

ISYS2110

Analysis and Design of Web Information Systems

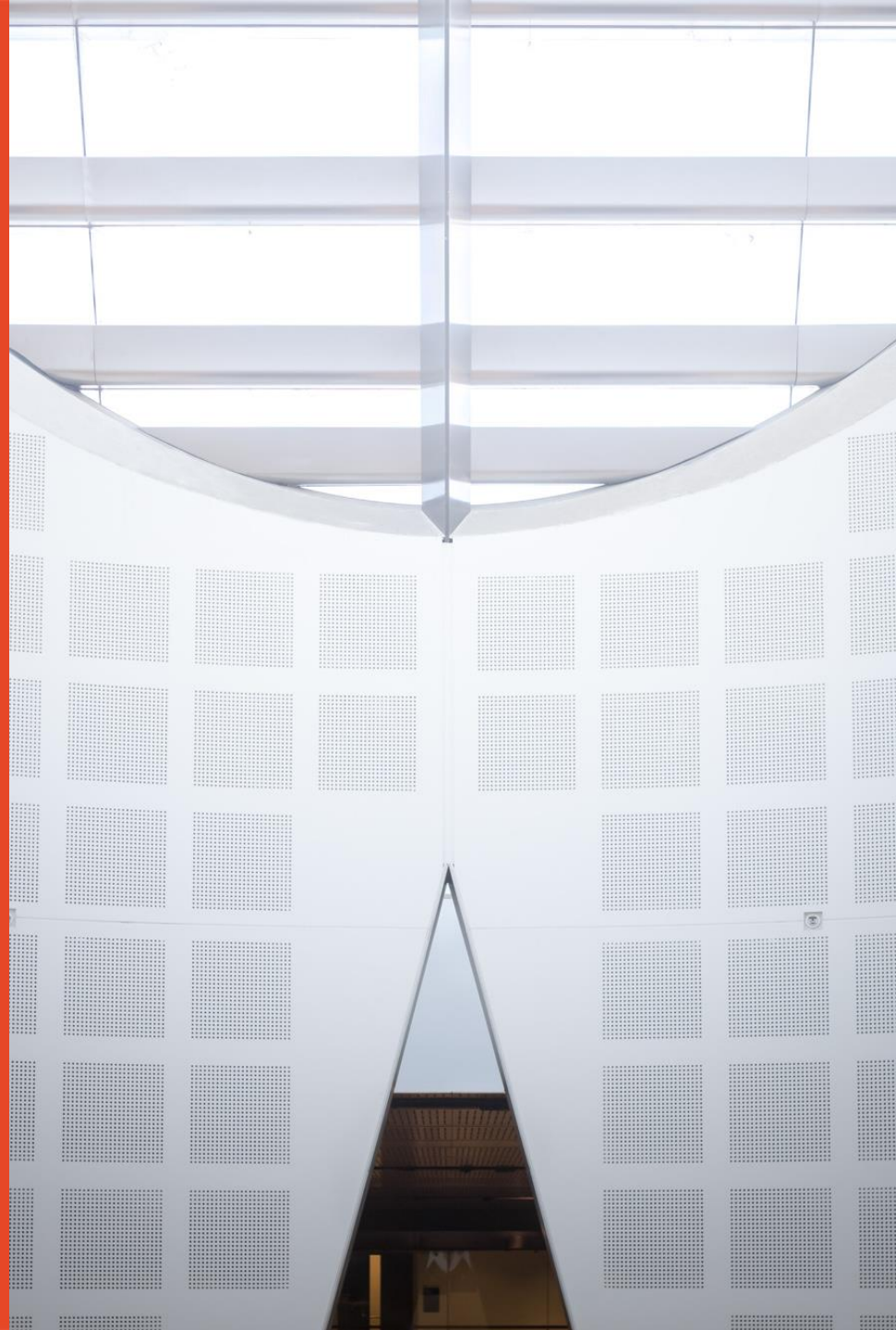
Lecture 3 Managing Systems Projects

Semester 1, 2018

Dr Rabiul Hasan



THE UNIVERSITY OF
SYDNEY



Recapture From Lecture 2

What we have covered last week on the topic:

Investigating System Requirements

- Business and Systems requirements
- Systems feasibility
- Requirement investigation techniques
- System requirements prioritization

What Will We Do Today ?

- Lecture
 - Project/Systems Project ?
 - Agile Project Management
 - Scope, Time, and Cost
 - WBS, Gantt Chart, CPM, PERT
 - Quality, Conflict
 - Risk Register
- Class activities
 - Critical Thinking / Problem Solving
 - <https://padlet.com>
 - <https://answer garden.ch>
- Tutorial: How is it going?
- Assessment
 - Assignment 1: Due in week 5
 - Quiz 1: Due in week 6, Friday, during the lecture
- Announcement (if any):

Learning Objectives

- Understand System Projects
- Explain the relationship among project cost, scope, and time
- Create a work breakdown structure, and calculate a critical path
- Explain techniques for estimating task completion times and costs
- Describe various scheduling tools, including Gantt charts and PERT/CPM charts

Learning Objectives

- Analyze task dependencies, durations, start dates, and end dates
- Describe project management software and how it can be of assistance
- Discuss the importance of managing project risks

Project ?

- What comes to your mind ? How do you define Project?
- Is Web-based Information Systems a Project?
- What do the following images tell us about project?

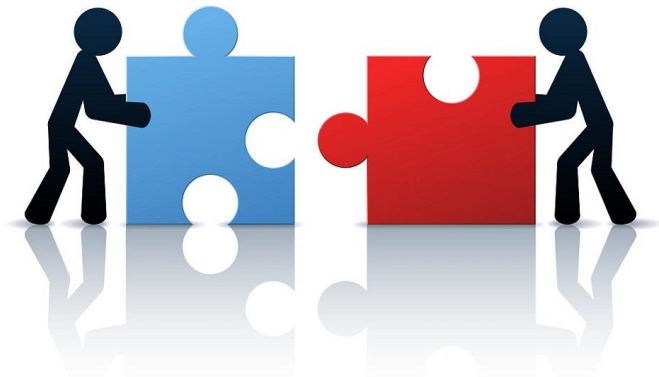


Image Source: <http://bookboon.com/blog/2013/05/project-launch-stage-how-to-get-a-project-properly-running/>



Image source: <https://it.sheridancollege.ca/aboutIT/pmo.html>

Type of Information System Projects

- Software development
- Package implementation
- System enhancement
- Systems migration
- Infrastructure implementation
- Outsourcing (and in-sourcing)
- Disaster recovery

Managing Project

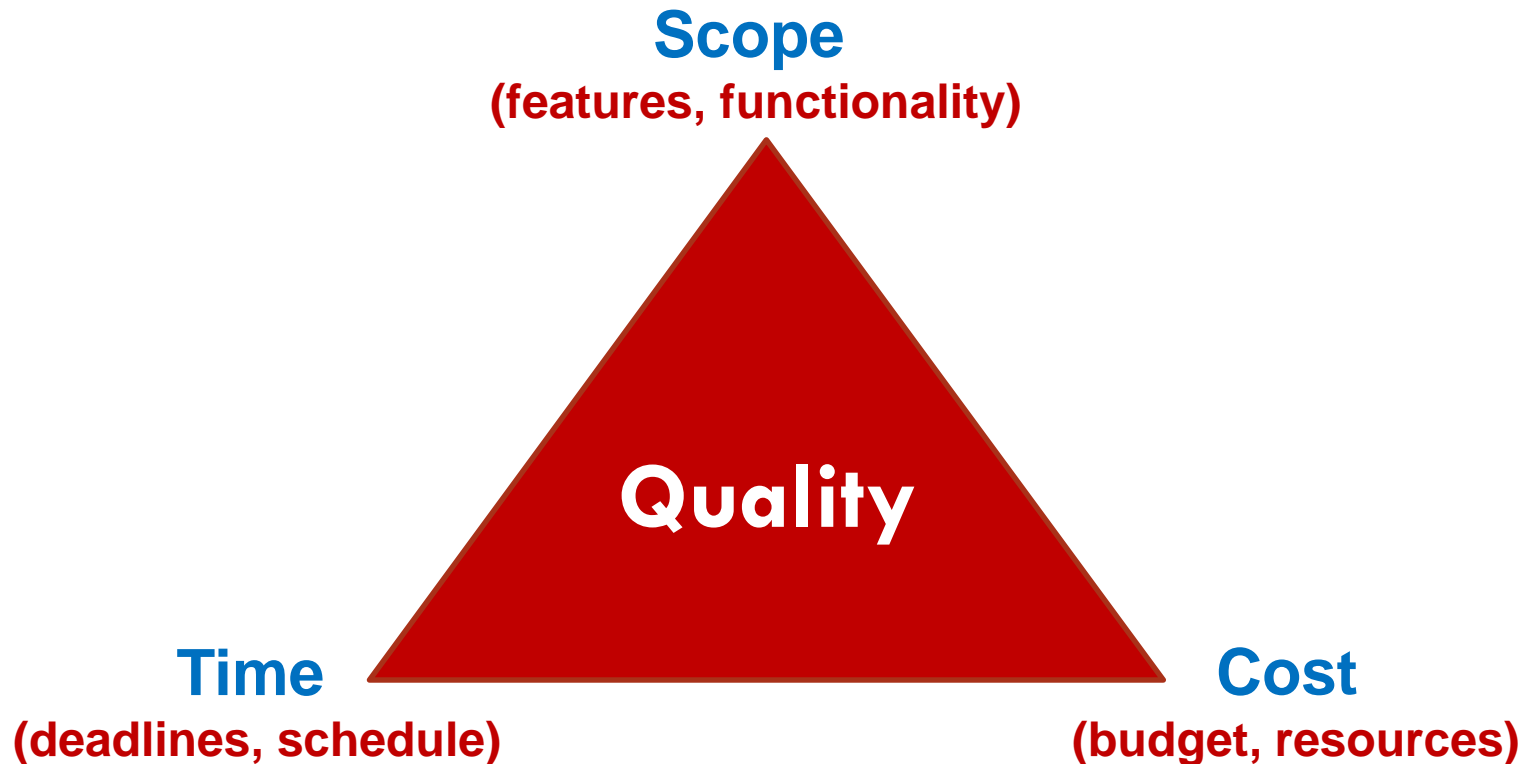
- “The application of knowledge, skills, tools and techniques to project activities to meet project requirements” (PMBOK® Guide, Fourth Edition, 2013)
- A complex team-based activity

