducted in a workshop environment and involves: establishing the factors that can impact the business; creating the links between these factors; and understanding how one factor influences another. Then, the model is calibrated through data analysis and formalized into a final model which can be used to test decisions under a variety of different scenarios and to understand the risks associated with a decision.

- *Portfolio analysis* allows organizations to understand the relationship between market share, cash generation and the products and services it sells. This approach is based on three concepts: the product lifecycle, the experience curve, and portfolio matrices. The portfolio analysis is relatively straightforward to execute and can help the business track its products and services over time.

APPENDIX – G: Establishing the PMO

If you find yourself in the project management chaos that typically exists in an organization without a PMO, you may consider initiating a movement to establish a PMO in your company. This can be an arduous and time consuming task depending on the complexity of the organization, its strategic objectives and other internal and external factors. However, this procedure can be made easier with the right information at hand. Below are some basic hints to help you support the decision of establishing a PMO in your company:

Keep the implementation simple

- Focus on value
- Structure it with a plan
- Start with a tactical focus
- Consider business necessities
- Keep the needs minimal
- Consider long-term, not only short-term benefits

A phase guide to establishing a PMO can be used to support this process. For example, in the article, *How to Start up and Roll out a Project Office*, the Project Management Professionals Dianne Bridges and Kent Crawford offer a unified approach for this procedure that can be useful for most organizations. The approach consists of the following four phases:

- *Phase I–Establish the Foundation*
- *Phase II–Startup with Short-Term Initiatives*
- *Phase III–Rollout with Long-Term Solutions*
- *Phase IV–Support and Improve*

Phase I–Establish the Foundation:

Within this phase you should define the PMO within your organization and determine its short-term and long-term objectives. You may start with an assessment of your current state and objectives. Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis and comparison against a project management maturity model may also be utilized. Numerous meetings with key stakeholders and experts have to be conducted

to understand the current situation, reservations, problems and goals. Based upon the findings, an assessment report is developed. The report must include the current and future vision along with an improvement plan recommending short-term and long-term actions. After gaining buy-in from the top-level authority of your organization, you have to establish the PMO functions and staffing, and identify stakeholders (make sure to include management, mentors, and pilot projects). Prepare a communications strategy, conflict resolution principles and negotiation tactics. This phase will end with funding and staffing approval of the PMO.

> ### *Phase II – Start with Short-Term Objectives:*

Within this phase the organization must start-up the PMO, implement short-term objectives, and initiate the project mentoring practice. PMO start-up includes staffing for initial operating capability, establishing communication activities, and distributing notifications about the newly opened PMO. Make sure to include information about the functions of the office that demonstrate an immediate value of using it within your company. These functions include the short-term objectives which are solutions to immediate concerns. These items can be implemented quickly, while at the same time consistent with the organization's long-term objectives. Examples may include:

- A list of projects in your portfolio;
- Project management methodology implementation;
- Establishing a database of reports and metrics that are used in them;
- Project review meetings;
- Training sessions;
- Line of support for organizational project activities;
- Project management workshops with the topics that are of the current priority to the company;
- Establishment of templates for managing projects; and
- Meetings on the initiation of new projects.

In accordance with the short-term objectives, another effort that needs to be undertaken is project mentoring. Project mentoring is an excellent means of creating immediate project management value to projects that are in the initiation phase or are in

need of immediate support. Phase II ends when the short-term objectives are accomplished. The PMO is now ready to focus on long-term objectives.

Phase III– Rollout with Long-Term Objectives:

Within this phase the PMO team focuses on improving the processes established in previous phases, developing and enhancing staff capabilities, and establishing stronger support practices necessary for successful project management. This phase is focused on the development of long-term objectives, continuing project mentoring practices, conducting pilot tests, and gradually rolling out the fully functioning PMO. There are some critical success factors which include:

- Process and methodology unification and continuing development;
- Establishment of a training curriculum;
- Detailed development of requirements for project documentation;
- Resource allocation;
- Tools distribution;
- Project manager career guides and certification;
- Project portfolio management practices; and
- Change management practices.

All of these items require extensive development and judicious deployment. To limit the risk inherent in any process change new practices should be implemented incrementally after successful pilot testing on selected projects. The assessment and improvement plan completed during Phase I provides the long-term objectives for the PMO and guides Phase III in the actual application of pilot tests, and establishing methodologies, standards, training, and support activities to achieve the overall objectives.

Phase IV– Support and Improve:

Within this phase, the PMO is confidently operating and supporting the organization. They conduct necessary activities, process project management tasks, and measure the involvement of the PMO where needed. Training, mentoring, workshops and other activities continue under the direction of the PMO. With stakeholders feedback the PMO continually improves and makes necessary modifications in its operations.

There are some suggestions that you should keep in mind while in the process of establishing the PMO:

- Do not forget about stakeholders;
- Do not procrastinate, make it quick;
- Do not underestimate the power of communication; and
- Do not cram the work.

APPENDIX – H: Project Management Institute's Professional Obligations

The Project Management Institute's (PMI) Ethical Standards highlights several professional obligations that are extremely helpful in assisting the project manager in determining the "right" course of action when confronted with an ethical dilemma. The following is a summary of some of the most pertinent PMI professional obligations:

Fully and accurately disclose any professional or business-related conflicts or potential conflicts of interest in a timely manner;

- Refrain from offering or accepting payments, or other forms of compensation or tangible benefits, which: (a) do not conform with applicable laws; and (b) may provide unfair advantage for themselves, their business or others they may represent;

- Conduct research or similar professional activities in a manner that is fair, honest, accurate, unbiased, and otherwise appropriate, and maintain accurate, appropriate, and complete records.

- Respect and protect the intellectual property rights of others, and properly disclose and recognize the professional, intellectual, and research contributions of others;

- Strive to enhance one's own professional capabilities, skills, and knowledge; and accurately and truthfully represent and advertise one's professional services and qualifications;

- Provide customers, clients, and employers with fair, honest, complete, and accurate information concerning one's qualifications; professional services; and the preparation of estimates including costs, services, and expected results;

- Honor and maintain the confidentiality and privacy of customer, client, and employer work information.

- Do not take personal, business, or financial advantage of confidential or private information acquired during the course of professional relationships: and

- Perform all work consistent and in conformance with professional standards to ensure that the public is protected from harm.

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Development

Table of Contents

2.0   Development

2.1   *Introduction*

> *I keep six honest serving men,*
> *(They taught me all I knew)*
> *Their names are What and Why and When*
> *And How and Where and Who.*
>
>   -- Rudyard Kipling

Congratulations, you are now the project manager on a project that has been successfully competed! Now you need to begin putting your vision on paper in the form of project plans, policies, processes, and procedures. The Development phase of the project life-cycle focuses on the planning of the project using these various documents that will be used during the Implementation phase.

There are two key concepts of project management according to Archibald (1976, p. 135). They are:

- Single point of integrative responsibility, the project manager
- Integrative project planning and control

The first concept was applied with the publishing of the project charter appointing you as the project manager. The second concept is now your responsibility. In addition to the "six honest serving men" mentioned above, project planning will require your entire focus and the efforts of your staff to produce the project plan. (Verzuh, 1999)

The following sections provide an overview of key processes to be considered during your planning. A suggested project plan can be found in the appendix, Figure 2-13 Project Plan Elements (Meredith & Mantel, 2003).

2.2   *Scope*

In the process of development, a major priority is establishing the boundaries of the project. The scope definition sets the basis for the planning process. The purpose of defining the scope is to establish the required final product/service that will be delivered to the client. In order to define the scope, it is important that most of the stakeholders and the project team spend as much time as necessary to elaborate and tailor this document to

the project's needs. It is the project manager's responsibility to ensure that the customer approves the project's objectives, deliverables, technical requirements, limits and exclusions.

The scope definition is a document that will help the customer and the project team to measure the success of the project. In order to do so, the scope deliverables should be expressed in specific, tangible and measurable terms. The following items should be in the scope document (Gray & Larson, 2003):

Project objectives: Defining the major objectives of the project helps to establish parameters to satisfy the customer. The objectives have to answer the questions of what, when, and how much.

Deliverables: The next step is to define major deliverables throughout the life cycle of the project. It is advisable to be as specific as possible. Usually, the deliverables are expressed in time, quantity and cost estimates.

Milestones: It is important to establish significant events that will provide the PM with clear delineated points that will enhance the overall management of the project. Consequently, milestones should be easy to recognize and measure.

Technical Requirements: With the purpose of ensuring a successful level of performance, in most cases it is necessary to define the technical requirements. This refers to specifications that might affect the results of the project, such as capacity of production, electrical voltage, speed of the driver, etc. It includes important standards that represent details that are not part of the big picture but are important for its successful completion.

Limits and exclusions: It is imperative to define the limits of the project and its deliverables. Also, it is necessary to establish the areas that will not be covered by the project to avoid customer's dissatisfaction.

Review with customer: Probably one of the most essential steps is the signature of agreement from the customer. It is important that the customer approves all items established in previous steps, and that both parties agreed on the project characteristics and requirements.

In the process of establishing the scope, the project priorities in terms of time, cost and/or deliverables should be discussed with the stakeholders. This will help to allocate resources throughout the project in order to achieve the project's goal.

> ***Meet with the customer until all requirements are clear in order to have a thorough scope.***

Once the project scope is set and priorities defined, it is time to create a Work Breakdown Structure (WBS) and a Resource Breakdown Structure (RBS). These documents will help to ensure that all deliverables are taken into account and to connect them to the organizational resources available to the project.

The WBS can be divided using varied criteria such as by deliverables (product, functional system, physical area, etc), schedule (sequence of activities or tasks), and resource (administrative units, areas of work, budget account). Whichever criterion is used to build the WBS, it is important to be consistent throughout the structure.

The structure begins with the major deliverable, considered the total project. Major work deliverables are defined first, sub-deliverables next, and so on, until the work package becomes manageable. The different levels of the WBS have a hierarchical relationship to the organization's structure, where top management will monitor high levels of the structure and lower levels could be managed by supervisors, and the lowest level will probably be the responsibility of one person. The hierarchical structure is represented in Figure 2-1 WBS Hierarchical Structure (Gray & Larson, 2003):

Figure 2-1 WBS Hierarchical Structure

Level	Hierarchical Breakdown	Description
1	Project	Complete Project
2	Deliverables	Major Deliverables
3	Sub - deliverables	Supporting deliverables
4	Lowest Sub - deliverables	Lower management responsibility level
5	Cost account	Grouping of work packages for monitoring progress and responsibility
6	Work package	Identifiable work activities
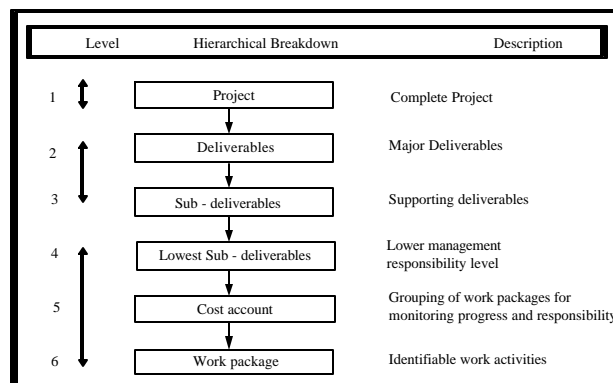
> *Be aware that the criteria selected to structure the WBS is consistent throughout*

The RBS provides a consistent framework for dividing the resources into small units for planning, estimating, and managing (Rad & Cioffi, 2004). The RBS classifies and catalogs the organizations resources needed to accomplish project objectives. As a project manager you may not have to develop an RBS because your organization's PMO has already created an enterprise RBS that is used for all projects. Rad and Anantatmula (2005) suggest that the best way to divide resources is by labor, tools and machinery, materials and installed equipment, and fees and licenses.

2.3   *Schedule*

A schedule should serves as a baseline for monitoring and controlling project activities and the major tool for the project management. The WBS is absolutely necessary for both cost estimation and scheduling. Duration estimates and resource estimates are also required. Those estimates should be reviewed and revised in order to create an effective schedule. It is critical to take the resource utilization and the work calendar into consideration when developing a project schedule. As illustrated in Figure 2-2 Schedule Development Process, PMBOK® (PMI 2004) suggests that the Project Calendar, Project Scope Statement, Activity List, Activity Attribute, Recourse Calendars, and Project Management Plan are necessary or helpful for successful schedule development.

Figure 2-2 Schedule Development Process
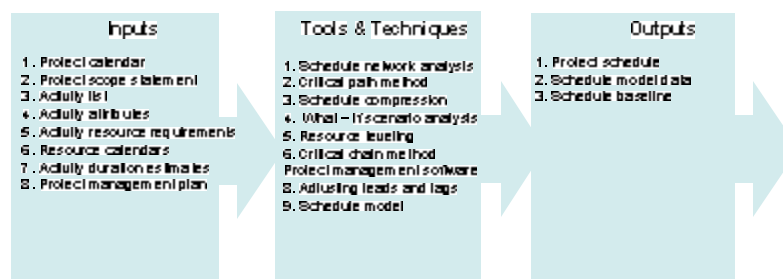
Network Diagram

Not all project activities need to be scheduled at the same level of detail. It is a common practice to create a schedule for each major task level in the WBS that covers the work packages. The basic approach of all scheduling techniques is to form a network of activity and event relationships. As shown in Figure 2-2 Schedule Development Process, not only activities that comprise the project, but also predecessors and/or successors for each activity become important inputs in order to form a network. An activity may have a successor(s) but no predecessor(s); it may have a predecessor(s) but no successor(s); or it may have both predecessor(s) and successor(s). A network of activity and event relationship can be depicted in two basic ways: activity-on-node (AON) and activity-on-arrow (AOA). In the AON format, nodes represent the activities and the network usually starts from a single node called "START" and finishes with a node of "END," where as in the AOA format, the activities are shown on the arrows and the circular nodes represent events. Figure 2-4 Activity on Node and

Figure 2-5 Activity on Arrow display the Action Plan shown in Figure 2-3 Action Plan Table in the AON format and AOA format respectively.

Figure 2-3 Action Plan Table

ACTION PLAN			
Tasks	Predecessors	Duration	Cost
A	--	5 days	--
B	A	4 days	--
C	--	6 days	--
D	B,C	2 days	--
E	D	5 days	--
F	E	8 days	--

Figure 2-4 Activity on Node
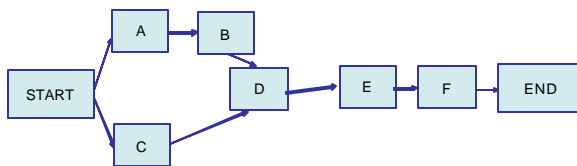
Figure 2-5 Activity on Arrow
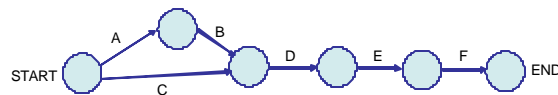
Both network diagramming methods shown in Figure 2-4 and 2-5 can be used to identify the project's critical path and the activity float. The critical path methods are used to calculate the early start and finish dates and the late start and finish dates for all

project activities without consideration of resource limitations. The Critical Path is a path that has zero total float and will delay the completion of the project if delayed.

Dependencies

There are basically four types of activity relationships: Finish - Start, Start - Start, Finish - Finish, and Start - Finish. The activity relationships may also involve lead or lag. Lead is an overlap between two activities and lag is a task-waiting time. Both lead and lag can be used on all four types of dependencies described above.

Gantt chart

The Gantt chart is the most commonly used project management tool used to display activities. The Gantt chart plots activities or events against time or dollars and can provide a great deal of information in a simple format. Using the Action Plan in Figure 2-3 Action Plan Table, the Gantt chart is constructed as shown in Figure 2-6 Gantt chart.

Figure 2-6 Gantt chart
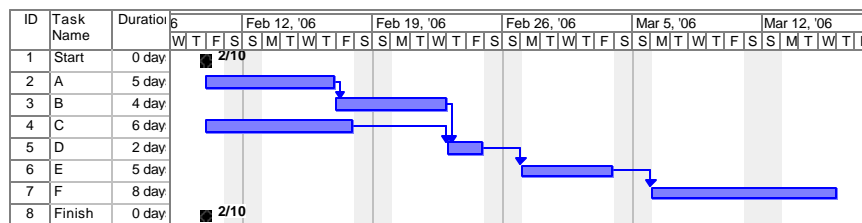
Another advantage of the Gantt chart is that it is easy to maintain and make changes. Gantt charts are the simplest and least complex methods of displaying progress of activities and can be used to identify specific elements, such as behind or ahead of schedule. One major limitation of the Gantt chart is that it is not suitable for a huge complex project.

From the schedule network analysis, a schedule baseline can be developed. The schedule baseline includes baseline start dates, baseline finish dates, schedule milestones, and schedule activities.

Schedule Compression

Some circumstances may force a project to be compressed at its development stage. For example, a government regulation may set a project deadline regardless of the circumstances. Without changing the project scope, project schedules can be shortened.

However, there are always cost and schedule tradeoffs. In order to obtain the most optimal outcome, cost and schedule tradeoffs must be analyzed.

Resource Leveling

Resource leveling is performed to keep selected resource usage at a constant level during specific time periods. Although resource leveling is usually done by shifting project activities within their slack allowances, resource leveling may cause the original critical path to change. There are cost implications to resource leveling, as well as managerial implications. The associated costs tend to be leveled as resources are leveled.

The basic approach to scheduling is to form a network of activity relationships

2.4   *Cost*

Cost estimating is the process used to quantify cost by pricing the resources required to accomplish objectives. It is a single value estimate based on the most likely values of the cost elements of work required by the project. There are several tools and techniques that can be used during the development of cost estimates. Each company uses their unique process that fits with their organization culture.

2.4.1   Types of Cost Estimates

No matter what the project may be, whether large or small, the estimates and type of information needed may vary radically. Order-of-magnitude analysis, approximate estimate and definitive estimate are all types of estimates that vary in their accuracy percentage. Figure 2-7 Cost Estimate Accuracy presents the accuracy percentage of each type.

Figure 2-7 Cost Estimate Accuracy

Cost Estimate Types	Accuracy
Order-of-magnitude analysis	±35
Approximate estimate	±15
Definitive estimate	± 5

2.4.2   Techniques

Top-Down Estimation

The top-down technique, which was introduced in the previous chapter, includes both analogous estimating and parametric modeling. Top-down estimation development is based on the use of the collective judgments and experiences of top and middle managers and available past data when similar activities and projects were undertaken. Typically, these cost estimates are then provided to middle management personnel who are expected to continue to breakdown these global estimates into specific work packages that comprise the sub-projects. This process continues at respectively lower levels until the project budget is completed.

Bottom-Up Estimation

In the bottom-up estimation the activities and their respective costs are determined using the WBS. The estimation here is based on the WBS and the Resource Breakdown Structure (RBS) together by linking the project activities with available resources. After linking the WBS and the RBS, the amount of money required by the project is estimated by adding the quantities of resources needed to each work package and the corresponding unit costs. The people doing the work are consulted regarding times and budgets for the tasks to guarantee the best level of accuracy. The sum of all the WBS elements is equivalent to the cost baseline. The manager must verify that the cost baseline of the project is reasonable.

2.4.3   Cost Estimation Tools

Cost estimation tools include project management software, spreadsheets, databases, simulation and cost estimating software.

2.4.4   Direct and Indirect Cost

Project cost generally includes both direct and indirect cost. Direct costs are those specifically required by the project. They can be identified with a particular project. Direct costs usually include the following:

- **Labor**: The cost of people working on the project.
- **Supplies and raw materials:** The cost of materials required by the project.

- **Equipment**: The cost of tools and machinery required by the project.
- **Travel**: The cost of travel related to the project.
- **Legal fees:** Legal expenses that is related to work on the project.
- **Training:** Training for project team members and project end users.

Indirect costs are those not specific to the project. They are the expenses of doing business that are not readily identified, but are necessary for the general operation of the project and the activities it performs. Indirect costs include the following:

- **Facilities:** The physical location required for the project participants and shared resources.
- **Site-specific requirements:** government charges for business operations.
- **Management and administrative overhead:** The cost of managers and support staff used by the project.

2.4.5   Budgeting

Cost estimates become a budget when it is time-phased. The data used in the budgeting process is cost estimation, WBS, project schedule and the risk management plan. The management plan includes contingency percentage and management reserve. These data are considered as inputs for the process that will help us to allocate funds for the project. The cost estimating tools and techniques are used here to develop the budget.

