Project Management Workshop

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Module 1: Communication

The most important factor in becoming a good Project Manager is the ability to communicate clearly. Good communication skills cannot be stressed enough when it comes to Project Management. This will be demonstrated throughout the workshop. For now, let's start with an exercise where we communicate with each other as members of teams.

■ Introductory Exercise

The purpose of this exercise is to introduce you to your fellow workshop participants.

1. With the other participants in the workshop, form teams of three to five members each.

2. Within each team, introduce yourself to your team members.

3. As part of your introduction to each other, find out what each person's job and interests are. Also find out if they have any Project Management experience and what is their computing experience?

4. Also find out the following information:
   a)   Who has had the most interesting job?
   b)   Who has traveled the furthest from New York City?
   c)   Who reads the most?
   d)   Who has the youngest child?
   e)   Who has been married the longest?

5. One member of the team will act as a spokesperson for the group and introduce the members of the team to the rest of the workshop participants. Make sure to include the information discovered in question four.

6. The instructor will tell the participants how much time is available for this exercise and when to begin.

■ Introductory Exercise Follow-Up

This exercise really has two purposes. The first was the stated purpose of introducing you to your fellow workshop participants. The other was to help you understand the different roles within a Project.

1.   For this exercise was there a particular task that needed to be accomplished? If so, what was it?

Did one person within your team make sure all the questions were answered?

Did the same person

1. a)   Did one person within your team assume leadership?

_____

_____

    b)   Was information gathering effective within your team?

    b)   Was information gathering effective within your team?

_____

_____

A Project Manager should be both a leader and a facilitator. Project Managers are responsible for the results of the project. They do not, and usually cannot, do all the work themselves. They rely on others to work together and accomplish the goals of the project. A Project Manager must communicate those goals, to the team, so that everyone understands what they are.

■ Communication Exercise

When a Project Manager communicates the goals of the project to all the members of the team, it is easier for the team members to see the "big picture." Once they understand how all the pieces of the project fit together they can understand how important each person is. Even some one with a minor role can see that they are critical to the success of the project.

The purpose of this exercise is to understand the importance of why every member of the project team needs to see the "big picture."

1.   One member of each team will act as a ***receiver*** of information. The other members of the team are ***transmitters*** of information.

2.   Each team will take a turn.

3.   The receiver from the first team will stand at the front of the room facing the other workshop participants.

4.   The receiver will have a pad or white board, on an easel, so that they may draw what is transmitted to them. The other workshop participants should not be able to see what has been drawn on the easel.

5.   The instructor will give the other team members, the transmitters, a design made of simple geometric shapes.

6.   The first transmitter, for the team, will describe the size and placement of one of the geometric shapes to the receiver. The transmitter may not describe the picture, just its components such as rectangles, squares, lines, circles or triangles.

7.   The receiver will then draw the shape that they believe was transmitted to them.

8.   After the first shape is drawn, the second transmitter will describe another component of the design and the receiver will attempt to draw that shape.

9.   This continues until all the component shapes have been transmitted to the receiver and all transmitters have had a turn.

10. The design that the receiver has drawn is shown to the workshop participants and compared to the original picture.

■ Communication Exercise Follow Up

In this exercise we learned that without good, clear communication among team members, even the simplest task is difficult. We also learned that it is hard to understand how important a single task is without relating it to the project as a whole and being able to see the "big picture."

> *"Communication of the vision to all levels of the organization is critical."*

> — From Strategies for Taking Charge by Warren Bennis and Burt Nanus

Workshop Objectives

By the end of this workshop you will:

❍ Have a basic understanding of Project Management terms, concepts and techniques

❍ Understand the importance of good communication skills

❍ Learn five rules for successful Project Management

❍ Understand why many projects fail

❍ Discuss project phases

❍ Create a project task list and work breakdown structure

❍ Create a project network

❍ Learn techniques for estimating

❍ Understand and assign resources

❍ Determine a project's critical path

❍ Establish a project baseline

❍ Track the progress of a project during its implementation

❍ Learn how to bring a project to a close

What you won't learn

Project Management is both an art and a science with very strict standards. To become a certified Project Manager you must pass the Project Management Professional exam offered by the Project Management Institute (PMI). That test is based on the Project Management Body of Knowledge also referred to as PMBOK. The Project Management Professional exam lists nine areas of expertise: Cost, Time, Scope, Quality, Communications, Human Resources, Contracts, Supplies, and Risk Management.

This workshop does not prepare you for that exam. In addition, by the end of this course you will not become:

❍ A Project Management expert (a thorough introductory class takes from three to five days)

❍ An expert user of Microsoft Project (an introductory class is a minimum of two days of hands-on experience)

Module 2: Project Management Concepts

To start talking about Project Management we need a shared vocabulary. So we will begin this section with definitions. Then we will discuss project priorities, 5 rules of Project Management, why projects fail and what can be done to ensure successful projects.

Definitions

Some important Project Management definitions are:

Term	Definition
Project	A series of interrelated tasks leading to a specified goal within a defined timeframe and budget. A project has a start and finish date and a one-time result.
Process	An ongoing series of tasks, with no set timeframe, that may repeat itself as necessary.
Project Management	The methodology used to complete a project within specified goals of time, budget and quality.
Goal	The result that we wish to accomplish by completing the project. Reaching the goal ends the project.
Milestone	An interim goal that either marks the occurrence of an important event or summarizes the completion of a set of tasks. A milestone is an intermediate task in the project plan that is used as a checkpoint to determine if the project is on schedule.
SMART	An acronym for the five characteristics of what a goal should be: **S**pecific, **M**easurable, **A**greed upon, **R**ealistic, and within a **T**imeframe.
Deliverable	The clearly defined results, goods or services produced during the project or at its outcome. At the end of the project the deliverables should be completed.
Task	An activity of short duration that, when taken collectively with the other project tasks, accomplishes the goals of the project. All tasks within a project must be interrelated.
Scope	The work content or components of a project. The sum of the tasks. The size of the project. A detailed version of the goals of the project.

Resource	The people, equipment, locations and supplies used in a project. The cost of a project is directly related to the resources. Any person, place or item that is required to perform a task. Resources can be one of seven items: People, money, equipment, facilities, materials and supplies, information and technology.
Project Plan	The schedule of the project. The plan for performing the work and tracking the progress of a project
Project Duration	The time necessary to complete the entire project from start to finish.
Project Requirement Document	A set of detailed specifications listing the goals, budget and timeframes of the project. Once the project requirement document is signed-off by the sponsor it officially becomes a project.

