

PROJECT MANAGEMENT | ITACS 5203, Unit 2

1

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

LEARNING OBJECTIVES

explain the process of managing an information systems project, including project initiation, project planning, project execution, and project closedown,

describe how to represent and schedule project plans using Gantt charts and network diagrams, and

explain how commercial project management software packages can be used to assist in representing and managing project schedules.

2

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

TOPICS

3. Project Management

3.1. Managing the Project

3.1.1. Initiating

3.1.2. Planning

3.1.3. Executing

3.1.4. Closing Down

3.2. Planning

3.2.1. Representing Project Plans

3.2.2. Calculating Expected Time Durations (PERT)

3.2.3. Diagrams

3.2.3.1. GANTT

3.2.3.2. Network

3.1. Project Management and Governance

3.1.1. Project management Practices

3.1.1.1. Project Management Lifecycle

3.1.2. Project Management Cycle

3.1.2.1. Functional Structure

3.1.2.2. Project Structure

3.1.2.3. Matrix Structure

3.1.3. Project Management Roles and Responsibilities

3.1.3.1. Senior Management

3.1.3.2. User Management

3.1.3.3. User Project Team

3.1.3.4. Project Manager

3.1.3.5. Quality Assurance

3.1.3.6. System Development Project Team

3.1.3.7. Security Officer

3.1.3.8. Information Systems Security Engineer

3.1.4. Project Management Techniques

3.1.5. Portfolio/Program Management

3.1.6. Project Management Office

3.1.6.1. Project Portfolio Dashboard

3.1.7. Project Benefits Realization

3.1.8. Project Initiation

3.1.8.1. One-on-one meetings

3.1.8.2. Kick-off meetings

3.1.8.3. Project team workshops

3.1.9. Project Objectives

3.1.9. Project Planning

3.1.10. Information System Development Project Cost Estimation

3.1.10.1. Analogous estimating

3.1.10.1.2. Parametric estimating

3.1.10.1.3. Bottom-up estimating

3.1.10.1.4. Actual cost

3.1.10.2. System Size Estimation

3.1.10.3. Function-Point Analysis

3.1.10.4. Cost-Budgets

3.1.10.5. Software Cost Estimation

3.1.10.6. Scheduling and Estimating Time Frame

3.1.10.6.1. GANTT Charts

3.1.10.6.2. Critical Path

3.1.10.6.3. Program Evaluation Review Technique (PERT)

3.1.10.6.4. Timeline Management

3.1.11. Project Execution

3.1.11.1. Project Execution

3.1.11.2. Project Controlling and Monitoring

3.1.11.2.1. Management of Scope Changes

3.1.11.2.2. Management of Resource Usage

3.1.11.2.3. Management of Risk

3.1.11.3. Project Closing

3

Introduction
 PM Knowledge Areas
Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

KNOWLEDGE AREAS FOR PROJECT MANAGEMENT

Project Management Institute's (PMI) 5 lifecycle domains for Project Management Professional (PMP) certification:

1. Initiating the project
2. Planning the project
3. Executing the project
4. Monitoring and controlling the project
5. Closing the project

These map to 10 knowledge areas:

1. Project Integration Management
2. Project Scope Management
3. Project Schedule Management
4. Project Cost Management
5. Project Quality Management
6. Project Resource Management
7. Project Communications Management
8. Project Risk Management
9. Project Procurement Management
10. Project Stakeholder Management

4

Introduction
 PM Knowledge Areas
Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

PROJECT ROLES

Project

- A planned undertaking of related activities to reach an objective that has a beginning and an end

Project management

- A controlled process of initiating, planning, executing, and closing down a project

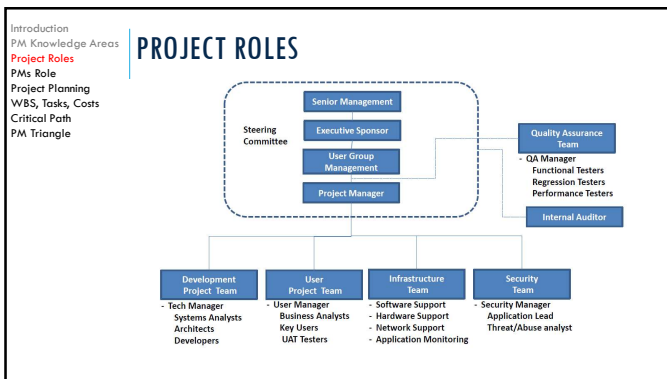
Project manager

- A systems analyst with a diverse set of skills—management, leadership, technical, conflict management, and customer relationship—who is responsible for initiating, planning, executing, and closing down a project

Deliverable

- The end product of an SDLC phase

5



6

Introduction
PM Knowledge Areas
Project Roles
PMs Role
Project Planning
WBS, Tasks, Costs
Critical Path
PM Triangle