2.4.6   Contingency

Contingency funds are established to cover errors and risks in project cost estimation that may occur during the project life cycle. When, where, and how much money will not be known until the risks and unexpected cost appears. The amount of the contingency reserve depends on the project type. Usually contingency percentage range between 1 to 10 percents, but in unique and high technology projects it ranges between 20 to 60 percent.

2.4.7   Management Reserve

Management Reserve is an amount of the total allocated budget withheld by contractors for management control purposes. The purpose of management reserve is to provide an adequate budget for in-scope but unanticipated work on the contract. Contracts with greater risk will need a greater management reserve budget. There are no

rules for estimating the amount of management reserve. However, most contractors can determine the budget for their management reserve from their own experience with prior contracts.

Cost estimating is the process used to quantify cost by pricing the resources required to accomplish the project objectives. Each organization must use their unique style and technique in cost estimating and budgeting that fits with their organization culture.

2.5   *Quality*

Quality and the success of a project are defined as meeting the expectations of the customer and upper management in terms of cost, time and specifications of the project.

Since a high standard of quality is expected in delivering projects, the organization should already have established policies regarding quality management. Based on such organizational policies, a quality management system must be developed. The quality management system, if required, should be customized to achieve project requirements.

A good quality management system should address quality objectives, quality assurance, quality control, quality audit and quality Plan.
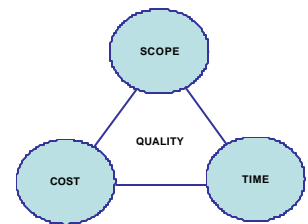
2.5.1 Quality Objectives

Quality objectives must be determined carefully according to organizational standard and customer needs. The objectives should be attainable and specify deadlines. A Project Manager should establish the processes and procedures in order to ensure the quality level through out the project.

2.5.2 Quality Assurance

The quality assurance system should identify objectives and standards, create feedback system, including data collection and performance measurement, and include quality audits.

2.5.3   Quality Control

An effective quality control program should identify what to control, set measuring standards, establish the measurement methods, and describe all processes in detail. As discussed in the PMBOK® (PMI 2004), some useful tools of quality control are: Control charts, Flowcharting, and Histogram. Control charts can be used to collect data and to display how a process behaves over time. For example, control charts can help determine cost variance or schedule variances in a project. Control charts also can be used for a product, such as evaluating the number of defects found during testing of the product.

Figure 2-8 Control chart example
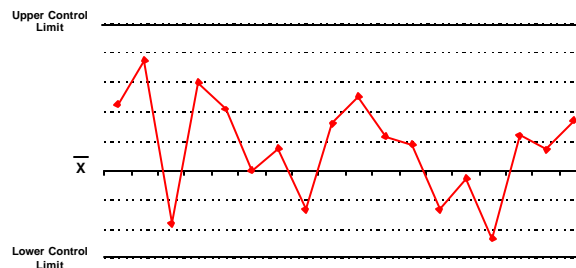
Flowcharting is a tool used to display a process, including decisions and operations. Flowcharting helps to analyze problems in a particular process. There are three basic symbols on this flowchart: squares - which represent activities or tasks, diamonds - which represent decision points, and arrows - which represent flow of control.

A histogram can be used to display a distribution of variables. Each bar represents a specific characteristic of a problem and its height shows the relative frequency of the characteristic.

2.5.4   Quality Audit

Quality audit is defined by the PMBOK® (PMI, 2004) as "a structured review of other quality management activities, with an objective of identifying lessons learned that could improve performance of this project or other projects within the performing organization". It is an independent evaluation performed by qualified personnel. An audit should be done whenever an independent assessment is needed. The audit report findings and recommendations can be used to improve business processes within the organization.

The audit report usually includes a risk assessment. The audit enhances value to the organization by helping the organization accomplish its objectives.

2.5.5 Quality Plan

The Quality Plan is related to the WBS, developed by the project team and monitored by the project manager. In this plan, the team should make sure that all deliverables are broken down until specific actions can be planned to ensure the product's quality. These actions have to be documented and delegated responsible parties. A good Quality Plan should identify internal and external customers, ensure that all parties (suppliers, employees, etc) are aware of the required standards of quality, and have points of control to prove the quality system is working as planned.

2.6   *Teamwork*

2.6.1   Introduction

During the project development phase, you need to identify and assign tasks that will be needed to accomplish the project in its entirety. As Project Manager you will assign tasks to team members according to their knowledge, skills and abilities. Your project team can be built from human resources within one functional organization, or it can consist of members from many different functional organizations. The most difficult task at this time is selecting the right project manager. A project manager who is responsible for the successful outcome of the project heads the project, but the project team carries a huge responsibility on its shoulders that is the success or the failure of the project. Team members are the ones responsible of executing the project, produce reports to the project manager, and make changes and corrections when needed. Each member of this team has individual tasks and responsibilities, which represent a part of the whole project.

2.6.2   The Project Manager's Role

A high performance project manager needs to have not only technical and administrative skills but also interpersonal and leadership and strategic/business skills. During this phase, the project manager has to accomplish the following objectives as part of the project plan -

- Acquire the best possible team

- Set milestones

- Calculate the duration of the project

- Arrive at an optimal project plan and to avoid resources conflicts

- Envision possible risks and their impacts on the project

- Handle risks in a professional way as they appear

- Interact with the customers and ensure that they are satisfied

2.6.3   Staffing Plan

Once the questions indicated in the inception phase are answered, the project manager should use tools such as responsibility matrix charts or text based charts to document roles and responsibilities.   The sample in the appendix, Figure 2-14 Sample Responsibility Matrix, uses the RACI format (Responsible-Accountable-Consult-Inform).

The resulting staff management plan indicates the how and when project team members will be acquired, the criteria for releasing them from the project, and the identification of training needs, the planning for recognition and rewards, the compliance considerations, and the safety issues.

2.6.4   The Project Team

After selecting the members who will execute the project including the project manager, the group needs to come together to perform as an effective team. It is important to align goals, objectives and personality preferences at this stage. Keep in mind that communication is of utmost importance for successful teamwork; therefore, the leader should establish an excellent communication process. The most important tasks that the project team has at this stage are, understanding the work to be completed and planning out the assigned activities in more detail, if needed. Hans Thamhain cited by Cleland gives a specific list of recommendations for helping leaders cultivate high performing teams (Cleland, 2004):

- Plan the project effectively. Involve the team early and set realistic objectives.

- Ensure personal drive and leadership. Lead by example. Leaders must be enthusiastic, competent and committed.

- Ensure senior management support. Sponsorship and a positive organizational environment are critical.
- Build commitment. Collaboration in planning helps team members gain commitment to project objectives and plans.
- Conduct team-building sessions. Team planning meetings, brainstorming sessions, social gatherings are all useful forms of team building.

2.6.5   Team Building Model

The four-stage model developed by Bruce Tuckman is one of the most powerful tools used for team planning and development. Whilst the team goes through this widely referenced "four-stage model" of forming, storming, norming and performing, the communication processes established will set the tone for how it performs. Milosevic (2003) recommends a set of management parameters for each stage. They are: include the critical success factors; important for effective team performance; decisions by each stakeholder including management, team members and other responsible individuals; action items to be taken by them; the required resources and their approval process and the specific results to be delivered at each point in time. During the forming stage the project manager who is performing, as the leader, must show the team clear direction, guidance, image building, vision sharing, close supervision, and considerable top-down decision-making. During the storming stage the project manager has to answer many questions from the rest of the team. The project manager needs to resolve conflicts, facilitate interaction among members, build cross-functional interfaces, provide feedback and foster an environment conducive to mutual trust and respect. It is important to begin social gatherings at this stage. Apart from social activities, challenge and integration workshops during which the team members can review the WBS, share their insights and innovations and provide feedback should be held. At the norming stage, the project manager needs to share power with other team members and encourage self-direction and control but should continue to build confidence. A refined team charter is useful at this stage as the PM continues to deal with issues of workload, performances and integration. During the performing stage the project manager needs to maintain the power balance as the team becomes self-directed.   Figure 2-15 Team Effect on Project in the appendix illustrates the effect that an effective team places on the life of a project.

Acquiring and developing the right project team is critical in the early phases of any project but team building is an ongoing process.

2.7   *Communication*

Communication during the development phase comprises many different facets for managing a project. During the inception phase, communication is described and explained as to the importance and by which channels to use to assist the PM in managing. This chapter builds on to the previous chapter by detailing areas and presenting tools that can be helpful for the PM in order to prevent miscommunication and/or to help mitigate conflicts as they arise. There must be a willingness by all parties to cooperate in order for communications to work most efficiently and effectively. The more mature an organization becomes, the more levels there are to communicate: vertically, horizontally, and geographically. This makes communicating much more difficult and more necessary.

The following areas will be discussed briefly:

- Negotiation – using Circle Chart, BATNA and/or Jujitsu approaches
- Conflict Management – using Conflict-Handling Modes
- Commitment Management – using Commitment Management Protocol
- Managing within an international environment

Following the PMBOK processes,

Figure 2-9 Communication Planning shows the inputs needed to build the communication plan. The tools and techniques are suggested methods to assist in enhancing communication within the project.

Figure 2-9 Communication Planning

Tools & Techniques

Circle Chart
Conflict-Handling Behavior
Commitment Protocol

Input

Project Management Plan
Communications Requirement Analysis
Change Management Plan

Communication Planning

Output

Communications Plan
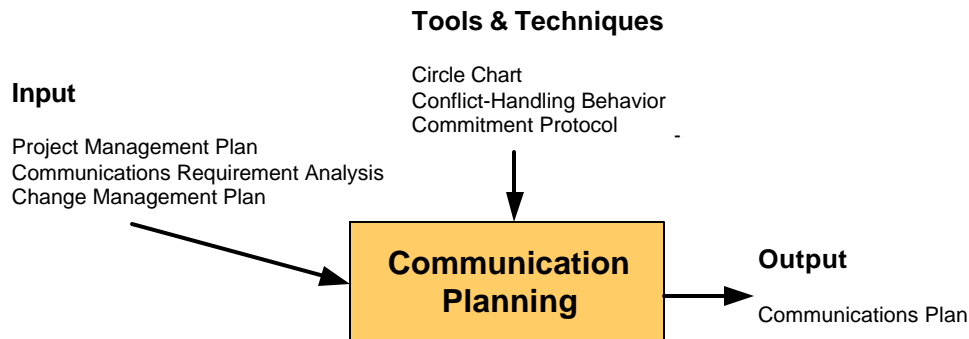
2.7.1   Negotiation

Negotiations are often thought of as being used for marketing/sale's pitch. However, people do not realize that they are negotiating in every day of their life. In order to communicate, some type of negotiation is occurring. Staffs negotiate with managers on tasking, taking time off, priorities, etc. and vice versus. So to be able to apply "good" negotiation skills or tactics, this can help significantly in making the project to run smoother.

A technique that can be used to help understand and define the problem or issue in order to come to an agreement that is useful for all parties is shown in the appendix, Figure 2-16 Circle Chart. There are four steps: define problem, analyze problem, create strategies, and implement strategies. In theory, the manager and team should take the time to proceed through each step, however; in reality, projects will jump from step 1 to step 4 without spending the time to analyze and create strategies.

Develop a Best Alternative To a Negotiated Agreement (BATNA). "One's BATNA is the standard against which any proposed agreement should be measured." (Fisher & Ury, 1991, page 100) This puts parameters as to not accidentally accepting terms that are unfavorable or not accepting terms that would be in your best interest to accept.

Another technique that can be used in conjunction with the previous two techniques is Jujitsu Negotiation. This is used to counter attacks. In order to accomplish this best is to "not push back". One can accomplish this by first using questions instead of using statements and then to be silent. Instead of aggressively reacting to an attack or

unfair proposal, just sit silently. This type of reaction tends to leave the other party uncomfortable because they assume the discussions are at a stalemate. Therefore, they will try to break the ice by either suggesting another option or answering your question.

> ***The key is to agree on what you disagree so you know exactly the issue in dispute.***

2.7.2   Conflict Management

Managers are always involved in conflict management and resolution. Whether the conflict is with the manager itself, between staff on his/her team, between functional groups, or other levels of management, refereeing is an invisible part of the manager's job description. Being able to fine-tune these skills can have immeasurable success for the manager. As shown in the appendix

There are five modes of conflict handling: competing, compromising, collaborating, avoiding, and accommodating. The optimal outcome is to have a win-win situation. Creating a collaborative environment will help one to accomplish a win-win solution. The worst environment to create is an avoidance environment. By avoiding issues and problems, the tension is felt, but neither party is aware of each other's problem. Too much assuming is involved which wastes much unnecessary energy rather than focusing on the "real" issue/s.

2.7.3   Commitment Management

Often there is misunderstanding of who is responsible for certain tasks. The outcome of this can cause people to wait for a tasking that they will never receive because the one tasked did not know they had an action item. In order to "try" to mitigate these issues, a commitment management protocol diagram can be used to layout exact roles and responsibilities.

Figure 2-10 Commitment Management Protocol

"Adaptive Enterprise" by Lester Haeckel
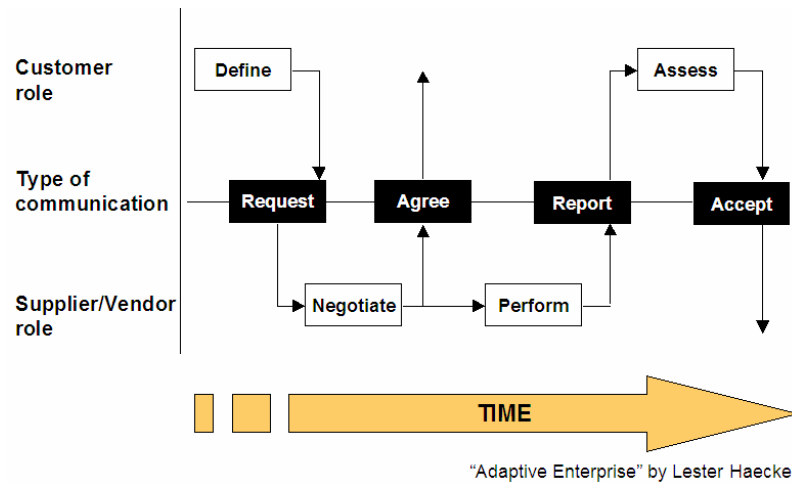
The white boxes represent tasks and the black boxes represent communication. There are four tasks and seven communications (only four are shown in this diagram). The tasks are to define, negotiate, perform, and assess. The communications are offer or request, reject or agree, report, accept, and withdraw (which can happen at any time throughout this process). This protocol designates responsibility and shows the lifecycle of the commitment (i.e. time).   The purpose is to be used to avoid miscommunication on what is committed and who is accountable for each tasking.

"Good communication" really becomes a value system.

2.7.4   Managing within an International Environment

If you look around the workplace, many of the teams/employees are from different international backgrounds. A manager needs to be aware of cultural differences, gestures, non-verbal communication, and distancing. For example eye contact is very important in the Japanese culture, short distance comfort for Latin Americans, Italians, southern French, and Arabs, as opposed to Germans, Americans, Chinese, and Japanese sit and stand further apart. Body language, facial expressions, time, touch, and gestures can sometimes contradict the communication that is trying to be conveyed. Being aware of these actions can actually be used to compliment the communication and conversation.

Overall Communication TIPS:

Tailor communication plan to the size and complexity of the project.

Communicate directly and simultaneously to everyone affected by the change and all parts of the enterprise.

Schedule messages and actions to ensure that promised action would happen while message is still fresh in the audience's mind.

Stay in control of the amount of information that is going out, the audience it is intended to reach, and the timing of the information released.

2.8   *Risk*

As stated by Heldman (2005), "Can you name the ultimate project management four letter word? You guessed it: R-I-S-K." (p. 1). Risk management is, according to Caver (as cited in Pritchard, 1997), the "method of managing that concentrates on identifying and controlling the areas or events that have a potential of causing unwanted change...it is no more and no less than informed management." It is any issue, concern, or uncertainty that can adversely affect a project's technical, cost or schedule performance.

Risk is inherent in all projects. The PM is ultimately responsible for planning, allocating resources, and executing risk management. During the Development Phase of your project, you will begin your risk planning and start to perform risk assessment from the project manager's perspective.

There are three main components to project risk management that need to be accomplished during this phase:

Establishing the Project Risk Management Strategy – includes tailoring the Risk Management Framework as appropriate, identifying responsibilities, and establish monitoring and controlling methods. The strategy is documented in a separate Risk Management Plan (RMP) or as part of another project plan. The risk plan describes

methods for assessing (identifying and analyzing), prioritizing, and monitoring risk drivers; developing risk-handling approaches; and applying adequate resources to handle risk. It assigns specific responsibilities for these functions, and prescribes the documenting, monitoring, and reporting processes to be followed. The risk plan does not address force majeure risk, insurance risk, safety risk, or accident risk. (Pritchard. 1997) A sample outline of a risk plan is included in the appendix.

Identifying and Analyzing Risks – identifies risks faced by the project and analyzes and prioritizes them. This is a continuous process throughout the project. Risk sources – things each project should look at as possible causes of risk. Risk categories – groups into which risks are organized, based on their area of project impact. Risk parameters – criteria for evaluating risks, thresholds at which risk mitigation actions should occur, and bounds on the application of thresholds. See Figure 2-19 Sample Risk Sources, Figure 2-20 Risk Categories, and Figure 2-21 Risk Assessment Guidelines in the appendix for examples.

Mitigating Risks – includes planning for how each identified risk will be handled to avoid its occurrence or reduce its impact, carrying out mitigation plans as needed, monitoring risk mitigation activities, and reporting results.

Risk management is carried out at the project level, building on the risk framework.

There are three elements to project risk management: establishing a strategy, identifying and analyzing risks, and mitigating the risks

Document risk decisions in the project's Risk Management Plan.

Contracts

The transition into the development stage of the project life-cycle redirects the focus of the contract from that of securing an agreement for the rights to pursue the project to that of creating contracts that would ultimately ensure the proper implementation of all activities necessary for the successful completion of the project.

Hence, the emphasis shift is on creating contracts for procurement needs such as supplies, materials and services, human resources and other subcontracting needs.

There are lots of resources available on Project Management websites as well as within the organization (sometimes) regarding the area of contract development. It would serve the PM well to research the latest contract development information available that is specific to your particular industry. There is also information available in journals such as Project Management Journal, Construction Management, Cost Engineering among others.

It is crucial as a Project Manager that you are always cognizant of the fact that contracts are about developing and maintaining business relationships / partnerships between both parties of the contracting process. Contracts affect overall project success and should be carefully formulated.

If you are functioning within an organization with a Project Management Office (PMO), then resources are available to you through that office. Otherwise, seeking help from experts is recommended – though you are Project Manager you may not be an expert in the field of contracting even though you have determined the type of contracts you need for the project. The Project Management Institute (PMI) is a valuable partner and source of information.

You are responsible for performing activities that would determine and finalize contracts with respect to: Supplier Availability; Contractual Pricing; Approved Subcontractor Lists; and Human Resource Availability. Figure 2-11: Plan Contracting provides a template from PMBOK® 2004 that shows what sources of information are needed for Plan Contracting.

Figure 2-12: Plan Contracting

INPUTS	Tools & Techniques	OUTPUTS
Procurement Management Plan		**Procurement Documents**
Contract Statement of Work	Standard Forms	**Evaluation Criteria**
Make or Buy Decisions	Expert Judgment	**Contract Statement of work (updates)**
Project Management Plan: - Risk Register - Risk Related Contractual Agreement - Resource Requirements - Project Schedule - Activity Cost Estimate - Cost Baseline		

Plan Contracting: Inputs and Outputs

Adapted from PMBOK® 2004

It is important to consider the process so that you cover all the bases in developing your project contracts. Your ultimate goal within the area of contracts in the development phase as project manager is to:

- Develop contract documentation that would detail the arrangement between subcontractors and the project

- Develop contract documentation that would detail the arrangement with suppliers and the project

Under the category of contract documentation for subcontractors, there are two sub-categories namely: **Internal Contracts**: These are contracts used to secure and formalize the agreement for personnel from other departments within the organization promised to the project. This may be done using Project Work Authorizing Agreements (PWAA). A template may be created unique to your organization and needs that entails vital information on the project details, resources to be assigned, budget, statement of work among others, which would serve as an informal agreement document within the organization.

