SCSD2613
System Analysis and Design

UTM
UNIVERSITI TEKNOLOGI MALAYSIA

PART II
Project Planning Process

OBJECTIVES

- Understand how projects are initiated and selected.
- Define a business problem and determine the feasibility of a proposed project.
- Plan a project by identifying activities and scheduling them.
- Manage team members and analysis and design activities so the project objectives are met while the project remains on schedule.

PROJECT MANAGEMENT OVERVIEW

PROJECT INITIATION	•Typical IS Project Problem •Problem definition steps •Project selection
DETERMINING PROJECT FEASIBILITY	•Cost Benefit Analysis (CBA)
MANAGING TIMES AND ACTIVITIES	•Work Breakdown Structure (WBS)
PROJECT SCHEDULING	•Gantt chart •Pert Diagram
MANAGING THE PROJECT TEAM	•Project charter •Avoiding project failure

PROJECT MANAGEMENT OVERVIEW

PROJECT INITIATION

- Typical IS Project Problem
- Problem definition steps
- Project selection

HOW DOES A PROJECT BEGINS?

PROBLEMS
in the organization

- Problems that lend themselves to systems solutions

OPPORTUNITIES
for improvement

- Caused through upgrading, altering, or installing new systems

PROJECT INITIATION

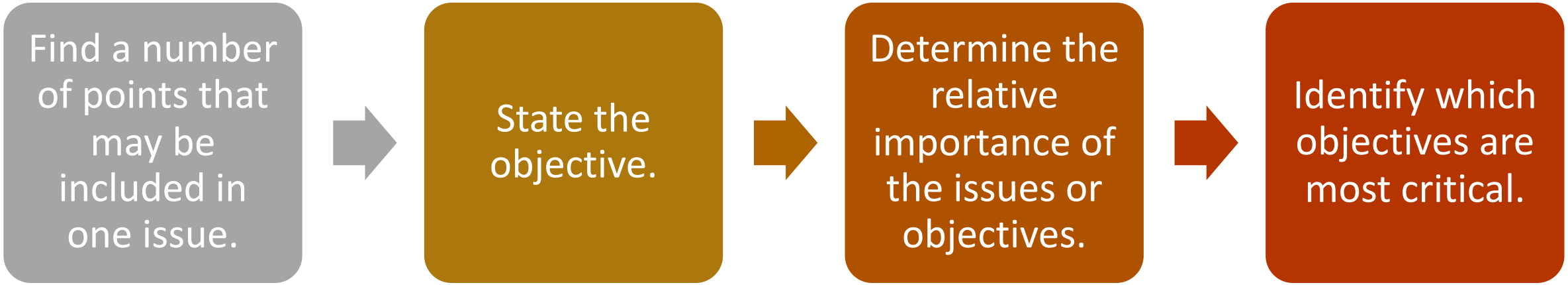
To Identify Problems	Look for These Specific Signs:
Check output against performance criteria.	• Too many errors • Work completed slowly • Work done incorrectly • Work done incompletely • Work not done at all
Observe behavior of employees.	• High absenteeism • High job dissatisfaction • High job turnover
Listen to external feedback from: Vendors. Customers. Suppliers.	• Complaints • Suggestions for improvement • Loss of sales • Lower sales

Figure 3.1 Checking output, observing employee behavior, and listening to feedback are all ways to help the analyst pinpoint systems problems and opportunities

TYPICAL INFORMATION SYSTEMS PROBLEM

Relevancy	to decision making.
Accuracy	comprising completeness, correctness and security
Timeless	to decision making needs.
Economy	resources or cost
Efficiency	expressed as amount produced per economic unit
Reliability	measuring the consistency
Usability	the human factors dimension

PROBLEM DEFINITION STEPS



PROBLEM DEFINITION - Content

PROBLEM STATEMENT

- A paragraph or two stating the problem or opportunity.

ISSUES (CURRENT SITUATION)

- Major independent pieces of the problem or opportunity.

OBJECTIVES (desired situation)

- Goals that match the issues point-by-point.

REQUIREMENTS

- The things that must be accomplished (with the possible solutions and the constraints)
- May include security, usability, government req. etc

CONSTRAINTS

- The limitation – budget, time etc.

SELECTION OF PROJECTS

- Backing from management.
- Appropriate timing of project commitment.
- Possibility of improving attainment of organizational goals.
- Practical in terms of resources for the system analyst and organization.
- Worthwhile project compared with other ways the organization could invest resources.

PROJECT MANAGEMENT OVERVIEW

DETERMINING PROJECT FEASIBILITY

- Cost Benefit Analysis (CBA)

DETERMINING FEASIBILITY

- Determine whether the selected projects are feasible.
- Determining resources
- a FEASIBILITY STUDY assesses the **OPERATIONAL**, **TECHNICAL**, and **ECONOMIC** merits of the proposed project.

DETERMINING FEASIBILITY

The Three Key Elements of Feasibility
Technical Feasibility Add on to present system Technology available to meet users' needs
Economic Feasibility Systems analysts' time Cost of systems study Cost of employees' time for study Estimated cost of hardware Cost of packaged software or software development
Operational Feasibility Whether the system will operate when installed Whether the system will be used

Figure 3.5 The three key elements of feasibility include technical, economic, and operational feasibility

DETERMINING FEASIBILITY

Operational feasibility

- determines if the human resources are available to operate the system once it has been installed.
- Users that do not want a new system may prevent it from becoming operationally feasible.

Technical feasibility

- assesses whether the **current technical resources** are sufficient for the new system.
- If they are not available, can they be upgraded to provide the level of technology necessary for the new system.

Economic feasibility

- determines whether the **time and money** are available to develop the system.
- Perform **cost-benefit analysis (CBA).**
- Includes the purchase of
- New equipment
- Hardware
- Software

IDENTIFYING BENEFITS AND COSTS

TANGIBLE BENEFITS

- advantages that are measurable and accrue to the organisation through the use of IS.
- Can be measured in terms of dollars, resources or time saved
- Increase sales, increase speed of processing

INTANGIBLE BENEFITS

- benefits that accrue to an organisation from the use of an IS are difficult to measure but are important nonetheless.
- Improving the decision-making process, maintaining a good business image, more competitive in customer service

TANGIBLE COSTS

- can accurately projected by the personnel, well established or can be discover quite easily
- Equipments, cost of resources, employee salaries etc

INTANGIBLE COSTS

- difficult to estimate and may not be known.
- Losing a competitive edge, losing the reputation, declining company image.

