ADM 4103:Project management

1.1 PROJECT MANAGEMENT INTRODUCTION AND OVERVIEW

Getting ready for a good start

Prof. Lavagnon Ika@Telfer2018

Introduction

"We are proud of what we achieved, but we know that he who thinks he is someone has yet to become someone "

(Bernd Pischetsrieder, Pdt. Steering Committee, BMW S.A.)

The Rise of Projects in the Organization

- Shortening the product design cycle
  - Ex 1: K model v. Chrysler Neon

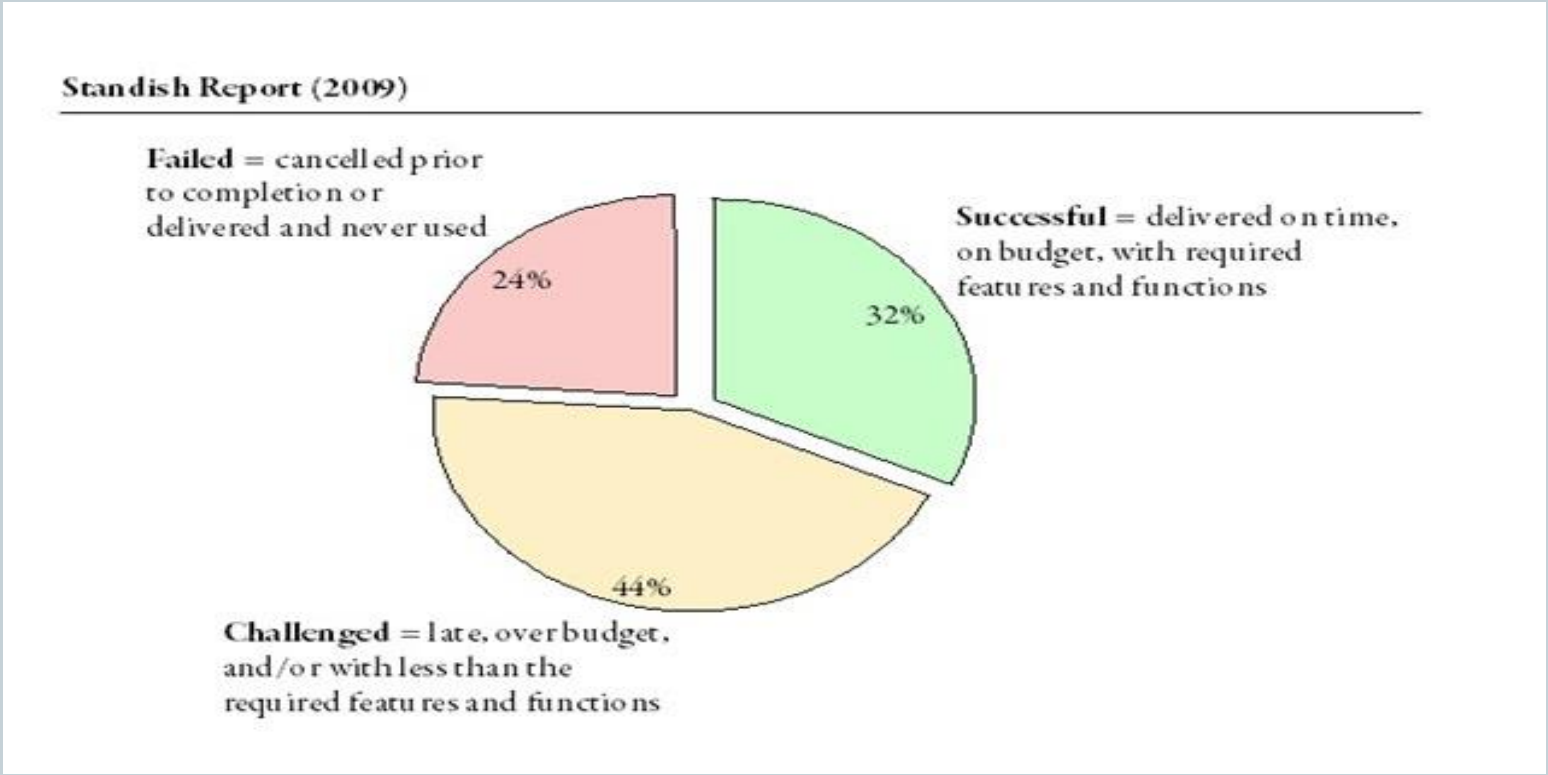
Model	Year	Design Cycle	Quantity dof resources
K	End 70s-Starting 80s	4,5 years	3 000 pers.
Neon	Later	2,5 years	700 pers