Figure 2-22 Project Work Authorizing Agreement Sample in the appendix contains one such example. **External Contacts**: These are contracts used to secure subcontractors external to the organization.

> *Remember that your contracts determine the environment under which your project is implemented. For your project to be successful it is important to develop contracts that promote the idea of partnerships, and emphasize mutual benefits for both parties!*

Having completed the development phase for your project contracts (though there will be incidents of change throughout the project lifecycle), you are ready to begin the implementation phase. You are about to see the benefits of all your hard work put into the contract development phase as well as the initial phase.

> *Do as many iterations of the process as necessary until both parties agree to the final contract. Solid planning and development will help you cope with inevitable project changes – so "develop" well!*

2.9   *Project Management Office*

There is no single Project Management Office (PMO) model that fits every project. If an optimal balance of specialization, flexibility and discipline is engineered into a PMO, it will reduce waste, eliminate rework and save time and money. An efficiently operated PMO can serve as a platform for managing change throughout an organization. The decision to deploy any type of PMO in a given organization should be made on a case by case basis. To achieve the benefits of a PMO, it must be right sized to the project it's managing. David Tilk (XXXX) suggests four types of PMOs to choose from. These are as follows:

- Tactical - for small self contained projects

- Cross-functional - for medium to large projects utilizing a set of diverse project controls

- Strategic - for projects that are directly linked to the overall strategy of an organization

- Enterprise - provides project portfolio management, enterprise resource management and organization-wide centers of excellence dedicated to strategic project management methods and enterprise support tools.

As Project Manager, you need to consider the following three essential steps for sound implementation of a PMO after you have determined that your project needs to interface with a PMO:

- Step 1 - Define Your Objectives. The structure and processes of your PMO will be expressly aligned with the goals of the various projects of the organization.

- Step 2 - Review Your Project's Characteristics. The unique characteristics of your projects will guide you in structuring the scale and functions of your PMO.

- Step 3 - Map your Project Theoretically to a Proposed PMO Structure. To ensure success, the staffing and building of infrastructure for your PMO will need to be tailored to the specific needs and characteristics of the PMO model you select.

-

It would be good to research the PMO models being used by other organizations within your industry. There may just be some best practice situations that you can benefit from!

Implement your PMO in accordance with your organization's culture, requirements, and governance. Pay attention to all your project stakeholders for they have a significant part to play in the successful execution of projects through the PMO. Some of these stakeholders would be for example Senior Management who is responsible for formulating strategies, have overall business responsibilities, and provide the final decision in conflict resolution. The Project Sponsors are crucial stakeholders and they

request the project work and have the final approval over deliverables and expenditures. The organization's Line Managers can make your request for resources an easy exercise since they have overall responsibility for resources used in the project's execution. Sub contractors, vendors, and other external partners linked to the project by their commercial transactions referred to as third parties; also have their part to play in your PMO functioning efficiently and successfully.

The development phase of the PMO is critical. You need the support of all project stakeholders so get them involved in the decision making process that has an impact on their relationship with the project.

It is at this time that the project team is selected and assigned tasks; The project scope, initial estimates, assumptions are revised and refined; Resource calendars are verified and necessary changes are made with the project sponsor; The WBS is refined and all work packages are defined; and a performance baseline is established. During this phase the organizational project management method is adapted and tailored to the needs of the project.

Transitioning into the implementation phase of your PMO will verify whether you have developed it well enough so that it will function to specifications and the project can reap benefits as it interfaces with it. This is your project's life line – Keep stakeholders updated!

2.10   Other Areas

2.10.1   Maturity Models
Kerzner (2003) suggests the following maturity definition:
> "Maturity in project management is the implementation of a standard methodology and accompanying processes such

that there exists a high likelihood of repeated successes." (p. 59)

The Capability Maturity Model® Integration (CMMI) developed by the Software Engineering Institute (SEI) is a process improvement approach that provides organizations with the essential elements of effective processes. It can be used to guide process improvement across a project, a division, or an entire organization. CMMI helps integrate traditionally separate organizational functions, set process improvement goals and priorities, provide guidance for quality processes, and provide a point of reference for appraising current processes.

The Organizational Project Management Maturity Model (OPM3^{TM}) developed by the Project Management Institute (PMI) provides the building blocks for knowledge about organizational project management maturity. It provides a comprehensive body of knowledge regarding what constitutes Best Practices in organizational project management.

2.10.2   External Inspections / Audits

Your project may have the requirement to be routinely inspected and audited by external governmental agencies. At the Federal level, the "Defense Contract Audit Agency, under the authority, direction, and control of the Under Secretary of Defense (Comptroller), is responsible for performing all contract audits for the Department of Defense, and providing accounting and financial advisory services regarding contracts and subcontracts to all DoD Components responsible for procurement and contract administration. These services are provided in connection with negotiation, administration, and settlement of contracts and subcontracts. DCAA also provides contract audit services to some other Government Agencies." (DCAA, 2006)

State and local governments will also their own inspection and audit agencies, ranging from building inspections, to formal contract audits. Regardless of who is conducting the audit, the project manager sets the standard by which the project team will emulate in their dealings with outside agencies.

Always conduct yourself with the highest professionalism and ethics.

Appendix

Figure 2-13 Project Plan Elements

Project Plan Elements

Overview – short summary of the objects and scope of the project

Objectives – more detailed statement of general goals

General Approach – description of the managerial and technical approach

Contractual Aspects – a complete list and description of all reporting requirements, customer-supplied resources, liaison arrangements, advisory committees, project review and cancellation procedures, proprietary requirements, any specific management agreements, technical deliverables, delivery schedule, and scope change procedures.

Schedules - outlines various schedules and lists all milestones

Resources – both capital and expense requirements are detailed by task, cost monitoring and control procedures are described

Personnel – lists the personnel requirements, including special skills, knowledge or abilities required

Evaluation Methods – describes the procedures to be followed in monitoring, collecting, storing, and evaluating the history of the project

Potential Problems – this is your risk management philosophy and plan (Meredith & Mantel, 2003,p. 245-246)

Figure 2-14 Sample Responsibility Matrix

	Person			
Activity	Resource 1	Resource 2	Resource 3	Resource 4
Procure	A	I	C	R
Report	R	A	I	C
Implement	C	R	A	I
Test	I	C	R	A

R=Responsible A=Accountable C=Consult I=Inform

Figure 2-15 Team Effect on Project
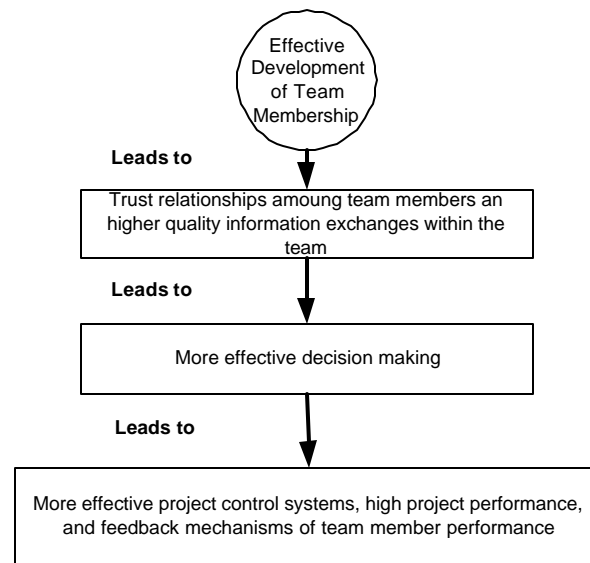
Figure 2-16 Circle Chart
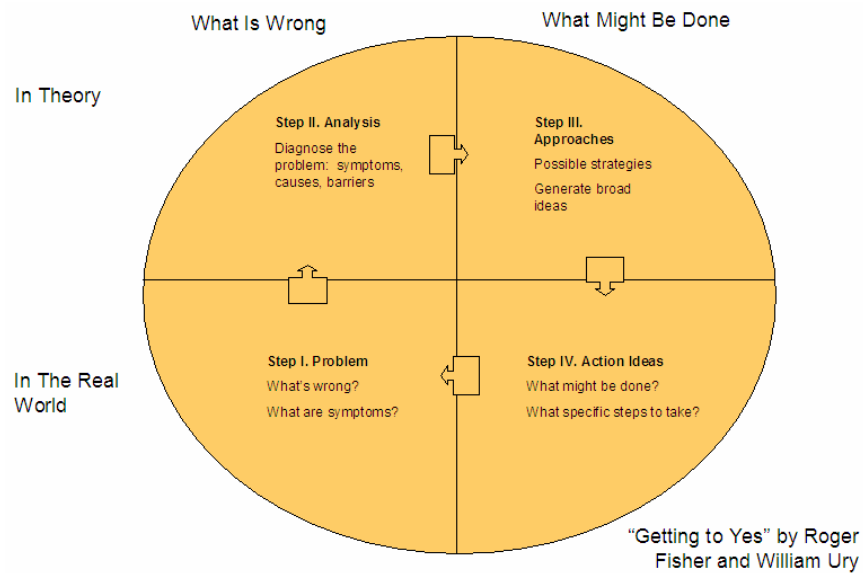
Figure 2-17 Conflict-Handling Modes

Mode	Level of Assertiveness	Level of Cooperation
Competing	High	Low
Compromising	Moderate	Moderate
Collaborating	High	High
Avoiding	Low	Low
Accommodating	Low	High

Summary of Thomas and Kilmann's (1974) communication style of conflict-handling behavior based on Blake and Mouton's (1964) categories of conflict style.

Figure 2-18 Sample Format for Risk Management Plan

Introduction. This section should address the purpose and objective of the plan, and provide a brief summary of the program, to include the approach being used to manage the program, and the acquisition strategy.

Program Summary. This section contains a brief description of the program, including the acquisition strategy and the program management approach. The acquisition strategy should address its linkage to the risk management strategy.

Definitions. Definitions used by the program office should be consistent with industry definitions for ease of understanding and consistency.

Risk Management Strategy and Approach. Provide an overview of the risk management approach, to include the status of the risk management effort to date, and a description of the program risk management strategy.

Organization. Describe the risk management organization of the program office and list the responsibilities of each of the risk management participants.

Risk Management Process and Procedures. Describe the program risk management process to be employed; i.e., risk planning, assessment, handling, monitoring and documentation, and a basic explanation of these components. It should address how the information associated with each element of the risk management process will be documented and made available to all participants in the

process, and how risks will be tracked, to include the identification of specific metrics if possible.

Risk Planning. This section describes the risk planning process and provides guidance on how it will be accomplished, and the relationship between continuous risk planning and this RMP.

Risk Assessment. This section of the plan describes the assessment process and procedures for examining the critical risk areas and processes to identify and document the associated risks.

Risk Handling. This section describes the procedures that can be used to determine and evaluate various risk-handling options, and identifies tools that can assist in implementing the risk-handling process.

Risk Monitoring. This section describes the process and procedures that will be followed to monitor the status of the various risk events identified. It should provide criteria for the selection of risks to be reported on, and the frequency of reporting. Guidance on the selection of metrics should also be included.

Risk Management Information System, Documentation and Reports. This section describes the MIS structure, rules, and procedures that will be used to document the results of the risk management process. It also identifies the risk management documentation and reports that will be prepared; specifies the format and frequency of the reports; and assigns responsibility for their preparation. (Defense Acquisition University, 2003)

Figure 2-19 Sample Risk Sources

Risk Source	Description
External dependencies	Dependency on a vendor, subcontractor, or co-contractor that, if not met, could impair our ability to perform.
Staffing	Availability of adequate staff with the right skills. Dependency on key staff members whose loss could create risk. Aggressive hiring plans that may be difficult to achieve.

Estimated cost items	Items for which we have included an estimated cost, where real cost may differ – for example, the cost of purchasing a needed system component or of establishing a new facility
Incomplete or unclear requirements	Requirements that aren't fully defined or understood, which may affect the realism of our cost and schedule, the validity of our technical solution, or our ability to meet our customer's expectations.
Potential requirements changes	Any changes we might envision occurring later in the program that could invalidate our solution, requiring major rework. We may choose to make our design more flexible to accommodate such changes more easily.
Technological challenges	Elements of the project that involve new technologies that may fail to perform as expected, or that require particularly difficult engineering work or tasks/processes with which we lack prior experience
System performance/ capacity challenges	System requirements that establish criteria for how fast the system responds to users, what throughput is required, or capacity of information to be stored.
End user acceptance	Any concerns that the requirements may not reflect end user expectations/needs. Other reasons that our product/service may not be embraced by the intended users.
Performance-based contracting challenges	Ability to meet performance measures associated with seat-managed or similar contracts, where any shortfall affects our earnings.
Customer support	Any risks/concerns regarding our customer's commitment to and support for our work. Issues

	associated with possible changes in customer personnel.
Customer funding	Any risks regarding availability of funds required to complete the project.
Societal/cultural/political factors	Dependency on political parties, factions, or lobbies, acceptance by cultural groups or populations, actions of foreign governments, etc.
Vulnerability to natural or man-made problems	Dependencies on weather, e.g., for construction or for satellite operation. Potential impact of natural disasters. Vulnerability to physical or cyber intrusion.
Assumptions	Any assumptions made developing our proposed solution and price. If these assumptions are not met, impact on our ability to perform is likely.

Figure 2-20 Risk Categories

Risk Category	Description
Cost	The risk jeopardizes our ability to complete the project within the estimated cost.
Profit	The risk jeopardizes the profitability of the contract to .
Schedule	The risk jeopardizes our ability to deliver the system or services on schedule.
Performance	The risk jeopardizes our ability to deliver a system or service that meets contractual requirements.
Customer Satisfaction	The risk causes uncertainty that we can deliver a system or solution with which the customer is happy.

End User Satisfaction	The risk causes uncertainty that the system will meet end users' needs and expectations.
Company Image	The risk has the potential to result in negative impact on 's image, within this customer community or potentially in the press.

Figure 2-21 Risk Assessment Guidelines

Risk Category	1 - Minor	2 - Moderate	3 – Significant	4 - Severe	5 – Catastrophic
Cost	Cost overrun in parts of project requires use of management reserve; budget not exceeded.	Cost increase of 1 to 5%.	Cost increase of 6 to 20%.	Cost increase of 21 to 50%.	Cost increase of greater than 50%.
Profit	Profit decrease of 1 to 10%.	Profit decrease of 11 to 40%.	Profit decrease of 41 to 70%.	Profit decrease of 71-100%. No work performed at cost to .	No profit to . Some work performed at cost to .
Schedule	Schedule slip in one or more tasks that can be accommodated by adjusting schedule; no impact on delivery.	Minor slip of a deliverable that does not impact customer's mission.	Slip in one or more tasks that result in deferring or dropping some of planned capability.	Slip in anticipated delivery that significantly threatens customer's mission performance, resulting in scope renegotiation and loss of planned future capability.	Slip in anticipated delivery that will make the product obsolete or useless to the customer, resulting in termination of most or all tasking.

Risk Category	1 - Minor	2 - Moderate	3 – Significant	4 - Severe	5 – Catastrophic
Performance	System or service will fail to meet one or more performance requirements (e.g., capacity, response time), but is usable for customer's mission. The problem can be resolved with minimal mission impact should that occur (e.g., adding hardware or staff).	System or service will fail to fully meet one or more performance requirements, resulting in degraded support for customer's mission. The problem can be resolved but not without a period of unsatisfactory performance..	System or service will fail to fully meet one or more performance requirements, resulting in degraded support for customer's mission. There is no resolution compatible with our approach, resulting in continuing sub-par performance.	System or service will fail to fully meet one or more performance requirements, resulting in severely degraded support for customer's mission. Users must rely on alternatives for part of their mission, and 's contract scope is reduced.	System or service will perform so poorly that it cannot support the customer's mission and cannot be made to do so within reasonable time and cost, resulting in termination of contract.
Customer Satisfaction	Informal complaint from customer	Formal complaint from customer	Significant negative talk about within customer's agency.	Customer insistence on rework/ corrective action at non-trivial cost to .	Customer termination of contract.
End User Satisfaction	A minority of users find the product somewhat difficult to use or do not feel that all of their needs and expectations are fully met, but no changes are deemed necessary by the customer.	Some users do not feel that all of their needs and expectations are fully met, resulting in change requests that are easy to address.	A majority of users have a need that is not fully addressed that impacts their ability to perform their mission; it is correctable without changes to technology or cost overrun.	A majority of users have a significant need that is not addressed that impacts their ability to perform their mission; correction impacts cost and schedule, and may require technology changes.	Users are unable/ unwilling to use our product to perform their mission, and must continue working as they do now. Customer elects to abandon the program.
Company Image	Some negative comment within customer community.	Negative articles in trade press.	Negative publicity in mainstream media (newspapers, television).	Congressional or other highly-visible investigation not resulting in loss of contract.	Congressional or other highly-visible investigation resulting in loss of contract.

Figure 2-22 Project Work Authorizing Agreement Sample

Adapted from: Project Management Handbook, 2002, pg. 84

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Implementation

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3.0   Implementation

3.1   *Introduction*

The implementation chapter will elaborate on the fundamentals of project management practice applications during project execution. These are: directing, monitoring, forecasting, reporting, and controlling. The following major topics will be covered in detail in this chapter as they relate to the implementation phase: scope, schedule, teamwork, communication, risk, contract, cost, quality and project management office functions. This chapter will also touch on other areas in project management as they pertain to the implementation phase of a project. The following were identified as other areas in this chapter: ethics, culture, roles and responsibilities of the project manager during the execution phase, governance, and maintenance planning.

These are not unique to any project and may not be the case during the execution of some projects. The topics in this chapter may seem to stand-alone but in actuality they all work in tandem with each other during project execution.

Project implementation is the execution and control of processes. According to the PMBOK® Guide 3rd edition, (PMI, 2004) Figure 3-1 Execution and Control Processes illustrates these processes.

Figure 3-1 Execution and Control Processes

Executing Processes	Controlling Processes
*Project Plan Execution	*Integrated Change Control
*Quality Assurance	*Scope Verification
*Team Development	*Scope Change Control
*Information Distribution	*Schedule Control
*Solicitation	*Cost Control
*Source Selection	*Quality Control
*Contract Administration	*Performance Reporting
	*Risk Monitoring

The purpose of project execution and control is to develop the product or service that the project was commissioned to deliver. Typically, this is the longest phase of the project management lifecycle, and where the most resources are applied.

Project execution and control utilizes all plans, schedules, procedures and templates that were prepared and anticipated during prior phases. Unanticipated events and situations will inevitably be encountered, and the Project Manager and the Project Team will be taxed to capacity to deal with them while minimizing impact on the project.

The conclusion of this phase arrives when the product or service is fully developed, tested, accepted, implemented and transitioned to the performing organization. Accurate records need to be kept throughout this phase because they serve as an input to the final phase, project closeout.

Start Up

Moving from planning into execution can be a major obstacle to successful project delivery. A project kick off meeting can facilitate the transition from planning activities and tasks to executing them. A kick off meeting enhances execution by focusing the team on the project and by defining a starting point for beginning project execution. Additionally, it is a milestone where all resources needed to begin execution are assembled and available to the team.

The kick-off meeting provides an opportunity for communication and establishing the commitment of the team and stakeholders to the success of the project. The focus of the meeting is communications, identification of team members and stakeholders, reviewing the project scope and business objectives, identifying the challenges, and identifying the next step in getting the project underway. At this point, team members and team leads must, at a minimum, have copies of the schedule. The schedule must identify to each person his specific tasks and dates for starting and completing them. After this event, the implementation phase activities start in earnest.

3.2   *Scope*

The Implementation or Execution Phase is where the project is at its greatest risk for failure. The most important thing in this phase is to be disciplined in following the plans that have been developed in the planning phase and to use the Change Management process when they need to be modified. It is also important to recognize the practical

truth that the plans will not survive the execution intact, but disciplined execution of the plans will allow the project's challenges to be overcome. This is where the project manager's skills come into play.

The project management function shifts its focus in the execution phase. While the previous sections focused on what to do, and why to do it, this section focuses on the best way to do it. The approach is at a more practical, hands-on level, with each best practice identifying practical tips for best results and describing additional considerations that may impact the project's success.

