

Chapter 11 – Project Planning and Project Management

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Chapter Overview

This chapter has three major themes.

- A review of basic project management principles and the PMBOK
- A discussion of the activities of Core Process one: Identify the problem and obtain approval
- A discussion of the activities of Core Process two: Plan and monitor the project

Project management can be taught in two different ways, either from a conceptual point of view, or from a list of skills and activities point of view. The first section on the principles of project management, as well as the discussion of the PMBOK in Online Chapter C, present a conceptual foundation of project management principles.

Skills and activities are taught through explanations of the first two Core Processes.

Core Process one activities explain how to identify and document a business need and what information is usually required to get the project approved. Included in that discussion are such activities as calculating the net present value, estimating a total time period for project completion, and assessing project risks.

Core Process two activities explain how to get a project started: how to set up a working environment for the developers, how to create a work schedule and how to find and allocate team members to the various development tasks in the project. Also as part of Core Process two is a discussion of how to monitor the project once the work has started.

Learning Objectives

After reading this chapter, the student should be able to:

- Describe the factors that cause a software development project to succeed or fail
- Describe the responsibilities of a project manager
- Describe the knowledge areas in the project management body of knowledge (PMBOK)
- Describe the Agile approach to the project management knowledge areas
- Explain the activities required to get a project approved (Core Process 1)
- Explain the activities required to plan and monitor a project (Core Process 2)

Notes on Opening Case and EOC Cases

Opening Case

Blue Sky Mutual Funds: A New Development Approach: This case is a transition case between Chapter 10 and Chapter 11. Chapter 10 introduced the concepts of iterative development and Chapter 11 expands those concepts with more specific project management activities. This case is an excellent example of how a company might first begin using iterative development. It highlights some of the advantages as well as the concerns and issues that upper management will have with the iterative approach.

EOC Cases

Custom Load Trucking: Custom Load Trucking is a nationwide trucking firm. Stewart Stockton was a systems analyst who had also been a team leader with the company. His manager was trying to decide if Stewart was ready to be a project manager. Students are asked to analyze the policy used by Custom Load Trucking of promoting project managers from the pool of systems analysts. Students are also asked to develop criteria for promotion to project manager, and how to structure job responsibilities for new project managers.

Community Board of Realtors (running case): Community Board of Realtors is a professional organization that supports real estate offices and agents. Students are asked to develop the various documents discussed within the chapter including a System Vision Document, project iteration schedule for a single subsystem, an estimate of development cost, and time to complete. Finally students are asked to create a detailed work schedule using Microsoft Project. Hint: Have the students use the examples given in this chapter and in Chapter 1.

Spring Breaks 'R' Us Travel Services (SBRU) (running case): SBRU is an online travel services that books spring break trips to resorts for college students. Students are asked to develop a System Vision Document. Students are also asked to finalize a list of use cases, organize the four available developers into teams, and develop a project iteration schedule. Students are also asked to estimate the cost to develop and then develop a five-year NPV.

On the Spot Courier Services (running case): On the Spot is a small, but growing, courier service that needs to track customers, package pickups, package deliveries, and delivery routes. Students are asked to create a System Vision Document, a project iteration schedule based on the four identified subsystems, a work breakdown structure, and enter the WBS into Microsoft Project.

Sandia Medical Devices (running case): Sandia Medical Devices is a company that specializes in medical monitoring through remote, mobile telecommunication devices. Students are asked to define the required subsystems and prioritize which subsystem should be developed first. Students are also asked to create a project iteration schedule and a work schedule or a Gantt chart with Microsoft Project.

Instructor's Notes

Principles of Project Management

Key Terms

- **project management** – organizing and directing other people to achieve a planned result within a predetermined schedule and budget
- **client** – the person or group that funds the project
- **oversight committee** – clients and key managers who review the progress and direct the project
- **users** – the person or group of people who will use the new system
- **level of formality** or **ceremony** – the level of formality of a project; the rigor of holding meetings and producing documentation
- **project management body of knowledge (PMBOK)** – a project management guide and standard of fundamental project management principles

Lecture Notes

A project is a planned undertaking with a beginning and an end, which produces a predetermined result and is usually constrained by a schedule and resources. The development of information systems is usually a quite complex project, with many people and tasks that have to be organized and coordinated. Whatever its objective, each project is unique. Different products are produced, different activities are required with varying schedules, and different resources are used. This uniqueness makes information systems projects difficult to control.