Source: Joffre et al. (2006)

  - Ex 2: Zara

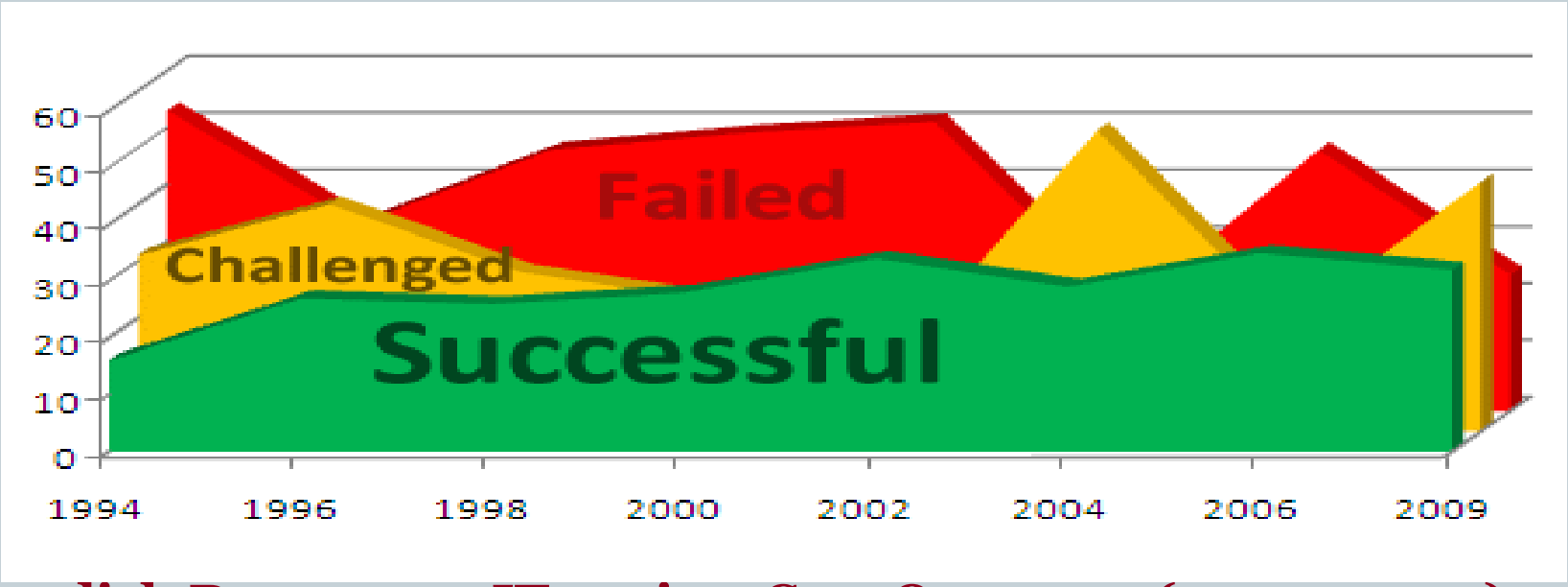
The track record of projects: Is it great?

Standish Report (2009)



Measuring project success over the years

Standish Reports on IT project success (1994 - 2009)



Standish Reports on IT project Cost Overruns (2004 - 2012)

Year	2004	2006	2008	2010	2012
Δ$	56%	47%	54%	46%	59%

Are we getting better over the years?