It must be stated however, that scope issues at the implementation phase are not looked at in isolation from other project management areas like schedule, quality, cost, risk, teamwork, and etc. These are considered in conjunction with the scope since working within the stipulated scope of the project at this phase involves a close monitoring and controlling of these other project management areas as well. Good co-ordination of these areas is key to the delivery of the specified output.

At the implementation phase, the Project Manager must execute the work in accordance with the terms and conditions of the contract. The scope should be clearly defined as part of the project definition. Much of the Project Managers' work during the execution phase must be directed at agreeing to the optimum definition of the project - both in terms of its deliverables and in terms of how it will operate. This scope definition should form the baseline against which potential changes could be assessed and against which the project's performance is measured during the implementation phase.

The PM will ascertain that the general scope of the work and general clarifications of the specifications are listed in the contract document. Also, at this stage the Project Manager must resolve inconsistencies between the specifications and his/her company's standard policies on a case-by-case basis.

The foundation of effective project management is the identification of the scope of the project and the organization of the scope into a comprehensive work breakdown structure (WBS). The PM must integrate all phases of the project from the inception and development phases to the implementation phase, through the close out phase in accordance with a defined WBS.

Additional work requested by, the customer, that is not included in the scope of work will require a change order to the contract with the appropriate compensation and time adjustments for the change in scope.

Changes to the contract must be controlled and negotiated to ensure that all involved parties fully understand any technical, cost and schedule impacts that may result. During the implementation phase, the PM must ensure that the execution plan is periodically updated, as required, to reflect any approval changes to the scope, schedule, cost, or quality requirements of the contract. A change order log will be maintained by the Project Manager to provide a detailed chronological record of changes.

Changes to the scope, schedule, cost or quality requirements of the contract will be submitted by the PM on a change order form. This form requires review and approval by the customer prior to inclusion into the baseline for the project. Both the PM and the client must approve these scope changes. Also, the PM before approval should research into the technical feasibility of any requested scope changes. The decision whether to accept or reject a change during the implementation phase should be based on a number of rules. The fundamental logic should be:

Is the change unavoidable (e.g. legislative changes, mergers, etc)?

Does the change increase the overall benefit to the organization (taking into account any impact on the costs, benefits, timescales and risks)?

Is the Project Team able to make such a change?

Is the change best done now, or would it be more beneficial to defer it until the current work is complete?

The PM at the implementation phase must see to it that "The Change" Control process involves a combination of procedures, responsibilities and systems. The key to success is to have a well-controlled but efficient process. The PM or project team must define and agree:

on what basis changes should be approved,

who does what,

the membership of the Change Control Board(s),

the detailed procedures, forms, etc,

protocols for levels of authority, e.g. what types of change can be approved without reference to the project's business owners,

linkage to other management procedures, e.g. the issue management process, configuration management,

which tools will be used to support and manage the process,

how to communicate and promote the process and its importance to all participants.

There should be reasonable accommodation for any scope changes made at this stage in the project life cycle since scope changes are almost inevitable. As Kerzner (2003) puts it, very few projects are completed within the original scope of the project. Scope changes are inevitable and have the potential to destroy not only morale on the project, but the entire project. (Kerzner, 2003, p.6)

There is also the risk of having serious cost overruns, negative impacts on the schedule, disregard of quality issues, and an increase in project risks if scope changes are not well managed or worked according to the project plan during the implementation phase. The PM however, must look out for the use of "scope change" as a tactical behavior. Sub-contractors may intentionally try to expand the size of their contract by establishing scope changes that lead them to do additional work outside the original agreement. Some contractor's under-bid the cost of the work to gain the contract, in the belief that they will be able to make their profit out of scope changes. (www.epmbook.com, 3/16/2006)

The Project Manager can also use various methods to ensure proper monitoring of the scope that include regular field visits, client briefings, providing project progress reports, and monitoring approved project plans.

3.3   *Schedule*

"A schedule is the conversion of a project action plan into an operating timetable." (Meredith & Mantel, 2003, P.379). "Project schedules may include all tasks and estimated work hours for the entire project or it may represent a "phased" or "iterative" approach to the project." (Johnson Controls, 1999 PMDP manual p.35) The project schedule is a yardstick by which the PM can measure the success or progress of the project with regards to time and cost. Based on what might have gone into the

development of the project schedule at both the inception and development phases, the schedule management at the implementation phase should be centered on the baseline schedule developed from these previous phases. Reporting statuses for the purposes of management should be verified against the detailed portion of the project schedule. Monitoring the critical path is essential at this stage because, the critical path of project(s) has little or no slack time. All schedule changes must therefore be analyzed for impact on the project's critic al path, since such changes will result in deviation from the project schedule. The Project Manager must constantly identify critical paths and work hard to avoid slippages. Any slippage or delay on a critical path or paths could result in major delays in the project completion time.

Monitoring of the planned versus actual starts and completions provides a gap analysis and leads the Project Manager to the identification of overall trends. The status of tasks should then be reported as:(1) Not Started - 0 %, (2) Started/In Process - 1-99 % (3) Completed - 100%

Monitoring The Schedule: during the implementation phase, the PM should also use necessary metrics to capture the reporting period and the plan to date. These are: Number of (1)"Planned Starts" (2) Number of "Planned Completed" (3) Number of "Actual Starts" (4) Number of "Actual Completed" (5) Number of tasks reporting > % completed and (6) Total number of project tasks.

The PM can use various scheduling techniques such as the Program Evaluation and Review Technique (PERT), the Critical Path Method, and Gantt Charts for monitoring and control.

In managing the schedule at the implementation phase, particular attention should also be paid to the following: a) Dependencies and Interdependencies of Tasks, b) Earned Value Analysis, c) Critical Path or Paths d) Floats, e) Lags, f) Leads.

The above give a good indication of what ought to be done and when it should be done in the projects life cycle. Also, knowledge of the dependencies and interdependencies of tasks is important in ensuring that delays or other issues on a task do not affect the scheduled completion of other tasks.

When necessary, and when approved during the implementation phase, the PM can hasten project completion or schedule in order to stay on schedule after delays, by using fast-tracking or crashing technique.

Controlling The Schedule: The following are some methods or procedures the PM could use to control the project schedule during the implementation phase: "(a) Collect actual data, and status the schedule, (b) Analyze any variances to identify problems, (c) Promptly find solutions to the problems identified, (d) Communicate project status to the team and all stakeholders (e) Look ahead a couple of weeks in the schedule". (Johnson Controls, Inc. 1999 PMDP manual).

3.4   *Cost*

Once the budget has been approved and formally established as the baseline it can be utilized to monitor and control costs. This baseline budget should include material cost, labor man-hours, and associated labor rates to carryout the elements of the project based on the WBS. During the implementation stage, it is prudent to break down the work included in the WBS with a linked sub-account number for time-phased budgeting and to allow for the collection of costs. The PM should report the financial status of the project to stakeholders on a regular basis with monthly reconciliation of cost variances.

Also at this stage in the project, the PM should ascertain that the materials described in the estimate are reconsolidated with the grade, cost and/or price as stipulated in the code of material, specified in the planning phase. The end product of any materials and equipment estimate should be the master equipment list. This list should be utilized from procurement through startup and commissioning of the project. The PM should specify who is responsible for procurement of material or equipment (i.e. subcontractor or preferred vendor) not included in the organization's in-house product line.

The PM should be diligent in documenting scope and design changes to help control the cost of the project. This documentation allows for the PM to monitor change variances from which he/she can assess the financial impact to the project.

Monitor and Control Costs

The PM should, as matter of good practice, compare the planned costs (baseline) against actual costs, which will allow for performance measures during this stage in the project. This is essential to project progress, a way to determine productivity and a way

to ascertain whether the project is progressing as expected. It is important to keep track of the actual costs for each work package. Comparing this data with projected expenses may be helpful in evaluating the project to some degree, however, there are some drawbacks associated with this type of analysis. Comparing planned and actual cash flows cannot tell you about the "physical" progress of the project. The rate at which money is being spent does not indicate whether or not the corresponding work is actually getting done. For example, you may have spent 40% of the planned budget at the time of analysis but are only 20% done with the project. "Physical" progress of the project can be determined through the implementation of Earned Value calculations, which is a method that measures the progress of a project and is represented in the figure below.

Image obtained from http://www.ams.mod.uk/ams/content/docs/evm2/image1.gif

Please refer to Table 3-1 **- Glossary of Earned Value Terminology** for earned value terminology and calculations.

The following is adapted from Tammo Wilkens (1999), the author of ***Earned Value, Clear and Simple,*** and identifies key steps in utilizing earned value at the implementation phase of a project. At this stage in the project, the PM should:

Enter the actual costs of the activities – the actual costs should be entered into the schedule. This information can be obtained from time sheets and invoices of the project

Execute the Earned Value calculation, print and plot the reports and charts

Analyze the data and write the performance narrative on the cost aspect of the project

If implemented and utilized correctly, earned value is the pre-eminent method to monitor and control project progress and, when implemented correctly, it can provide feedback that indicates whether project objectives are being met. This will help identify problems early in the project so corrective action can be taken.

Monitor Changes to Cost/Budget

The cost baseline is a representation of the original project plan that was approved by all stakeholders. The project should remain committed to this baseline unless it has been formally changed by the PM. If change to the baseline is required, the Project Manager should make sure it is formally submitted and approved. The changes should be tracked in a change log and the impact of these changes should be thoroughly addressed with the project team.

3.5   *Quality*

The Project Manager has several responsibilities pertaining to Quality Control (QC) during the implementation phase of the project. It is the responsibility of the PM to ensure that work is performed in compliance with contractual requirements, as well as industry standards. He/she should ensure the established project-specific QC measures are followed and that project tasks are performed in accordance with organizational standards. The PM should manage and coordinate QC activities (i.e. submittals, tests, samples, and results) and ensure that weekly project briefings are held to discuss quality as it pertains to the project. Goods and/or services should be kept up to date with the proper revisions and provided to the customer in a timely fashion. If there is equipment to be installed, it should be inspected prior to use. If it is found to be non-compliant with specifications or damaged during transportation, it should be rejected. The PM should investigate and resolve warranty problems and document the action taken on warranty reports.

The PM should also ensure that established quality metrics are readily available. Quality audits should be conducted in a timely manner to achieve predictions about the end product before the actual deliverable dates occur. The PM can opt to use one or more

statistical process control methods to measure and control quality data. There are seven major quality control tools that provide for the collection, identification of patterns, and measurement of variability in data (Meredith & Mantel, 2002, pp. 777-794). These are as follows:

- Data Tables – provide systematic method for collecting and displaying data.
- Cause and Effect Analysis – uses diagramming techniques to identify relationships between effect and its causes. Sometimes this diagram is also referred to as the fishbone diagram.
- Histogram – graphical representation of data as a frequency distribution.
- Pareto Analysis – special type of histogram that helps to identify and prioritize problem areas.
- Scatter Diagrams – organizes data using two variables: independent and dependent. These data are then recorded on a graph with X and Y coordinates showing the relationship between the variables
- Trend Analysis – statistical method for determining the equation that best fits the data in the scatter plot. It quantifies the relationship of the data, determines the equation and measures the fit of the equation to the data
- Control Charts – focuses on prevention of defects rather than their detection and rejection
- Once a control method process has been implemented the PM should:
- Provide reports (define frequency) of operation run, specific offline test run, issues, and achievements
- Communicate status to project team members for further actions to be taken (define frequency, means)
- Communicate status to customer and/or participate in customer meetings
- Ensure all changes are updated in the system, documented and communicated to the project team
- Document "lessons learned" to be used in future projects

Application of these measures during the implementation phase of the project will help ensure that all of the stakeholders are satisfied with the project deliverable.

3.6   *Teamwork*

At the start of Implementation Phase, new staff may be added to the Project Office. The MBTI (Myers Briggs Type Indicator) grid is a tool that can be used to assist with the selection of suitable personnel for the tasks ahead. According to Shenhar and Wideman, (2002, pgs. 7 & 8) the Execution Phase should include the assertive, "driver" type personalities. (Refer to Table 3-2 - The MBTI Grid and Suitability to Project Management and

Table 3-3 The MBTI Grid as seen from the Project Management Perspective in the

Appendix). "Drivers" typically make up 5% of the population at large. In the event,

however, the required amount of "drivers" is not available from the staff pool for the

Execution Phase, it is satisfying to know that another 40% - 45% of the population is

made up of people who are suited to projects. The key then would be to identify the

personality types who are suited to projects and assign them to tasks that match their

strengths and to teams that offer compatibility. Ultimately, the Project Manager has to set

the tone for each phase - emphasizing the indicative project traits as a means of keeping

the team focused.

The Project Manager presides over the Project Office and also the extended

project group who, (based on the size of the project), could include consultants,

contractors and vendors. According to Stephen Covey, (1990, *Pg. 174*) a working team in

any setting is empowered when they have been given a clear understanding of the

following:

- Desired results

- Parameters within which the results are to be accomplished

- Resources available to help achieve the desired results

- Expected standards of achievements

- Consequences associated with various levels of performance

The Team Charter then is the instrument through which these elements are

communicated. At this stage in the project cycle, the Team Charter must be updated if

new members are added. After the updating the charter of a project team in a PMO or a

PO, the Project Manager should convene the Implementation/Execution Phase "kick-off"

meeting to discuss the Team Operating Procedures (TOPs). These procedures are the

rules of engagement for meetings, change-orders, on-site client interaction etc. "Both the

Team Charter and the TOPs may be updated during the life cycle of the project. The

Project Charter, issued by a senior manager(s) outside the project team, cannot be

changed by the PM and the team. On the other hand, the Team Charter can be adjusted as

needed by the PM and the team to reflect their current TOPs." (Anbari, 2006)

With all the Planning already defined, the PM next works to update the

Responsibility Register. (Please refer to Table 3.4 in the Appendix). This document

would have been created and used in the Development Phase to indicate accountability from different disciplines in the project. It can be constructed to dovetail into the upper levels of the WBS and also at the activities level. In the Execution Phase, it can be expanded to assign the disciplines to primary and secondary roles for the associated tasks. The accountability factor in a project is critical to its success because when things go wrong (as they are prone to do), it must always be clear who is responsible to take the corrective actions to quickly get the project back on course.

The third element of W. Edwards Deming's (2000, *pg. 121*) system of profound knowledge as it relates to Total Quality Management is an understanding of psychology. Deming understood that when people find joy in their work, their output rises, they make improvements in what they do and they remain loyal to their colleagues and to the enterprise. In his list of 14 points he drew attention to the practices of managers who destroy joy in work, which make workers afraid to tell the truth and which result in competition when cooperation is needed. Therefore, it is advisable throughout the Implementation Phase, for time to be carved out in the schedule to allow for activities that strengthen and bind the team. The team should be constantly addressing areas of deficiency, and periodically stepping back to assess progress.

As the work force and technology change, many staffing problems that could not be addressed in an earlier era are now being resolved. One major development that has evolved for organizations is the opportunity for some people to work at home or "on the road." The data shows that they can be just as productive (if not more), when compared to being in the office environment. Some of the new tools that assist with this development are: light-weight laptop computers, wireless internet with IM (Instant Messaging), intranet spaces and video-conferencing. A virtual office space can be devised where one can check in at their convenience to gather information, deliver status reports or exchange ideas. It is a phenomenon that has greatly reduced the budgeted acquisition cost of physical office space for some POs. The determination is that rather than invest in additional physical space for a growing PO, a Project Manager might choose to invest in the tools and systems that promote communication in the virtual environment. Naturally, as with anything new, there are many bugs to work out; chief of all is the element of security. Considerable progress has been made in that arena with the

insertion of firewalls and protected log-ins, but security will always be a challenge as the user population increases and becomes more proficient.

3.7   *Communication*

Effective communication is extremely vital during the most productive phase - the Execution/Implementation Phase of a project. During the Planning Phase, most of the systems that are necessary to facilitate effective communication have been devised and are contained within the Communication Plan. In the Execution Phase the Communication Plan will be enacted and managed. Clear accurate and timely communication is critical to the success of any project since miscommunication can result in poor and uninformed decisions, which could have a negative impact.

Communication can be both formal and informal. What is critical about informal communication is the necessity to record or register it for future recall. To ensure that communications within a project are structured and coordinated, the status of all important messages should be logged within a Communications Register. This will help the PM keep track of each critical message that is dispatched and allow him/her to record feedback to improve communication in the future. A Project Manager should not rely only on his/her memory for recall. A sample of this document can be seen in Table 3.5 in the Appendix.

Another tool that should be used by the project manager is the Project Diary.

A Diary is useful as a reminder of planned appointments, key dates, and anticipated problems. Due to the fact that Project Managers are required to multi-task, the Project Diary plays a role in effectively assisting them manage their time.

There are many other types of formal communication tools that are utilized in projects. Some are Meeting Minutes, Progress Reports, News Letters, and Press Releases. It is important to follow a standard method when creating and issuing information via these vehicles. A rule of thumb to follow is:

- Decide on the message content, audience, timing and format
- Have the prepared message reviewed for accuracy and timeliness
- Issue the message to the audience with a sequential numbering system

As a tool, the Meeting Minutes are formatted to serve many roles in the management of a project. Not only are they used to record the progress, problems and

actions taken, they can also include an accountability factor. They can achieve this by stating responsible parties for specific action items. Additionally, they can also record the status of said action-items noting whether they are behind, ahead or on schedule. In smaller projects, the Meeting Minutes can serve as the progress report. Table 3.6 in the Appendix shows a sample of Meeting Minutes that have been formatted in the manner described. Naturally, in order to produce Meeting Minutes, meetings must be held. As part of the Communications Plan, regular meetings should be established, contingent on the size and possibly the schedule of the project. Scheduling flexibility for meetings is afforded to the Project Manager, but the advice is to have it structured from the start of the project so that everyone becomes familiar with the schedule.

The goal of the project manager is to preside over effective and efficient meetings. According to Patrick Lencioni, (2004, *pg. 249*) executive and team development expert, most people resist going to meetings particularly when prior meetings have proven to be unfocused, long, repetitive and poorly controlled. He offers a template describing four types of effective meetings. Dependent on the project and the phase, the project manager should determine which meetings work best. The Execution Phase is usually the phase with the highest level of productivity. As a result, communication levels would increase and meetings would be vital for the success of the project. State-of-the-art technology should be utilized to its fullest capabilities where necessary to enhance, accelerate and facilitate these models. Some of the technical tools available today are IM, chat rooms, teleconferencing, project intranets, etc. Table 3.6 in the Appendix demonstrates what is involved in each suggested meeting model with the focus being on keeping it simple, effective and non-burdensome. Project reports are prepared to deliver information about the project to the stakeholders. There are two types of reports. One type, The Status Report, is geared to:

- monitor the progress of the project
- inform all parties involved of the current status
- identify and report on current risks
- assist with problem solving and decision-making
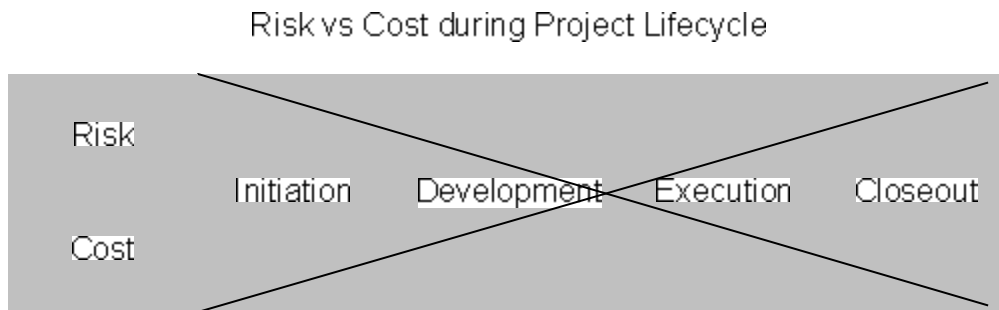- control the project

The reporting interval would be determined by the project size, complexity and the stakeholders' requirement. Typically, monthly reporting tends to satisfy most large scale projects.

The other type of report is content oriented, e.g. a report on research data or on a new methodology that needs to be applied during the existing or future phase. Reports such as these are solicited and communicated (as required) by the client and/or the Project Manager.