COST-BENEFIT ANALYSIS (CBA)

- The analysis to compare costs and benefits to see whether investing in the development of a new system will be beneficial.
  - Break-even analysis, payback, cash-flow analysis, **present value analysis**.
- Two main costs:
  - **Development costs** – one-time costs of installing new system and
  - **Production costs –** recur during operation of a system

COMPARING COST AND BENEFIT

- Well-known techniques: Break-even analysis, Cash-flow analysis, Payback, Present value analysis

- Guidelines for analysis:

Techniques	Use if/when
Break-even analysis	the project needs to be justified in terms of cost
Cash-flow analysis	the project is expensive relative to the size of the company
Payback	the improved tangible benefits form a convincing arguments for the proposed system
Present value analysis	The payback period is long

CBA: PRESENT VALUE ANAYSIS (PVA)

- Present value is calculated using the formula.

$$PV = Payment\ X\ (1/(1+C)^n)$$

C = discount rate or cost of money.
n = number of periods projected.

- A way to assess all the economic outlays and revenues of the IS over its economic life and to compare costs/benefits today with future costs/benefits.

e.g.:
Yearly payment value: RM28 840
Discount rate: 10%
Number of repayment year: 3 years

PV = Payment X $(1/(1+C)^n)$
= RM28 840 X $(1/(1+ 0.10)^{3)}$
= RM21 668

CBA: Present Value Analysis (PVA) sample

Estimated Cost	
Hardware	RM50 000
Software	RM 7 500
Consultant	RM 20 000
Training	RM 20 000
Supplies	RM 2 400 per year
IS Support	RM 18 000 per year
Maintenance	RM 2 500 per year

Estimated Benefits	
Inventory Savings	RM 1 500 per week

Assumptions	
Discount rate	**10%**
Sensitivity factor(cost)	1.1
Sensitivity factor(benefits)	0.9
Annual change in production costs	7%
Annual change in benefits	5%

CBA: Present Value Analysis (PVA) sample

Costs	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Development Costs						
· Hardware	55 000					
· Software	8 250					
· Consultant	22 000					
· Training	22 000					
Total	107 250					
Production Costs						
· Supplies		2 640	2 825	3 023	3 235	3 461
· IS Support		19 800	21 186	22 669	24 256	25 954
· Maintenance		2 750	2 943	3 149	3 369	3 605
Annual Prod. Costs		25 190	26 954	28 841	30 860	33 020
Present Value		22 900	22 276	21 669	21 078	20 503
Accumulated Costs		130 150	152 426	174 095	195 173	215 676

50 000*1.1

2 400*1.1

(2 640*0.07)+ 2 640

"22 900 = 25 190 X (1/(1+ 0.10)^{1})"

152 426 = 130 150 + 22 276

CBA: Present Value Analysis (PVA) sample

1500*52*0.9

(70 200*0.05)+ 70 200

Benefits	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Inventory saving		70 200	73 710	77 396	81 266	85 329
Present Value		63 818	60 917	58 149	55 506	52 983
Accumulated benefits		63 818	124 735	182 884	238 390	291 373
Gain or Loss		(66 332)	(27 691)	8789	43 217	75 697
Profitability Index	0.71					

"0.71 = 75 697 / 107 250" → $Profitability\ Index\ (PI) = \frac{Gain\ or\ Loss}{Development\ cost}$

Profitability index = 0.71, showing that it **is not good investment** because of its index **is less than 1.**

LET'S TRY

Checkpoint 1: PVA Question (Midterm Test 2016/2017)

GeniusAulad leading preschool was established with the dream of bringing quality of preschools to greater high based on Islamic principles, English emphasis, and cheerful well-designed facilities. The company grows to over 53 centers all over the country. Recently, the top management has decided to consider an information system to help their growing business. You have been hired as the system analyst to handle the project. Before continue with the development of the project, you need to assess the economic feasibility from the budget that the company plans to invest. Table 1 shows the information given by the company.

Table 1: Estimated cost and expected benefits for SkorBistari

Estimated Costs:		Expected Benefits:	
Hardware	RM 30,000	Savings	RM 5,000 per month
Software	RM 30,000	Increase sales	RM 25,000
Advertisement	RM 5,000		
Salary	RM 40,000		

Assumptions:	
Discount rate	10 %
Sensitivity factor (cost)	0.5
Sensitivity factor (benefit)	0.7
Annual increment (costs)	5%
Annual increment (benefit)	10%

(a) Calculate the cost-benefit estimation n using the Present Value (PV) analysis for 3 years to assess the economic feasibility for the GeniusAulad project proposal.
(b) What is the PI value for this PV analysis?
(c) What is your recommendation based on the PI value? Justify your answer.

PROJECT MANAGEMENT OVERVIEW

MANAGING TIMES AND ACTIVITIES

- Work Breakdown Structure (WBS)

PROJECT PLANNING AND CONTROL

- Planning includes:
  - Selecting a systems analysis team, assign members.
  - Estimating time required to complete each task.
  - Scheduling the project.