PROJECT MANAGER

Phases of Project Management Process

- Phase 1: Initiation
- Phase 2: Planning
- Phase 3: Execution
- Phase 4: Closedown

Analysis
Design
Implementation

7

Introduction
PM Knowledge Areas
Project Roles
PMs Role
Project Planning
WBS, Tasks, Costs
Critical Path
PM Triangle

PROJECT PLAN

Should define clear, discrete activities and the work needed to complete each activity. Tasks include:

1. Describing Project Scope
2. Dividing the Project into Manageable Tasks
3. Estimating Resources and Creating a Resource Plan
4. Developing a Preliminary Schedule
5. Developing a Communication Plan
6. Determining Project Standards and Procedures
7. Identifying and Assessing Risk
8. Creating a Preliminary Budget
9. Setting a Baseline Project Plan

8

Introduction
PM Knowledge Areas
Project Roles
PMs Role
Project Planning
WBS, Tasks, Costs
Critical Path
PM Triangle

PROJECT PLAN

Answers the questions:

- What tasks must be done to complete the project?
- What are the dependencies among tasks?
- Who is responsible for each task?
- What resources are required to complete the tasks?
- How long will it take to complete the project?
- Is the project possible, given the known parameters?
- Where is the project most at risk?

9

Introduction
PM Knowledge Areas
Project Roles
PMs Role
Project Planning
WBS, Tasks, Costs
Critical Path
PM Triangle

PROJECT PLAN

- Phase 1: Initiation
- Phase 2: Planning
- Phase 3: Execution
- Phase 4: Closedown

Is a 5-step process that defines a "road map" for successful project completion:

1. Define the work
 - What problem or opportunity does the project address?
 - What are the quantifiable results to be achieved?
 - What needs to be done?
 - How will success be measured?
 - How will we know when we are finished?
2. Develop initial project schedule
3. Refine project plans
4. Assess project risk
5. Set fixed delivery date and publish plans

10

Introduction
PM Knowledge Areas
Project Roles
PMs Role
Project Planning
WBS, Tasks, Costs
Critical Path
PM Triangle

PROJECT PLANNING — DEFINE THE WORK

Project Manager does the following:

- Reviews historical project information
- Identifies major project activities
- Decomposes major activities and identifies individual tasks
- Establishes task ownership
- Identifies skills and resources needed

Outputs of this step:

- Work Breakdown Structure (WBS)
- Clearly defined tasks and deliverables
- Tasks assigned to the Functional Leads
- Specify resources by task

11

Introduction
PM Knowledge Areas
Project Roles
PMs Role
Project Planning
WBS, Tasks, Costs
Critical Path
PM Triangle

PLANNING DETAIL

Level of project planning detail should be high in the short term, with less detail as time goes on

- The general principal is that we need to accept the fact of uncertainty, and that things will change over time
- Although we want a detailed idea of what we're going to do in the immediate future, we allow for more flexibility as time goes on
- This implies that planning is always going on
- Plans are revisited and evolve over time

12

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
WBS, Tasks, Costs
 Critical Path
 PM Triangle

DIVIDING A PROJECT INTO MANAGEABLE TASKS

Work Breakdown Structure (WBS)

- Division of project into manageable and logically ordered tasks and subtasks

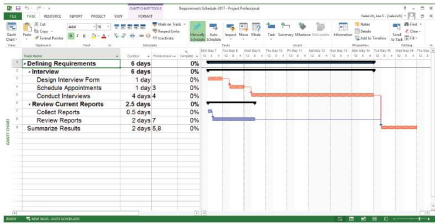
Scheduling Diagrams

- **Gantt** chart: horizontal bars represent task durations
- **Network diagram**: boxes and links represent task dependencies

13

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
WBS, Tasks, Costs
 Critical Path
 PM Triangle

PROJECT SCHEDULE



Gantt chart showing project tasks, duration times for those tasks, and predecessors
 (Source: Microsoft Corporation.)

14

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
WBS, Tasks, Costs
 Critical Path
 PM Triangle

WORK BREAKDOWN STRUCTURE (WBS)

Is a "top down" logical structuring of project work

At the highest level, the WBS may be broken down into major work packages that reflect phases of the SDLC, for example:

1. Planning
2. Analysis
3. Design
4. Implementation

Each work package is further broken down into tasks of greater detail, for example:

2. Analysis
 - A. Workflow requirement analysis
 - B. Functional requirements analysis
 - C. Data requirements analysis
 - D. Information security requirements analysis
3. Design
 - A. User interface design
 - B. Database design
 - C. Applications processing design

15

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

NETWORK DIAGRAM

Once the tasks have been defined in a WBS, we map dependencies using a "Network Diagram"

- No... Not that kind of network diagram...