Finally, the Project Manager will have to return to his/her negotiating skills again and again during the Execution Phase. (Please refer to Table 3.8 in the Appendix for a Negotiations Checklist.)(2002, **http://www.africaleadership.org/library**). It is well known that no matter how well a plan is designed, the execution of a project never follows the baseline plan unchanged. So as the project progresses, changes may develop due to scope creep, accidents, union action, weather delays etc. In order to deal with the effect of these changes, many negotiations between the Project Manager and affected parties are necessary. The goal should be to create an environment of compromise in which there is always a give and take. Further, it is always important to document changes, transactions and key decisions using the planned format. Given these different types of communication models (as discussed earlier), the challenge involved in managing the generated records from projects grows exponentially with time. Good records management means the efficient management of both paper and digital assets and the identification of permanently valuable records. Hence this is a process that should not wait until the end of the project to get started; it should be maintained throughout the life of the project. The standard system that would have been adopted in the project's Initiation Phase should be maintained. Depending on the size and complexity of the project, there is a cost associated with the management of electronic records and paper documentation that project managers must anticipate and budget for at the onset of the project.

3.8   *Risk Management*

During project implementation the importance of the risk management plan will be fully realized. At this stage of the project risk will be lower than at the beginning of the project but cost will increase as depicted in

Figure 3-2 Project Cost & Risk Relationship Diagram

Risk vs Cost during Project Lifecycle

Risk

Initiation   Development   Execution   Closeout

Cost

It is here that the risks identified during the planning and development stage will be monitored and handled in accordance to the risk management plan.

Risk Monitoring and Controlling

During implementation the project is monitored to determine if identified risks are about to occur and new risks are also identified. It is important to keep in mind that risk management planning will be continuously revised as the project progresses (Risk Assessment). If or when new risks are identified the newly identified risk must go through the risk planning process of risk identification, risk assessment (qualitative and quantitative), and a risk response as discussed in chapter 2. Once a decision has been made by the project manager to avoid, mitigate, transfer or accept the risk residual risk and/or secondary risks may occur. Residual risks are usually minor and can be taken care of through the use of contingency reserves. Secondary risks are new risks that are identified after implementing a risk response. These secondary risks will need to go through the risk planning process also.

Tools for risk monitoring & controlling

- Risk Response Audits
  - Risk response auditors will review the avoidance, mitigation, and transference strategies during implementation. The audits are done to ensure that these response plans are still effective at a particular stage of implementation. It is the responsibility of the project manager, with help from subject matter expects, to determine how frequently audits will be performed.(Kerzner, 2003, p. 326)
- Risk Reviews
  - Risk reviews should be held periodically throughout the duration of the project. It is important that a variety of stakeholders are represented during risk reviews. If risk reviews are attended by only engineers then only engineer risks will get addressed. (PMI, 2004, P.154)
- Earned Value Analysis
  - Earn value analysis gives project measurements for the project cost and schedule. By reviewing project earn value reports the project manager can identify new risks and add them to the risk management plan. These risks will of course go through the risk process of risk identification, assessment, and response".(Kerzner, 2003, p. 326)
- Contracts and Implementation
  - The contract process during project implementation includes solicitation of contractors for their proposals, choosing among those contractors, and administrating the contract.

Figure 3-3 Selecting Suppliers

A Process for Advertised RFPs
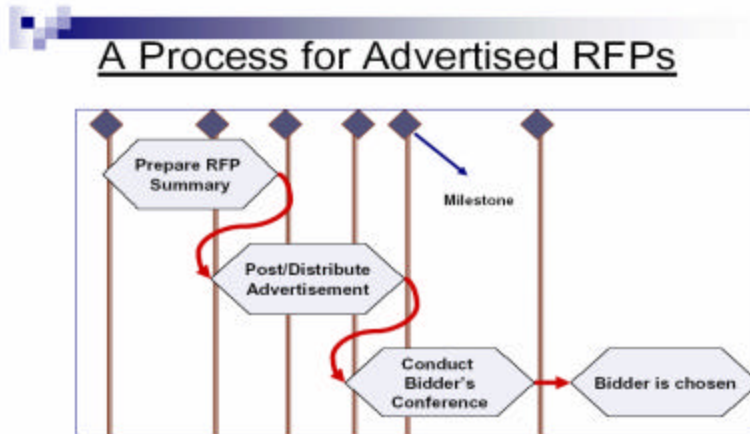
(Hammad, 2005)

- Solicitation of bids for contracts
    - During solicitation, Requests For Proposals (RFP) are sent out to contractors especially when there is a change. The company may choose to advertise a RFP via journals, on the Internet, in newspapers, or in magazines. Bidders usually take on most if not all of the cost in preparing a response to the RFP. Bidders' conferences are held to clarify any questions about the request for proposal. Bidders' conferences should be used by the buyer to explain exactly what the project requirements are.
- Selecting Among candidates
    - If there is a supplier that the PM has worked with in the past, or is still working with the PM may by pass the bidders conference and select that provider. For competitive bids, an evaluation of the responses should be conducted. A weighted scoring method is one tool used when evaluating bids. To prevent biases or prejudices in selecting a bidder a standardized evaluation sheet should be used. This helps ensure that all bidders are rated based on the same criteria.
    -

Figure 3-4 Scoring Example

(Hammad, 2005)

Administering the contract

Change Orders

During project implementation, it is inevitable that a change order is requested from either the client or a subcontractor. The project manager is obligated to understand the requested scope change, its impact to the project, and the direction to proceed? Figure 3.4 shows a template change order request form that a project institutes to standardize project changes during implementation. This form helps prevent the abuse of change orders from both clients and customers by providing a standard that must be followed.

The project manager must demand the requestor provides information concerning the change request along with all supporting documents. After receiving the request form the PM must do an initial review of the change form and do an initial impact analysis of the change. The PM can use the impact analysis results to define the specific requirements. From there, the PM can decide to implement or not implement the change and determine alternatives to the proposed change.

Managing Contract Disputes

Contract disputes between the project team and the contractor or the project team and the customer may arise. During disputes all stakeholders must abide with the terms of the primary contract. If one stakeholder should deviate from the contract without agreement from all stakeholders then he or she would be in breach of contract. In this scenario, the protesting stakeholder should notify the prime contractor in writing that he

or she considers the work to be beyond the contract's scope. The work should be performed under formal protest and that the protesting stakeholder reserves all rights to seek appropriate adjustment. The project manager should get a written directive to proceed with the work in dispute. If the dispute cannot be resolved and the contract allows it, the project manager can go through arbitration for a resolution.

Another important issue is that PM must familiarized himself with the contract clauses, terms and conditions such as: Conduit clauses, Waiver of Lien Rights, No Damage for Delay, Force Majeure, Concealed Conditions, suspension of Work Clauses, Termination clauses etc.
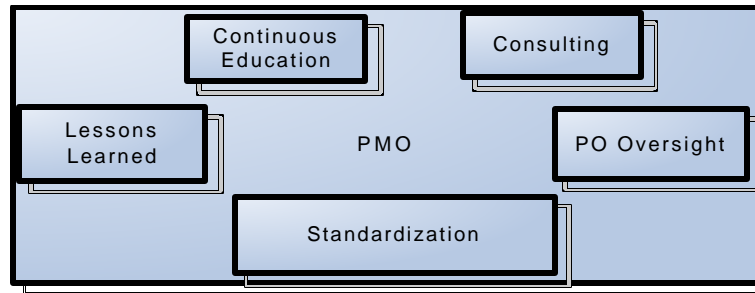
3.9   *Project Management Office*

The Project Management Office (PMO) is established to assist project managers and teams manage and monitor their projects. During the implementation phase of a project, it constantly reviews industry best practices and works closely with major organizations in the relevant industry, whether in the private or public sector.

The main purpose of the PMO during the implementation phase is to follow through with the main objective of the project and protect the organization's assets. The Project Management Office strives to institutionalize formal project management best practices to improve the project success rate. The main goal of the PMO is to ensure that project goals and objectives are achieved through the use of standard project management best practices, thus increasing the business value derived from the projects. Another objective of the PMO is to ensure repeatable and predictable success of these projects by institutionalizing formal project management practices in all areas of project management.

The Conceptual Approach: The PMO is organized around the following conceptual approaches during the implementation phase of a project: Practices (Lessons Learned), Academy (Continuous Education), Consulting, PO Oversight and Institutionalization (Standardization).

Figure 3-5 PMO Conceptual Organization

(Johnson Controls Project Management Institute 2001) and

(www.state.mn.us/portal/mn/jsp/content.3/16/2006)

Lessons Learned (Practices): During the implementation phase, the Project Management Methodology Document (a document that defines the methodology of best practices) will provide a common point of reference for talking and writing about the practice of project management for all projects within the company. This common basis is intended to increase the awareness and professionalism of those charged with the responsibilities defined in the methodology. "The roles of the Executive Sponsor, Steering Committee, Project Manager, Stakeholders, Subject Matter Experts and other team members are positioned as Critical Success Factors" (Johnson Controls Institute, 2001). A common understanding of the requirements and the rationale behind those requirements are key factors for improving project results.

Continuous Education (Academy): The Project Management Academy, which is a school for special instruction, is a service that the company's Project Management Office delivers to the PM and the team throughout the implementation phase This service is provided to the PM and the team out of the Office of Technology manager in the PMO's Department of Administration.

Statement of Need: In order to fulfill the mission of the Project Management Office during the implementation phase, the academy office has a need to provide training to multiple audiences on a variety of project management best practices and oversight topics. A training and professional development component of the Project Management Office (PMO) is needed to:

Deliver training in PMO methodology, procedures, documentation standards and reporting requirements;

Ensure that company executives, project managers and contractors understand the PMO role and requirements for project oversight; and

Cultivate an atmosphere of professional discipline and growth among company project managers.

Meeting the Need: To meet this need (academic need) during the implementation phase the PMO will package project management professional development training opportunities, informational executive seminars, and PMO methodology and reporting requirements workshops under a Project Management Academy umbrella.

Target Audiences: The Project Management Academy (PMA) will deliver appropriate curriculum content to multiple audiences. Identified audiences are: executive sponsors (business and functional management), CIO's, project managers (novice, intermediate, advanced), project team members, contractors / consultants, project stakeholders, and project steering committee members.

Delivery Mechanisms: during the implementation phase, the PMA will feature small class sizes, providing interaction between project students, and with the instructors. Learning opportunities will also be available online through resources available through the PMO website. This may include collaboration among project managers, and may also include plans of videotaped sessions, and interactive TV classes.

Standardization (Institutionalization): At the implementation phase, the Project Management Office (PMO) establishes the goal of assisting project managers and project teams to successfully incorporate project management processes into their project execution plans. At any stretch the company or industry may have a wide variation in project management maturity levels, of which some may already be very successful while others may hardly have any process.

The PMO makes certain the task of institutionalization at the execution or implementation phase is highly a collaborative effort and facilitates sharing best practices. Also the PMO ensures that minimal standards and reporting needs for various projects are established. The PMO at this stage organizes around conceptual functions that will each provide ongoing contributions towards "institutionalization". Institutionalization or the execution of these initiatives at the implementation phase

produces a project management infrastructure and culture that allows project managers and or practitioners to effectively manage and monitor their projects.

Consulting: Consultants are in essence problem solvers and do coaching. At the implementation phase of projects' the PMO does not provide consultancy for mundane problems. They usually deal with difficult and or challenging issues, since the PMO possesses the know-how and is certain of the issues at stake. They also have the conviction and or authority to speak their minds and are able to bring tremendous experience to bear on project problems quickly and effectively. Their frameworks and platforms give them a ready-made set of standards to apply to each new situation and to assess them expeditiously.

Oversight: A key objective of the Project Management Office and its mandated oversight role is to enable successful company-wide Project Portfolio Management (PPM). Project Portfolio Management is a multi-dimensional problem impacting both large and small projects. Most project portfolios suffer from too many marginal projects for the limited resources available, ineffective project prioritization, and indecisive go/no-go decisions. The end result may be poor project and resource performance, critical delays on project deliverables and higher-than-acceptable failure rates.

During the implementation phase, however, Project Portfolio Management becomes a decision process whereby new projects are evaluated, selected and prioritized. Active projects may be continuously up-dated and revised and may be accelerated, rescued, discontinued or de-prioritized by the PMO.

The Project Management Office at this point will support and enable company-wide Project Portfolio Management in the following ways:

Maintaining a repository of company-wide projects, along with related business justification, project scope and identification of key sponsors and stakeholders.

Actively updating project status by measuring progress against cost, scope and schedule.

Documenting and tracking issues and requests for change that impact original project objectives and budgets.

Facilitating and recording outcomes assessment of completed projects by measuring the deliverable against the intended business objectives, as well as validating the original needs and recommends next steps (lessons learned).

Using a structured process by which projects can be managed to counter inevitable things/events, factors that may potentially interfere with the project's successful completion.

Reviewing the health of a project from a management standpoint.

This will provide key information to support improved company-wide portfolio management and improve overall project processes and performance. Enhanced Project Portfolio Management by the PMO during implementation phase is about controlling how the company spends its funds and people resources, and identifying the total consolidated industry Project Portfolio in which to invest, while maximizing stakeholders benefits and return on investment.

3.10   *Organizational Culture*

Different theorists define organizational culture concepts in many different ways. Organizational culture is made up of the following definitions: "Symbols, languages, ideologies, rituals and myths" (Pettegrew, 1979). Organizational culture is also define as "Organizational scripts derived from the personal scripts of the organizations founder(s) or dominant leader(s)" "Is a product; is historical based upon symbols; and is abstraction from behavior and the products of behavior" (Jongeward,. 1973). "Organizational culture is what employees perceive as institutional norms and this perception creates a pattern of beliefs, values, and expectations,"

Edgar Schein (1985) therefore defines culture as:

> "… (a) a pattern of basic assumptions, (b) invented,
> discovered, or developed by a given group, (c) as it learns
> to cope with its problems of external adaptation and
> internal integration, (d) that has worked well enough to be
> considered valid and, therefore (e) is to be taught to new
> members as the (f) correct way to perceive, think, and feel
> in relation to those problems."

With this definition in mind the PM must put emphasis on values or the things that are important to the people or project team members. He should also encourage individuals to perceive, think about, and feel about work, performance goals, human relationships, and the performance of colleagues in a manner that is fitting for the project.

During project execution, culture must involve shared expectations, values and attitudes. It exerts influence on individuals, groups and individual processes. For instance team members should be influenced by the project manager to be good character citizens, and be customer oriented. This will create a sense of stability and organizational identity among the project team members thereby providing strong culture, which is very critical during project execution.

Throughout the implementation phase, the PM must cope with multiple cultures and different environments. "The project manager must manage and reduce conflicts between parties-at-interest or stakeholders in a project: the project team, client, senior management and the public" (Meredith & Mantel, 2003). The PM must be aware of the technology of culture influencing his/her project, such as tools, materials, skills-set and attitude towards work.

Last but not the least; the PM must be conscious of "multiculturalism" and its effects on executing the project. The PM must value diversity even though it may be only unique to an American idea. This is true because in many parts of the world, including the majority of the cultures of Africa, Latin America, Southern Asia (Japan) and the Arab world, it will seem highly inappropriate to suggest to the hiring manager that you expect them to skip over hiring their relatives to hire a stranger. In most places women are not considered to be co-equals to men in certain professions and that they become offended when gender issues are brought to bare during project execution. It behooves the project manager to study the race and gender issues that might affect the execution of the project in a particular geographical area. The time and or tardiness issue is an area that must be paid attention to. Certain cultures in this world are not particularly concerned about delivering projects on time, on demand or showing up on time to a scheduled meeting. Temporal conception is an issue that can cause a bone of contention during project implementation in places such as Saudi Arabia, Africa, South America etc.

Conclusion: Culture plays perhaps the biggest role in an organization's success in executing projects. If an organization has difficulty completing projects successfully, you can't blame the project managers. They're only toiling within a culture that's not supportive of their efforts. Managers, including the head of the organization, need to step up and evaluate the project culture. Until the culture changes, project managers will consistently struggle to be successful.
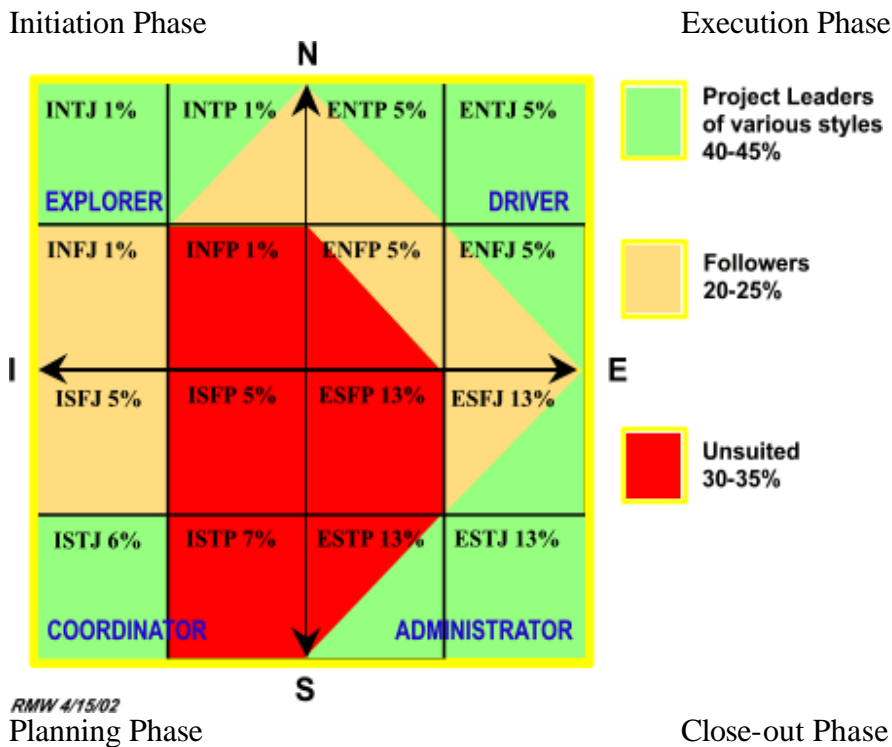
Appendix

Table 3-1 **- Glossary of Earned Value Terminology**

- Budgeted Cost of Work Performed (BCWP), also referred to as Earned Value, is the budgeted cost to accomplish work that has been completed as of the analysis date
- Budgeted Cost of Work Scheduled (BCWS) is the total budgeted cost up to the analysis date
- Actual Cost of Work Performed (ACWP) is the actual cost to accomplish all the work completed as of the analysis date
- Schedule Variance (SV) is BCWP - BCWS
  - 0 indicates you are on schedule
  - a negative number indicates you are behind schedule
  - a positive number indicates you are ahead of schedule
- Schedule Performance Index (SPI) is BCWP / BCWS
  - 1 indicates you are on schedule
  - less than 1 indicates you are behind schedule
  - greater than 1 indicates you are ahead of schedule
- Cost Variance (CV) = BCWP – ACWP
  - 0 indicates you are on budget
  - a negative number indicates you are over budget
  - a positive number indicates you are under budget
- Cost Performance Index (CPI) = BCWP / ACWP
  - 1 indicates you are on budget
  - less than 1 indicates you are over budget
  - greater than 1 indicates you are under budget
- Budget At Completion (BAC) is the total original budgeted cost and is the equal to BCWS at completion
- Estimate At Completion (EAC) is the estimate of the amount of money that will be spent on the project

- Independent Estimate At Completion (IEAC) is the projected final cost of the project based on performance up to the date of analysis
- IEAC = BAC / CPI
- Independent Schedule At Completion (ISAC) is the projected duration of the project based on performance up to the date of analysis
  - ISAC = Schedule / SPI
- Variance At Completion (VAC) is the forecast of final cost variance
  - BAC - IEAC or
  - VAC = BAC - EAC

Table 3-2 - The MBTI Grid and Suitability to Project Management

Initiation Phase   Execution Phase

RMW 4/15/02
Planning Phase   Close-out Phase

Table 3-3 The MBTI Grid as seen from the Project Management Perspective

Note: The percentages show the approximate proportion of the type in the total population

Table 3-4 The Responsibility Register

Ref #	Task	Responsibility »	OD	PD	LAC	PCM	JA
0.1	Gather all pertinent information		◉	●			
0.2	Establish pro forma models for optimizing ROI		◉	●			
0.3	Assess current market rents, inducements, property values			●			
0.4	Assess alternative retail mixes where appropriate		◉	●			
0.5	Collect typical operating costs, tax information, etc.			●			
0.6	Develop 'Order of Magnitude' budget		◉	●			
0.7	Identify 'window of opportunity', if applicable		●	◉			