MODERN RESOLUTION FOR ALL PROJECTS

	2011	2012	2013	2014	2015
SUCCESSFUL	29%	27%	31%	28%	29%
CHALLENGED	49%	56%	50%	55%	52%
FAILED	22%	17%	19%	17%	19%

The Modern Resolution (OnTime, OnBudget, with a satisfactory result) of all software projects from FY2011-2015 within the new CHAOS database. Please note that for the rest of this report CHAOS Resolution will refer to the Modern Resolution definition not the Traditional Resolution definition.

Cost overruns in Canada and elsewhere in the world

In Canada

- Mtl Olympic Stadium (budget 134; total cost 264 millions)
- Rogers Center (125 M; 580M)
- Canadian Firearms Program (119 M; 1 billion)
- C-Series ($ Δ:2 billion)

Elsewhere in the world

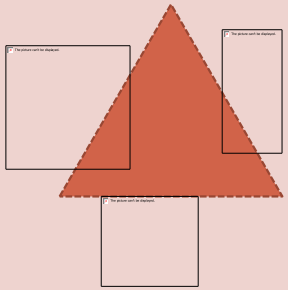
- Denver Int'l Airport (budget: 4,5 billion; $ Δ: 200%)
- Boston Big Dig (2,6 billion; 14,6)
- San Francisco-Oakland Bay Bridge (1,3 billion; 6,4 billion)
- Pentagon Spy Satellite $Δ: 4 billion
- LA and Houston Congress Centers; Miami and Mexico City Subways

Measuring project success (Ika, 2009)

- **PM success**
  - Cost, time, quality (iron triangle)
- **Deliverable success**
  - Client strategic Objectives and business success;
  - End-user's satisfaction;
  - Benefits to stakeholders including project personne
  - Symbolic and rhetorical evaluations of success

P!
project impact

Measuring success across time

	Period 1 1960s-1980s	Period 1980s-2000s	Period 3 21st century
Success crietria	"Iron triangle" (time, cost, quality) 	Iron triangle Client satisfaction Benefits to organization End users's satisfaction Benefits to stakeholders Benefits to project personnel	**Iron triangle** **Strategic objective of client orgnaizations and business success** **Benefits to organization** **End users's satisfaction** **Benefits to stakeholders** **Benefits to project personnel and symbolic and rhetoric evaluations of success and failure**
Success Factors	Anecdotic lists	Empirical lists	**More inclusive CSF frameworks and symbolic and rhetoric success factors**
Emphasis	**Project management success**	**Project/product success**	**Project/product, portfolio, and program success and narratives of success and failure**

Source: Ika (2009)

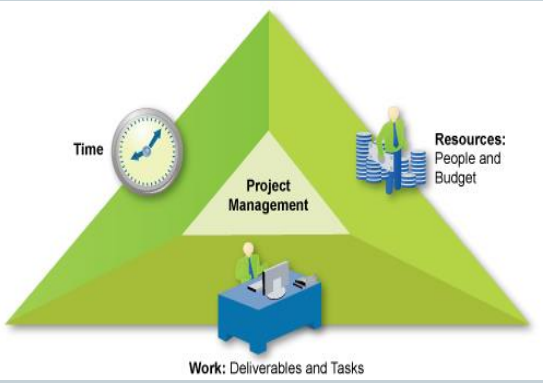
Project performance with time: It is not all doom or gloom! (See Ika, 2018)

PM failure but deliverable success

- Sydney Opera (14 times budget, 11 years late)
- Ford Taurus: 6 months late
- A 380; Eiffel Tour
- Space Station Δ $: 5 billion
- London Olympics: (budget: 2,4 billions £; Total cost, 11 to 24)
- *Etc…*

PM success but deliverable failure

- 2nd generation Ford Taurus
- The 5-billionMotorola Iridium
- LA Subway System
- Etc…



Project performance with time: It is not all doom or gloom!