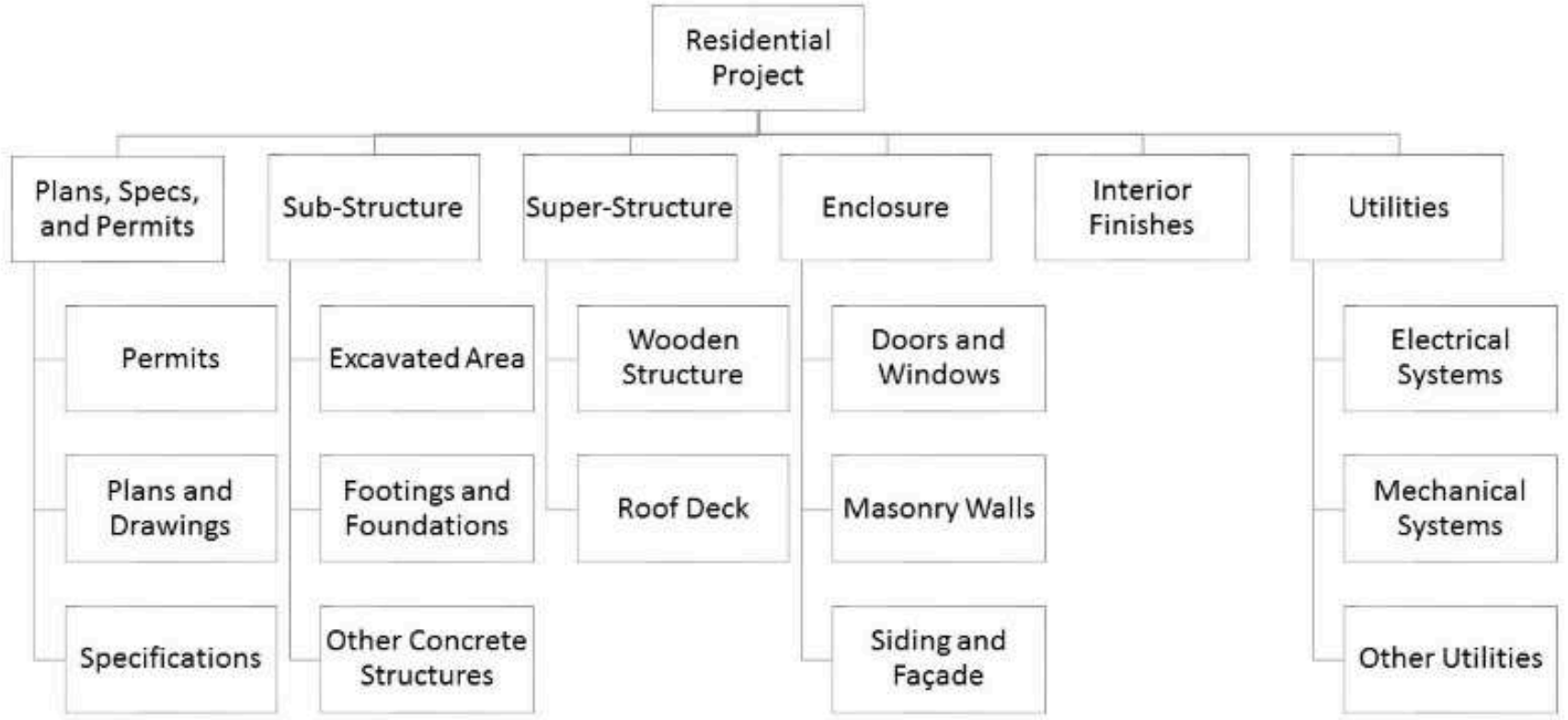
- Control means using feedback to monitor project, including:
  - Comparing the plan for the project with its actual evolution.
  - Taking appropriate action to expedite or reschedule activities.

MANAGING TIME AND ACTIVITIES

- For completing projects on time, within budget and including the features promised, a project needs to be broken down into smaller tasks or activities – work breakdown structure (WBS)
- WBS can be **product-oriented** or **process-oriented**
- Time is estimated for each task or activity.

MANAGING TIME AND ACTIVITIES

PRODUCT-ORIENTED WBS



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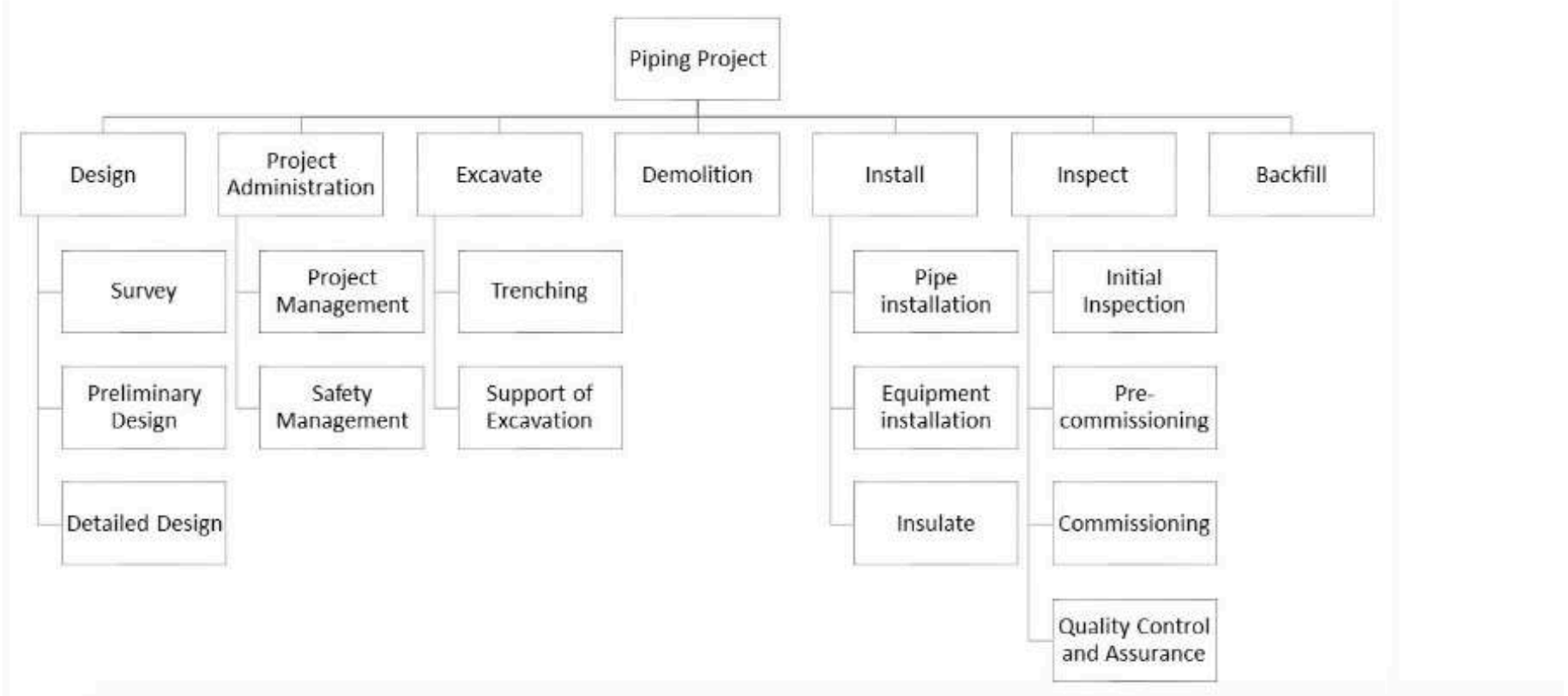
MANAGING TIME AND ACTIVITIES

PROCESS-ORIENTED WBS



https://www.adroitprojectconsultants.com/tag/process-oriented-wbs/

MANAGING TIME AND ACTIVITIES

Phase	Activity
Analysis	Data gathering Data flow and decision analysis Proposal preparation
Design	Data entry design Input design Output design Data organization
Implementation	Implementation Evaluation