16

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

NETWORK DIAGRAM

Once the tasks have been defined in a WBS, we map dependencies using a "Network Diagram"

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17

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

TASK COMPLETION TIME

For each task defined in the WBS and Network Diagram, you must estimate the time to complete the task (and resources required).

PERT Time Estimate = $\frac{\text{Optimistic} + (4 \times \text{Most Likely}) + \text{Pessimistic}}{6}$

18

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
Critical Path
 PM Triangle

THE CRITICAL PATH

An algorithm for scheduling a set of project activities

Used with Program Evaluation and Review Technique (PERT) network diagram

Determines

1. Critical path by identifying and measuring the time required to complete the longest path of dependent activities (i.e. tasks) from start to finish
2. Earliest and latest that each task can start and finish without making the project longer

- Slack time is the amount of time a task can be delayed without making the project longer
- **Critical path has 0 slack**

19

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
Critical Path
 PM Triangle

THE CRITICAL PATH

PERT chart for a project with

- 5 milestones: 1 through 5
- 6 tasks: A through F

Which is the critical path?
 3 Paths through the tasks:

A, D, F = 3 + 1 + 2 = 6 mo. Slack time = 1 mo.
 A, E = 3 + 3 = 6 mo. Slack time = 1 mo.
B, C = 4 + 3 = 7 mo. Slack time = 0 mo.

20

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
Critical Path
 PM Triangle

CRITICAL PATH EXERCISE

PERT Time Estimate = $\frac{\text{Optimistic} + (4 \times \text{Most Likely}) + \text{Pessimistic}}{6}$

What is the critical path?
 What is the slack time?

21

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
Critical Path
 PM Triangle

GANTT

Once the tasks have been defined, their dependencies well understood, and the durations estimated, we can use a graphical model of the project plan:

22

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
Critical Path
 PM Triangle

GANTT EXERCISE

Use the network diagram to create a GANTT using TeamGantt.com

23

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, **Costs**
Critical Path
 PM Triangle

COST ESTIMATION

Can be based on:

- Analogous estimating – using experience from prior projects
- Parametric estimating – extending cost models from similar prior projects
- Bottom-up estimating – building up costs from detailed Work Breakdown Structure
- Actual costs – leveraging actual historic costs from identical prior project

Software Size Estimation Techniques:

- Source Lines of Code (SLOC)
- COConstructive COst Model (COCOMO)
- Function Point Analysis (FPA)
- FPA With Feature Points

24

Introduction
PM Knowledge Areas
Project Roles
PMs Role
Project Planning
WBS, Tasks, **Costs**
Critical Path
PM Triangle

COCOMO

Models for estimating effort, cost, and schedule
Boehm, B. (1981) Software Engineering Economics

- Derived from fitting regression formulas to historical project data
- Applies to 3 classes of software development projects
 - Organic projects** - small teams with "good" experience working with flexible requirements
 - Semi-detached projects** - "medium" teams with mixed experience working with a mix of rigid and less than rigid requirements
 - Embedded projects** - developed within a set of "light" constraints
- A hierarchy of three increasingly detailed models:
 - Basic COCOMO** for quick, early, rough order of magnitude estimates of software costs
 - Intermediate COCOMO** added "Cost Drivers"
 - Detailed COCOMO** added influence of individual project phases

25

Introduction
PM Knowledge Areas
Project Roles
PMs Role
Project Planning
WBS, Tasks, **Costs**
Critical Path
PM Triangle

COST ESTIMATION — FUNCTION POINT ANALYSIS (FPA)

A technique used to determine size of a development task, based on the number of function points

Function points are factors such as inputs, outputs, queries, and logical processing units

| Parameter | Simple | Simple Weight | Average | Average Weight | Complex | Complex Weight | Function Points | Labor Hours | Labor Costs |
|-----------------------------|-----------|---------------|-----------|----------------|-----------|----------------|-----------------|--------------|----------------|
| # of Screens | 5 | 5 | 10 | 10 | 5 | 15 | 200 | 2,000 | 200,000 |
| # of Services | 0 | 10 | 2 | 20 | 2 | 40 | 120 | 1,200 | 120,000 |
| # of Database Tables | 4 | 10 | 2 | 15 | 0 | 20 | 70 | 700 | 70,000 |
| # of Data Files | 0 | 5 | 4 | 10 | 0 | 15 | 40 | 400 | 40,000 |
| # of Reports | 0 | 20 | 2 | 30 | 3 | 40 | 180 | 1,800 | 180,000 |
| # of External interfaces | 1 | 20 | 1 | 40 | 1 | 60 | 120 | 1,200 | 120,000 |
| # of Environment Variables | 3 | 20 | 4 | 30 | 0 | 40 | 180 | 1,800 | 180,000 |
| Total: | 13 | 90 | 25 | 155 | 11 | 230 | 910 | 9,100 | 910,000 |
| Labor Hours/Function Point: | 10 | | | | | | | | |
| Cost/Function Point: | 1,000 | | | | | | | | |