The Need for Project Management

History is replete with stories of software development projects that go awry. There are a number of organizations that study software development to evaluate success rates and to identify best practices. Software development success is often measured using three criteria: finishing on time, finishing within budget, and effectively meeting the need as expressed by the original problem definition.

Given these three criteria, software projects are often categorized in three ways:

1. Successful projects, which are completed on time and within budget while meeting the users' requirements for functionality
2. Challenged projects, which have some combination of being late, over budget, or reduction of scope
3. Failed projects, which are canceled or result in the system never being used

Since 1994, the well-known Standish Group has produced an annual CHAOS report, which provides statistics on the outcome of IT development projects for the preceding year. Figure 11-1 illustrates success rates based on several different types of development paradigms. Even though the success has improved substantially, billions of dollars are still spent on projects that don't meet their objectives. Many of these studies and reports don't just indicate the rate of information technology (IT) project failure or success. They also identify the reasons for each. Here are some of the primary reasons for failure:

- Undefined project management practices
- Poor IT management and poor IT procedures
- Inadequate executive support for the project
- Inexperienced project managers
- Unclear business needs and project objectives
- Inadequate user involvement

The Role of the Project Manager

Project management is organizing and directing other people to achieve a planned result within a predetermined schedule and budget. Project managers must be effective internally (managing people and resources) and externally (conducting public relations). This list identifies a few of these internal responsibilities:

- Developing the project schedule
- Recruiting and training team members
- Assigning work to teams and team members
- Assessing project risks
- Monitoring and controlling project deliverables and milestones

Major external responsibilities include:

- Reporting the project's status and progress
- Working directly with the client (the project's sponsor) and other stakeholders
- Identifying resource needs and obtaining resources

A project manager works with several groups of people. First of all, there is the **client** (i.e., the customer), who pays for the development of the new system. For large, mission-critical projects, an

oversight committee (sometimes called the steering committee) may be formed. Finally, of course, are the **users**, or the people who actually use the system.

Project Management and Ceremony

Ceremony is a measure of the amount of documentation generated, the traceability of specifications, and the formality of the project's decision-making processes. Some projects, particularly small ones, are conducted with very low ceremony with few meetings and informal status reporting. Other projects, usually larger, more complex ones, are executed with high ceremony and formal meetings. Historically, predictive projects often had high ceremony where adaptive, Agile projects had low ceremony. But this is not a required pattern.

Project Management Body of Knowledge (PMBOK)

The Project Management Institute (PMI) is a professional organization that promotes project management, primarily within the United States but also throughout the world. This body of knowledge, referred to as the **project management body of knowledge (PMBOK)**, is a widely accepted foundation of information that every project manager should know. The PMBOK is organized into these ten knowledge areas. Figure 11-3 highlights more details about each.

- Project Integration Management—Integrating all the other knowledge areas into one seamless whole
- Project Scope Management—Defining and controlling the functions that are to be included in the system
- Project Time Management—Creating a detailed schedule of all project tasks and monitoring the progress
- Project Cost Management—Calculating the initial cost/benefit analysis
- Project Quality Management—Establishing a comprehensive plan for ensuring quality
- Project Human Resource Management—Recruiting and hiring project team members
- Project Communications Management—Identifying all stakeholders and the key communications to each
- Project Risk Management—Identifying and reviewing throughout the project all potential risks for failure
- Project Procurement Management—Developing requests for proposals, evaluating bids, writing contracts
- Project Stakeholder Management—Identifying and communicating with the stakeholders of the new system

Agile Project Management (APM)

More than anything else, Agile project management is a way of balancing these two conflicting requirements: how to be agile and flexible while maintaining control of the project schedule, budget,

and deliverables.

Agile Scope Management: Scope management refers to the scope of the new system and the scope of the project. The Agile philosophy accepts the fact that the scope isn't well understood and that there will be many changes, updates, and refinements to the requirements as the project progresses. However, uncontrolled scope can result in a project that never finishes, even if it is an Agile project. The project manager must have a process and mechanisms in place to control the scope of the project.

Agile Time Management: In an Agile project, because the requirements are always changing, it can be very difficult to create and maintain a meaningful project schedule. Within an iteration a more detailed schedule can be developed, frequently as the first task of that iteration.

Agile Cost Management: Estimating the project's cost isn't as important as controlling the cost during the life of the project. The project manager's responsibility to control costs is just as important for an Agile project as it is for a traditional predictive project.