Figure 3.16 Beginning to plan a project by breaking it into major activities

**Do Phase 1 (Planning) first before analysis phase*

MANAGING TIME AND ACTIVITIES

Activity	Detailed Activity	Weeks Required
Data gathering	Conduct interviews	3
	Administer questionnaires	4
	Read company reports	4
	Introduce prototype	5
	Observe reactions to prototype	3
Data flow and decision analysis	Analyze data flow	8
Proposal preparation	Perform cost/benefit analysis	3
	Prepare proposal	2
	Present proposal	2

Figure 3.17 Refining the planning and scheduling of analysis activities by adding detailed tasks and establishing the time required to complete the tasks

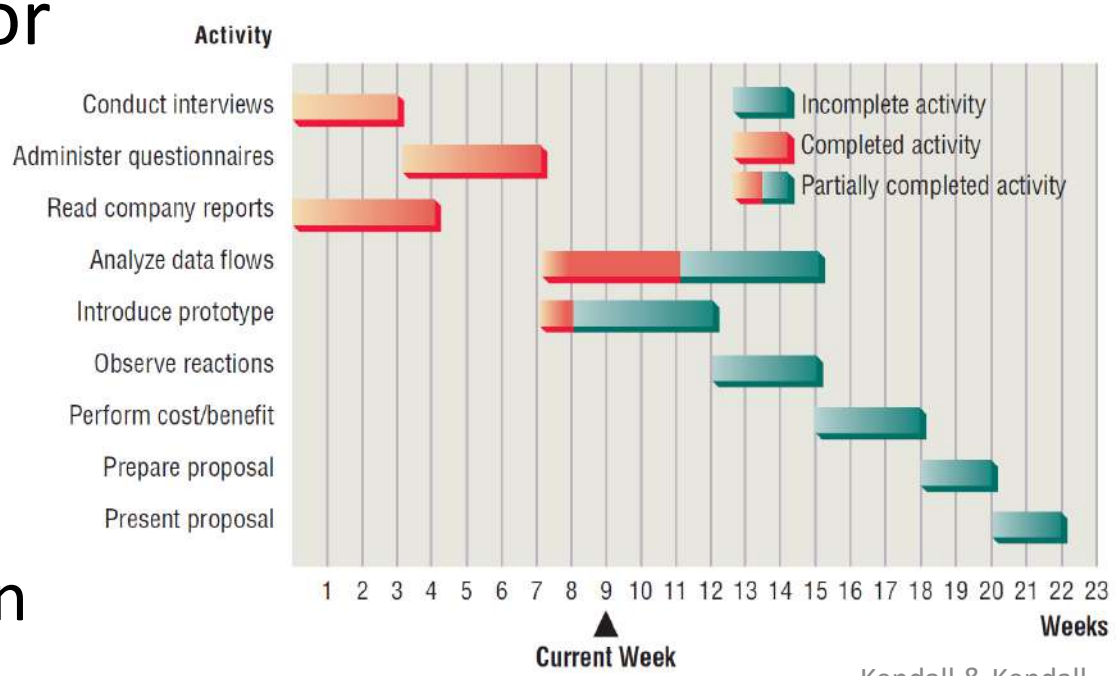
PROJECT MANAGEMENT OVERVIEW

PROJECT SCHEDULING

- Gantt chart
- Pert Diagram

PROJECT SCHEDULING TOOLS – GANTT CHART

- Chart in which bars represent tasks or activities
- Advantages:
  - Simple.
  - Worthwhile communication with end user.
  - Representing activities/tasks are drawn to scale.

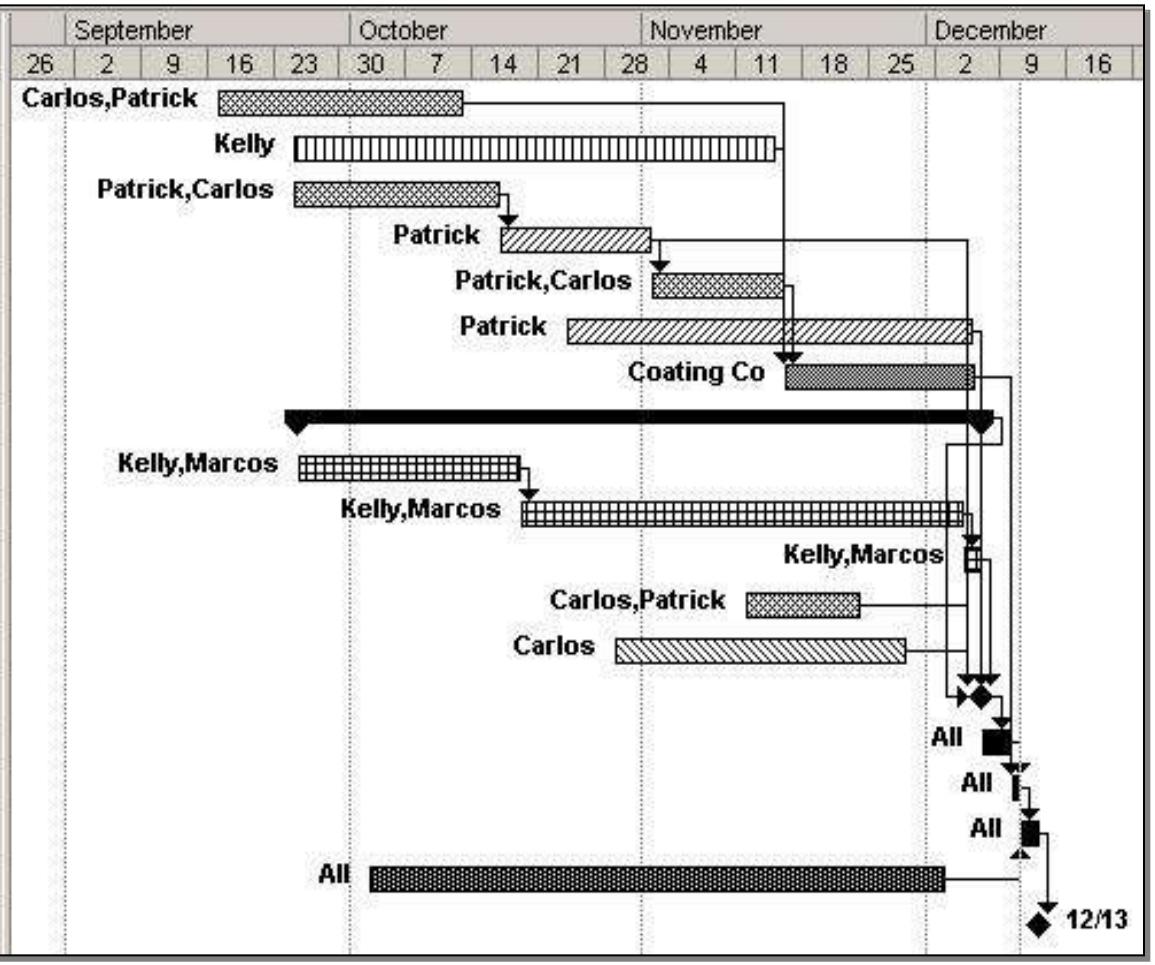


Kendall & Kendall

Figure 3.18 Using a two-dimensional Gantt chart for planning activities that can be accomplished in parallel