●   Primary Responsibility
◉   Secondary Responsibility

Responsibility Register

Table 3-5 Formatted Communication Register

PROJECT ID	STATUS	DATE APPROVED	APPROVED BY	DATE SENT	SENT BY	SENT TO

Table 3-6 Sample Meeting Minutes

THE MARLEY ORGANIZATION

10th Floor Modification & Classroom Construction
 Project Management Meeting Minutes
Meeting Date: May 27, 2004
Project Number: 800.58
Attendees: Harry, Jane, Bill, Juliet
CC: Andre, Carol
Prepared By: Juliet
<mark>C:\Project Management Handbook.doc</mark>

Item Number	Description	Follow-Up Action By:
001	Select (2) preliminary cut sheets for the Roll-down grill.	Jane Juliet ν $ КНаGRІ 6FКНGХІВl ? 2 Q6FКНGХІВl ? %НKLQG6FKНGХНО ? 8 QNQRZ Q
002	Remove the old Monitoring station. Also, show the new reduced shelving requirement for unbound periodicals and note the Roll-down security grill being considered for the Service Desk. The 3-M gates on this floor to be removed altogether.	Jane Juliet ν $ КНаGRІ 6FКНGХІВl ? 2 Q6FКНGХІВl ? %НKLQG6FKНGХНО ? 8 QNQRZ Q

Table 3-7 Meeting Models

MEETING STRUCTURE—THE FOUR TYPES OF MEETINGS			
Meetings	**Time Required**	**Purpose/Format**	**Keys to Success**
Daily Check-in	5-10 minutes	Share daily schedules and activities.	• don't sit down • keep it administrative • don't cancel even when someone can't be there
Weekly Tactical	45-90 minutes	Review weekly activities and metrics, and resolve tactical obstacles and issues.	• don't set agenda until after initial reporting • postpone strategic discussions
Monthly Strategic (or ad hoc)	2-4 hours	Discuss, analyze, brainstorm, and decide upon critical issues affecting long-term success.	• limit to one or two topics • prepare and do research • engage in good conflict
Quarterly Off-site Review	1-2 days	Review strategy, competitive landscape, industry trends, key personnel, and team development.	• get out of office • focus on work; limit social activities • don't overstructure or overburden the schedule

Lencioni, Patrick: Death by Meeting (2004)

Table 3-8 Negotiation Checklist

Preparation:

1. Clarify what you are negotiating about

2. Identify the issues the other party will raise

3. Determine their knowledge of you and your needs

4. Identify the strengths and weaknesses of the other party

5. Identify their most likely objections to your request

6. Write down your ideal settlement

7. Identify the worst you will agree to accept

8. Identify the arguments that support your case

9. Determine the benefits that you can offer to the other party

10. Ask what unpleasant consequences they may suffer

11. Identify objections to these consequences

12. Figure out the weak points of your case

13. Check how the other party behaved in other negotiations

14. Identify if you can do anything now to strengthen your hand

Bargaining:

15. 0pen by asking more than you expect to get

16. Let other party talk – you listen actively

17. Stress the importance of your project

18. Ask questions to determine their position

19. Don't accept a first offer

20. Never offer more than you have power to give

21. Do not give way by impulses

22. Consider all implications before accepting a concession

23. Avoid debating sanctions outside your power or control

24. Remain firm and assertive but always calm

25. Remain objective – do not be diverted to other issues

Concluding:

26. Summarize what is agreed and what is left in abeyance

27. Confirm your communication procedure to them

28. Clarify and confirm the benefits to them

29. Agree when you will meet again

Don't:

- Infer other party is unreasonable

- Respond immediately to counter proposals – take time to think

- Lose your temper even if they get emotional

Do:

- Explain 'why' you are doing something and give reasons for disagreeing

- Ask questions to clarify your understanding

- Use your strongest argument on its own – not intermingled with others.

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Closeout

Table of Contents

4.0   Closeout

4.1   *Introduction*

The major deliverables of the project Closeout Phase are:

- The successful transition and hand-off of project deliverables to the satisfaction of the client.
- The successful return of assets (including satisfied project participants) to the organization, client and suppliers.
- The project post-implementation review or project audit document to capture project experience, intelligence, lessons learned, and best practices.
- The final report to summarize project history and record project documents for future reference from an electronic project document repository.

To ensure quality and that no item has been overlooked before closure, the PM should oversee the usage of well prepared templates, checklists, and sign-off documentation. These performance monitoring tools help with testing, verification, confirmation, and acceptance activities for project deliverables. Project business success should be measured against the projects intended business goals and objectives as laid out at the inception of the project. As a stark illustration of improperly recognizing project business success: For the example of a computer software delivery project, it is not sufficient to perceive business success because products and services are delivered to the client to specification, or that the project is successfully piloted. Pilot project participants may be especially well attended to and/or enthusiastic due to their selection and visibility, whereas subsequent ordinary end-users may not even make use of the products and services let alone exhibit interest – inhibiting the business value of the product or service to be extracted.

The Closeout Phase must be treated as a project within the overall project and planned and budgeted during the Development Phase of the overall project. It should employ the same project management principles, tools, and techniques as the rest of the project. In many organizations, this seemingly obvious edict is ignored due to a lack of

recognition of the full benefits of a disciplined closeout process. Consequently, time and resources that should properly be allocated to the Closeout Phase are commonly prioritized out to non-closeout phases of other projects or operational management. Ironically, the lessons learned and best practice findings from the Closeout Phase, when carried out, actually serve to support of the success and improvement of other projects. During the planning stage of the overall project, it is the project manager's (PM's) responsibility to strongly communicate and emphasize the benefits of a fully planned and resourced Closeout Phase towards successful completion of the project.

In keeping with the importance of a successful project closeout for the overall success of the project, in many large projects a separate PM, specialized in the closeout of projects, is assigned to the effort. The primary duties of the closeout manager are (Mantel et al., 2000, p. 273):

- Ensure completion of the work.
- Notify the client of project completion and ensure that delivery and installation are accomplished.
- Ensure that documentation is complete.
- Clear for final billing and oversee the preparation of the final invoice sent to the client.
- Redistribute personnel, material, equipment, and any other resources to the appropriate places.
- Determine which records to keep.
- Ascertain any product support requirements, decide how such support will be delivered, and assign responsibility.
- Oversee the closing of the project's books.
- Create the project final report, including project metrics, post-implementation review, project audit and lessons learned.

There is a tendency for the project closeout to drag on, because:

- The more salient and visible deliverables of the project are perceived to be complete creating an opportunity for senior management to move resources to other projects.

- There is less enthusiasm for what remains, which are mostly administrative activities.

- Remaining project participants may be distracted by the prospect of their next assignment, securing their next assignment if uncertain, or resisting their next assignment if perceived to be less glamorous for visibility or ego.

The PM should strongly communicate and promote a culture in which the success of the organization, overall project, project team, and individual participant is not perceived to be fully realized without the timely completion of the Closeout Phase. It goes without saying that the PM should garner the support, legitimacy, and assistance of senior management for this, and other areas advocated for the overall success of the project. The PM should work closely with the remaining project participants and Human Resources to ensure smooth job transitioning plans for the remaining project participants.

The project Closeout Phase serves as an exclamation mark for the successful completion (or termination) of a project and for the lessons learned (and best practices) that improve the management of ongoing and future projects.

The manner in which the project is closed out will have a major impact on the quality of life in the organization (Mantel et al, 2000, p. 269). It will influence the lingering feelings and attitudes all project stakeholders (e.g. client, senior management, project team, and other affected parties) will have about the project and similar ventures. It will influence perceptions of expertise and competency for taking on similar projects or projects in general.

4.2   *Scope*

The items below are some of the key items the project manager (PM) should be aware of when closing out on project scope.

- Scope Signoff – The scope document, sometimes referred to as the product requirements document, is often times a dynamic document. It frequently changes throughout the early phases of product definition and sometimes during later phases of the project life cycle. Requirement changes ought to be captured by the change management process that is in place, and properly reflected in a version-controlled scope document.

Appropriate "written" signoff from the business owner must be obtained for every version of the scope requirement document. During project closeout, every scope document baseline should be filed along with the proper signoff.

- Documentation – The latest scope document, as well as all versions of the scope document, should be filed in an enterprise-level document repository that is accessible to the entire project team. Proper documentation of the scope documents will ensure accurate traceability of any budget changes or quality plan changes which resulted from changes to the scope.

- Requirements Matrix – Ensure that the final and signed-off version of the scope document has an updated requirements matrix, which ties the higher-level product requirement to a more specific system requirement. This type of monitoring mechanism is typically used during quality control.

- User Acceptance Test (UAT) – UAT is a final verification, whereby the user conducts formal inspection in order to verify that the final product does meet the signed-off project scope (after all previously approved scope changes have been implemented). Successful UAT represents formal acceptance of the final product by the project owner and the steering committee. It is the responsibility of the PM to facilitate user acceptance testing.

- UAT Signoff – Once the users are finished conducting their testing to verify that the scope details have been met, the PM should obtain appropriate "written" signoff. This signoff must be appropriately documented for future reference.

4.3   *Scope Documentation:*

Some of the salient points that the PM needs to remember regarding scope documentation are the following:

- Developing proper scope documentation will eliminate scope redundancies on future projects. As organizations grow larger, integration within their projects becomes weaker. For that reason, it is not uncommon for a large organization to build products or systems with redundant functionalities. In order for an organization to be able to leverage existing functionalities within their products and systems, proper scope documentation must exist. Leveraging existing functionalities translates into tremendous savings, as well as faster time to market.

- Archiving project scope and scope change documents in a common repository will enhance knowledge management / knowledge transfer within the organization, especially when management or other resources leave the organization. As the project gets ready for closure, the experience and knowledge gathered about the project scope remain with the PM and the other team members who supported the project during its multiple phases. But because the project remains long after the resources leave, the collective amount of knowledge gathered while the project was still in development should be maintained and made readily available for anyone in the organization.

- Preserving baseline scope documentation to be used in project audits and company audits will guard against legal concerns associated with losing or destroying business data. In many companies, especially publicly traded ones, details about system scope is used in various types of audits. During project closeout, the PM should ensure that the baseline scope document is readily available for any potential audit.

- Detailed scope change documentation can help in the traceability of cost and schedule changes. In organizations where change management is not formalized, scope changes can be used as a source for tracing scheduling and cost re-baselines.

- In the case of third-party vendors, scope signoff by the project owner can be utilized for contract fulfillment and closure.

4.4   *Schedule*

By the time a project has reached the Closeout Phase, all project activities, with the exception of project closeout function, are complete. To fully understand how the project progressed, the PM should undertake a thorough review of project performance as it relates to schedule. One way to do this is to examine each lowest level element of the WBS and compare planned versus actual activity duration. If the actual duration of an element differs by more than 10% from the original estimate, an explanation for this variance should be provided.   Figure 4-1 Duration Comparison Report is an example of such a report.

Figure 4-1 Duration Comparison Report

Element ID	WBS Number	Planned Duration (Wks)	Actual Duration (Wks)	Variance (Wks)	% Variance	Reason for Variance (if greater than +/- 10%)
1	1.1.1	5.0	4.6	-0.4	-8%	
2	1.1.2	2.0	2.2	0.2	10%	Supply problems due to Hurricane Katrina.
3	1.1.3	2.0	2.0	0.0	0%	
4	1.2.1.1	10.0	10.0	0.0	0%	
5	1.2.1.2	12.6	17.0	4.4	35%	Contractor default; 2nd contractor hired.
6	1.2.2	11.2	10.0	-1.2	-11%	Materials arrived early
7	1.2.3	7.2	8.0	0.8	11%	Short laborers
8	1.2.4	2.4	2.4	0.0	0%	
9	1.3.1	5.0	4.8	-0.2	-4%	
10	1.3.2	7.6	9.4	1.8	24%	Significant rework due to poor quality control.
11	1.3.3	8.4	9.4	1.0	12%	Weather delay due to blizzard
12	2.1.1	9.0	9.4	0.4	4%	
13	2.1.2	10.0	10.6	0.6	6%	
14	2.2.1	10.6	11.6	1.0	9%	
15	2.2.2	4.4	4.2	-0.2	-5%	
16	2.2.3	3.2	3.2	0.0	0%	
17	3.1.1	1.4	1.6	0.2	14%	Greater effort required than anticipated.
18	3.1.2	3.2	3.0	-0.2	-6%	
19	3.1.3	2.2	1.8	-0.4	-18%	Greater efficiency achieved than anticipated
20	3.2.1	2.0	2.0	0.0	0%	
21	3.2.2	1.0	1.0	0.0	0%	

Total Durations   120.4   128.2

Note: 0.2 Weeks = 1 Day; 0.4 Weeks = 2 Days; 0.6 Weeks = 3 Days; 0.8 Weeks = 4 Days.
A negative sign for variance indicates the element was completed early, ahead of schedule. A positive sign indicates that the element was completed late, behind schedule.

Although this table provides information with respect to every individual element that is part of the schedule, it does not indicate if the elements that were delayed or accelerated affected the final completion date. To understand the progression of the project to completion, the PM must examine the elements that lie on the critical path. Even though many of the lowest level elements that make up the schedule experience a delay, this does not necessarily indicate that the project was completed late. Elements that are not part of the critical path may be completed later than their planned completion date, using up schedule float and not adversely impacting the elements that are on the critical path. Float is the amount of time an activity can be delayed without affecting the

project's critical path (Meredith, 2003). Conversely, delaying just one element on the critical path will cause the project to finish late, even if all of the non-critical elements are completed within their expected durations.

The tables in figure 4.2.2 examine the critical path for a project. The table on the left shows the original critical path that was prepared during the Inception and Development Phases. The table on the right depicts the actual critical path that unfolded during the Implementation Phase of the project. A direct comparison between the two can be made. Note that although the cumulative delay of all elements as shown in Figure 4-1 Duration Comparison Report sums up to 7.8 weeks (128.2 – 120.4), the project was actually delayed by only 3 weeks (63.6 – 60.6) per Figure 4-2 Critical Path Comparison Report.

Figure 4-2 Critical Path Comparison Report

Initial Critical Path Schedule		
Element ID	WBS Number	Planned Duration (Wks)
1	1.1.1	5.0
5	1.2.1.2	12.6
6	1.2.2	11.2
11	1.3.3	8.4
14	2.2.1	10.6
15	2.2.2	4.4
18	3.1.2	3.2
19	3.1.3	2.2
20	3.2.1	2.0
21	3.2.2	1.0
Total Project Duration		**60.6**

"As-Built" Critical Path Schedule		
Element ID	WBS Number	Actual Duration (Wks)
1	1.1.1	4.6
5	1.2.1.2	17.0
6	1.2.2	10.0
11	1.3.3	9.4
14	2.2.1	11.6
15	2.2.2	4.2
18	3.1.2	3.0
19	3.1.3	1.8
20/21*	3.2.1/3.2.2	2.0
Total Project Duration		**63.6**

* It was not necessary to complete Elements 20 and 21 sequentially as originally thought; they were able to be executed concurrently.

While this level of detail is useful to an organization's PM, many senior managers do not have the time or training to scrutinize a project schedule. To help them better understand how a project performed with respect to schedule, the PM should provide answers to the following fundamental questions:

- What was the original estimated project duration?
- What was the actual project duration?
- Is this deviation acceptable (within 10% of original duration)?
  - If the deviation exceeds the original duration by 10%, what is the primary reason for the deviation?

- If the actual duration exceeded the estimated deviation, could this overrun have been anticipated and prevented?
    o Was crashing or fast tracking the schedule considered or attempted?
- Recommend changes for how similar future projects should be scheduled

This data can be extremely useful to the organization. If these reports are entered into an organization-wide database that contains similar information on other projects, it can be accessed by other PMs when scheduling future projects. This information can be particularly valuable if the organization takes on unique projects where little scheduling information is available from other sources. It is good business practice for organizations to collect and save this information. Organizations have already paid for this information as part of the project, and with minimal additional effort, it can be preserved for future use.

4.5   *Cost*

The Closeout Phase of a project is the optimal time for the PM to check the validity of the costing assumptions made during the Inception and Development Phases. This is accomplished by comparing the budgeted cost to the actual cost incurred.

Throughout the Implementation Phase, the PM prepared reports that tracked cost and used Earned Value Management (EVM) calculations to determine the status of the project's financial performance. Now, with all of the cost information available, the PM can perform the final calculations that will determine if the project has been completed under, on, or over budget.

Before performing the EVM calculations, it is essential that the PM identify all costs associated with the project, so an accurate overall accounting of the project cost can be determined. Failure to properly account for all expenses can lead to under-reporting the project cost or double-counting some costs. When collecting this information, the PM must consider the following costs:

- Direct labor charged to the project by project team members
- Total cost of subcontractors, if any were used
- Material consumed by the project

- Overhead incurred as a percentage of the direct labor, subcontracts, and material purchases

- General and administrative expenses incurred as a percentage of the direct labor, subcontracts, and material purchases

- Special equipment purchased specifically for the project

- Miscellaneous costs directly attributed to the project (permits, users fees, etc)

- Any penalties or liquidated damages associated with the project (Kerzner, 2003).

Once all costs are known, the PM may examine the project's cost performance. One way to accomplish this is by studying each lowest level Work Breakdown Structure (WBS) element and comparing the budgeted cost to the actual cost. This information can be summarized and incorporated into a final closeout cost report that explains how the final cost was determined. When a variance between the two exceeds 10% in either the positive or negative direction, an explanation should be provided.

Figure 4-3 Cost Comparison Report shows an example of such a report.

Figure 4-3 Cost Comparison Report

| WBS Number	Planned Cost ($000)	Actual Cost ($000)	Variance ($000)	% Variance	Reason for Variance (if greater than +/- 10%)
1.1.1	$5.20	$4.68	-$0.52	-10%	
1.1.2	$2.40	$2.76	$0.36	15%	Supply problems due to Hurricane Katrina.
1.1.3	$1.70	$1.79	$0.09	5%	
1.2.1.1	$10.00	$10.00	$0.00	0%	
1.2.1.2	$12.50	$16.88	$4.38	35%	Contractor default; 2nd contractor hired.
1.2.2	$11.20	$10.08	-$1.12	-10%	
1.2.3	$7.20	$7.92	$0.72	10%	
1.2.4	$2.30	$2.19	-$0.12	-5%	
1.3.1	$5.00	$4.75	-$0.25	-5%	
1.3.2	$7.50	$9.38	$1.88	25%	Significant rework due to poor quality control.
1.3.3	$8.30	$9.55	$1.25	15%	Poor initial work; significant rework needed.
2.1.1	$9.00	$9.45	$0.45	5%	
2.1.2	$10.00	$10.50	$0.50	5%	
2.2.1	$10.50	$11.55	$1.05	10%	
2.2.2	$4.40	$4.18	-$0.22	-5%	
2.2.3	$3.20	$3.20	$0.00	0%	
3.1.1	$1.50	$1.80	$0.30	20%	Greater effort required than anticipated.
3.1.2	$3.20	$3.04	-$0.16	-5%	
3.1.3	$2.20	$1.87	-$0.33	-15%	Salvage value greater than expected.
3.2.1	$1.90	$2.00	$0.10	5%	
3.2.2	$1.00	$1.00	$0.00	0%	
Total	**$120.20**	**$128.54**	**$8.34**		

A negative sign for variance indicates that the actual cost of the element was less that the planned cost of the element. A positive sign for variance indicates that the actual cost of the element was larger than the planned cost of the element.

Although this data is useful to the PM, many senior level managers desire a final figure that synthesizes how the project performed with respect to cost. This can be achieved by determining the total cost Variance at Completion (VAC) (Anbari, 2003). This figure is calculated by subtracting the Actual Cost (AC) at Completion from the Earned Value (EV) at Completion. Note that at project completion, EV is equal to the Planned Value (PV). For the above example, the VAC = EV-AC = $120,200 - $128,540 = -$8,340. The negative sign indicates that the project was over budget.

Another way of expressing the cost variance is to convert it into a ratio. This can be accomplished by calculating the Cost Performance Index (CPI) at project completion (Anbari, 2003). A value greater than 1.0 indicates that the project was completed under budget, and a value less than 1.0 indicates that the project was over budget. If AC at completion equals EV at completion, the project is said to be completed on budget. Looking at the values in Figure 4.3.1, the CPI (at completion) = EV/AC = $120,200/$128,540 = 0.935. This means that for every $1 spent on this project, $0.935 of value was realized (Anbari, 2003).