Agile Risk Management: In most adaptive, iterative projects, including Agile projects, close attention is given to project risks, particularly technical risks. Iterative projects are often risk-driven, meaning that early iterations focus specifically on addressing the most critical project risks.

Agile Quality Management: Quality management has to do with the quality of the deliverable from the project and from each iteration. In an Agile project, we also consider the quality of the process. How well is the project working, and how well do the internal procedures promote project success?

Quick Quiz

Q: What does the Chaos report indicate about the success rate of software development in the US?

A: It has a poor track record with about 1/4 failing completely, and almost 1/2 having serious problems.

Q: What are the two major categories of responsibility for the role of project manager? Identify some elements of each.

A: External responsibilities for external stakeholders: Report status, work with stakeholders, identify resources needed. Internal responsibilities: Schedule and assign the work, train team members, monitor and control progress.

Q: What does project ceremony mean?

A: How formally the project is executed with formal meetings, formal documentation, formal status reporting, etc.

Q: What are the nine areas of the PMBOK?

A: Scope, Time, Cost, Quality, Human Resources, Communication, Risk, Procurement, Integration

Activities of Core Process 1: Identify the Problem and Obtain Approval

Key Terms

- **System Vision Document** – a document to help define the scope of a new system
- **business benefits** – the benefits that accrue to the organization; usually measured in dollars
- **system capabilities** – the required capabilities of a new system; part of a System Vision Document
- **cost/benefit analysis** – process of comparing costs and benefits to see whether investing in a new system will be beneficial
- **net present value (NPV)** – the present value of dollar benefits and dollar costs of a particular investment
- **break-even point** – the point in time at which dollar benefits offset dollar costs
- **payback period** – the time period after which the dollar benefits have offset the dollar costs
- **tangible benefit** – a benefit that can be measured or estimated in terms of dollars
- **intangible benefit** – a benefit that accrues to an organization but that can't be measured quantitatively or estimated accurately

Lecture Notes

Figure 11-5 highlights the four activities associated with Core Process 1.

Identify the Problem

Information system development projects are initiated for various reasons, including: (1) to respond to an opportunity (part of strategic planning), (2) to resolve a problem, and (3) to respond to an external directive (such as legal requirements).

Identifying and carefully defining the problem is a critical activity for a successful project. The objective is to ensure that the new system actually meets the business need. The purpose is to precisely define the business problem and determine the scope of the new system. The **System Vision Document** is often used to document the need and get the project approved. It includes a list of **business benefits** and **system capabilities**.

Quantify Project Approval Factors

The objective of this activity is to provide sufficient justification so funds will be released and the project can start. Sometimes, the need is so great or so obvious that project approval is almost automatic. In other situations, it may be necessary to prepare a thorough cost-benefit analysis. These criteria must frequently be considered to obtain project approval:

- The estimated time for project completion

- The estimated cost for the project and system
- The anticipated benefits from the deployment of the new system

Estimated time for project completion: During project initiation, there usually isn't enough known about the project to create a schedule. But there is nevertheless a need to estimate the project's completion date, even though this is one of the hardest things to do. The major inputs toward estimating the project completion date are the scoping document and the amount of effort required to develop the listed requirements. At this early point in the project, gross estimates of team size and time frame are usually the best that can be achieved as shown in Figure 11-7.

Estimated cost for the project and system: By far, the largest cost item in the project's budget is the salaries of the project team. Other cost elements include the cost of the new computers, training for the users, offices, facilities, and utilities for the project team, travel expenses for the project team to do site visits, and software licenses.

Anticipated benefits from the Deployment of the New System: Benefits come from either reducing costs or increasing revenues. It isn't the project manager's job to predict the value of business benefits. However, the project manager can help the client identify categories of potential benefits. Many organizations like to compare the estimated costs with the anticipated benefits to calculate whether the benefits outweigh the costs. This process is called a **cost/benefit analysis**. One popular approach is to determine the **net present value (NPV)** of the new system. Figure 11-11 illustrates the technique for calculating the NPV. Companies also use a **break-even point** calculation to determine the **payback period**. Benefits used in these calculations are those where an estimated dollar value can be assigned, and are called **tangible benefits**. Other benefits, where a dollar value cannot be estimated or assigned, are called **intangible benefits**.