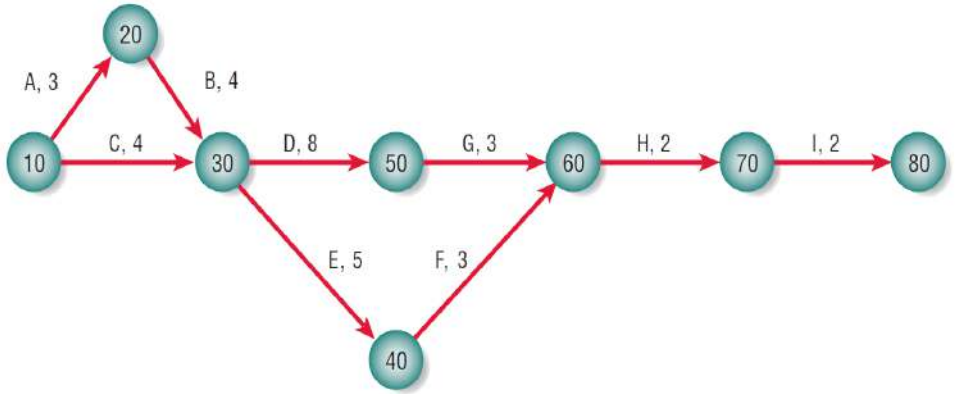
GANTT CHART EXAMPLE

Task Name	Duration
Research and choose coatings	2.86 wks
Get canoe balls ready	5.29 wks
Design washers	2.29 wks
Detailed washer repeatability analysis	1.71 wks
Make washers	1.43 wks
Make washer and canoe grooves	33 days
Have parts coated (max)	2.29 wks
Test rig development	**54.5 days**
Design	2.5 wks
Build	5 wks
Troubleshoot	0.29 wks
Research and chose lubricants	1.43 wks
Design Test and Test Automation	3.29 wks
Start testing	0 days
Test	3 days
Analyze data	1 day
Finish report and presentation	2 days
Write up analysis and results	6.43 wks
End of term	0 days



PROJECT SCHEDULING TOOLS – PERT DIAGRAM

- Also known as **NETWORK DIAGRAM**
- Useful when activities can be done in parallel rather than sequence.
- Represented by a network of nodes and arrows
- Nodes
  - called event, identified by numbers, letters etc
  - To recognize that an activity is completed
  - Indicate which activities need to be completed before new activities maybe undertaken (*precedence*)



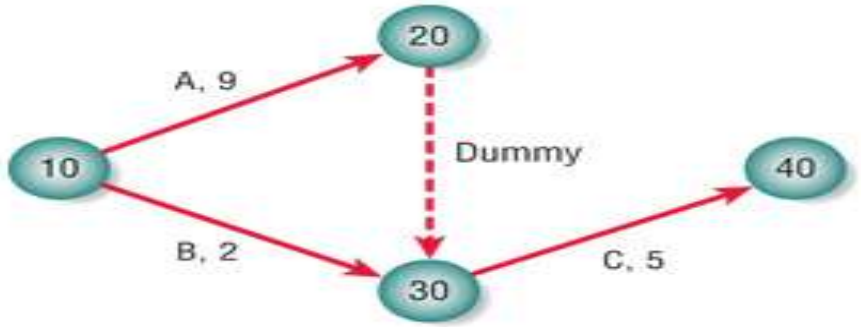
A,3 - means Activity A has a duration of 3 days/weeks/months

PERT DIAGRAM

- Advantages:
  - Easy identification of the order of precedence.
  - Easy identification of the critical path and thus critical activities.
  - Easy determination of slack time.
- Occasionally, PERT Diagram need pseudo-activities, referred to as dummy activities
- It is used to preserve the logic or clarify the diagram.

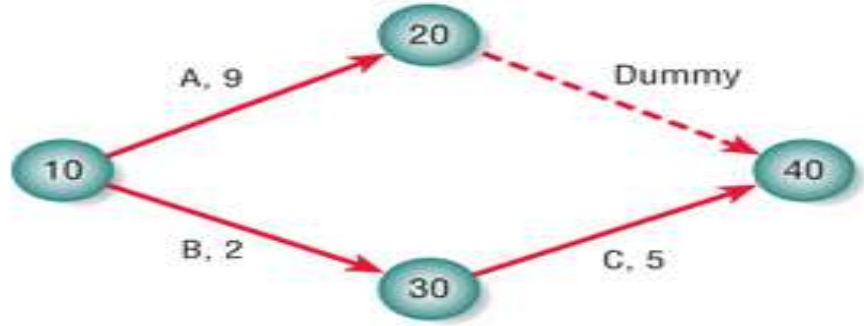
PERT DIAGRAM – Dummy line

Dummy line is used to show logical sequence of the activity.
Example:



Project 1

Project 1 – **C** can only be started if both A & B are finished



Project 2

Project 2 – **C** only requires B's completion & could be under way while A is still taking plac