It is also possible to plot the CPI over the life of the project, providing senior management with a graphical representation of the cost trend as the project progressed. Figure 4-4 Cost Performance Index Over Time Plot below is an example of such a plot.

Figure 4-4 Cost Performance Index Over Time Plot
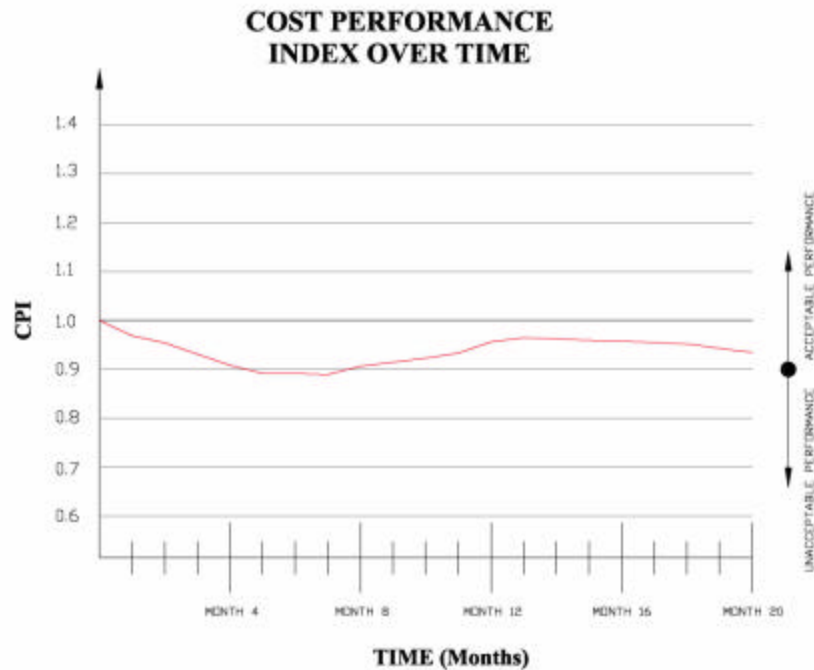
This graph indicates that the project stayed within an acceptable CPI range throughout most of the project. This type of graphical representation can be useful because it shows how the project began, how it progressed, and how it finished.

4.6   *Quality*

The Quality Management Plan ensures that the products or services provided meet the customer's needs and requirements. Quality Planning, Quality Assurance and Quality Control processes developed within the Quality Management Plan are used to achieve these demands. The objective is to be certain that quality is an integrated aspect and characteristic of the project deliverables.

Throughout the life cycle of the project, there is enormous responsibility on the PM to conform to, enforce, and improve upon the quality planning, assurance, and control processes to meet acceptance standards. Any large deviation from the proscribed product will derail or restrict the project success.

During the administrative closeout, the PM gathers and synthesizes all pertinent information related to quality plan, assurance, control, and improvement. The final report

details the effectiveness of the quality management plan and any deficiencies in meeting customer requirements.

Using Lessons Learned sessions, quality issues are identified along with impact and corrective actions. Any defects or non-conformities in the delivered product point to a lack of quality standards and control processes. Comparison between the actual product versus the negotiated or planned product provides more information on quality control and quality improvement strategies used in the project. Process and product metrics from a quality perspective are captured to improve quality and reduce defects.

Lessons Learned is an integral part of the closeout process and must be effectively implemented by the PM. Surveys conducted as part of this process may include questions related to Quality Management such as:

- How effectively was the Quality Management Plan applied during Project Implementation?
- How effective was the Quality Assurance Process?
- How effective were project audits?
- How effective was the utilization of Best Practices from prior projects in the performing organization?

A project is considered complete when it has been successfully implemented and transitioned to the performing organization and approved by the project sponsor. At this point in the project management lifecycle, the responsibilities of the PM are to assess how closely the project met customer needs, highlight what worked well, learn from mistakes made during the project, identify patterns and trends, and, most importantly, communicate results. The purpose of conducting a Post-Implementation Review is to gather the information required to meet those responsibilities, and to present the information in a Post-Implementation Report. The Post Implementation Evaluation Report (PIER) includes:

- Processes used for change control, quality, and configuration management
- Report from the Lessons Learned sessions
- Summarized deliverables in compliance with defined quality standards
- A quality resolution plan to identify outstanding quality defects and resolve them through a continuous improvement process.

Finally, the report has recommendations for improvements to be used by other projects of similar size and scope.

4.7   *Teamwork*

Holding the team together and maintaining the cohesiveness and morale of the team is as important during the Closeout Phase as during any of the previous phases in the project lifecycle. Primarily, teamwork in the Closeout Phase involves keeping the team focused on closeout duties and making sure that team members experience a smooth transition from the current project to future projects.

In previous teamwork sections of this handbook, reference has been made to Bruce Tuckman's oft-quoted theory on developmental sequences of groups (forming-storming-norming-performing). In 1977, Tuckman, along with Mary Ann Jensen, revised their 1965 theory (Tuckman, Bruce W., & Jensen, Mary Ann C,1977) to include "adjourning" as the final phase to the development sequence after performing. Tuckman recognized that groups experience a phase of anxiety about separation from team members. In the project management context, this may mean anxiety due to termination of the project, as well as separation from the team members with whom a considerable amount of time has been spent.

Before the PM, as a team leader, focuses on techniques to ensure a smooth transition out of the project, it is important for her/him to realize that there are still elements of "performing" by the team during the Closeout Phase. The biggest teamwork challenge in this phase is to focus the team's attention on the closeout tasks.   In this phase, team members are often more involved in thinking about their next project and they view closeout work for the current project more as "overhead" work and not "real work." However, there are some techniques that a PM can use to ensure her/his team's attention:

- Continuous communication even though the implementation stage of the project is over, is a good idea to keep the team members informed about the status of the Closeout Phase. Keeping the team members in the "loop" keeps them connected to the project.
- Remind team members that closeout products are part of project deliverables. It is the PM's job as the facilitator of the project team to

remind the team that although some closeout tasks may be seen as "boring" paperwork, they are nonetheless important project deliverables.

- Emphasizing the value of such products for organizational goals. It is also the PM's job to stress the fact that the deliverables of the Closeout Phase are strongly linked to the strategic goals of the performing organization. Good lessons learned may lead to future cost savings for the organization.

Though some of the above actions may serve as motivators for current tasks, the PM needs to also engage herself/himself in ensuring that the team moves through the adjourning phase smoothly. The adjourning phase is particularly difficult for organizations which have a projectized structure. As Kerzner (2003) points out, "At project completion [in a projectized environment], functional personnel do not have a home to return to (p.100)."

Hosting a project closeout party where the hard work of the team members is recognized and commemorative items like plaques and t-shirts are given out may go a long way in bringing closure to the project in the minds of the team members. The experience can prove to be more rewarding if the PM can get senior management involved in such functions.

Other means of allaying the anxiety of the team can include keeping project personnel informed of upcoming job opportunities. One of the responsibilities of the PM in the Closeout Phase is to assist in redistribution of resources to other new projects. The team members feel relaxed with the prospect of new work and the PM builds goodwill if she/he needs to use the same resources in the future.

One step that the PM needs to take on the cautionary side during this phase is to ensure that the organization is protected against disgruntled employees. Though there is no sure way of detecting an employee who may feel slighted, there are certain steps the PM can take to reduce the chances of any such employee turning disgruntled. One good practice can be to disable UserIDs and passwords of team members who no longer require access to a system or database. Also, if the project was being conducted in a high security environment (e.g., the Pentagon) it is advisable to request that employees turn in their security badges once the PM determines that a team member no longer requires access to the facility.

4.8   *Communications*

The unique communication challenges during the Closeout Phase are:

- Maintaining amicable and constructive relations with the client during the acceptance activities for client deliverables.

- Ensuring the effective delivery of all client support and maintenance training, knowledge transfer, and documentation set out by the statement of work for the client product and service deliverables.

- Performing a constructive project post-implementation review by soliciting feedback from project participants and stakeholders through well constructed surveys, interviews, and town hall meetings.

- Producing, distributing, and presenting the project post implementation review document (or project audit), the lessons learned recommendations and action plan, and the project final report, which summarizes the project history and post implementation review findings.

- Focusing the support of the project team and senior management on the completion of closeout activities.

- Mitigating distraction, anxiety and personality conflicts that typically heighten as a result of impending project closure.

Although the project team moves on and generally disbands at the conclusion of the project, the relationship with the client is important for potential follow-on operation and maintenance support contracts, or other business opportunities. It is incumbent upon the PM to facilitate good relationship with the client by constructively closing out (e.g., signing off) the issues log with the client, by agreeing to disagree, or by third party intervention (e.g., mediation, conciliation, or arbitration). The triggers and means for the third party intervention process should have been agreed upon in the project contract package during the project development phase.

Sometimes a client experiences difficulty in fully extracting sustained business value from the project deliverables some time after project closeout. This often happens when the availability or quality of maintenance and training documentation is inadequate

- especially if client personnel who were initially prepared and charged with the operation of the deliverables move on. In the excitement and rush to close out a project, client support documents may be inadequately certified for completion and quality. Where the client is in the trust of the project provider to certify such documentation as part of the statement of work, the PM should take special care to ensure proficient completion and certification of such documentation and knowledge transfer. At stake are the legacy of the project, the reputation of the provider organization and project team, and possible legal consequences.

The project post-implementation review (PIR) should solicit constructive feedback on project strengths and weaknesses from key project participants and stakeholders through prepared survey and interview questions. The review should be conducted while project experience is fresh with the PIR participants. Feedback should be solicited on project performance, administrative performance, organizational structure, project teamwork, and project management processes and techniques. It is advisable for the PM to keep an informal project diary to chronicle lessons learned and special issues throughout the project which can also serve to identify lessons learned and best practices

The PIR report should be constructed to facilitate the comparison of planned versus actual results, explain exceptional deviations, and identify lessons learned and potentially new best practices. The report should be written in a clear, professional, style to convey information and issues impacting the project.

The project final report should summarize the history of the project and the key findings from the PIR. It should provide recommendations for future projects and an action plan for implementing the recommendations. It should identify the electronic project document repository where the historical project documents can be found. It is advisable for the report to be distributed to all project teams and key project participants, and presented to the PMO and the senior management.

As indicated in the introduction to the closeout section, project team anxiety, distraction and personality conflicts heighten during the closeout phase as the future assignment of project participants are in transition or uncertain. The PM should be sensitive to the concerns and political differences, and employ great listening, emotional intelligence, and conflict management skills to assist with project participant concerns

without alienating the cooperation and support of any party. The PM should convincingly communicate that success of the organization, overall project, project team, and individual participant is linked to the effective completion of the project Closeout Phase. This win-win approach should help focus and reinforce the spirited efforts of the project participants to complete the project Closeout Phase.

4.9   *Risk*

The Risk Management Plan adopted by the PM will describe how risks are identified, tracked, assessed and, if necessary, mitigated. During the Closeout Phase, the PM documents issues, both old and new, identified during the lifecycle of the project and creates or maintains the issue. The PM, upon completion of the project, closes all risks and issues, evaluates the identified risks and impacts, and prepares a final report relating to the risks, risk mitigation plan, and their effectiveness during project closeout.

During administrative closure, the PM collects all the documentation related to risk management such as risk inventory and assessment forms, risk control forms, risk identification forms, the risk response plan, the risk register and risk status forms. Data collected is evaluated, analyzed, and a final report is produced, which highlights the effectiveness of risk management throughout the project. Finally, an update to the skills inventory is made and key project metrics are captured.

Organizations improve through a continuous cycle of planning, doing, reflecting, and acting on what is learned. Lessons learned are the documentation of the experience gained during a project. Identified problems are documented and solutions provided to address them so that the occurrence of the same problems in future projects is eliminated. Lessons learned typically provide: a brief discussion of the problem to identify its nature, source, and impact; the citation of any references that provide additional detail.

The lessons learned session is typically a large meeting that includes: the project team, stakeholder representation - including external project oversight, and executive management. Some typical questions to answer in such a session include:

- Were risks identified and mitigated?
- What could be done to improve the process?
- How comprehensive was the Risk Management Worksheet?

- Did risk events occur as planned or were there any unanticipated events?
- Effectiveness of the risk plan and any weaknesses in the existing risk plan?

Figure 4-5 Sample Lessons Learned Form

Statement of Problem	Discussion	References	Corrective Actions
New module batch processing is running slow delaying many tasks	New module has code performance problems. Inadequate standards followed during coding	Performance logs & batch logs	Enforce quality policy on coding standards. Common sharing code with strict rules/policies will enhance reuse and performance

(Source: Project Management Guide, Dept. of Veteran Affairs, OIT)

The Project Closeout Transition Checklist is a list of questions that indicates necessary actions to be accomplished before completing the Project Closeout Report.

Figure 4-6 Sample Closeout Transition Checklist

	Item	Status	Comments/ Plan to Resolve
1	Have all the product or service deliverables been accepted by the customer?		1.
1.1	Are there contingencies or conditions related to the acceptance? If so, describe in the comments.		2.

(Source: Project Management Guide, Dept. of Veteran Affairs, OIT)

The Project Closeout Report provides a historical summary of project deliverables and baseline activities over the course of the project. To assess project success and customer satisfaction, the PM solicits feedback from the Project Team, Customers, Consumers and other stakeholders. Some typical questions posed in the surveys include:

- How much were team members involved in the risk identification and mitigation planning process?
- To what extent was the evolution of risks communicated?
- How accurate were the risk probabilities on the Risk Management Worksheet?

- How effectively was the Risk Management Worksheet updated or reviewed?
- How comprehensive was the Risk Management Worksheet?
- What could be done to improve the risk management process?
- What were successful risk assessment and mitigation techniques, i.e., what risks occurred and what techniques were used to mitigate these risks?
- What unplanned risk events occurred, what was their impact and why were they not identified and mitigated?

The post implementation review and report documents summarize the risk management plan that is in place, risk events that have occurred and effectiveness in mitigating these risks. Comparison is made with similar risk events recorded from earlier projects and evaluated for extent of variability and deviation. Risks are carefully analyzed to find out why they were not identified initially in the risk identification process and documented for retention in the project archives.

4.10 *Contracts*

Contract closeout is complete when all administrative actions have been completed, all disputes settled, and final payment has been made. Closeout activities include, but are not limited to:

- Verifying that the contract is complete
- Preparing a contract completion checklist
- Reviewing contract data and confirming all deliveries have been accepted
- Ensuring all subcontracts are settled by the prime contractor
- Verifying that the terms and conditions of the contract have been satisfied
- Verifying that there are no outstanding claims or disputes
- Making final payment
- De-obligating remaining funds
- Obtaining all pertinent forms, reports and clearances
- Completing final closing statement
- Submitting final invoice
- Completing audit

It is generally the responsibility of the PM to establish that the work under the terms of a contract has been completed and the contract is ready for closeout. The PM should prepare a checklist showing that all the contract deliverables have been reviewed, inspected and accepted. In order to make this assessment, the PM should review all contract documentation to include: the contract, sub-contracts, supporting schedules, requested and approved contract changes, seller-developed technical documentation, seller performance reports, financial documents such as invoices and payment records, and the results of any contract-related inspections.

The PM should develop and use a contract closeout checklist, listing all administrative steps required to close out a contract. The checklist is an extremely useful tool for the PM responsible for contract closeout. This checklist should be tailored to the contract vehicle type chosen during the Development Phase and should focus on the specific closeout requirements of that contract vehicle. It should highlight both the legal and commercial factors of the contractor documentation to be verified.   The PM should share the contract closeout list with the Contract Administrator (CA) for use during the formal acceptance and closure procedures. The CA must be sure that all administrative steps have been accomplished prior to final payment. In addition, the CA must ensure that all required inspections have been performed by the technical program office, and the PM has certified the satisfactory completion of the contract. This certification includes all required documentation from the contractor, before the CA authorizes final payment or the release of any funds retained under the contract.

Another useful tool for a successful close out is the procurement audit. A procurement audit is a structured review of the contract process from the contract inception through contract closeout. The audit allows the PM to document the review of the pertinent contract documentation. This information should be archived in the Project Management Office for future review and/or guidance for the next project undertaken. The procurement audit gives the PM a structured methodology to review the contract documentation and ensure that all aspects of the contract have been satisfactorily completed and accepted.   Figure 4-7 Contract Closure depicts the inputs and outputs required to perform a procurement audit. Once the audit is complete and the PM is sure that all contract requirements have been fulfilled, a statement of compliance is sent to the

contract administrator, if different than the PM, for the initiation of the final acceptance and closure process.

Figure 4-7 Contract Closure
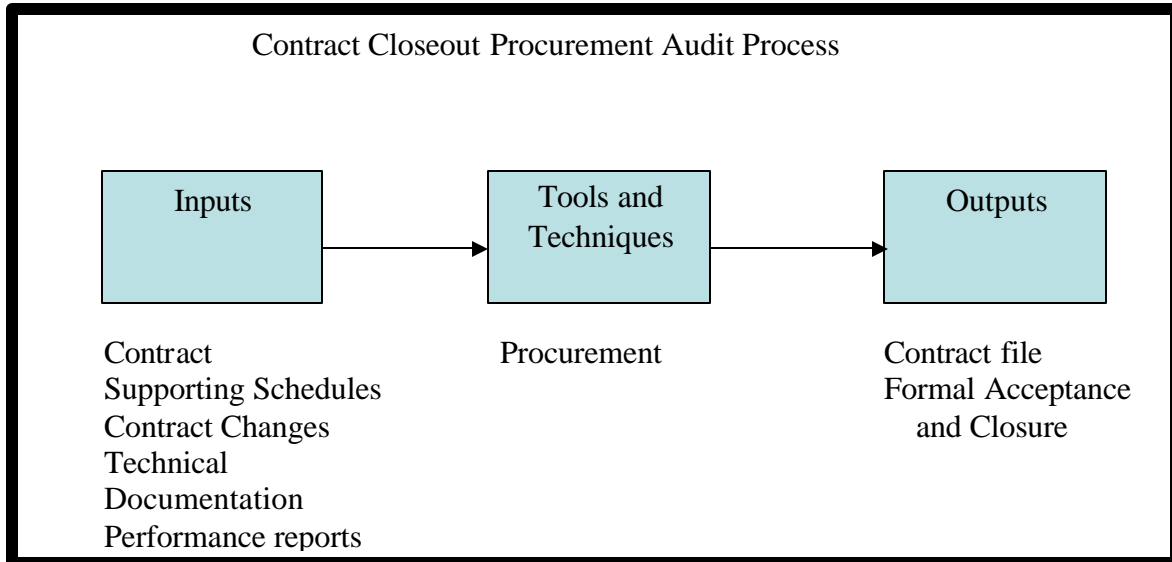
(PMBOK® Guide, 2004)

The final output of the procurement audit is the contract file and formal acceptance and closure documentation. The contract file should be prepared for inclusion with the final project records and retained in the project file in the Project Management Office for use by other PMs and team members. As part of the contract closeout process, the CA must send the contractor a closeout letter that includes the contractor's general release. This document is a standard statement prepared by legal counsel for use on all contracts. The release allows that for a certain sum, which is an amount agreed to by both parties, and states that the Contractor releases the firm from any and all claims directly or indirectly arising out of the contract. The general release is important to obtain prior to final payment, because it assures the firm that there will be no further claims from the contractor once the final payment has been made

4.11 *Project Management Office*

The role of the Project Management Office (PMO) during the Closeout Phase is to assess the project, to identify any lessons learned and best practices, to document the lessons learned and best practices in an archived project repository, and to communicate

those lessons learned and best practices to the organizational workforce. A project is considered complete when it has been successfully implemented and transitioned to the organization for which the project was undertaken and approved by the project sponsor and stakeholders. It is at this time that the PMO will initiate the post-implementation review.

During the Closeout Phase of the project lifecycle, the PMO's responsibilities are to facilitate/lead the post-implementation review, identify best practices, document lessons learned to ensure the same mistakes are not made in future projects, identify project management process improvements, and communicate results.