Project Priority Matrix (StaR)

Project management is often a juggling act between the Scope, Time and Resources (STaR) of a project. However, only one of these can have the highest priority within the project. Only one can be the second priority and that leaves the last one as the lowest priority. This is illustrated by the six grids below:

	1st Priority	2nd Priority	3rd Priority
Scope	■		
Time		■	
Resources			■

	1st Priority	2nd Priority	3rd Priority
Scope	■		
Time			■
Resources		■	

	1st Priority	2nd Priority	3rd Priority
Scope		■	
Time	■		
Resources			■

	1st Priority	2nd Priority	3rd Priority
Scope			■
Time	■		
Resources		■	

	1st Priority	2nd Priority	3rd Priority
Scope		■	
Time			■
Resources	■		

	1st Priority	2nd Priority	3rd Priority
Scope			■
Time		■	
Resources	■		

Another way of looking at the available choices is to use the expression: "Good, fast, cheap — choose any two."

5 Rules of Project Management

Five rules of Project Management are:

1. All projects must have a sponsor (client, customer, owner). This person will have the responsibility for accepting the outcome of the project and sign-off that the project is complete.

2. Get requirements and changes in writing. If they won't write it down, you write down the requirements and changes for them and have them sign-off. Do not continue the project until you get a sign-off.

3. All changes are changes. No matter how small it is, a change is still a change, and may have consequences for other aspects of the project. All changes must be signed-off.

4. Don't assume anything! If the requirements and changes are missing details then consult the necessary resource for those details.

5. Communicate up and down the organizational hierarchy. Include goals and deliverables, good news and bad news. On long projects have weekly meetings. Distribute reports at every milestone. (Corollary: All projects must have a kick-off meeting.)

Why Projects Fail

The ten most common reasons why projects fail:

1. Inadequate planning
   Unrealistic timeframes imposed on project
   Poor estimating skills by Project Manger or team
   Poor management of dependent tasks
   Poor planning of project delivery (installation) and closing

2. Lack of upper management support
   No formal project approval process
   Little commitment to project goals

3. Changing requirements
   Changes made to the project without acknowledgment of the consequences
      to other aspects of the project
   Sponsor or team members don't sign-off on changes
   "Scope creep" — adding features beyond the original requirements

4. Ambiguous objectives
   Lack of a clear sponsor
   Unclear purpose or need
   Poorly designed specifications (project requirement document)

5. Lack of user input and/or involvement
   Users not initially surveyed as to what they need or want
   Users not involved in the implementation phase

6. Project Manager lacks the necessary authority
   Little control of resources (people, money, equipment or facilities)

7. Inadequate resources
   People, money, equipment or facilities
   Lack of competent staff
   Loss of key personnel with no backup

8. Poor communication
   Of schedule changes or delays
   Not everyone understands objectives
   Poor technical and user documentation

9. Vendor / Technology problems
   Untested new technology
   Vendor incompetence
   Vendor not directly accountable to the Project Manager

10. No organized team effort
    Little effort to coordinate team members from different departments
    Objectives not agreed upon by all team members
    Other projects competing for resources

Project Management Practices Checklist

Practices that help to ensure successful projects:

- ❑ Our organization has published & circulated its objectives.
- ❑ Our organization has career paths for project managers.
- ❑ My job description includes clear project responsibilities.
- ❑ Performance evaluations include entire teams.
- ❑ Management encourages planning in our project management.
- ❑ Our management is concerned about tracking time.
- ❑ Our management is concerned about tracking project costs.
- ❑ Management is generally satisfied with project results.
- ❑ Our projects are clearly distinguished from on-going operations.
- ❑ There is a clear line between an authorized project and a "talking stage" project.
- ❑ Our projects are plan-driven, rather than crisis-driven.
- ❑ Our decision making expedites, rather than delays, our projects.
- ❑ Our meetings are productive.
- ❑ Problems are dealt with by anticipating them rather than reacting to them.
- ❑ Project due dates are established by plan rather than set arbitrarily.
- ❑ Project expectations are realistic.
- ❑ Related projects are organized into well-defined programs.
- ❑ Priorities are clear among competing projects.
- ❑ Projects have reasonably dedicated personnel resources.
- ❑ Projects are organized to make optimal use of limited resources.
- ❑ Project responsibilities pass smoothly between departments.
- ❑ Project work flows smoothly between departments or groups.
- ❑ Project management plans exist and are followed.
- ❑ Detailed specifications exist and are maintained or circulated.
- ❑ Changes in project requirements are controlled, not arbitrary.
- ❑ Decision-making is shared rather than unilateral.

Module 3: A Sample Project

Our sample project will be the development of a new software system. The exact nature of the system is not important for this workshop exercise. It could be a system for sales or customer support. For the purpose of our exercises we will assume that it is being developed in a networked environment.

Every project, whether IT related or not, has certain aspects that are similar. That is what this workshop will concentrate upon. Do not worry about getting the details perfectly right (especially if you do not work in an IT environment), we are more concerned with the Project Management concepts.

Project Phases (EPIC)

All projects can be conducted in four phases illustrated by the acronym **EPIC** that stands for **E**valuation, **P**lanning, **I**mplementation and **C**losing. Within each phase there can be, and usually are, sub-phases specific to the goals of the project.

(Some Project Management books will list five phases: Initiating, Planning, Executing, Controlling and Closing.)

Evaluation Phase

The Evaluation Phase is where the sponsor of the project, with the help of the potential project manager, asks questions and decides if a project is actually necessary. Typical questions are:

❍ Do we need this project?

❍ What, exactly, do we need?

❍ What is the Cost / Benefit analysis of creating something new compared to modifying the older version?

❍ Do we have the necessary resources?

❍ Does the sponsor agree to budget and schedule requirements?

❍ Has the sponsor created a Project Requirement Document?

❍ Is the sponsor willing to sign-off and make this a real project?

Planning Phase

The Planning Phase is where the Project Manager does most of his or her work. Activities or plans that occur during this phase are:

❍ Kick-off meeting

❍ Creation of the Task List

❍ Work Breakdown Structure

❍ Task Relationships

❍ Resource Allocations

❍ Budgets

❍ Schedules

❍ Sign-off of the baseline plan

The 1/3 Rule

The 1/3 rule states that, in a project, one third of the entire duration of the project should be allocated to the planning phase. If one third of the project duration is not allocated to the planning phase then the project will have an actual duration one third greater than the original estimate.

The Kick-Off Meeting

The kick-off meeting is one of the most important elements in successful Project Management. Unfortunately, it is often ignored which oftentimes starts a downward spiral of miscommunication leading to project failure.

The Project Manager conducts the meeting that should be attended by the project sponsor, a representative of upper management within the organization, end-users, as many team members as possible and any other interested parties.