Why Project Management in Systems Projects?

- Managing Systems with/without project management knowledge
- Success rate
- Demand/Issues

Triple Constraints of Managing Project

- Project scope, time, and cost goals



Your Role as a Project Manager

- **Project managers** work with project sponsors, project team, and other people involved in a project to meet project goals
- Job descriptions vary, but most include responsibilities like planning, scheduling, coordinating, and working with people to achieve project goals
- Remember that 97% of successful projects were led by experienced project managers, who can often help influence success factors

Managing Systems Projects – Project Management Knowledge Areas

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

PMBOK PM Process Groups

- Initiating
- Planning
- Executing
- Monitoring and control
- Closing

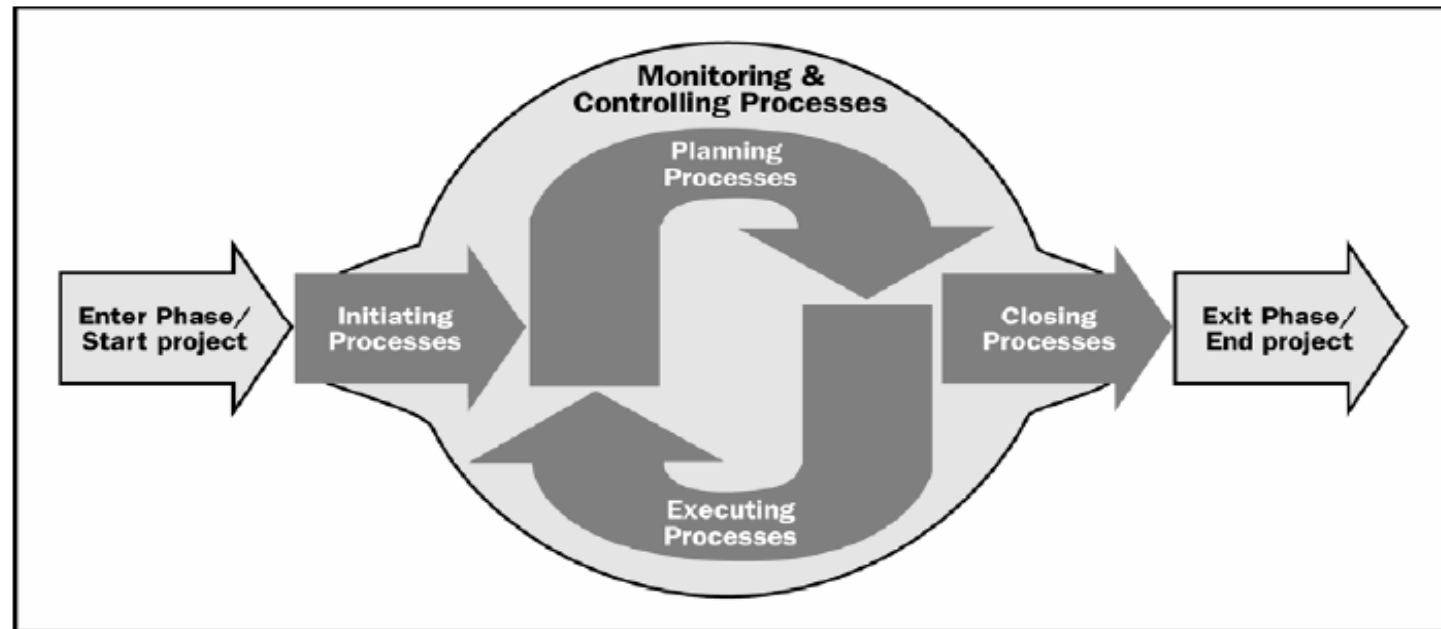
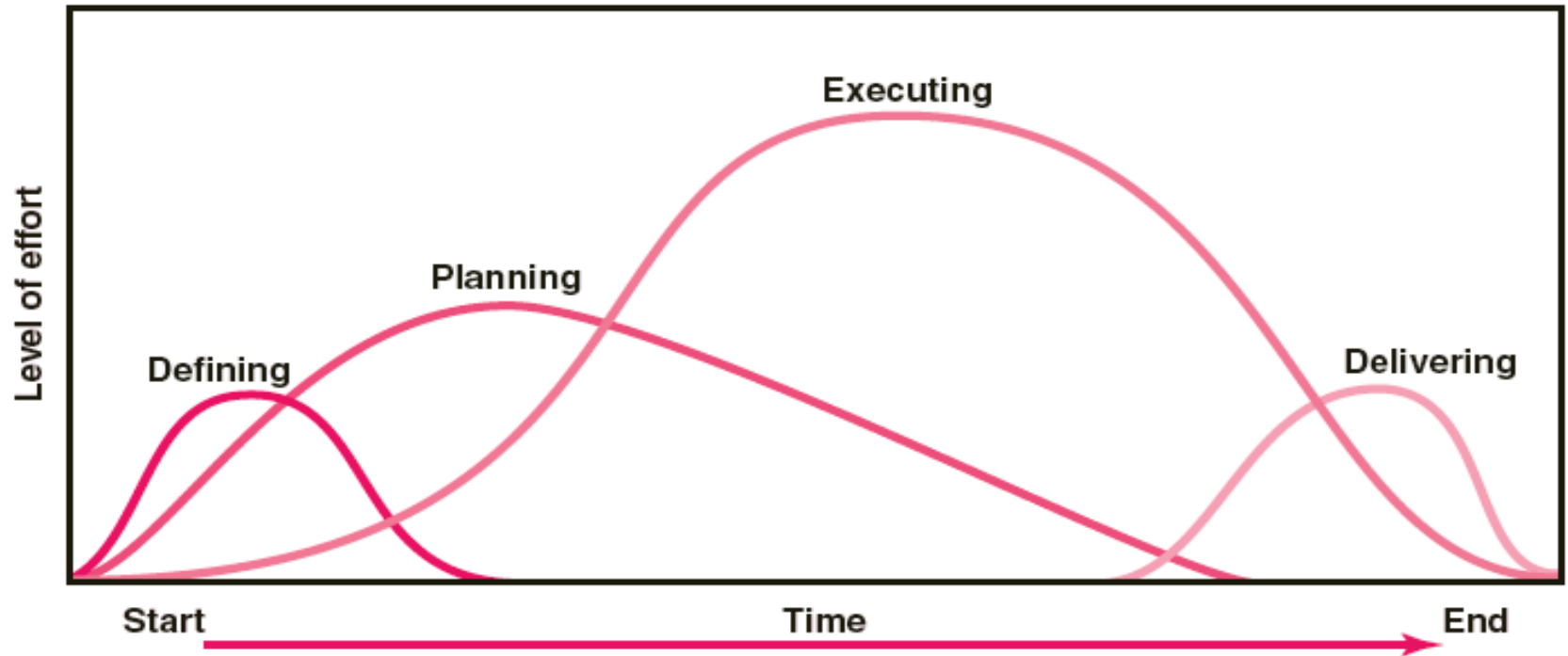


Figure 3-1. Project Management Process Groups

Project Life Cycle

- A **project life cycle** is a collection of project phases that defines
 - what work will be performed in each phase
 - what deliverables will be produced and when
 - who is involved in each phase, and
 - how management will control and approve work produced in each phase
- A **deliverable** is a product or service produced or provided as part of a project