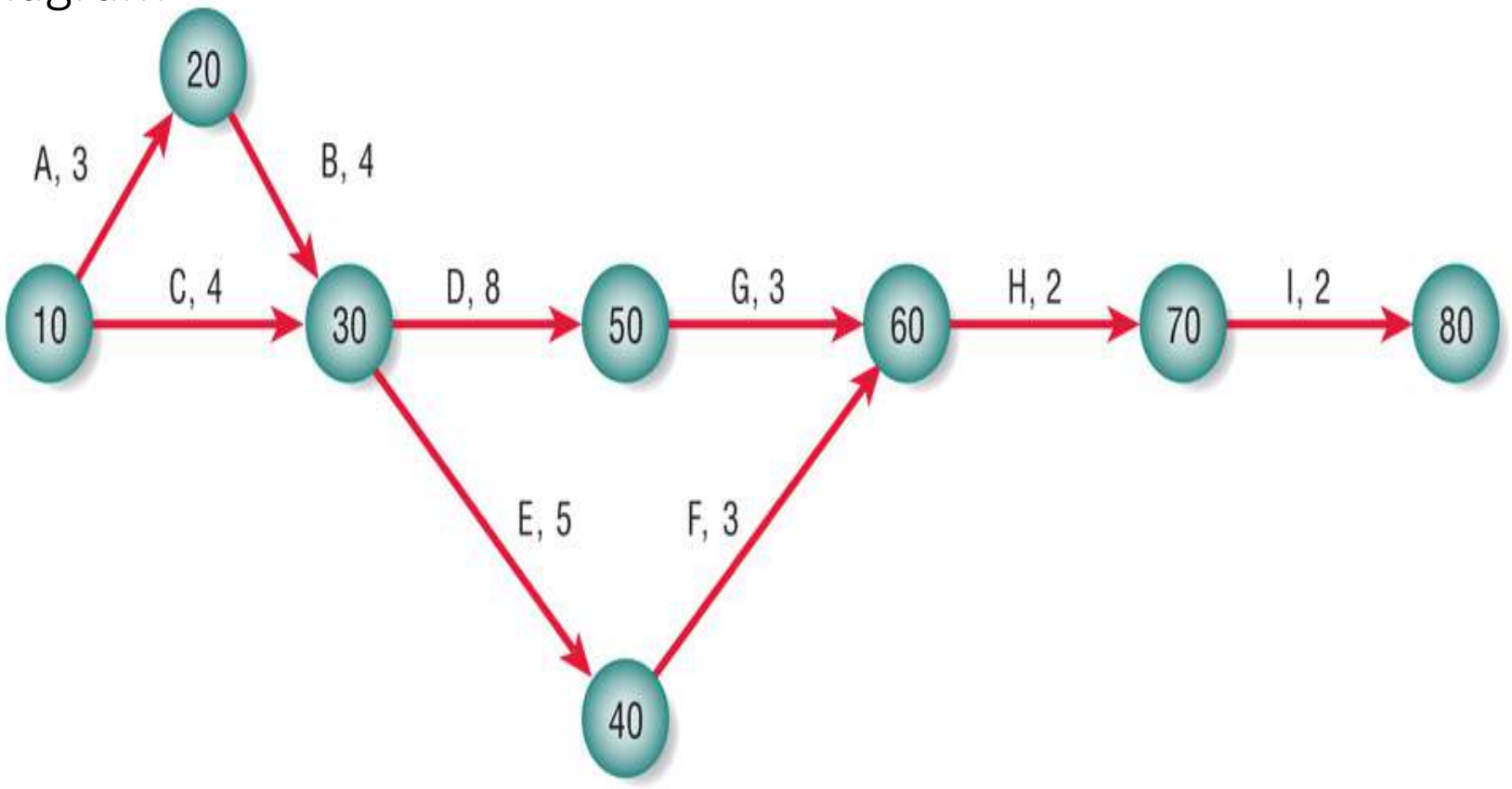
PERT DIAGRAM – Example

1. Listing activity to be used in pert diagram before drawing it

Activity		Predecessor	Duration
A	Conduct interviews	None	3
B	Administer questionnaires	A	4
C	Read company reports	None	4
D	Analyze data flow	B, C	8
E	Introduce prototype	B, C	5
F	Observe reactions to prototype	E	3
G	Perform cost/benefit analysis	D	3
H	Prepare proposal	F, G	2
I	Present proposal	H	2

PERT DIAGRAM – Example

2. Draw the diagram



PROJECT SCHEDULING: CRITICAL PATH METHOD (CPM)

- CPM is a project network analysis 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.
- A critical path for a project is the series of activities that determines the *earliest time* by which the project can be completed.

FINDING THE CRITICAL PATH

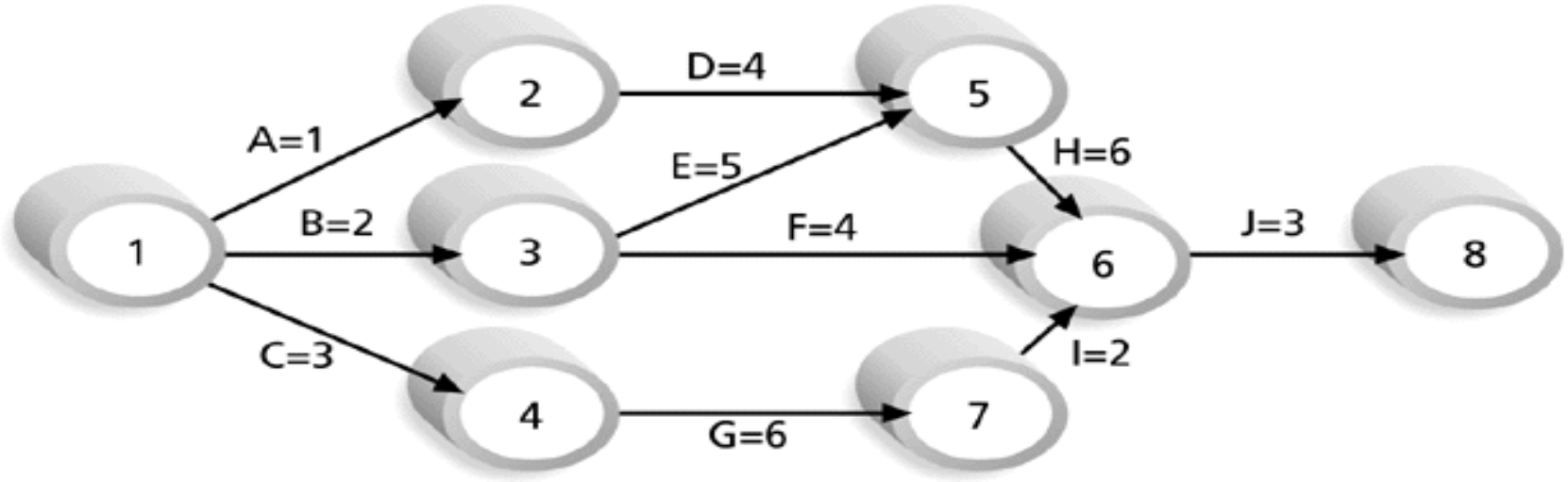
1. First develop a good project PERT diagram.
2. Add the durations for all activities on each path through the project network diagram.
3. The longest path is the critical path.