Determining Project Risk and Feasibility

The objective of this activity is to identify and assess the potential risks to project success and to take steps to eliminate or at least ameliorate these risks. They should be identified during the project approval process so all stakeholders are aware of the potential for failure. The team can also establish plans and procedures to ensure that those risks don't interfere with the success of the project. These four areas are important:

- Determine the organizational risks and feasibility.
- Evaluate the technological risks and feasibility.
- Assess the resource risks and feasibility.
- Identify the schedule risks and feasibility.

Determine organizational risks and feasibility: Each company has its own culture, and any new system must be accommodated to that culture. There is always the risk that a new system departs so dramatically from existing norms that it can't be successfully deployed. Such things as computer phobia, loss of control, changes in power structure, and fear of changing job responsibilities or loss of employment are organizational risks that must be evaluated.

Evaluate technology risks and feasibility: Generally, a new system brings new technology into the company, even state-of-the-art technology. The project management team needs to carefully assess the

proposed technological requirements and available expertise. When these risks are identified, the solutions are usually straightforward.

Assess resource risks and feasibility: The project management team must also assess the availability of resources for the project. The primary resource consists of team members. Required people may not be available to the team at the necessary times or may not have all the necessary skills.

Identify schedule risks and feasibility: Developing a project schedule requires many assumptions and estimates without adequate information. A frequent risk in developing the schedule occurs when upper management decides that the new system must be deployed within a certain time. If the deadline appears arbitrary, the tendency is to create the schedule to show that it can be done. Unfortunately, this practice usually spells disaster.

Review with Client and Obtain Approval

After the executive committee approves the project, it frequently goes to the board. After board approval, the IT department begins to assign full-time resources to the project. It is also a good idea at this point to have a company-wide memo or meeting to mark the beginning of this major activity. If the entire company knows that all the executives are supporting it and requesting cooperation, the project will proceed much more smoothly.

Quick Quiz

Q: What are the four activities of Core Process 1: Identify the problem and obtain approval?

A: Identify the problem, Quantify project approval factors, Perform risk and feasibility analysis, Obtain approval to begin.

Q: What is the difference between the business benefits and the system capabilities?

A: The business benefits are usually the dollar benefits that will be obtained from the system. The system capabilities are those functions that the system provides, which enable the business benefits.

Q: What kinds of things (3 things) does management usually want to know before approving a project?

A: How long will it take, how much will it cost, and what benefit will it provide?

Q: What is NPV? What is payback period?

A: NPV is net present value, and it is a calculation of the expected return or the net benefit to the organization. It is usually calculated using the time value of money. The payback period is the length of time required for the organization to recoup its investment.

Activities of Core Process 2: Plan and Monitor the Project

Key Terms

- **project iteration schedule** – the list of iterations and use cases or user stories assigned to each

iteration

- **detailed work schedule** – the schedule that lists, organizes, and describes the dependencies of the detailed work tasks
- **work breakdown structure (WBS)** – the list or hierarchy of activities and tasks of a project; used to estimate the work to be done and to create a detailed work schedule
- **Gantt chart** – a bar chart that portrays the schedule by the length of horizontal bars superimposed on a calendar
- **critical path** – a sequence of tasks that can't be delayed without causing the entire project to be delayed
- **retrospective** – a meeting held by the team at the end of an iteration to determine what was successful and what can be improved

Lecture Notes

This core process lasts throughout the entire project. A major planning effort occurs immediately after the project is approved. Ongoing planning and project monitoring continue during all project iterations. Not only must each iteration be planned as it starts, but progress must continually be monitored and corrective actions may be required.

Establish the Project Environment

There are important project structure considerations that must be addressed as the project gets under way. The project manager must ensure that the project's parameters and the work environment are finalized so the work of the project can proceed without roadblocks or delays.

Recording and communicating – Internal/External: One of the first tasks for a project manager on a new project is to establish the procedures and guidelines for how to handle the project's information, including external reporting and internal communication. A good project manager understands this need and structures his or her project so he or she communicates frequently, with the appropriate detail, to each of his or her stakeholders. Maintaining project information can be done via electronic means. Schedule information can be published to a Web site so everyone can view it. Another type of project-tracking tool, sometimes called a project dashboard, allows all types of project information to be posted and viewed by Web browsers.