Project Lifecycle



Defining

1. Goals
2. Specifications
3. Tasks
4. Responsibilities

Planning

1. Schedules
2. Budgets
3. Resources
4. Risks
5. Staffing

Executing

1. Status reports
2. Changes
3. Quality
4. Forecasts

Delivering

1. Train customer
2. Transfer documents
3. Release resources
4. Release staff
5. Lessons learned

What Happens in Different Project Phases

- In early phases of a project life cycle
 - **resource** needs - ?
 - the level of **uncertainty** (risk) - ?
 - **stakeholders influence** on the project - ?
- In middle phases of a project life cycle
 - the **certainty** of a project - ?
 - **resource** needs - ?
- The final phase of a project life cycle focuses on
 - ensuring that project **requirements were met**
 - the sponsor approves **completion** of the project

PM Process Groups VS Project Life Cycle

- Initiating
- Planning
- Executing
- Monitoring and control
- Closing

- Defining
- Planning
- Executing
- Delivering

Project Management Methodologies

- A methodology is a system of practices, techniques, procedures and rules used by those who work in a discipline.
- Popular PM Methodology in IT context:
 - **Agile Project Management**

Agile Project Management

- Agile project management focuses on adaptability to changing situations and constant, regular feedback – whether it's from the client or from other members of the team.
- This is ideal when clients or management need to be in on the production process, resulting in **changing requirements and drastic shifts** in team assignments.
- Agile project management is usually ideal for smaller software projects and/or those with accelerated development schedules.

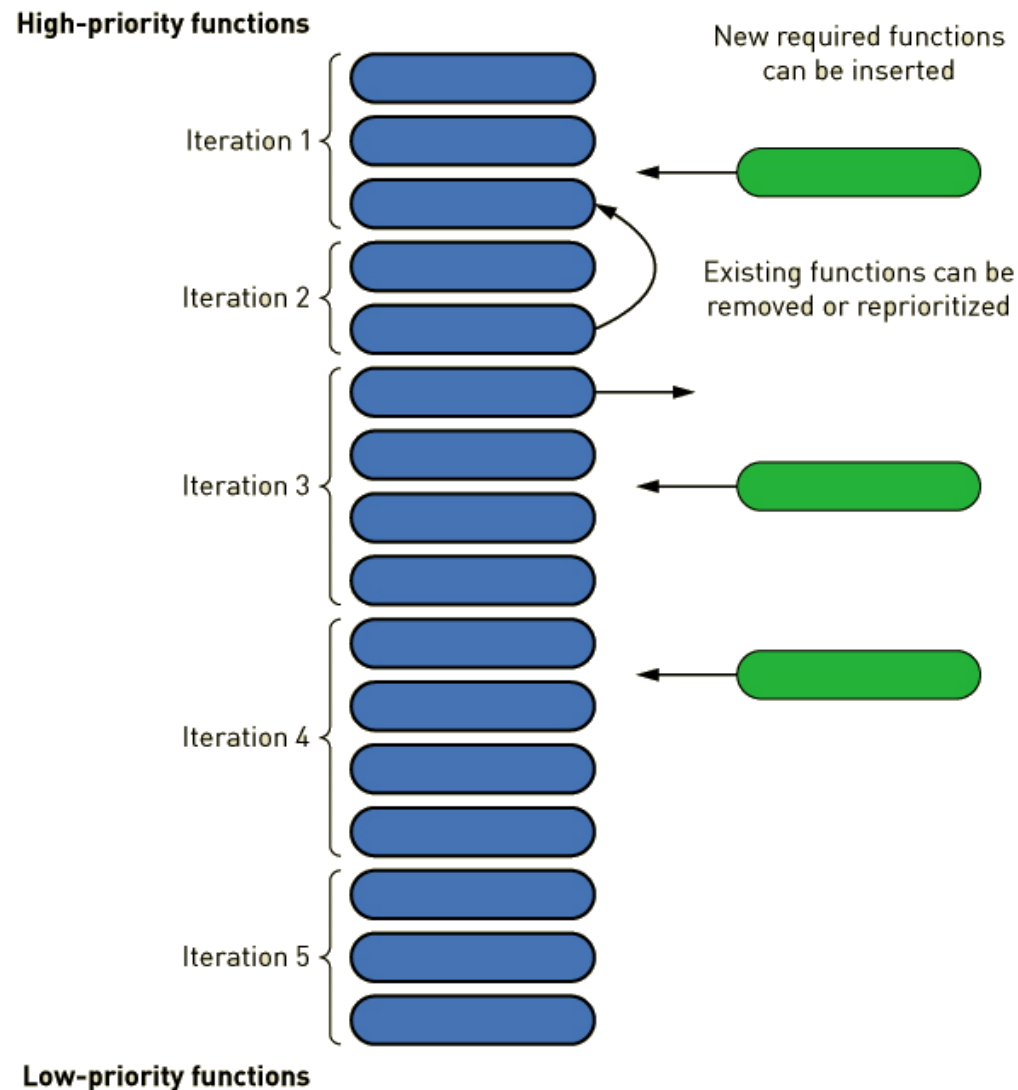
Agile Project Management ... continue

- **Agile means** being able to move quickly and easily, but some people feel that project management, as they have seen it used, does not allow people to work quickly or easily.
- **Early software development projects** often used a waterfall approach. As technology and businesses became more complex, the approach was often difficult to use because requirements were unknown or continuously changing.
- **Agile today means** using a method based on iterative and incremental development, in which requirements and solutions evolve through collaboration.

Agile Project Management ... continue

- Agile Scope Management
 - Scope is not well understood, but needs to be controlled
- Agile Time Management
 - Schedule must be flexible due to changes
- Agile Cost Management
 - Costs are more difficult to estimate
- Agile Risk Management
 - Higher risk aspects of project are completed first
- Agile Quality Management
 - Quality assessed after each iteration

Agile Scope Management



Managing Scope in Systems Projects

Project Scope Management Processes

- **Planning scope:** determining how the project's scope and requirements will be managed
- **Collecting requirements:** defining and documenting the features and functions of the products produced during the project as well as the processes used for creating them
- **Defining scope:** reviewing the project charter, requirements documents, and organizational process assets to create a scope statement
- **Creating the WBS:** subdividing the major project deliverables into smaller, more manageable components
- **Validating scope:** formalizing acceptance of the project deliverables
- **Controlling scope:** controlling changes to project scope throughout the life of the project

Defining Project Scope

Input:
**Project
Charter**

Output:
**Project
Scope
Statement**

Project Charter

Project purpose or justification

Measurable project objectives
and related success criteria

High-level requirements

High-level project description

High-level risks

Summary milestone schedule

Summary budget

Stakeholder list

Project approval requirements
(what constitutes success, who
decides it, who signs off)

Assigned project manager,
responsibility, and authority
level

Name and authority of the
sponsor or other person(s)
authorizing the project charter

Project Scope Statement

Project scope description
(progressively elaborated)

Acceptance criteria

Project deliverables

Project exclusions

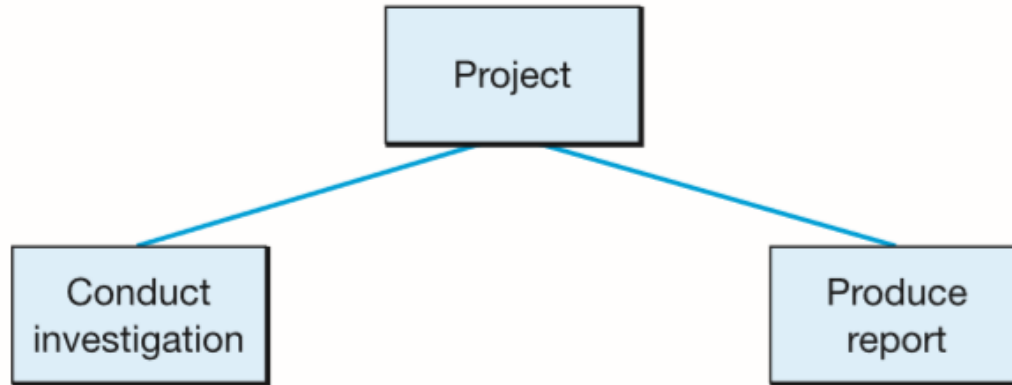
Project constraints

Project assumptions

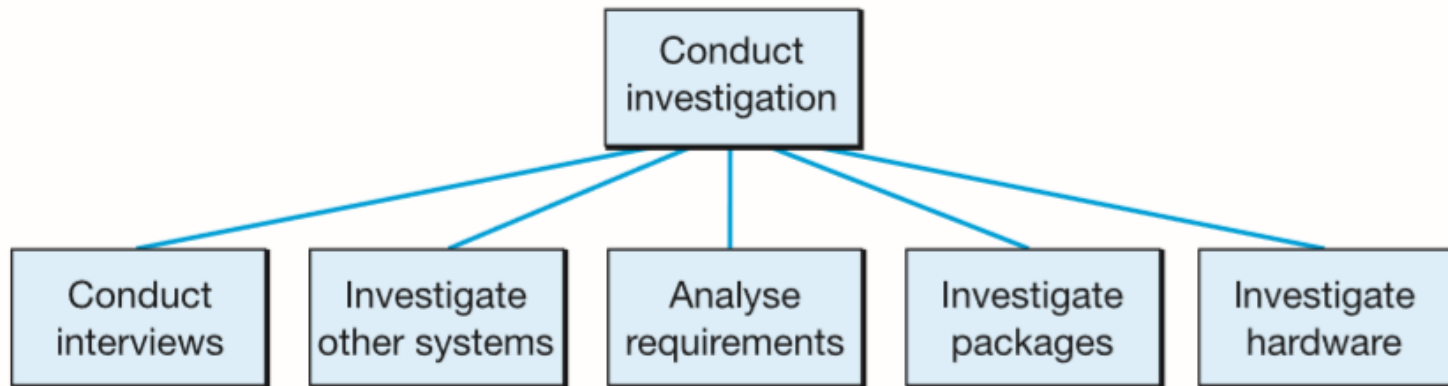
Managing and Controlling Project Scope

- Scope creep
- WBS – why?