Throughout the Closeout Phase, the PMO receives analysis, reports, findings, recommendations, data, and contract information from the different areas within the project team, (i.e., scope, cost, schedule, risk, quality, etc.) Examples of this information have been discussed in the previous sections of this chapter. After this data has been analyzed and the output compared to the baseline, the final reports are sent to the PMO for use during the post-implementation review. The PMO should gather feedback using a survey appropriate to a specific project as each project is different and the survey should reflect those differences. While a standard template can be developed it is essential that the template is updated and tailored for use after implementation of each project.

This information is included in the archived project repository and shared with both the key organizational managers and the workforce. This can be done through briefings and town hall meetings. It is most important that the PMO: 1) engages management for their support of process improvements identified during the close out phase, and 2) establishes a metric to track the implementation of those process improvements. When the project is officially closed, the project repository should include items such as:

- Supporting project documentation
- Project charters and project plan
- Documents defining cost, scope, schedule and quality
- Project schedules
- Financial documentation
- Scope changes

- Status reports

- Progress reports and timesheets

- Deliverable acceptance log

- Deliverable approve forms

- Audit results

- Correspondence

- Post-Implementation report

In addition to the post-implementation review, it is the responsibility of the PMO, the PM and the task leads to complete such tasks as: 1) updating the skills inventory of the individuals that participated in the project; 2) providing feedback to the supervisors of the team members; and 3) archiving the project information in such a way that others have easy access to the final data. The PMO should take the time to document feedback for each individual project team member. This feedback should include accomplishments and performance for each team member and should be shared with both individuals and their supervisors. In most cases the individuals have been matrixed to the project team and their supervisors have no insight into the day-to-day activities performed on a given project. This practice can serve as a reward for those that have worked hard on a particular project and offset the anxiety felt by individuals when they have been away from their division or group for a prolonged period of time. It can also be used as an incentive to influence individuals to maintain a high standard of performance throughout a specific project.

The final responsibility of the PMO is to serve as a mentor and educator to the organization. The PMO can be the bridge between one project's closeout and the next projects initiation. The PMO holds information on best practices, lessons learned, updated skills inventory, process improvements, project management methodologies and other related information that can be used to ensure the success of the next project that is undertaken. The PMO comes full circle in its efforts to ensure that projects are successful the first time, and if not, that the lessons learned during a project are passed on to the next PM.

4.12 *Knowledge Management*

"Absence of KM will make projects unable to contribute to any improvement of the organizational business processes."

Peter E.D. Love, Patrick S.W. Fong, Zahir Irani (2005)

It is often said that project closeout is a continuous process and not an activity that is initiated after project implementation. This is probably most relevant in reference to capturing and managing knowledge in a project.

Though a lot of the KM components are produced during the various phases of the project lifecycle, the creation of artifacts by themselves do not constitute KM. Like a project, KM has its own lifecycle. The following figure explains the KM cycle.

Figure 4-8 Knowledge Management Cycle

The knowledge management cycle
Source: Liebowitz (2005)
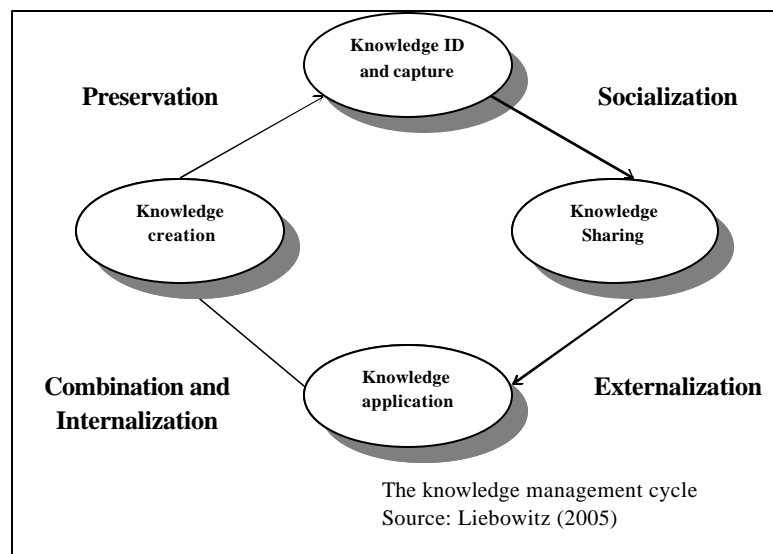
Liebowitz (2005) explains that the KM cycle goes through the four-step process of knowledge capture, knowledge sharing, knowledge application, and knowledge creation. Once new knowledge is created, it is preserved and cycled back to the knowledge capture phase as the cycle begins again. This model also corresponds with Nonaka and Takeuchi's (1995) model of Socialization-Externalization-Combination-Internalization, which is explained in their book, The Knowledge Creating Company.

As evident from the model, establishing a successful KM process in the project environment involves developing a strategy and an implementation plan from the inception of the project. However, the PM's strategy and KM implementation plan prove

to be inadequate, if team members do not contribute to the plan's execution. Before finalizing the KM strategy, the PM needs to ask some basic KM questions that will help formulate the strategy. Questions, as discussed by Sveiby (2001), may include:

- How can competence be transferred within the people of the organization?
- How can individually held competence be converted to systems, tools and templates?
- How can individual competence be improved by using systems, tools and templates?

If the PM is fortunate, he/she can probably get concrete answers to the above questions and formulate a KM strategy. However, implementing KM in a project environment can be challenging. Projects are unique products and knowledge gained in one project may not be applicable to other "unique" projects. Additionally, projects often involve cross-functional work groups with very specialized functional knowledge. Unless the knowledge-base is subcategorized into specific disciplines, many members of the project team may not see any value in learning anything new or may not know where to look for information.

With all the given constraints, the PM can use the following findings from the American Productivity and Quality Center's Knowledge Management Benchmarking studies (2000) for successful KM implementation:

- The PM should work toward getting buy-in from senior management to champion the KM cause and make a significant investment in it.
- The PM should ensure Communities of practice which are central to the KM strategy are available within the organization.
- The PM should solicit senior leadership to break down functional silos which can often create significant cultural barriers.

The PM can try to get upper management sponsorship by highlighting the following benefits the organization can realize with effective KM. According to Grey (1999), by developing a knowledge map, an organization can:

- Encourage reuse and prevent reinvention, saving search time and acquisition costs.

- Reduce the burden on experts by helping staff find critical information/knowledge quickly.

More importantly, the PM can also try to convince upper management that since most knowledge components are produced as part of implementing the project, a great deal of the cost of instituting a KM system is already included in implementing the project.
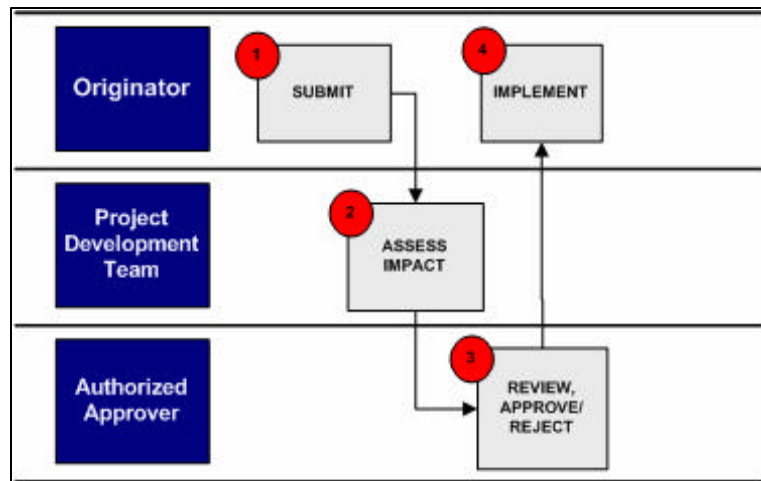
4.13   *Change Management*

Change Management (CM) is applicable to all phases of the project. Below are some change management considerations:

- Change Management (CM) helps manage and control costs, scope and risks to Projects and Portfolios.
- CM documentation provides PMs, Business Owners, and Executives visibility and justification for changes in project costs, scope and schedules.
- Lack of CM is a risk to all projects – it is amplified across all project initiatives, especially, high priority projects.
- Project schedule baseline policies and scope management initiatives set forth by the PMO require a stable change management process.
- CM provides a standard process to identify, track, assess and incorporate changes to projects for the organization.
- CM procedures are required during project audits (i.e., CM is not an option. It's mandatory).

The change management framework supports 4 basic steps (see Figure 4-9 Change Management Framework below):

- Submitting changes to a project
- Assessing the impact of changes to all project deliverables
- Approving/rejecting changes to a project
- Implementing approved changes to a project

Figure 4-9 Change Management Framework

Source: AOL Inc. Training, 2006

The Change Management Challenge is usually attributed to the factors below (see Figure 4-10 Cross Functional Change Management Challenge):

- Multiple cross functional teams
- Complex project management structures
- Complex program management structures

Figure 4-10 Cross Functional Change Management Challenge
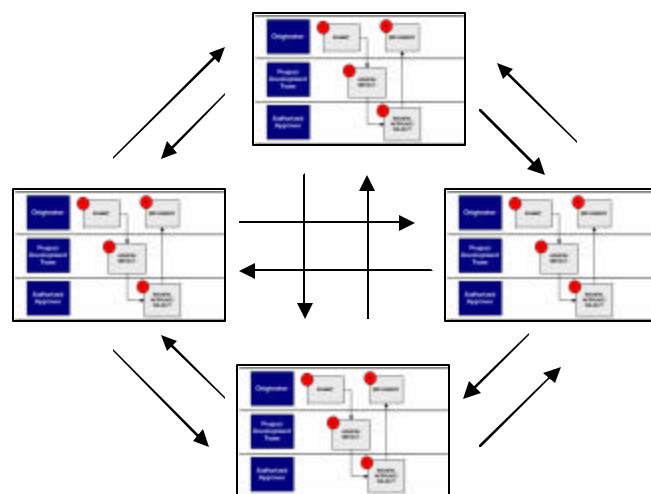
Source: AOL Inc. Training, 2006

Change occurs in the following project attributes:

- Product Requirement Document (scope)

- Project Priority

- Resources (Availability, increased hours)

- Schedules (Delivery dates/quarters, key milestones)

Change Management begins after baseline in any of the above project attributes

Figure 4-11 Change Management Roles and Responsibilities

Role	Responsibility
Project Manager	• Complete change request form (gathers analysis, information, PPL and Business approvals, estimates etc.) • Submits change request forms to Change Manager • Ensures impacted project documentation and systems are updated AFTER changes are approved (i.e.. implement change to the project)
PPL	• Reviews change request before being submitted to Change Manager • Provides additional priority related information that may be needed in order to implement the change request • Communicates with the business regarding changes that impact the entire portfolio • Retains proof of CR approval for auditing purposes
Business Owner, Sponsor, or designated CCB	• Approve change requests that are being submitted for processing to include budget, resources, prioritizations, etc. • Provide thresholds for re-baseline
Change Manager	• Logs change and assigns change request number • Manages change request through the process • Communicates to all parties involved regarding the change being requested and actions that need to be taken after approval
Planning and Scheduling Group	• Provides priority analysis of change requests • Incorporates approved changes to the priorities • Assists in changes impacting multiple resource pools

Source: AOL Inc. Training, 2006

Appendix

The following are suggested sections for the Quality Management Plan

Source: Project Management Guide, Dept. of Veteran Affairs, OIT

Purpose of Quality Management Plan	Describe the purpose of the Quality Management Plan using the following guidelines: The Quality Management Plan uses the organization quality policy and industry standards to describe the processes the project will use to accomplish project quality assurance and quality control. It describes the criteria used to determine acceptable products and the processes used to control quality during the development, deployment and operational phase of the project.
Executive Summary	Approach: Provide an executive level overview of the project: identify the business need or problem, identify the project goals and objectives, and define the management strategy used to implement the project.
Quality Policy	Describe the organizations quality policy or the policy adopted for the project. Quality policy might involve document preparation standards, status reporting standards, levels of communication standards for project events, contracting standards, development and testing standards, etc.
Quality Management Approach	Describe how the project team will implement the quality policy and achieve the project quality standard. Include the quality criteria identified during the quality planning process.
Quality Assurance	Describe the project quality assurance process, which include the test and acceptance processes, documentation and operational support transitions, milestone checklist, the requirement verification process, schedule and communication activities, and continuous improvement processes. (see example of a Quality Management Process Model in the Quality Management Plan section)
Quality Control	Define in-process control processes, which address quality assurance activity areas. Describe how control information will be collected and how the information will be used to control processes and deliverables. Describe the periodic quality audits and reviews and how variances from acceptable criteria will be reported and resolved.
Quality Change Review and Approval Process	Describe the organization and process for evaluating and assessing proposed quality changes. Define the authority for accepting and approving changes in quality, which may include the customer. Note: the change review and approval process should be contained within the Project Integrated Change Control Process and referred to in this section.
Project Team	Describe quality-related responsibilities of the project team including

Quality Responsibilities	specific tasks such as acceptance test, audit, review and checklist responsibility assignments.

The following are suggested sections for the Risk Management Plan

Source: Project Management Guide, Dept. of Veteran Affairs, OIT

Purpose of Risk Management Plan	Describe the purpose of the Risk Management Plan using the following guidelines: The Risk Management Plan describes how risks are identified, tracked, assessed and, if necessary, mitigated. The plan identifies the tools used to capture identified risks, risk categories, assigned owners, calculated probabilities, identified thresholds or triggers for instigating mitigating action and contingency plans. The Risk Management Plan identifies the Risk Management process, responsible managers, the timing of risk assessments and reporting.
Executive Summary	Approach: Provide an executive level overview of the project: identify the business need or problem, identify the project goals and objectives, and define the management strategy used to implement the project.
Risk Identification	During risk identification, the perception of a potential problem is documented in sufficient detail to enable effective assessment of the risk to support subsequent management decisions. Once the risk has been identified and reviewed, the risk is recorded into the risk database. See Risk Inventory and Assessment at form end.
Risk Triggers	Risk triggers are events or performance characteristics that warn of the occurrence of risk events. An example of a risk trigger would by a supplier missing deliverable dates and delaying related activities and adding cost to project. Risk triggers should be captured on the Risk Control Form.
Risk Analysis	The goal of risk analysis is to ensure that the risks are examined in a structured and systematic manner. The risk owner may work with the risk coordinator to formulate the initial risk assessment. A qualitative risk assessment qualifies the expected impact, probability, and timeframe of a risk. The results of the risk analysis are recorded on a risk identification form. The results are used to determine Risk Management priorities. A quantitative risk analysis is also accomplished where the impact of a risk is ranked against other risk events or in the case or performance, the risk is assessed as a percentage of reduction in performance.
Risk Severity	The results of qualitative analysis and quantitative analysis are captured on a impact/probability chart, called the Risk Severity Grid. The grid is used to determine the priority that is assigned

	each risk and the need to develop containment strategies.
Risk Response Planning	Risk response planning involves identifying the strategy for minimizing the effects of the risk to a level where the risk can be controlled and managed to ensure the project objectives are achieved. Risk reduction strategies include research, watch, mitigate, accept or transfer.
Risk Documentation and Reporting	Create a central repository for risk information and mitigation strategies. This is typically an automated system where risk information is available to appropriate project team members and risk owners. Typical tools include the risk register (the complete risk database) and a monthly risk status report that is part of the Monthly Performance Reporting Process and becomes an input to the Milestone briefing process and the OMB Exhibit 300 process.
Risk Control	Define the risk control process, which addresses risks on a periodic basis. Describe how risks are regularly reassessed and the risk database is updated. Describe how the risk triggers are regularly assessed and validated. Insure, on a periodic basis that new risks are being identified, assessed and captured in the database.

Source: www.oft.state.ny.us/pmmp/guidebook2/

Sample Project Closeout Report

A.   General Information

Project Name:		**Date:**	*(mm/dd/yyyy)*
Agency:			
Project Manager:			

In each of the following sections, provide references to the location of the requested information and document successes, problems, and recommendations associated with that section.

B.   Final Acceptance

Verify the Final Acceptance materials (provide reference):
The results of the review of the product delivered compared to the baseline requirements and specifications.
List of deviations; documented, approved, justified and future action plans
Action items and issues closed or reassigned to the support organization
References to other deliverables, key features and pertinent information about final product delivery
Verification of final acceptance via signatures of the Executive Sponsor and key stakeholders
Include statement that all product documentation has been transferred to the operations and maintenance organization and all required project documentation has been archived

G.   Risk Management

Provide reference to risk management artifacts that description of the major risks identified for the project and how they were handled.

Risk Identification and Mitigation

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Risk Impact

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H.   Quality Management

Provide reference to quality control artifacts that describe how quality assurance was involved in this project.

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L.   Additional Lessons Learned

Describe the successes, shortcomings, problems, issues, and recommendations for aspects not addressed above.

Describe recommendations for process improvement and/or template modification.

Describe new ideas that were successful in the project and make recommendations on how these processes might be adapted to other projects.

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M.   Outcomes Assessment Report

This report documents the extent the business objectives and anticipated benefits are achieved. In some cases this report cannot be completed until the product is in operation for three to six months, or until a particular business cycle has occurred. Document the responsibility and timeframe for producing the initial Outcomes Assessment Report.

Responsibility:

Scheduled Completion Date:

N.   Project Closure Sign-Off

The Executive Sponsor and key stakeholders authorizes project closure by signing below.

Name/Title	Signature	Date

Source: Project Management Guide, Dept. of Veteran Affairs, OIT

Sample Project Closeout Transition Checklist

Provide basic information about the project including: Project Title – The proper name used to identify this project; Project Working Title – The working name or acronym that will be used for the project; Proponent Secretary – The Secretary to whom the proponent agency is assigned or the Secretary that is sponsoring an enterprise project; Proponent Agency – The agency that will be responsible for the management of the project; Prepared by – The person(s) preparing this document; Date/Control Number – The date the checklist is finalized and the change or configuration item control number assigned.

Project Title:		*Project Working Title:*	
Proponent Secretary:		*Proponent Agency:*	
Prepared by:		*Date/ Control Number:*	

Complete the Status and Comments column. In the Status column indicate: Yes, if the item has been addressed and completed; No, if item has not been addressed, or is incomplete; N/A, if the item is not applicable to this project. Provide comments or describe the plan to resolve the item in the last column.

	Item	*Status*	*Comments/ Plan to Resolve*
1	Have all the product or service deliverables been accepted by the customer?		
1.1	Are there contingencies or conditions related to the acceptance? If so, describe in the Comments.		
2	Has the project been evaluated against each performance goal established in the project performance plan?		
3	Has the actual cost of the project been tallied and compared to the approved cost baseline?		
3.1	Have all approved changes to the cost baseline been identified and their impact on the project documented?		

	Item	Status	Comments/ Plan to Resolve
4	Have the actual milestone completion dates been compared to the approved schedule?		
4.1	Have all approved changes to the schedule baseline been identified and their impact on the project documented?		
5	Have all approved changes to the project scope been identified and their impact on the performance, cost, and schedule baselines documented?		
6	Has operations management formally accepted responsibility for operating and maintaining the product(s) or service(s) delivered by the project?		
6.1	Has the documentation relating to operation and maintenance of the product(s) or service(s) been delivered to, and accepted by, operations management?		
6.2	Has training and knowledge transfer of the operations organization been completed?		
6.3	Does the projected annual cost to operate and maintain the product(s) or service(s) differ from the estimate provided in the project proposal? If so, note and explain the difference in the Comments column.		
7	Have the resources used by the project been transferred to other units within the organization?		
8	Has the project documentation been archived or otherwise disposed as described in the project plan?		
9	Have the lessons learned been documented in accordance with the Commonwealth Project Management guideline?		
10	Has the date for the post-implementation review been set?		
10.1	Has the person or unit responsible for conducting the post-implementation review been identified?		

Signatures

The Signatures of the people below relay an understanding that the key elements within the Closeout Phase section are complete and the project has been formally closed.

Position/Title	Name	Date	Phone Number

Source: Project Management Guide, Dept. of Veteran Affairs, OIT

Sample Lessons Learned

Lessons Learned should be stated in terms of Problems (or issues) and Corrective Actions taken. Provide a brief discussion of the problem that identifies its nature, source, and impact. Site any references that provide additional detail. References may include project reports, plans, issue logs, change management documents, and general literature or guidance used that comes from another source.

Statement of Problem	Discussion	References	Corrective Actions

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