All-around success

- The NASA Appolo project (1966-1972): on time!
- Golden Gate Bridge
- Etc…

Outright failure

- Concorde and other White Elephants (e.g. Ciudad Real Airport)
- Canadian Firearm Program
- Etc…

Success or failure ?

Success or failure?

Success or failure?

Success or failure?

Success or failure?

Success or failure?

Success or failure?

Success or failure?

Define Project

- Here is *one* definition:
  - **« A temporary endeavor undertaken to create a unique product or service »**

    (PMI, 1996, p.4)
- More definitions?
- Thinking of the word project, what terms or concepts or images come to your mind?
- Any project example?



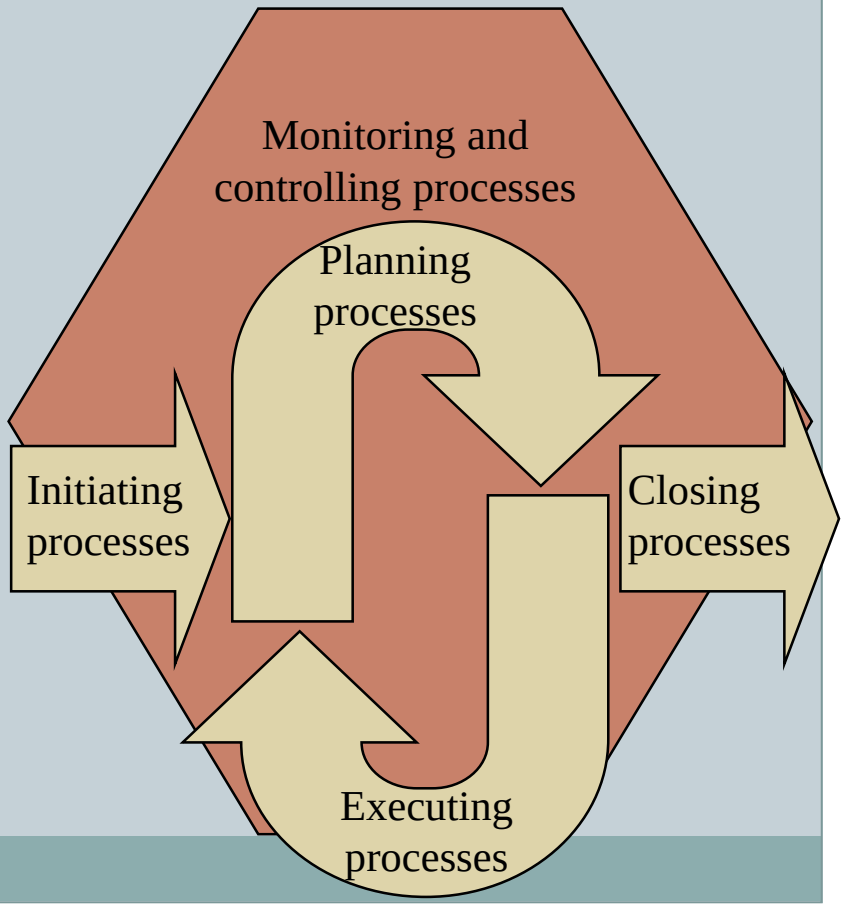
A project


Client
Product or service
Time
Cost
Res
Quality
End
Client's vision
Idea
Start

The PMBOK Perspective

- PMBOK = "Project Management Body of Knowledge "
- The management of a single project (lonely project)
- Neither multi-project management; nor program management… Thus, there are other standards.
- Knowledge not skills or know-how and lifeskills

- **5 groups of processes**
- Source: A Guide to the PMBOK, *4th edition, PMI 2008*