Information distributed at the kick-off meeting should include:

○ A project summary, goals and milestones
○ An organization chart of the team members
○ A contact list of the team members
○ A list of key team members and their responsibilities
○ The rough project schedule including due dates and meeting times
○ Samples of required reports
○ Problem reporting procedures

Implementation Phase

The Implementation Phase is where the project tasks are actually performed and the goals accomplished. Typical activities during this phase are:

❍ Task completion

❍ Tracking

❍ Reporting

❍ Sign-off for all changes

❍ Sign-off for each deliverable

Closing Phase

The Closing Phase of a project occurs after the goals have been accomplished. However, this phase is still an important part of the Project Management process. Typical activities during this phase are:

❍ Project Summary

❍ Final Reports

❍ Closing meeting

❍ Filing of Documentation

Module 4: Tasks and Outlines

As mentioned earlier, tasks are activities of short duration that, when taken collectively, accomplish the goals of the project. They should also be interrelated by means of an outline or work breakdown structure.

■ Task List Exercise

Tasks are clearly defined, unambiguous units of short-duration work. All work within the task should occur without any gaps in time.

Using these guidelines, the members of each team will work together to create a task list for our software development project. Each team should list at least 20 tasks necessary to complete the project.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

■ Task List Exercise Follow Up

Below is a list of possible tasks associated with our software development project:

Kick-off meeting	Integration testing
Meet with team members	Quality assurance testing
Meet with managers	End-user testing
Meet with end-users	Write technical documentation
Write screen design code	Write training manuals
Write menu code	Write Help files
Write background code	Design Helpdesk process
Write system integration code	Helpdesk training
Debug code	End-user training
Design test cases / test scripts	Installation
Module testing	Go live
System testing	Project closing meeting

Milestones

A milestone is a point of time in a project that represents an important event or the completion of a series of tasks. In the list above the "Kick-off meeting" is an important moment in the project. The same can be said for "Go live" but that milestone also marks the completion of most of the tasks of the project.

In a project plan, a milestone is usually represented as a task of no duration. Each series of tasks can have a beginning and ending milestone.

Milestones are a way to measure progress throughout the project implementation phase. A good project plan will have several milestones marking how far the project should have progressed by a certain point in time. Add milestones to your project plan as necessary and appropriate.
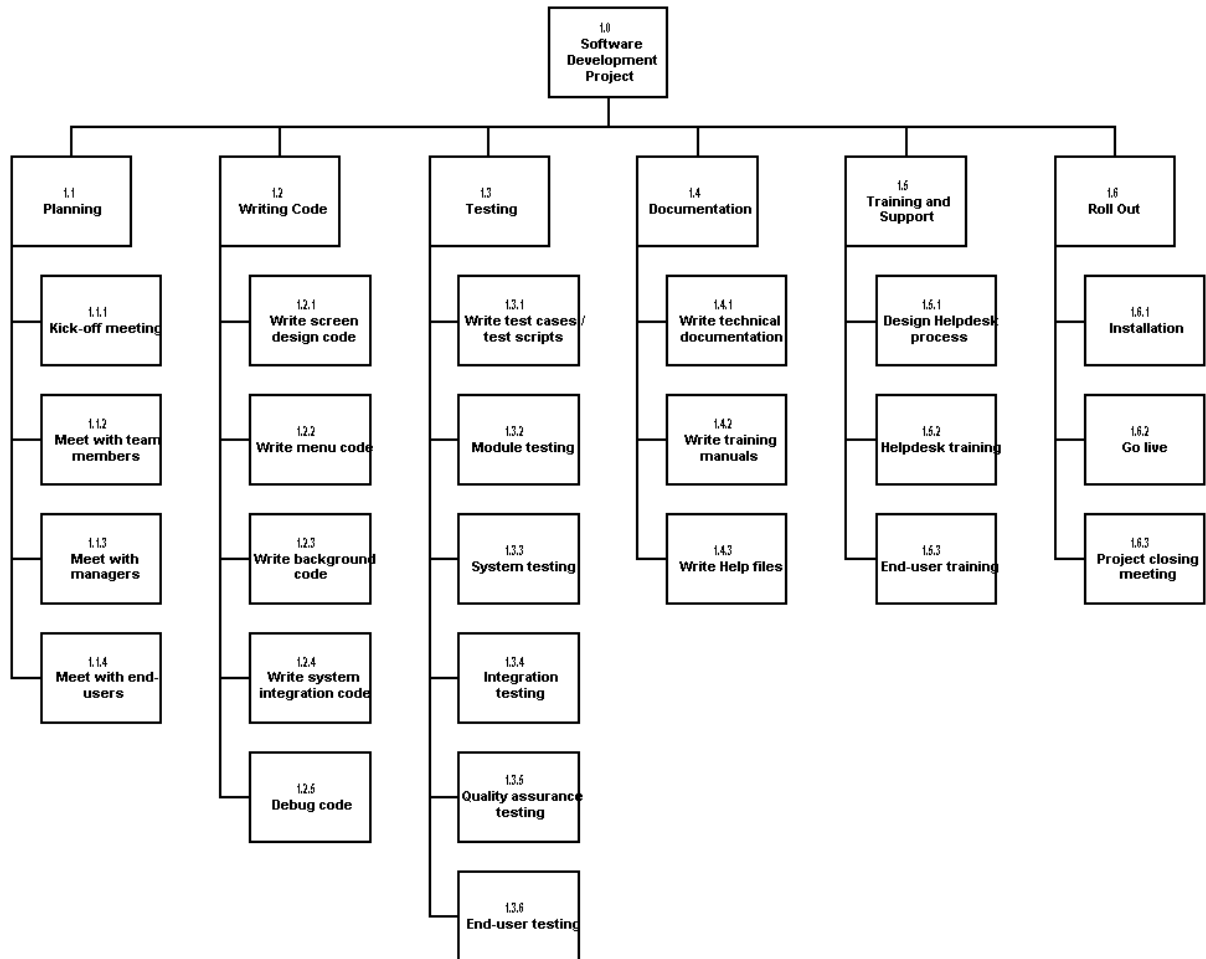
Work Breakdown Structure (Outlining)

Once the task list has been created the Project Manager must organize it into an outline. Summary tasks are added to group the tasks into logical units

Term	Definition
Work breakdown structure (WBS)	An outline list of all the tasks that must be performed to complete the project. Each task is assigned a place in the hierarchy of all tasks. The WBS may take the form of a flowchart or an outline.
Summary Task	The name given to an umbrella task that has a group of tasks below it. The duration of a summary task is the sum of the durations of its sub-tasks.
Sub-Task	An actual task, to be performed during the implementation of the project, that comes under the umbrella of a summary task.
WBS Number	A multi-level number assigned to tasks based on their hierarchical position within the WBS outline. The number is a combination of the summary task number and the sub-task number.