Note: *If one or more activities on the critical path takes longer than planned, the whole project schedule will slip unless corrective action is taken.*

- *There can be more than one critical path if the lengths of two or more paths are the same.*
- *The critical path can change as the project progresses.*

CRITICAL PATH METHOD (CPM)

Determining the Critical Path for Project X:

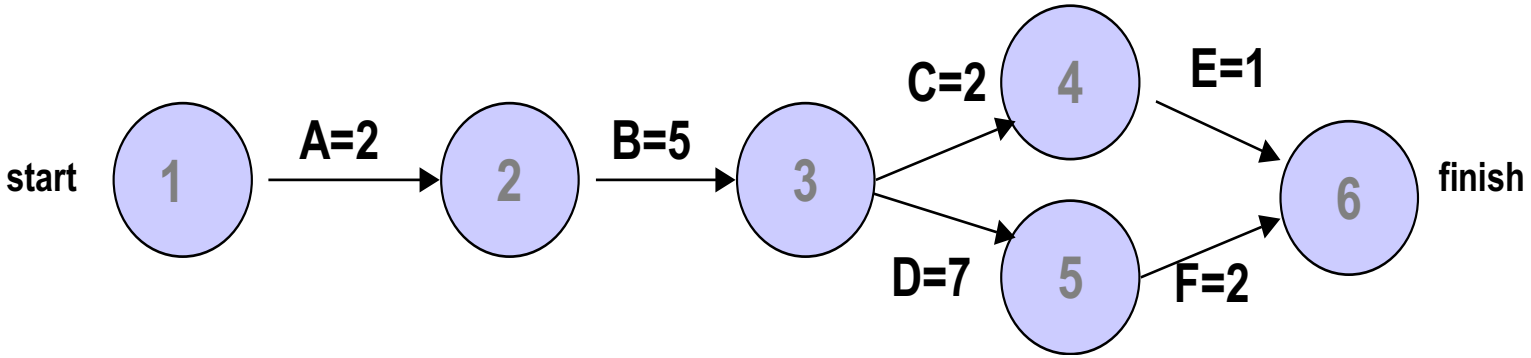


Note: Assume all durations are in days.

Path 1:	A-D-H-J	Length = 1+4+6+3 = 14 days
Path 2:	**B-E-H-J**	**Length = 2+5+6+3 = 16 days**
Path 3:	B-F-J	Length = 2+4+3 = 9 days
Path 4:	C-G-I-J	Length = 3+6+2+3 = 14 days

Since the critical path is the longest path through the network diagram, Path 2, B-E-H-J, is the critical path for Project X.

CPM Example



Consider the following project network diagram. Assume all times are in days:

a) How many paths are on this network diagram?

b) How long is each path?

c) Which is the critical path?

d) What is the shortest amount of time needed to complete this project?

LET'S TRY

Checkpoint 2: Pert Chart & CPM (Midterm Test 2016/2017)

A project has been defined to contain the following list of activities along with their required times of completion.

Activity No	Immediate Activity	Time (weeks)	Predecessors
1	Collect requirements	3	
2	Analyze processes	2	1
3	Analyze data	2	2
4	Design Process	6	2
5	Design data	3	3
6	Design Screens	2	3, 4
7	Design reports	4	4,5
8	Program	5	6, 7
9	Test and document	7	7
10	Install	2	8, 9

a) Draw a network diagram for the activities (4 Marks)

b) Calculate the earliest expected completion time (3 Marks)

c) Show the critical path (3 Marks)

d) Construct a Gantt chart for the project defined above. (5 Marks)