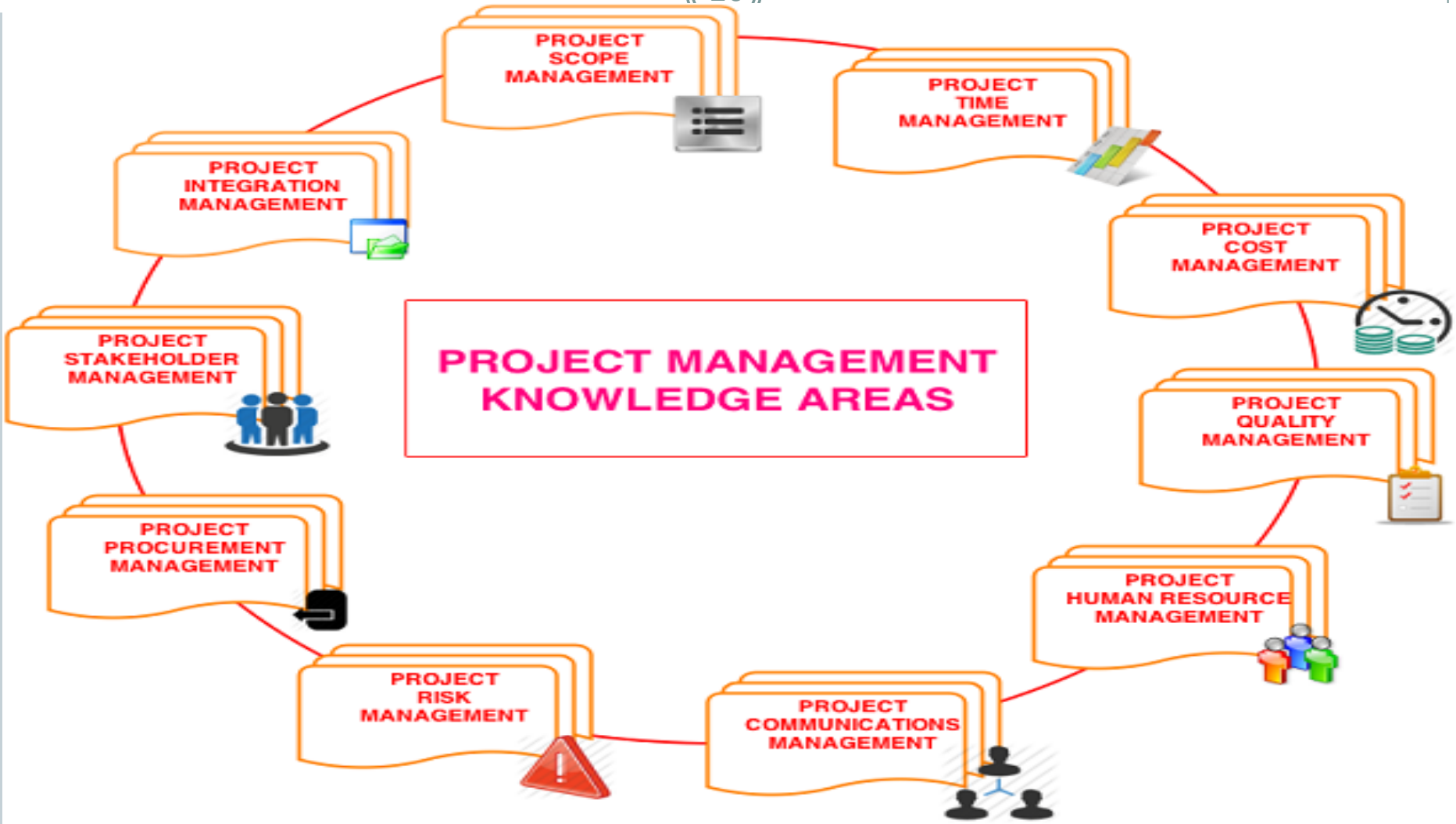
Project Characteristics

Projects are generally :