An example of a Work Breakdown Structure in outline format:

```
1.0     Software Development Project
        1.1     Planning
                1.1.1   Kick-off meeting
                1.1.2   Meet with team members
                1.1.3   Meet with managers
                1.1.4   Meet with end-users
        1.2     Writing Code
                1.2.1   Write screen design code
                1.2.2   Write menu code
                1.2.3   Write background code
                1.2.4   Write system integration code
                1.2.5   Debug code
        1.3     Testing
                1.3.1   Design test cases / test scripts
                1.3.2   Module testing
                1.3.3   System testing
                1.3.4   Integration testing
                1.3.5   Quality assurance testing
                1.3.6   End-user testing
        1.4     Documentation
                1.4.1   Write technical documentation
                1.4.2   Write training manuals
                1.4.3   Write Help files
```

An example of a Work Breakdown Structure in flowchart format:

1.0 Software Development Project

1.1 Planning	1.2 Writing Code	1.3 Testing	1.4 Documentation	1.5 Training and Support	1.6 Roll Out
1.1.1 Kick-off meeting	1.2.1 Write screen design code	1.3.1 Write test cases / test scripts	1.4.1 Write technical documentation	1.5.1 Design Helpdesk process	1.6.1 Installation
1.1.2 Meet with team members	1.2.2 Write menu code	1.3.2 Module testing	1.4.2 Write training manuals	1.5.2 Helpdesk training	1.6.2 Go live
1.1.3 Meet with managers	1.2.3 Write background code	1.3.3 System testing	1.4.3 Write Help files	1.5.3 End-user training	1.6.3 Project closing meeting
1.1.4 Meet with end-users	1.2.4 Write system integration code	1.3.4 Integration testing			
	1.2.5 Debug code	1.3.5 Quality assurance testing			
		1.3.6 End-user testing			

■ Work Breakdown Structure Exercise

Using the task list created in the previous exercise, create a Work Breakdown Structure for the software development project. Add Summary Tasks and Milestones as necessary.

■ Work Breakdown Structure Exercise Follow-Up

Here is an example of a Work Breakdown Structure created in Microsoft Project:

⊟ **1 Software Development Project**
⊟ **1.1 Planning**
1.1.1 Kick-off meeting
1.1.2 Meet with team members
1.1.3 Meet with managers
1.1.4 Meet with end-users
⊟ **1.2 Write Code**
1.2.1 Write screen design code
1.2.2 Write menu code
1.2.3 Write background code
1.2.4 Write system integration code
1.2.5 Debug code
⊟ **1.3 Testing**
1.3.1 Write test cases / test scripts
1.3.2 Module testing
1.3.3 System testing
1.3.4 Integration testing
1.3.5 Quality assurance testing
1.3.6 End-user testing
⊟ **1.4 Documentation**
1.4.1 Write technical documentation
1.4.2 Write training manuals
1.4.3 Write Help files
⊟ **1.5 Training and Support**
1.5.1 Design Helpdesk process
1.5.2 Helpdesk training
1.5.3 End-user training
⊟ **1.6 Roll Out**
1.6.1 Installation
1.6.2 Go live
1.6.3 Project closing meeting

Module 5: Estimating Durations

Developing a realistic project schedule and budget begins with accurate estimates of task durations and costs.

Estimating Techniques

There are three basic techniques for estimating:

Technique	Description
Intuitive	A best guess approach. Primarily subjective. Most managers use this method.
Analysis	Discussion and reasoning are used to analyze the rough estimate. The factors that could influence the duration or cost of a task are taken into consideration. This is usually a participative approach.
Research	Estimates are based on similar projects, tasks that were previously documented, or hard evidence.

Estimating Guidelines

❍ The minimum duration for any task should be 1 day

❍ The maximum duration for any task should be 2 weeks

❍ People (resources) should only be expected to produce 5 - 6 hours of productive work each day

❍ Resources allocated less than half of their time to a task are difficult to manage.

Task Durations

The duration, or cost, of most tasks depends on the resources assigned to them. But this is not always the case.

Duration Type	Description
Resource Driven	The duration of a task is determined by the number of resources assigned to that task. The more resources, the shorter the duration. This is the default in Microsoft Project.
Fixed Duration	The duration of a task remains the same regardless of the number of resources assigned to it.

■ Estimating Exercise

The purpose of this exercise is to illustrate the different estimating techniques.

1. Each participant in the workshop should guess how much, in coin, the average person carries with them. Do not count your own coins!

2. The instructor will write down these estimates.

3. What is the range of estimates?

    lowest: _____   highest: _____   difference: _____   average: _____

4. What are the factors that determine how much, in coin, each person carries with them?

    _____

    _____

    _____

    _____

    _____

    _____

    _____

5. Now that we know the factors that determine how much, in coin, the average person carries with them, let's take another estimate.

6. The instructor will write these new estimates down.

7. What is the new range of estimates?

    lowest: _____   highest: _____   difference: _____   average: _____

8. Let's take a real average. Take out your coins and count them.

9. The instructor will write these down and take an actual average.

    lowest: _____   highest: _____   difference: _____   average: _____

■ Estimating Exercise Follow Up

1.   What estimating technique was used in step number 1?

Intuition   ❑

Analysis   ❑

Research   ❑

2.   What estimating technique was used in step number 5?

Intuition   ❑

Analysis   ❑

Research   ❑

3.   What estimating technique was used in step number 8?

Intuition   ❑

Analysis   ❑

Research   ❑

4.   Which technique was the least accurate:

Intuition   ❑

Analysis   ❑

Research   ❑

5.   Which technique was the most accurate?

Intuition   ❑

Analysis   ❑

Research   ❑

Estimating Formulas

To estimate duration:

"...multiply the figure by two and change the unit of measure to the next higher unit. So, in this way, you allocate two days to a one hour task."

— Westheimer's Rule

To calculate project costs:

"...then multiply the result by pi (3.1416). I have seen this technique used more than once with decent results."

— Susan Kramer, NASA

A Real Estimating Formula

The following multi-point formula is widely used in Project Management. Start with three rough estimates: the most optimistic case, the most pessimistic case and the most likely case. Then use the formula:

$$\frac{O + 4\,(ML) + P}{6} = E$$

where **O** represents the most optimistic value, **ML** the most likely and **P** the most pessimistic. **E** will be the best estimate.

■ Task Estimating Exercise

Within your team, use the analysis estimating technique to enter durations for each task in the project plan. Enter zero durations for milestones. Do not enter durations for summary tasks.