GANTT CHART vs PERT DIAGRAM

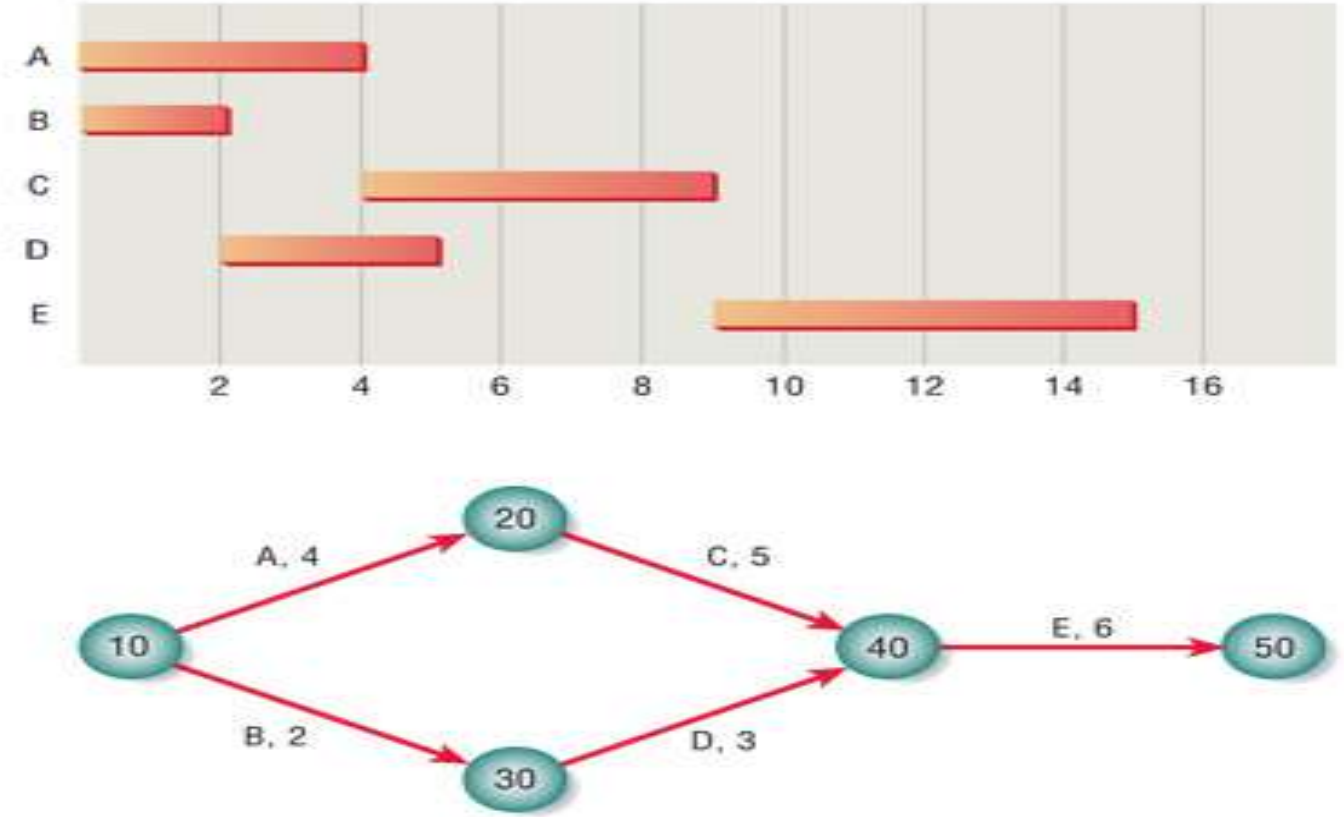
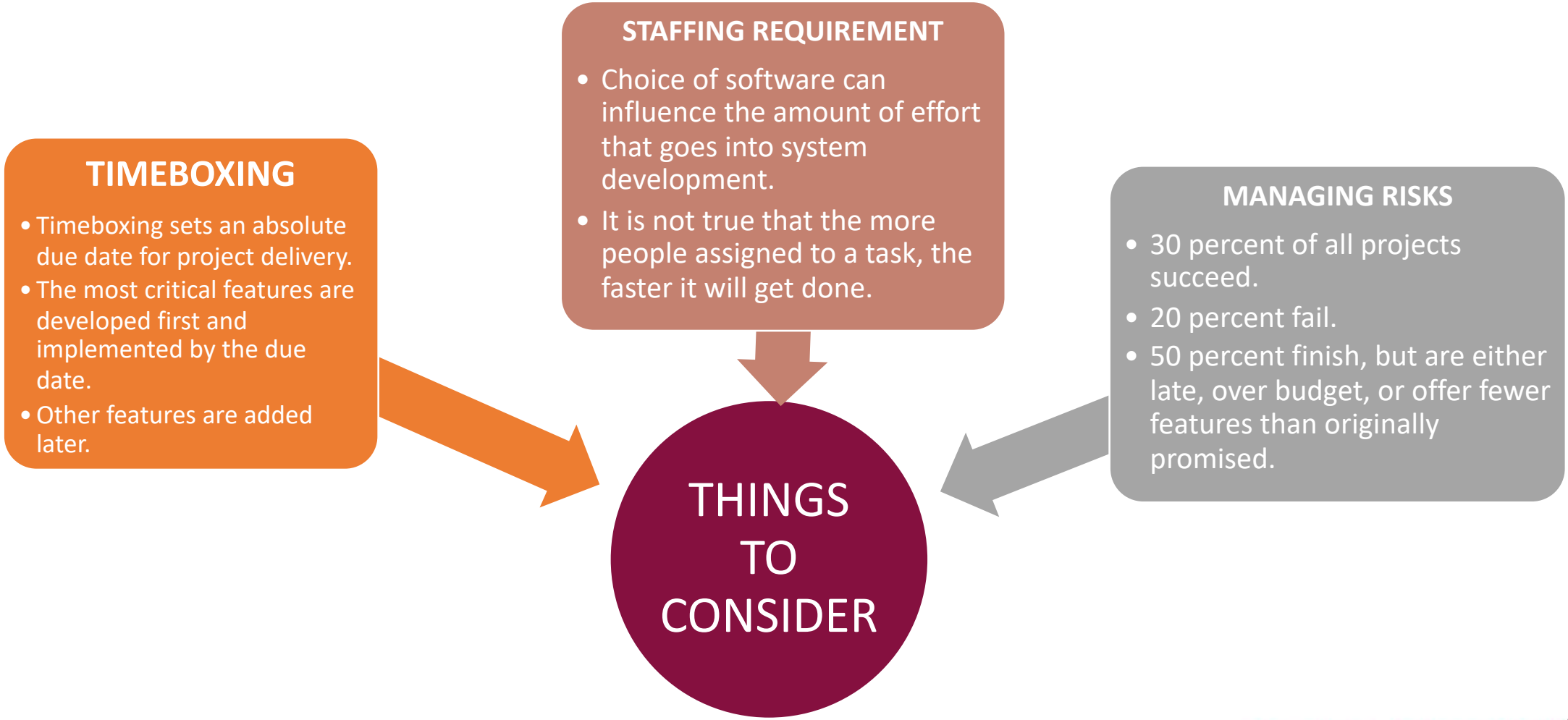


Figure 3.19: A Gantt Chart compared with PERT Diagram for scheduling activities

CONTROLLING CHANGES TO THE PROJECT SCHEDULE

- Perform reality checks on schedules.
- Allow for contingencies.
- Don’t plan for everyone to work at 100% capacity all the time.
- Hold progress meetings with stakeholders and be clear and honest in communicating schedule issues.

CONTROLLING CHANGES TO THE PROJECT SCHEDULE



PROJECT MANAGEMENT OVERVIEW

MANAGING THE PROJECT TEAM

- Project charter
- Avoiding project failure

MANAGING THE PROJECT TEAM

Assembling a team.

- Shared value of team work
- Good work ethic
- Honesty
- Competency
- Readiness to take on leadership based on expertise
- Motivation
- Enthusiasm for the project
- Trust of teammates

Team communication strategies.

- Teams often have two leaders – (1) one who leads members to accomplish tasks AND (2) one that concerned with social relationships.
- The systems analyst must manage the team members, their activities, and their time and resources.

TEAM MANAGEMENT

Project productivity goals.

- Goal-setting helps to motivate team members
- Successful projects require that reasonable productivity goals for tangible outputs and process activities be set

Team member motivation.

PROJECT CHARTER

- Describes in a written document what the expected results of the systems project are and the time frame for delivery.
- Written narrative that clarifies several questions such as:
  1. What does the user expect of the project?
  2. What is the scope?
  3. What analysis methods will be used?
  4. Who are the key participants?
  5. What are the project deliverable?

AVOIDING PROJECT FAILURES

- Project failures may be prevented by:
  - Training.
  - Experience.
  - Learning why other projects have failed.

SUMMARY

1 PROJECT INITIATION

- Problems or opportunities?

2 DETERMINING PROJECT FEASIBILITY

- Operational, Technical, Economic (CBA)

3 MANAGING TIMES AND ACTIVITIES

- WBS

4 PROJECT SCHEDULING

- Gantt Chart, Pert Diagram, CPM

5 MANAGING THE PROJECT TEAM

REFERENCES

Kendall, K.E. & Kendall, J.E., 2014. *System Analysis and Design*. 9th Ed. Essex:Pearson.

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Thank You

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