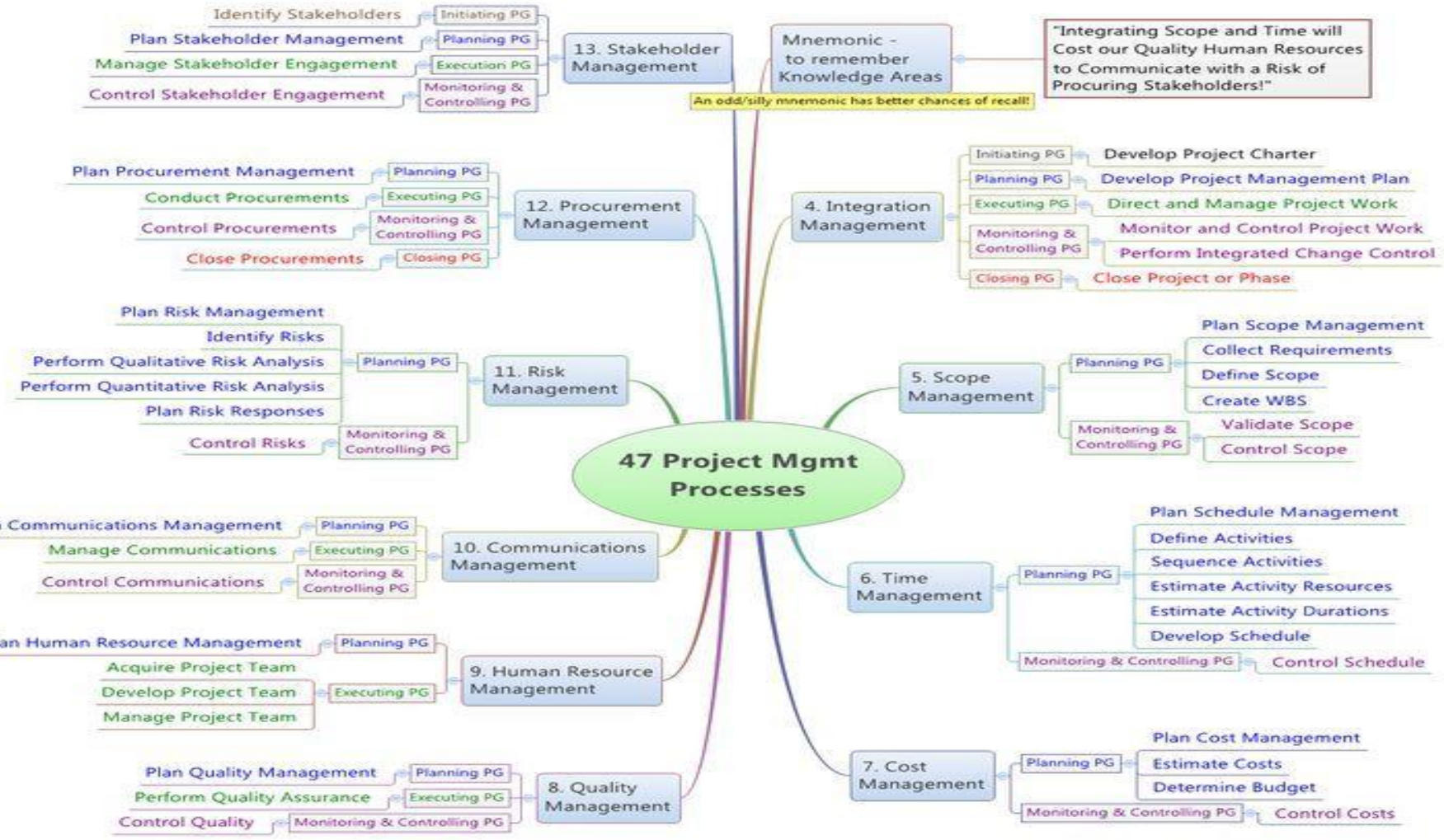
- Limited
- Temporary
- Innovative
- Unique
- Multidisciplinary
- …

- Instead operations are…
- Thus, project management ≠ operations management
- Hence, project management requires its own tools, techniques and methodologies !!!
- So, one should be aware of them and master them…