Understanding Project Works – Work Breakdown Structure (WBS), Work packages, Activities and Tasks

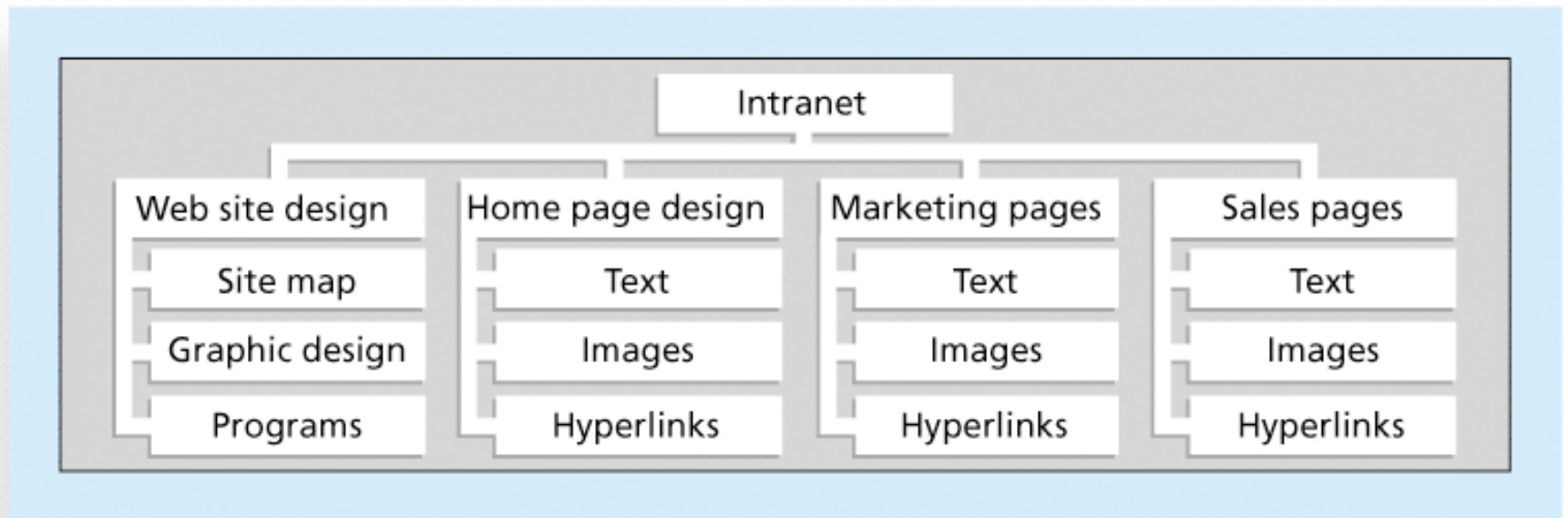


Work breakdown structure: top level

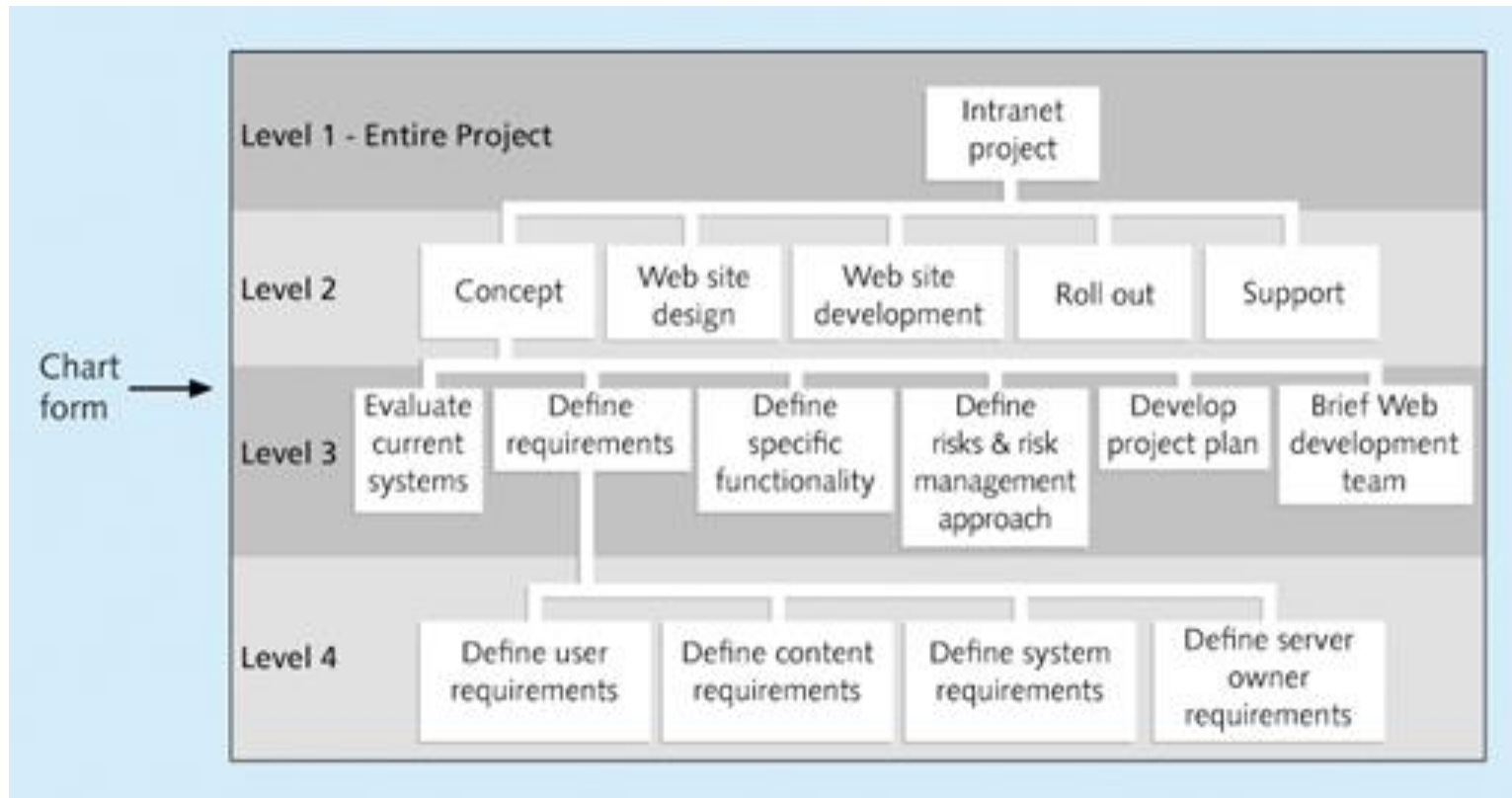


Work breakdown structure: second level

WBS Organized by Product



WBS Organized by Phase



WBS Organized in Tabular Form

Tabular form with PMI numbering

- 1.1 Concept
 - 1.1.1 Evaluate current systems
 - 1.1.2 Define requirements
 - 1.1.2.1 Define user requirements
 - 1.1.2.2 Define content requirements
 - 1.1.2.3 Define system requirements
 - 1.1.2.4 Define server owner requirements
 - 1.1.3 Define specific functionality
 - 1.1.4 Define risks and risk management approach
 - 1.1.5 Develop project plan
 - 1.1.6 Brief Web development team
- 1.2 Web site design
- 1.3 Web site development
- 1.4 Roll out
- 1.5 Support

Approaches to Developing WBSs

- Using guidelines: Some organizations, like the Department of Defense (DOD), provide guidelines for preparing WBSs
- The **analogy approach**: Review WBSs of similar projects and tailor to your project
- The **top-down approach**: Start with the largest items of the project and break them down
- The **bottom-up approach**: Start with the specific tasks and roll them up
- Mind-mapping approach: **Mind mapping** is a technique that uses branches radiating out from a core idea to structure thoughts and ideas