The members of the project team also need to have mechanisms in place to communicate among themselves and document project decisions. This is an entirely different type of information—information about the system under development. An experienced project manager knows the right amount of documentation so the project isn't overloaded with overhead but critical decisions are recorded. Information items include such things as project schedules, analysis results, design specifications, outstanding problems and resolutions, test cases, and so forth. Fortunately, in today's connected world, there are many tools available so external and internal communication can be done easily. With so many electronic tools, all project information should be available online and accessible to all stakeholders. Figure 11-15 illustrates various methods to electronically maintain information.

Work environment—Support/Facilities/Tools: Although the work environment may relate more to the work processes of the project team, the project manager must ensure that it is adequate to allow the project team to work productively. There are five major components of the work environment:

- Personal computer(s) and/or workstation(s)
- Personal development software and tools
- Development server with repositories, sandboxes, and communication tools
- Office space, conference rooms, and equipment, including printers, scanners, and projectors
- Support staff

Processes and procedures: The final major set of decisions has to do with the project's internal processes and procedures. Procedures must be established for the following:

- Reporting and documentation—What is done? How is it done?
- Programming—Single or pair programming? How is work assigned?
- Testing—Programmer tests or user tests? How to mark items ready for testing?
- Deliverables—What are they? How and when are they handed over to users?
- Code and version control—How is the code controlled to prevent conflicts?

Schedule the Work

Scheduling the work is necessary for any size or type of project. However, the techniques used can vary widely depending on the type of project. For adaptive types of projects, creating the project schedule is done throughout the life of the project. During the initial planning phase, the initial list of use cases or user stores are developed for each subsystem. The use cases are divided up and tentatively assigned to the iterations, in what is called the **project iteration schedule**. The other schedule, the **detailed work schedule**, schedules the work within an iteration.

Creating the project iteration schedule must take into account the total size and configuration of the solution system and the number of teams available to work on the project. Separate lists of requirements are made by subsystem, and project iteration schedule can then be made for each subsystem. Developing a detailed work schedule for a single iteration is a three-step process:

- Develop a work breakdown structure.
- Estimate effort and identify dependencies.
- Create a schedule by using a Gantt chart.

The first step, developing a **work breakdown structure (WBS)**, which is a list of all the required individual activities and tasks for the project, can be done in either of two ways: by deliverable or by a time line. The first approach identifies all the deliverables that must be completed for a given iteration. The second approach works through the normal sequence of activities that are required for the final deliverable.

How detailed should the individual tasks be in a WBS? A few guidelines can help answer that question:

- There should be a way to recognize when the task is complete.

- The definition of the task should be clear enough so one can estimate the amount of effort required.
- As a general rule for software projects, the effort should take one to five working days.

The second step in developing a detailed work schedule is to determine the dependencies between the tasks and the amount of effort required for each. The most common way to relate tasks is as one task finishes, the next one starts. This is called a finish-start relationship. Other relationships are start-start, start-finish, and finish-finish. The effort required should be the actual amount of work required to complete the task.

The third step in developing a detailed work schedule is to actually create the iteration schedule, which is often done with a **Gantt chart**, which is a bar chart showing the tasks and the amount of time required for each. A widely used tool for building Gantt charts is Microsoft Project. Figure 11-18 illustrates a Gantt chart where the duration of each task superimposed on a calendar. The red bars indicate a critical path on the schedule. The **critical path** is defined as those tasks that must stay on schedule. If any of the critical path tasks cause a schedule slip, then the entire project is delayed.

Staff and Allocating Resources

In an Agile project, the various teams are self-organizing. However, the job of identifying what expertise is needed for the project and getting those people assigned to the project falls on the shoulders of the project manager. The staffing activity consists of five tasks:

- Developing a resource plan for the project
- Identifying and requesting specific technical staff
- Identifying and requesting specific user staff
- Organizing the project team into work groups
- Conducting preliminary training and team-building exercises

Evaluate Work Processes (How are we doing?)

After each iteration, team members can evaluate how well they worked together and how they can improve their effectiveness and performance as a team. In an Agile project, this is referred to as a **retrospective**. They will ask themselves such questions as: “Are our communication procedures adequate? Are our working relationships with the user effective? Did we miss any major issues? What things went especially well? What were the bottlenecks or problem areas?”

Monitor Project Progress and Make Corrections

In theory, executing and controlling the project plan sounds easy, but in fact, it is quite complicated. Figure 11-19 is a high-level process chart that illustrates the basic process for monitoring and controlling the project. It includes decision points as well as the following tasks: Assign the work, Collect status, Analyze variance, and Take corrective action.