■ Task Estimating Exercise Follow-Up

Below are possible estimates for the tasks in the project plan:

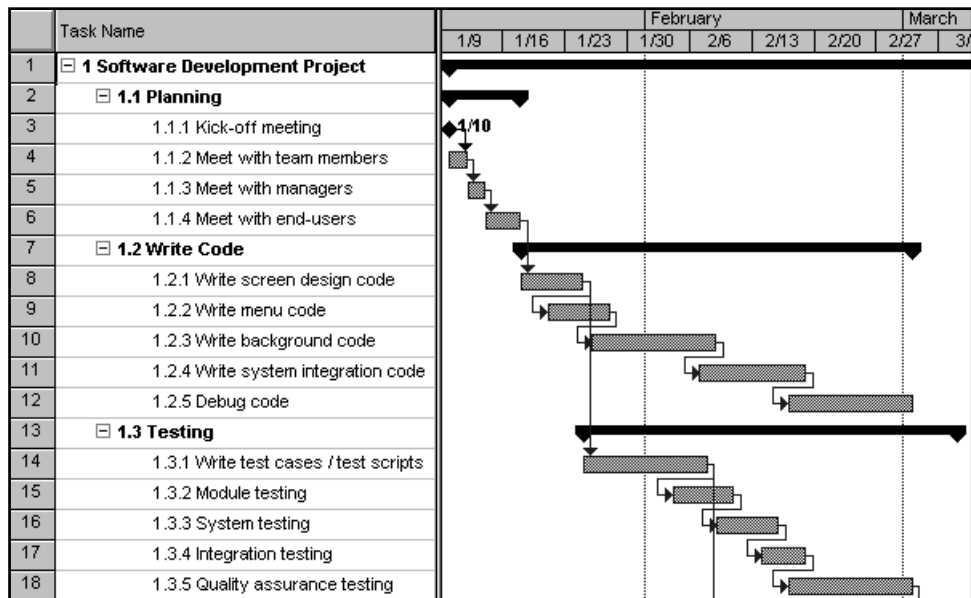| Task Name	Duration
⊟ **1 Software Development Project**	**10 days**
⊟ **1.1 Planning**	**2 days**
1.1.1 Kick-off meeting	0 days
1.1.2 Meet with team members	2 days
1.1.3 Meet with managers	2 days
1.1.4 Meet with end-users	2 days
⊟ **1.2 Write Code**	**10 days**
1.2.1 Write screen design code	5 days
1.2.2 Write menu code	5 days
1.2.3 Write background code	10 days
1.2.4 Write system integration code	10 days
1.2.5 Debug code	10 days
⊟ **1.3 Testing**	**10 days**
1.3.1 Write test cases / test scripts	10 days
1.3.2 Module testing	5 days
1.3.3 System testing	5 days
1.3.4 Integration testing	5 days
1.3.5 Quality assurance testing	10 days
1.3.6 End-user testing	5 days
⊟ **1.4 Documentation**	**10 days**
1.4.1 Write technical documentation	10 days
1.4.2 Write training manuals	10 days
1.4.3 Write Help files	10 days
⊟ **1.5 Training and Support**	**5 days**
1.5.1 Design Helpdesk process	5 days
1.5.2 Helpdesk training	2 days
1.5.3 End-user training	2 days
⊟ **1.6 Roll Out**	**2 days**
1.6.1 Installation	2 days
1.6.2 Go live	0 days
1.6.3 Project closing meeting	1 day

➤ Durations for summary tasks are not accurate at this point in the design of the project plan.

Module 6: Task Relationships

As previously mentioned, a project is a series of tasks that are related to one another. How tasks are related is the focus of this section of the workshop.

Graphical Representations

There are many ways to represent a project on paper. Graphical representations are easier to understand then long lists of information, especially when working with large, complex projects. The two major types of graphical representations are Gantt charts and PERT charts. A Gantt Chart has each task represented by a bar along a timeline:

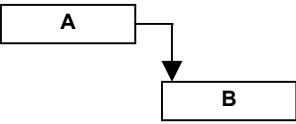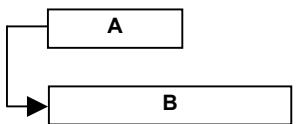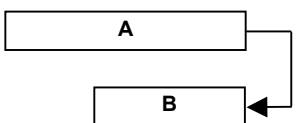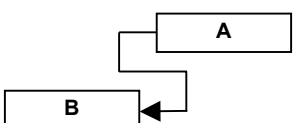|	Task Name	February							March	
		1/9	1/16	1/23	1/30	2/6	2/13	2/20	2/27	3/
1	□ 1 Software Development Project									
2	□ 1.1 Planning									
3	1.1.1 Kick-off meeting	1/10								
4	1.1.2 Meet with team members									
5	1.1.3 Meet with managers									
6	1.1.4 Meet with end-users									
7	□ 1.2 Write Code									
8	1.2.1 Write screen design code									
9	1.2.2 Write menu code									
10	1.2.3 Write background code									
11	1.2.4 Write system integration code									
12	1.2.5 Debug code									
13	□ 1.3 Testing									
14	1.3.1 Write test cases / test scripts									
15	1.3.2 Module testing									
16	1.3.3 System testing									
17	1.3.4 Integration testing									
18	1.3.5 Quality assurance testing									

A PERT Chart (Program Evaluation and Review Technique) uses boxes, called nodes, to represent the tasks with lines showing the relationship between two tasks:
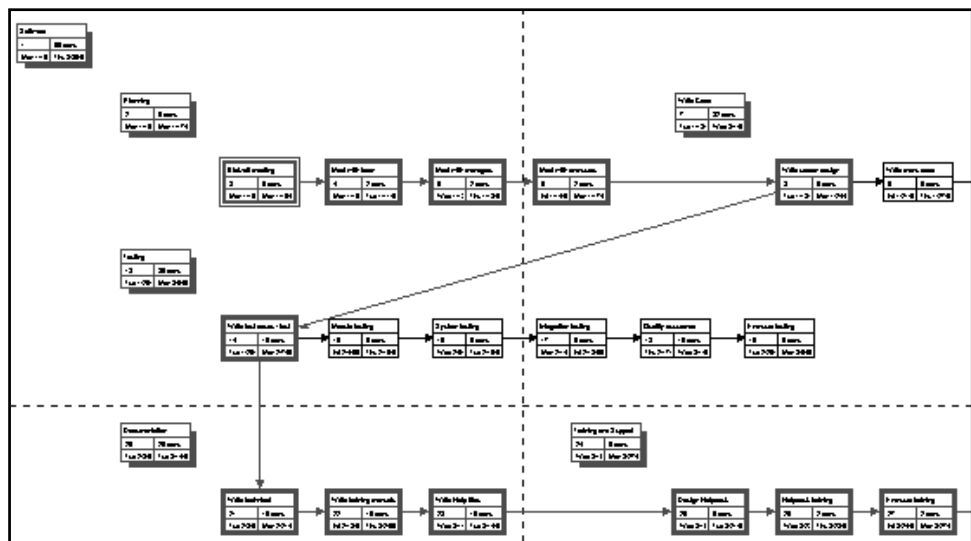
Relationships / Task Dependencies

Relationships, also called task dependencies, are what connect the tasks of the project together. Every task in a project must be related to at least one other task. Each task, then, is dependent on the other tasks.

Term	Description
Link	A relationship between two tasks that ties them together based on a time factor.
Predecessor	A tasks that comes before another.
Successor	A task that comes after another.

Relationship Types		
Task Dependency	**Example**	**Description**
Finish to Start (FS)	A → B	Task (B) cannot start until task (A) finishes.
Start to Start (SS)	A → B	Task (B) cannot start until task (A) starts
Finish to Finish (FF)	A → B	Task (B) cannot finish until task (A) finishes.
Start to Finish (SF)	A → B	Task (B) cannot finish until task (A) starts. This type of task dependency is rare and not usually used. However, it is available in Microsoft Project.