Managing Time in Systems Projects

Project Time Management Processes

- **Plan schedule management:** determining the policies, procedures, and documentation that will be used for planning, executing, and controlling the project schedule
- **Define activities:** identifying the specific activities that the project team members and stakeholders must perform to produce the project deliverables
- **Sequence activities:** identifying and documenting the relationships between project activities
- **Estimate activity resources:** estimating how many **resources** a project team should use to perform project activities
- **Estimate activity durations:** estimating the number of work periods that are needed to complete individual activities
- **Develop the schedule:** analyzing activity sequences, activity resource estimates, and activity duration estimates to create the project schedule
- **Control the schedule:** controlling and managing changes to the project schedule

Defining Activities

- An **activity** or **task** is an element of work normally found on the work breakdown structure (WBS) that has an expected duration, a cost, and resource requirements

Milestones

- A **milestone** is a significant event that normally has no duration
- It often takes several activities and a lot of work to complete a milestone
- They're useful tools for setting schedule goals and monitoring progress

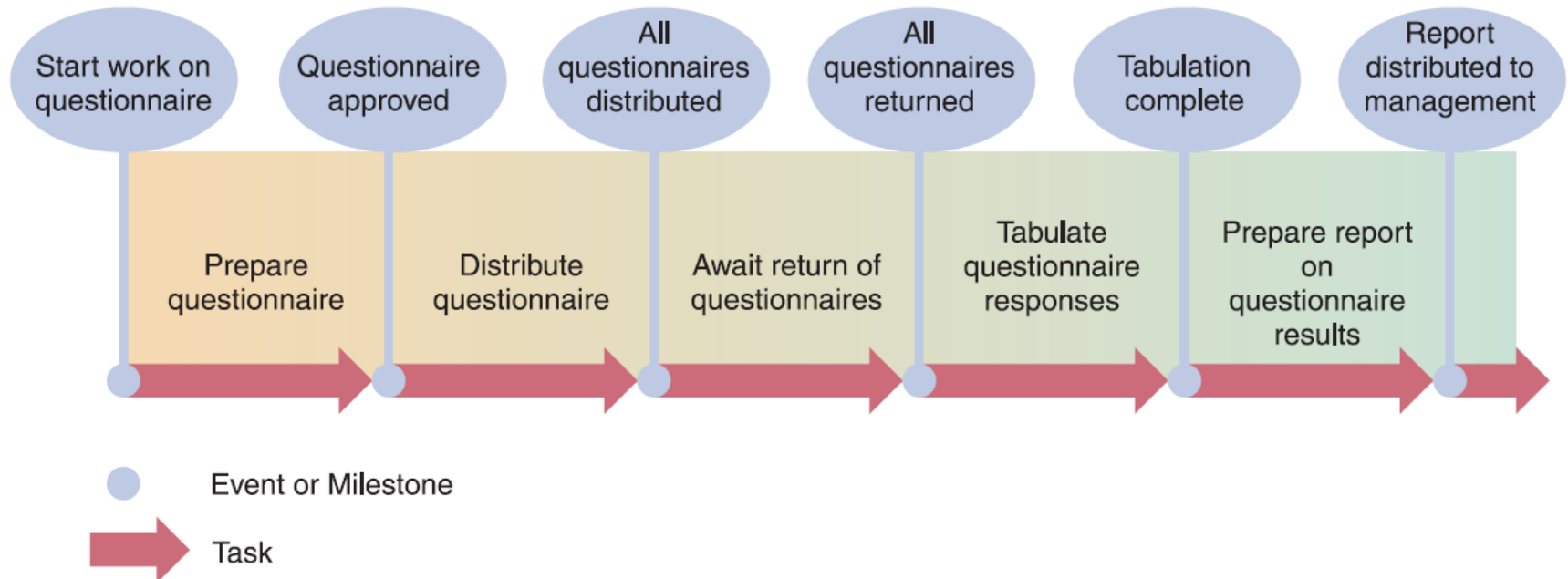
Example of Milestones

- Any Idea?

SMART Criteria

- Milestones should be
 - **S**pecific
 - **M**easurable
 - **A**ssignable
 - **R**ealistic
 - **T**ime-framed

Task and Milestone



Using a questionnaire requires a series of tasks and events to track the progress. The illustration shows the relationship between the tasks and the events, or milestones, that mark the beginning and end of each task.

Sequencing Activities

- Involves reviewing activities and determining dependencies
- A **dependency** or **relationship** is the sequencing of project activities or tasks
- You *must* determine dependencies in order to use critical path analysis

Three types of Dependencies

- **Mandatory dependencies:** inherent in the nature of the work being performed on a project, sometimes referred to as hard logic
- **Discretionary dependencies:** defined by the project team, sometimes referred to as soft logic and should be used with care since they may limit later scheduling options
- **External dependencies:** involve relationships between project and non-project activities

Network Diagrams

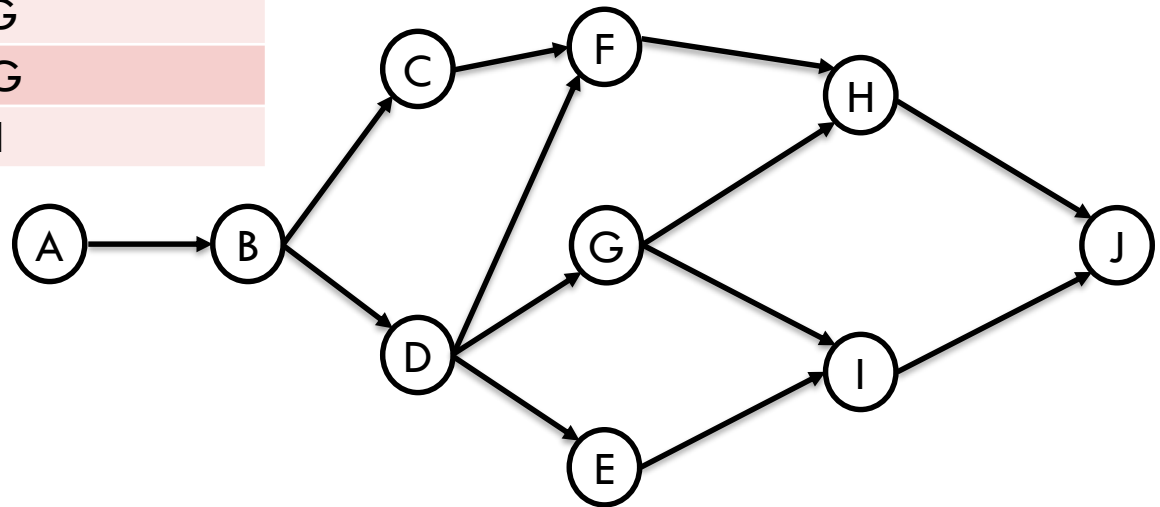
- Network diagrams are the preferred technique for showing activity sequencing
- A **network diagram** is a schematic display of the logical relationships among, or sequencing of, project activities
- Two main formats are the arrow and precedence diagramming methods

Network Diagram for a Project

- **Activity On the Node (AON)**
- **Activity-On-Arrow (AOA)**
- **Precedence Diagramming Method (PDM)**

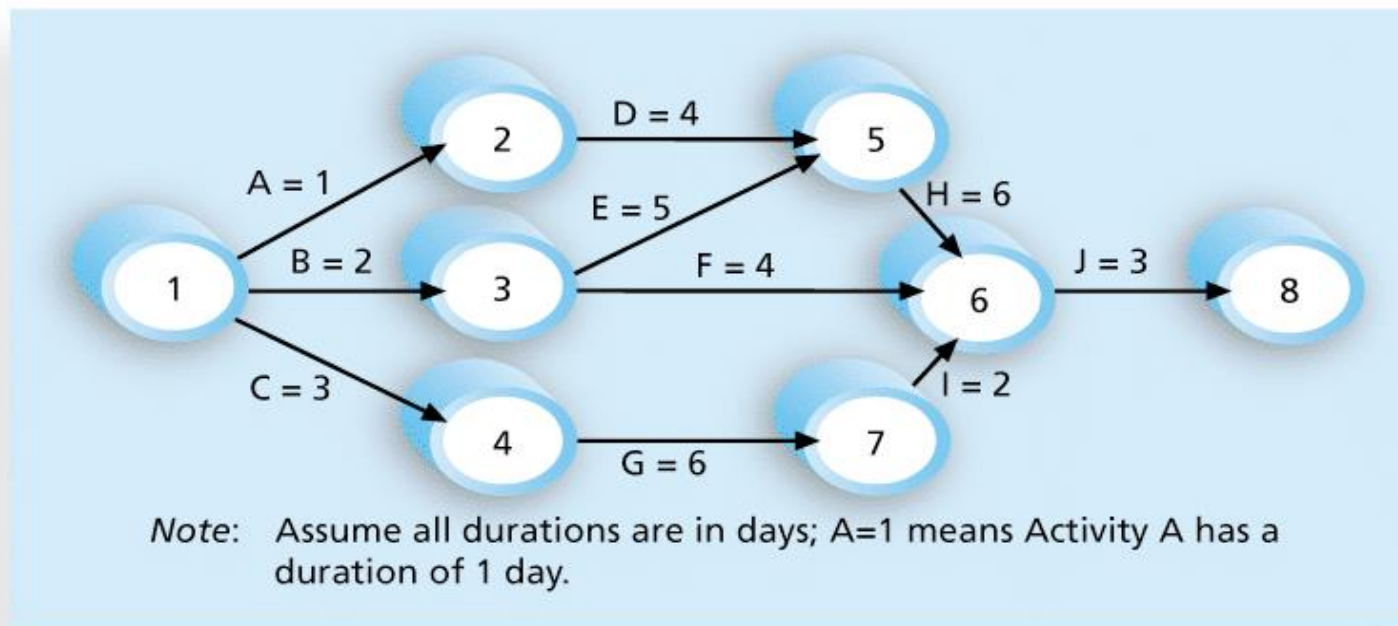
Activity On the Node (AON) Network Diagram