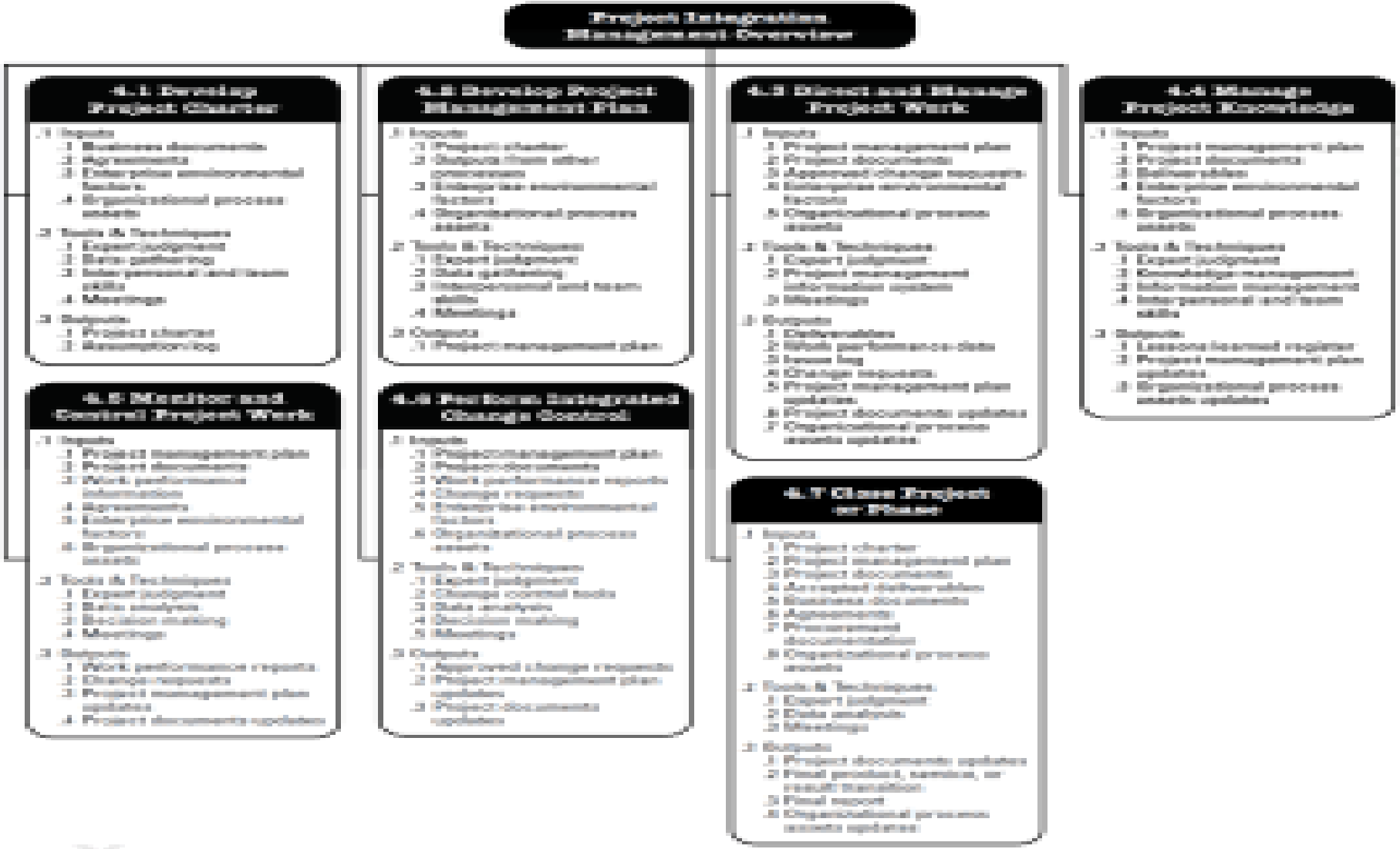
PMBOK: 10 knowledge areas