26

Introduction
PM Knowledge Areas
Project Roles
PMs Role
Project Planning
WBS, Tasks, **Costs**
Critical Path
PM Triangle

AUDITORS ROLE

An auditor should be able to review the project plan, and assess:

- The validity of costs and estimates**
 - Was an accepted industry standard used?
 - Are these estimates defensible?
- The reasonableness of tasks**
 - Was their rigor in developing the task list?
 - Is there specificity, i.e., not a template?
 - Is there evidence of objectivity in task definition and time estimates?
- Detail**
 - Is the level of detail appropriate at the time the plan was developed?
 - Was the plan incrementally modified to update to a level of detail as the project progressed?
- Risk**
 - Was the critical path identified, and well understood?
- Consistency**
 - Are the various project planning models consistent?
 - Ex: Each task in the WBS represented in the Network Diagram, GANTT chart, etc?

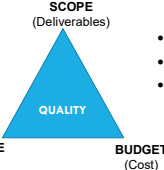
27

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

PROJECT PLANNING - PROJECT MANAGEMENT TRIANGLE

Projects are planned and managed in the context of 3 constraints: Scope, Schedule and Budget

- Project Managers can trade among these 3 constraints
- Changes in one constraint necessitate changes in others or quality will suffer

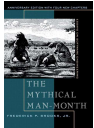


- Good
- Cheap
- Fast

Pick 2

Do not overlook implications of the "Mythical Man-Month"

- More budget/resources can increase schedule
- Good is a function of:
 - Need to meet/exceed stakeholder expectations
 - Need to pass User Acceptance Testing




28

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

PROJECT PLANNING - PROJECT MANAGEMENT TRIANGLE

Project planning and management accomplished in context of 3 constraints:
 Scope, Schedule and Budget



Scope involves getting information required to start a project, and the features the product would have that would meet its stakeholders requirements

- **Project Scope:** "The work that needs to be accomplished to deliver a product, service, or result with the specified features and functions"
- **Product Scope:** "The features and functions that characterize a product, service, or result."

Scope Risks: *If requirements are not completely defined and described and if there is no effective change control in a project, scope creep or requirements creep may result*


A Guide to the Project Management Body of Knowledge (PMBOK Guide) - Fourth Edition, Project Management Institute, 2008. ISBN 978-1-933896-51-7

29

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

PROJECT PLANNING - PROJECT MANAGEMENT TRIANGLE

Project planning and management accomplished in context of 3 constraints:
 Scope, Schedule and Budget



Schedule Risks:

- Tasks which are exceptionally complicated
- Tasks with durations longer than two weeks
- Tasks on the critical path
- Tasks which have several predecessors or dependencies
- Tasks that have minimal slack
- Optimistically estimated tasks
- Tasks reliant on external resources
- Start-to-Start and Finish-to-Finish dependencies
- Dependencies with lags
- Major milestones
- Unforeseen issues (e.g., sicknesses, relocations, reorganizations)
- Unstated assumptions

30

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

PROJECT PLANNING - PROJECT MANAGEMENT TRIANGLE

Project planning and management accomplished in context of 3 constraints:
 Scope, Schedule and Budget

- Under-budgeted or unbudgeted
- Development tasks
- Testing and bug fixing tasks
- Documentation tasks
- Hardware, software, other equipment, or datasets
- Meetings
- Training of clients

31

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

PROJECT PLANNING - PROJECT MANAGEMENT TRIANGLE

Project planning and management accomplished in context of 3 constraints:
 Scope, Schedule and Budget

Resource Risks:

- Tasks with one key individual assigned
- Tasks using scarce resources
- Tasks which are mismatched with the people assigned
- Tasks which require large amounts of resources
- Availability of tools and/or techniques
- Tasks which rely on sub-consultants or third party vendors for their completion
- Tasks which rely on resources within another organizational division or group for their completion

32

Introduction
 PM Knowledge Areas
 Project Roles
 PMs Role
 Project Planning
 WBS, Tasks, Costs
 Critical Path
 PM Triangle

PROJECT PLANNING - PROJECT MANAGEMENT TRIANGLE

Project planning and management accomplished in context of 3 constraints:
 Scope, Schedule and Budget

Preventative Tasks to Mitigate Risk

- Schedule high risk tasks earlier in the development cycle
- Shift more experienced people to tasks
- Add prototyping tasks to prove concepts
- Add review tasks
- Change the approach to eliminate high risk tasks
- Add resources to tasks for cross-training, if budget can support it
- Establish independent parallel efforts
- Reduce project scope
- Design in redundancy

33