Lag and Lead

Some tasks cannot happen immediately after others have finished or at the same time as other tasks. There may need to be some elapsed time. This time factor is called a lag. A negative lag is called a lead.

Lag and Lead		
Task Dependency	**Example**	**Description**
Lag (FS+1)	A → B	Task (B) cannot start until task (A) finishes and some time has elapsed.
Lag (SS+1)	A → B	Task (B) starts some time after the start of task (A) has commenced.
Lead (FS-1)	A → B	Task (B) starts before task (A) is scheduled to finish. Also called a negative lag.

Network Diagrams

The network diagram is a graphical representation of the sequence of tasks within a project showing the path of the project, start and finish dates, and resources responsible for each task. Gantt charts and PERT charts are two types of network diagrams.

■ Task Relationship Exercise

Create a network diagram by adding task relationships to your project plan.

Module 7: Resources

Resources are the people, equipment and facilities used to complete a project.

■ Resource Exercise

The purpose of this exercise is to learn to make use of your resources.

You are a member of a space crew originally scheduled to rendezvous with a mother ship on the lighted surface of the moon. Due to mechanical difficulties, however, your ship was forced to land at a spot some 200 miles from the rendezvous point. During re-entry and landing much of the equipment aboard was damaged and, since survival depends on reaching the mother ship, the most critical items available must be chosen for the 200-mile trip.

Below are listed the 15 items left intact and undamaged after landing. Your task is to rank them in terms of their necessity to your crew in reaching the rendezvous point. Place the number 1 by the most crucial item, the number 2 by the second most crucial, and so on through number 15, the least important.

By yourself, complete step 1 now:

Resource	Step 1 Your Individual Ranking	Step 2 Team Ranking	Step 3 Survival Expert's Ranking	Step 4 Difference between 1 & 3	Step 5 Difference between 2 & 3
Box of matches					
Food concentrate - ready to eat					
50 ft. of nylon rope					
Parachute made of silk					
Portable heating unit					
Two .45-caliber pistols with ammunition					
One case dehydrated milk					
Two 100-pound tanks of oxygen					
Stellar map (of the moon's constellation)					
Life raft - self inflating					
Magnetic compass					
Five gallons water					
Signal flares					
First-aid kit containing injection needles					
Solar-powered FM receiver transmitter (2-way radio)					
Totals					

When you have finished step 1, rejoin your team. Complete step 2 by discussing the exercise and agree on a team ranking.

■ Resource Exercise Follow-Up

Use the Survival Expert's ranking below to fill in step 3 on your exercise grid.

Resource	Step 3 Survival Expert's Ranking	Reasoning
Box of matches	15	Little or no use on the moon
Food concentrate - ready to eat	4	Supplies daily food required
50 ft. of nylon rope	6	Useful in tying injured together, help in climbing
Parachute made of silk	8	Shelter against sun's rays
Portable heating unit	13	Useful only if party landed on dark side
Two .45-caliber pistols with ammunition	11	Self-propulsion devices could be made from them
One case dehydrated milk	12	Food, mixed with water for drinking
Two 100-pound tanks of oxygen	1	Fills respiration requirement
Stellar map (of the moon's constellation)	3	One of principal means of finding directions
Life raft - self inflating	9	CO_2 bottles for self-propulsion across chasms, etc.
Magnetic compass	14	Probably no magnetized poles, thus useless
Five gallons water	2	Replenishes loss by sweating, etc.
Signal flares	10	Distress call when line of sight possible
First-aid kit containing injection needles	7	Oral pills or injection medicine, injection needles valuable
Solar-powered FM receiver transmitter (2-way radio)	5	Distress signal transmitter possible communication with mother ship

In step 4, calculate the difference between your individual ranking (step 1) and the survival expert's ranking (step 3). The difference should be a positive number by taking its absolute value.

For step 5, calculate the difference between the team ranking (step 2) and the survival expert's ranking (step 3). The difference should be a positive number by taking its absolute value.

Total columns 4 and 5. Column 4 is your individual score, column 5 is the team score.

1.	What resources, available to you, were not mentioned in the exercise?

2.	Did you make use of these additional resources?

3.	What happened when you made use of these additional resources?

Assigning Resources

Each task can have one or more resources assigned to it. This includes the people performing the task, any necessary equipment and the locations where the task is performed.

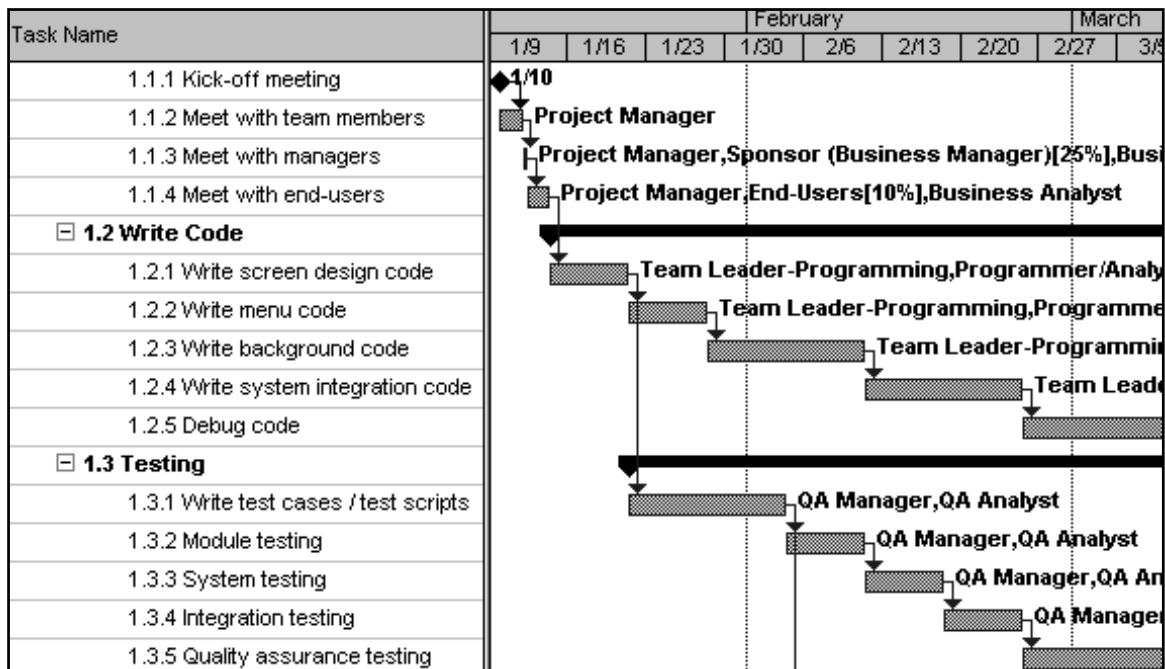➤ Do not assign resources to summary tasks.