Activity	Estimated Duration	Predecessor
A	5	None
B	4	A
C	5	B
D	6	B
E	7	D
F	3	C,D
G	6	D
H	7	F,G
I	8	E,G
J	3	H,I



Arrow Diagramming Method (ADM)

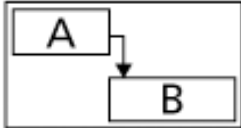

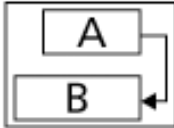
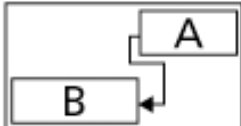
- Also called activity-on-arrow (AOA) network diagrams
- Activities are represented by arrows
- Nodes or circles are the starting and ending points of activities
- Can only show finish-to-start dependencies



Task Dependency Types

Task dependencies

The nature of the relationship between two linked tasks. You link tasks by defining a dependency between their finish and start dates. For example, the “Contact caterers” task must finish before the start of the “Determine menus” task. There are four kinds of task dependencies in Microsoft Project.

Task dependency	Example	Description
Finish-to-start (FS)		Task (B) cannot start until task (A) finishes.
Start-to-start (SS)		Task (B) cannot start until task (A) starts.
Finish-to-finish (FF)		Task (B) cannot finish until task (A) finishes.
Start-to-finish (SF)		Task (B) cannot finish until task (A) starts.

Estimating Activity Resources

- Before estimating activity durations, you must have a good idea of the quantity and type of resources that will be assigned to each activity;
- **Resources** are people, equipment, and materials
- Consider important issues in estimating resources
 - How difficult will it be to do specific activities on this project?
 - What is the organization's history in doing similar activities?
 - **Are the required resources available?**

Activity Duration Estimating

- **Duration** includes the actual amount of time worked on an activity *plus* elapsed time
- **Effort** is the number of workdays or work hours required to complete a task
- Effort does not normally equal duration

Factors Affecting Activity Duration

- Project size
 - Identify all project tasks and the time required for each
 - Consider time taken for events affecting productivity

- Human resources
 - Assemble and guide a development team that has the skill and experience to handle the project
 - Deal with factors that could affect the project's timeline

Factors Affecting Activity Duration

- Experience with similar projects
 - Develop time and cost estimates based on the resources used for similar, previously developed information systems
- Constraints
 - Define system requirements that can be achieved realistically within the required constraints
 - Calculate resources needed in the absence of constraints

Three-Point Estimates

- Instead of providing activity estimates as a discrete number, such as four weeks, it's often helpful to create a **three-point estimate**
 - optimistic, most likely, and pessimistic estimate
- Three-point estimates are needed for **PERT**

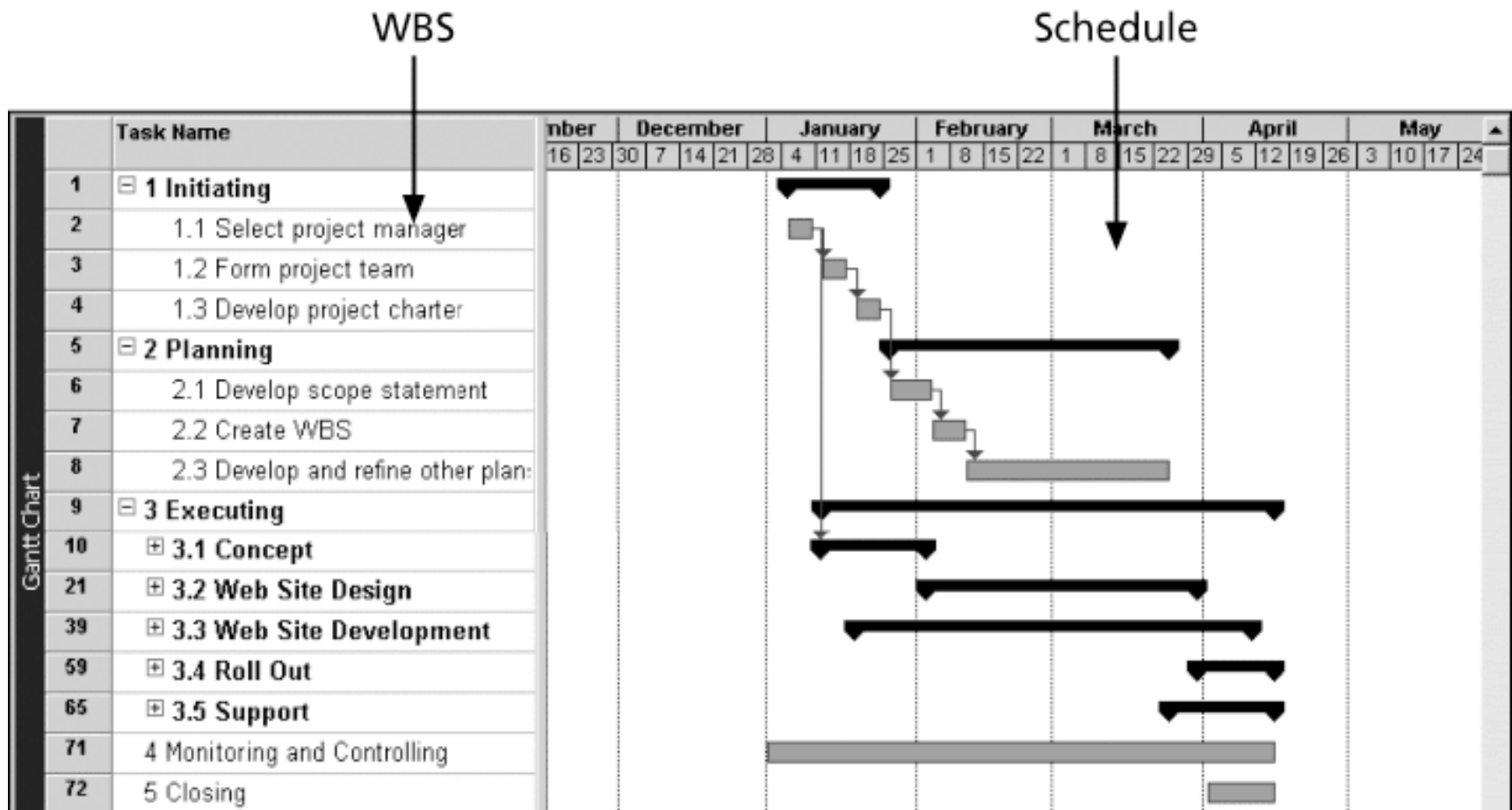
Developing the Schedule

- Ultimate goal is to create a realistic project schedule that provides a basis for monitoring project progress for the time dimension of the project
- Important tools and techniques include
 - **Gantt Chart,**
 - **Critical path Method (CPM),**
 - Critical chain scheduling,
 - **PERT analysis**