The monitoring and control of open issues and risks for a project is usually no more complex than building various tracking logs. These logs can be built in a simple spreadsheet and posted on the

project's Web site or central repository.

Quick Quiz

Q: What are the five activities in Core Process two?

A: Establish the project environment, schedule the work, Staff and allocate resources, Evaluate work progress, Monitor progress.

Q: What are three things included in setting up the project environment?

A: Capturing and communicating information, setting up a work environment for the developers, and establishing work procedures.

Q: What is the difference between the project iteration schedule and the detailed work schedule?

A: The project iteration schedule is a project level list of all use cases and their assignment to an iteration. The detailed work schedule is like a Gantt chart of the individual tasks to be done, by whom and when they are scheduled to be done.

Q: What is a work breakdown structure used for?

A: It is a list of tasks and their dependencies that is used to help build the detailed work schedule.

Q: What is the critical path?

A: It is the path, or sequence of tasks, must be complete on time in order for the project to hit the deadline.

Q: What is a retrospective good for?

A: It helps the agile project team members improve their performance. It is an "introspective" review of how well an iteration succeeded.

Classroom Activities

This chapter has so many concepts and potential activities that the problem will be to limit the activities and to choose which activities are most helpful to the students. One good way to teach this chapter is to have the students do several of the steps from Core Process one and Core Process two. Sometimes it is a good learning experience to use other kinds of project that are not software development projects.

For example, one fun activity is to plan a wedding activity (Wedding Planner or Father of the Bride). Another is to plan an extended excursion such as mountain climbing in the Himalayas. Select a few of the activities in each Core Process and have student teams plan the project.

Another way to approach this topic from the conceptual point of view is to have student teams select a specific area of PMBOK and develop a plan for that area. Ask students, "How would you go about to:

- Determine and control the scope
- Determine and control the schedule
- Estimate the budget and control the cost

- Determine and control the risks
- Determine who needs to be notified and how (communication)
- Determine resources
- Determine and control quality (determine what things need to be checked and how)
- Determine procurement and how to monitor/control
- Determine who the stakeholders are and how to manage them (related to communication plan)

Once that is done have the groups identify tasks and build a WBS. Next they can put them on a schedule. Finally, you can use their tasks to enter them into MS Project. For this activity, the answers are not important. It is the process and the learning that is important. This will take some time, so you will not be able to finish. But that is okay, it is not the result that is important, it is the process for learning. So after each section, discuss the process and answer questions.

Another way is to allow students to ask questions out loud as they are working. Another learning approach is to have one or two teams show their WBS, and then you and the rest of the class can critique it. (Of course, this is always a challenge for any teacher—to bring out the salient teaching points and to keep the discussion from either being too shallow (It looks good. They did a good job.) or too nit picky.

Troubleshooting Tips

The concepts in this chapter are usually not problematic. The difficulty in this chapter is in the developing of the skills – to know how to identify business benefits, to know how to do a WBS, to know how to identify risks, and so forth. We have moved this chapter to the middle of the book so that students will have some experience with SA&D concepts, which will help them understand these concepts. In class exercises and review of the homework will help students internalize these skills. This chapter will require not only understanding of the concepts, but some practice with the skills.

Discussion Questions

1. Discussion on the PMBOK.

The PMBOK is a large body of knowledge. However it was originally developed for management of big projects such as building a building or some other physical or engineering product, which tend to be predictive projects. Many of the principles apply to software development, but some do not fit as well. Take each of the nine areas of the PMBOK and ask the students to compare software development concepts against building a building type of project. (This discussion may also be appropriate for Online Chapter C, which gives more details about the PMBOK.)

2. Discussion of the PMBOK and Agile

As a continuation of the above discussion, you can compare and contrast the PMBOK (as given in this chapter and in Online Chapter C) areas for traditional project management and Agile project management. The chapter does a few, the discussion could be extended to all areas of the PMBOK.

3. Discussions of the problems of estimating project time and cost before detailed analysis

A continual management problem is that the executive stakeholders, i.e., the clients, as well as user stakeholders frequently need to know how long the project will take and how much it will cost. How does the project manager answer that question? How does he/she give a meaningful answer but also recognizing that it may be completely erroneous. How does he/she protect himself, yet give an answer to help executive management make a decision whether to invest in the new system or not.