Term	Description
Resource Pool	A list of the resources available to perform the tasks of the project, including the costs of using those resources.
Resource Calendar	A calendar listing the available work days for a resource. Each resource has its own calendar.

■ Assign Resources Exercise

Create a list of resources for the software development project and assign them to the tasks in the project plan.

■ Assign Resources Exercise Follow-Up

	Resource Name	Initials	Group	Max. Units	Std. Rate	Ovt. Rate	Cost/Use	Accrue At	Base Cale
1	Project Manager	P		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
2	Sponsor (Business Manager)	S		25%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
3	Upper Management	U		10%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
4	End-Users	E		10%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
5	Business Analyst	B		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
6	Team Leader-Programming	T		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
7	Programmer/Analyst	P		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
8	Programmer	P		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
9	QA Manager	Q		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
10	QA Analyst	Q		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
11	Technical Writing Manager	T		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
12	Instructional Designer	I		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
13	Training Analyst	T		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
14	Helpdesk Manager	H		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard
15	Technicians	T		100%	$0.00/hr	$0.00/hr	$0.00	Prorated	Standard

| Task Name	February							March	
	1/9	1/16	1/23	1/30	2/6	2/13	2/20	2/27	3/5
1.1.1 Kick-off meeting	◆1/10								
1.1.2 Meet with team members	Project Manager								
1.1.3 Meet with managers	Project Manager,Sponsor (Business Manager)[25%],Busi								
1.1.4 Meet with end-users	Project Manager,End-Users[10%],Business Analyst								
⊟ 1.2 Write Code									
1.2.1 Write screen design code			Team Leader-Programming,Programmer/Analy						
1.2.2 Write menu code			Team Leader-Programming,Programme						
1.2.3 Write background code				Team Leader-Programmi					
1.2.4 Write system integration code					Team Lead				
1.2.5 Debug code									
⊟ 1.3 Testing									
1.3.1 Write test cases / test scripts			QA Manager,QA Analyst						
1.3.2 Module testing				QA Manager,QA Analyst					
1.3.3 System testing					QA Manager,QA An				
1.3.4 Integration testing						QA Manager			
1.3.5 Quality assurance testing									

Module 8: Refining the Schedule

Once a network diagram has been constructed with task relationships and resource allocations the first draft of the project plan is complete. The schedule can then be refined by looking at the critical path, adjusting tasks and dealing with resource over-allocations.

The Critical Path

Every project has a series of tasks that forms a critical path. Understanding the critical path is essential to completing a project on time.

Term	Description
Critical path	The sequence of tasks that forms the longest duration within the project. If one task is delayed, on the critical path, the entire project is delayed.
Critical Task	A task on the critical path. A task with no float or slack.
Slack / Float	Extra time added to the duration of a task to accommodate unplanned events or the amount of time available for shifting a task without affecting the finish date of the project. The difference between the time available for a task and the time required to complete that task. Critical tasks have no float.
Critical Gantt Chart	A view of the project highlighting the Critical Path.
Crashing the schedule	Reducing the length of the Critical Path by reducing the duration of individual critical tasks.
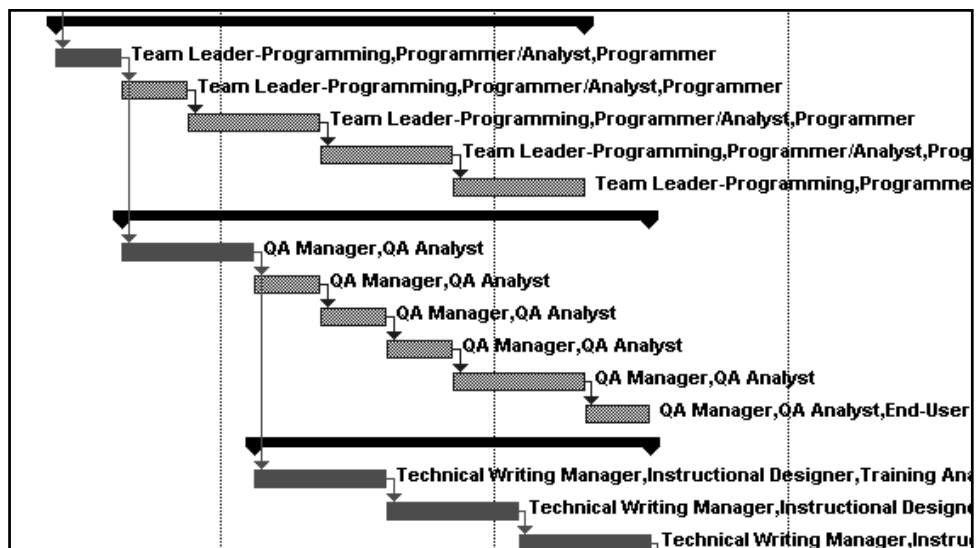
Task Adjustments

If the total time shown in your schedule exceeds the amount of time you have allotted for a project, you must eliminate time in your schedule somewhere. You can use the following options:

❍   Reevaluate task dependencies - use SS or FF instead of the default FS

❍   Break long duration tasks into shorter tasks that can be performed simultaneously

❍   Start tasks earlier

❍   Add resources to shorten the duration of a task

Resource Over-Allocation

Resource over-allocation occurs when, in order to finish the tasks assigned to them, a team member needs to work more than a days worth of work within one working day, or a piece of equipment needs to be in two places at the same time.

Term	Description
Over-Allocation	When a resource is used at more than 100% of its capacity.
Over-Allocation Report	A printed report showing when and how resources are over-allocated..
Resource Leveling	The process of shifting the use of resources to even out the workload of team members and equipment.

Leveling Techniques

Techniques that can be employed to level out the use of resources are to:

❍ Change the scope of the project and eliminate tasks

❍ Change the completion date of the project

❍ Add time to the duration of a task

❍ Shift non-critical tasks within their slack times

❍ Add additional resources

❍ Add more skilled or efficient resources that can complete the task quicker

❍ Substitute an under allocated resource for the over allocated resource

❍ Add overtime

❍ Adjust the percentage of involvement for a resource on a specific task.

➤ Microsoft Project has a feature that automatically applies resource leveling techniques. However, the outcome is very rarely acceptable (usually the completion date of the project is extended). Microsoft Project also has a feature that automatically removes the automatic leveling.

■ Refining the Schedule Exercise

Working as a team, look for any resource over-allocations and make adjustments to eliminate them. Identify the critical path in your project plan and mark it in red.

Module 9: Finishing the Plan

After the schedule has been fine-tuned, the project Manager is ready to communicate the project plan to the team members, the sponsor and upper management.