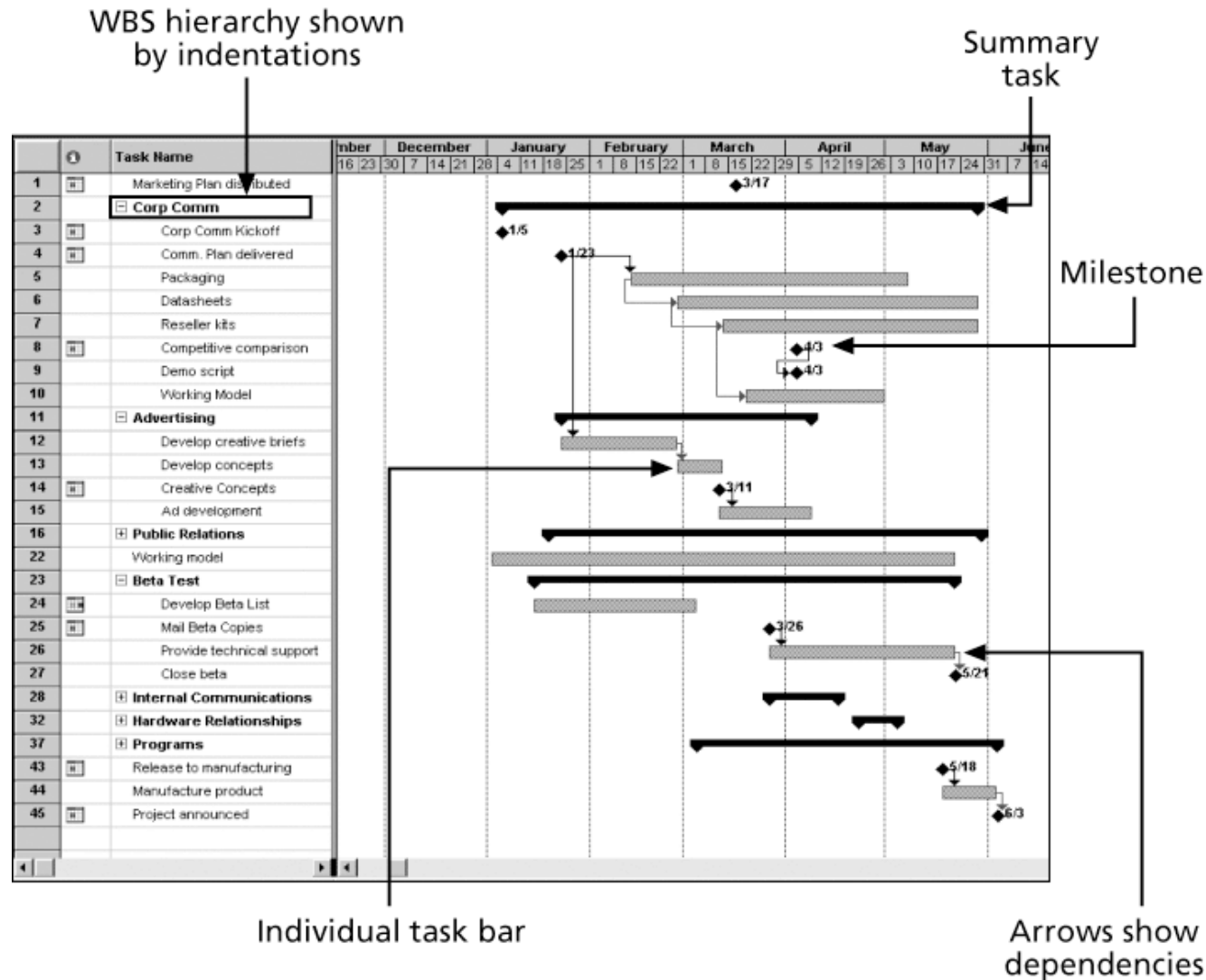
Gantt Chart

- **Gantt chart** provides a standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format
- Shows planned and actual progress on a project
- Simplifies complex projects using a **task group**
- Symbols include:
 - A black diamond: a milestones
 - Thick black bars: summary tasks
 - Lighter horizontal bars: durations of tasks
 - Arrows: dependencies between tasks

Intranet Gantt Chart Organized by Project Management Process Groups



Gantt Chart for Software Launch Project



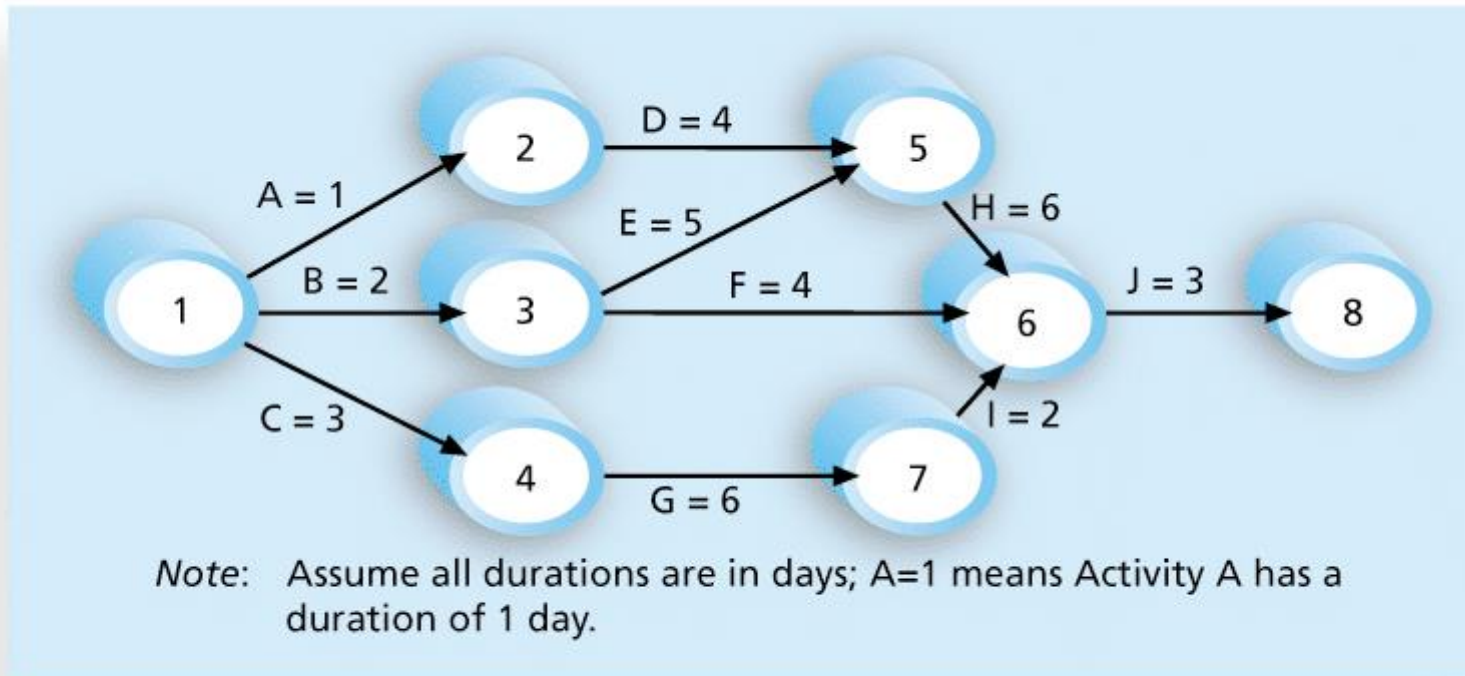
Issues With Schedule

- Problems with timetables and project milestones can indicate:
 - Failure to recognize task dependencies
 - Confusion between effort and progress
 - Poor monitoring and control methods
 - Personality conflicts among team members
 - Turnover of project personnel
 - Failure of an IT project

Critical Path Method (CPM)

- CPM is a network diagramming technique used to predict total project duration
- The **critical path is the longest path** through the network diagram and has the least amount of slack or float

Class Exercise 1: Calculate Critical Path



- Identify the number of paths available to complete the project?
- Which path is to be the Critical Path?
- What is the earliest time to complete the project?
- Using the critical path, how long will it take to complete the project?
- Any advantages of using CPM in project ?

PERT -- Example

- PERT weighted average =
$$\frac{\text{optimistic time} + 4 \times \text{most likely time} + \text{pessimistic time}}{6}$$
- Short form of the formula: Expected $E = (O + 4M + P)/6$
- Variance $V = [(P - O)/6]^2$

Range of project duration on a network path?

Upper end, Max duration = Expected path duration + variance

Lower end, Min duration = Expected path duration – variance

PERT Example 1

- Example:

PERT weighted average =

$$\frac{8 \text{ workdays} + 4 \times 10 \text{ workdays} + 24 \text{ workdays}}{6} = \mathbf{12 \text{ days}}$$

where optimistic time = 8 days

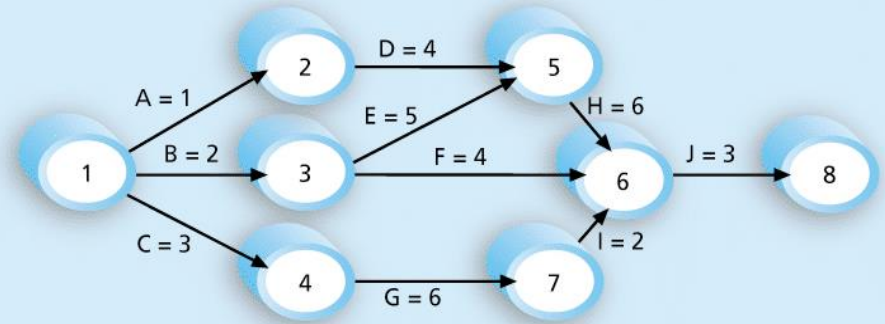
most likely time = **10 days**, and

pessimistic time = 24 days

Therefore, you'd use **12 days** on the network diagram instead of 10 when using PERT for the above example

Class Exercise 2: PERT

- Expected $E = (O + 4M + P) / 6$
- Variance $V = [(P - O) / 6]^2$

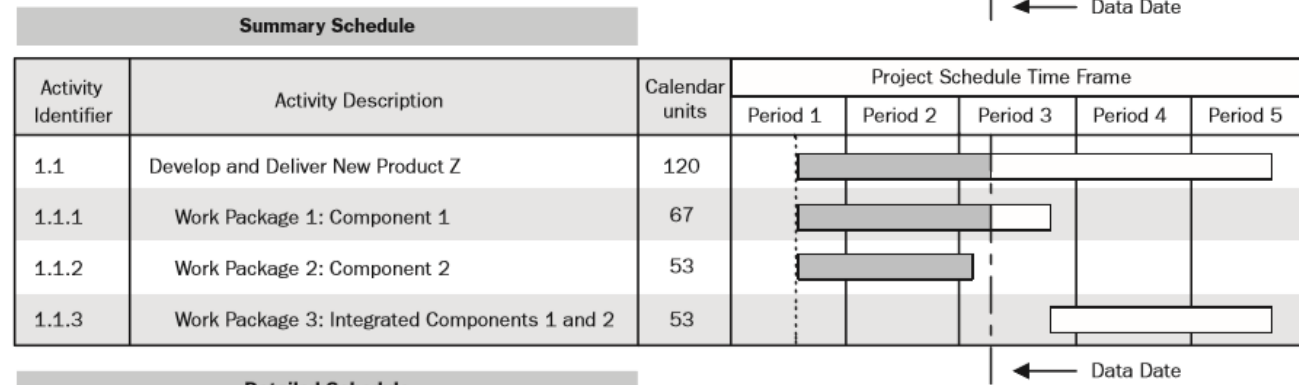


Note: Assume all durations are in days; A=1 means Activity A has a duration of 1 day.

Activity	Optimistic	Most likely	Pessimistic	Expected	Variance
A	.5	1	2.5		
B	1	2	4		
C	2	3	5		
D	2	4	8		
E	3	5	9		
F	3	4	8		
G	4	6	9		
H	5	6	10		
I	1	2	5		
J	2	3	7		

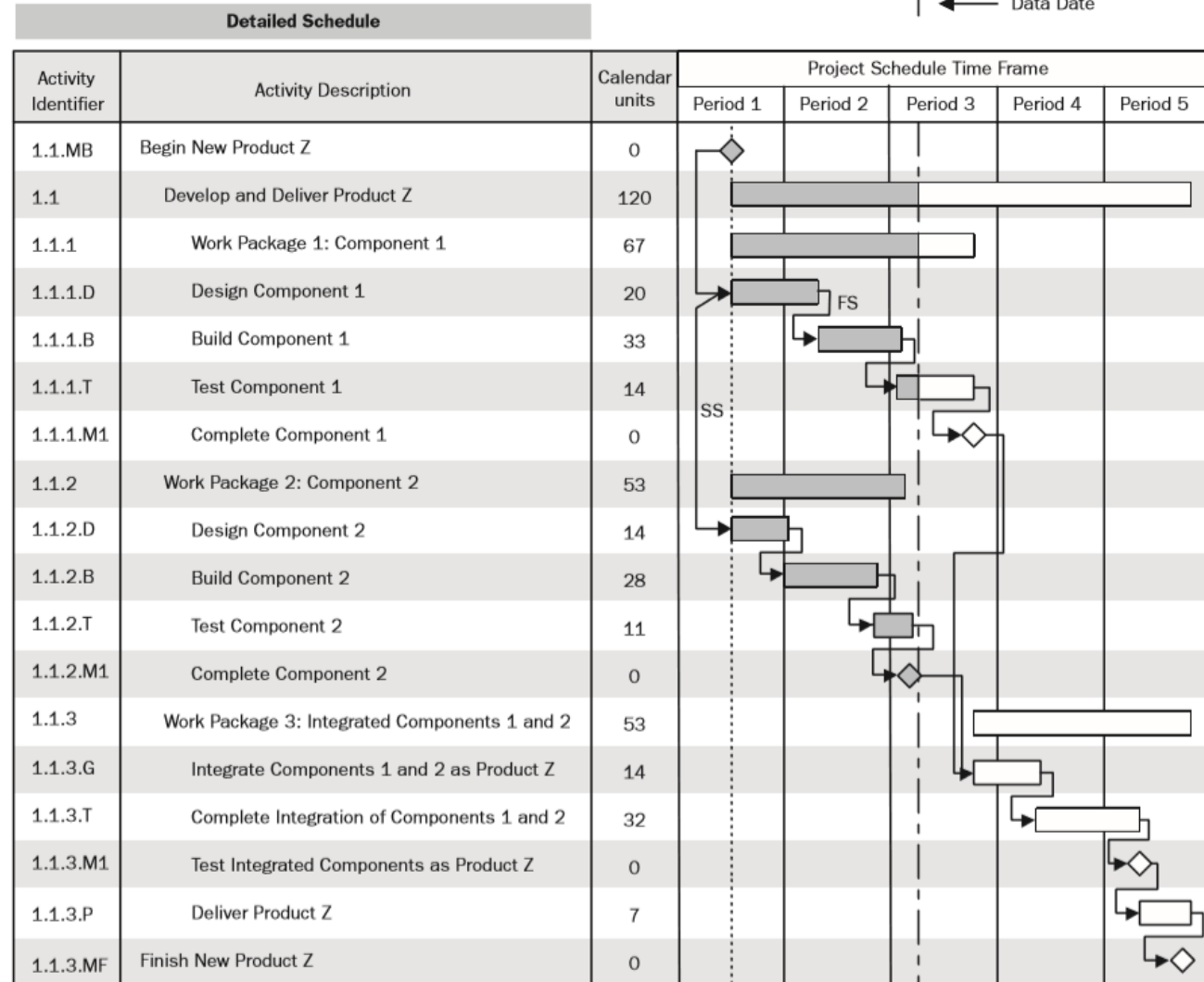
- Calculate expected project duration on critical path
- Calculate the range of project duration (longest and shortest) on critical path

Summary Schedule



&

Detailed Schedule



Source: A Guide to the Project Management Body of Knowledge, Fifth Edition (PMBOK® Guide) © 2013 Project Management Institute

Managing Cost in Systems Project

Cost/Benefit Analysis

- Cost modeling/Budget
- Benefit-cost ratio
- NPV
- Payback period

Managing Quality in Systems Project

Six Sigma

- 3.4/million

Six 9s of Quality

- 1/million

DMAIC

- **DMAIC** is a systematic, closed-loop process for continued improvement that is scientific and fact based

- DMAIC stands for:
 - **Define:** Define the problem/opportunity, process, and customer requirements
 - **Measure:** Define measures, then collect, compile, and display data
 - **Analyze:** Scrutinize process details to find improvement opportunities
 - **Improve:** Generate solutions and ideas for improving the problem
 - **Control:** Track and verify the stability of the improvements and the predictability of the solution

Managing Risk in Systems Project

Project Risk Management Processes

- **Planning risk management** : Deciding how to approach and plan the risk management activities for the project
- **Identifying risks**: Determining which risks are likely to affect a project and documenting the characteristics of each
- **Performing qualitative risk analysis**: Prioritizing risks based on their probability and impact of occurrence
- **Performing quantitative risk analysis**: Numerically estimating the effects of risks on project objectives
- **Planning risk responses**: Taking steps to enhance opportunities and reduce threats to meeting project objectives
- **Controlling risk**: Monitoring identified and residual risks, identifying new risks, carrying out risk response plans, and evaluating the effectiveness of risk strategies throughout the life of the project

Identifying risks

- Identifying risks is the process of understanding what potential events might hurt or enhance a particular project
- Another consideration is the likelihood of advanced discovery
- Risk identification tools and techniques include:
 - Brainstorming
 - The Delphi Technique
 - Interviewing
 - SWOT analysis

Risk Register

No.	RANK	RISK	DESCRIPTION	CATEGORY	ROOT CAUSE	TRIGGERS	POTENTIAL RISK RESPONSES	RISK OWNER	PROBABILITY	IMPACT	STATUS
R44	1										
R21	2										
R7	3										

Managing Team Conflict in Systems Projects

Managing Conflict

- Let's watch a video clip

https://www.youtube.com/watch?v=GnB3MpUfv_

Lecture Summary

- Project/Systems Project ?
- Agile Project Management
- Scope, Time, and Cost
- WBS, Gantt Chart, CPM, PERT
- Quality, Conflict
- Risk Register

Announcement (if any)

Q &A?

Thanks everyone !