Reports

Although some team members may be familiar with Project Management software (such as Microsoft Project) it is best print out and distribute project plan reports. Generate the following reports and plans:

❍ Overall Project Plan

❍ Project Summary

❍ Critical Tasks

❍ Milestones

❍ Who Does What When Report

❍ Budgets

Communicating the Plan

Distribute the reports to all team members, the sponsor, upper management, end-users and other interested parties. Based on feedback, the Project Manager may have to further adjust the project plan.

Establishing the Baseline

The baseline is the final project plan created prior to the implementation phase. During the implementation phase all actual data are compared to the baseline plan. The baseline plan is not accepted until the sponsor signs off. Then the project can move into the implementation phase.

Module 10: Implementing the Plan

During the Implementation Phase the Project Manager is responsible for gathering data from the team members on the progress of the project. The Project Manager analyzes the data and generates reports that are distributed to all concerned.

If changes need to be made to the original schedule (baseline plan) then the Project Manager must get the approval and sign-off of the sponsor.

During the implementation phase the Project Manager is responsible for Tracking Progress, Reporting / Communicating and the Deliverables.

Tracking Progress

During the implementation phase the Project Manager needs to procure information on the progress of the project from the team members. This information is plotted against the baseline plan and compared and analyzed. The typical data the Project Manager needs to obtain are:

❍ Actual start and finish dates for each task

❍ Hours spent on each task

❍ Time remaining to completion of each task

❍ Milestones met

❍ Any barriers to completion

❍ Comparison of quality versus project scope

Tracking Gantt Chart

The Tracking Gantt Chart is a special view, available in some Project Management software programs, that allows the Project Manager to compare the actual project data to the baseline plan.
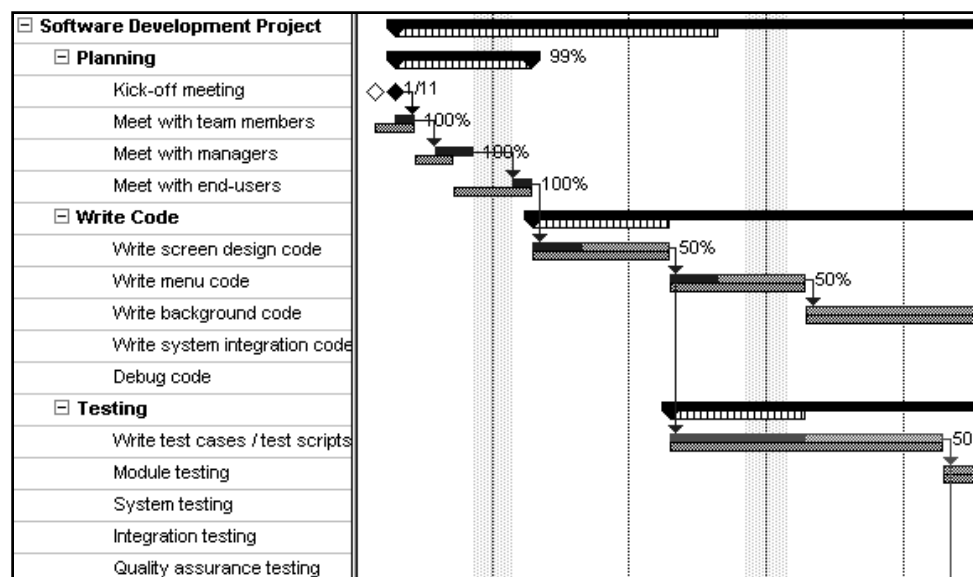
Reporting / Communicating

As mentioned repeatedly throughout this workshop, reporting and communicating are the most important parts of Project Management. This is never truer then during the implementation phase of the project.

Reports

Typical reports that are generated and distributed during the implementation phase:

❍ Unstarted Tasks

❍ Tasks Starting Soon

❍ To-Do List

❍ Tasks In Progress

❍ Completed Tasks

❍ Should Have Started Tasks

❍ Slipping Tasks

❍ Overbudget Tasks

❍ Overbudget Resources

Deliverables

Deliverables are the clearly defined results, goods or services produced during the project or at its outcome. At the end of the project the deliverables should be completed and signed-off by the sponsor.

All interim deliverables should be signed-off during the implementation phase. The final sign-off can take place in the closing phase.

Module 11: Closing the Project

The Closing Phase brings closure to the project in many ways:

❍ The sponsor and end-users give their final approvals (sign-off)

❍ Team members are acknowledged for their time and effort

❍ The Project Manager analyzes how the project was conducted

❍ All contracts and commitments are finalized

❍ Responsibilities are transferred from the project team to the process team

❍ Team members can be released and reassigned

❍ Accounting and costs are finalized

❍ The results of the project are documented

Closing Reports

Closing reports may include:

❍ Project Summary

❍ Project Plan

❍ Detailed Review

❍ Financial Report

❍ Variance Report

Filing

Filing the Final Reports for the project allows you and any other Project Managers within your organization to access this data easily in the future. Remember the acronym **DRaFT** that stands for **D**eliver **R**eport **a**nd **F**ile **T**oday.

Project Closure Meeting

During this meeting discuss with the team members what worked well, what problems arose, what adaptive actions worked well, and what areas require improvement.

■ Final Exercise

The purpose of our final exercise is to demonstrate that projects, just like everything else, are not finished until they are actually finished.

> *"It ain't over till its over."*
> — Yogi Berra

For this exercise we will play a word game called "Complete the Word." The first several letters of common words are listed below. These letters can start two or more words of different meanings. The words, and there final meanings, are not finished. Fill in the remaining letters to complete the words:

APAR _____   APAR _____

KINDL _____   KINDL _____

TERRI_____   TERRI_____

BRIT_____   BRIT_____

VERA_____   VERA_____

CAPT _____   CAPT _____

VICT_____   VICT_____

SENSI_____   SENSI_____

PARA _____   PARA _____

COLO _____   COLO _____

■ Final Exercise Follow-Up

Answer key:

APART	APARTMENT
KINDLY	KINDLING
TERRIFY	TERRITORY
BRITISH	BRITTLE
VERANDA	VERACITY
CAPTAIN	CAPTIVE
VICTIM	VICTORIAN
SENSIBLE	SENSITIVE
PARADE	PARALLEL
COLOR	COLON

Workshop Summary

In this workshop you learned the following:

❍ Project Management terms, concepts and techniques

❍ The importance of good communication skills

❍ Five rules for successful Project Management

❍ Why many projects fail and how to avoid failure

❍ The four project phases (EPIC)

❍ How to create a project task list and work breakdown structure

❍ How to create a project network

❍ Techniques for estimating

❍ Assigning resources and techniques for dealing with resource over-allocation

❍ How to determine a project's critical path

❍ The importance of a project baseline

❍ The Project Manager's role during the Implementation Phase: Tracking Progress, Reporting / Communicating and Deliverables

❍ How to bring a project to a close (DRaFT)

Notes