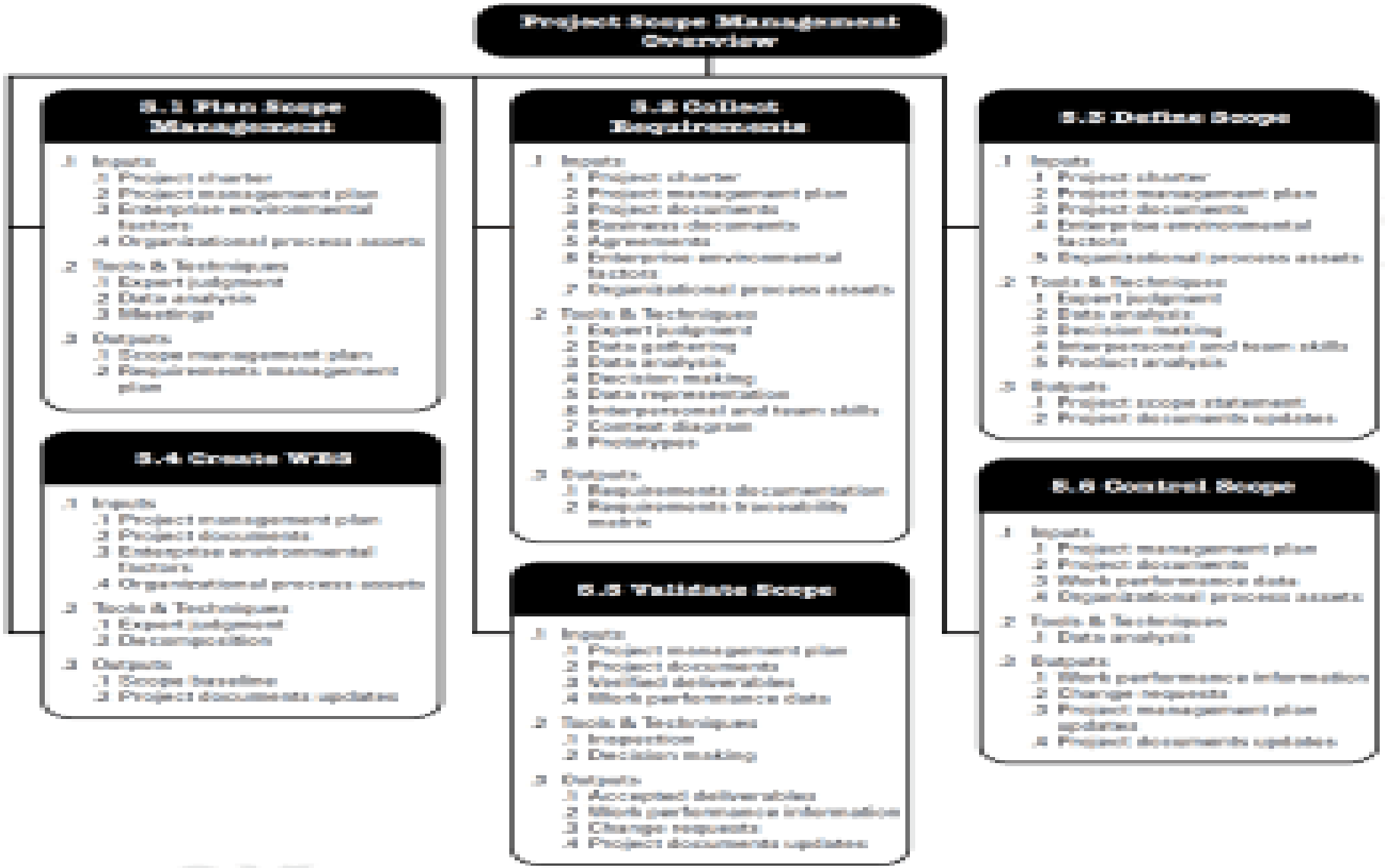
PMBOK: 47 processes



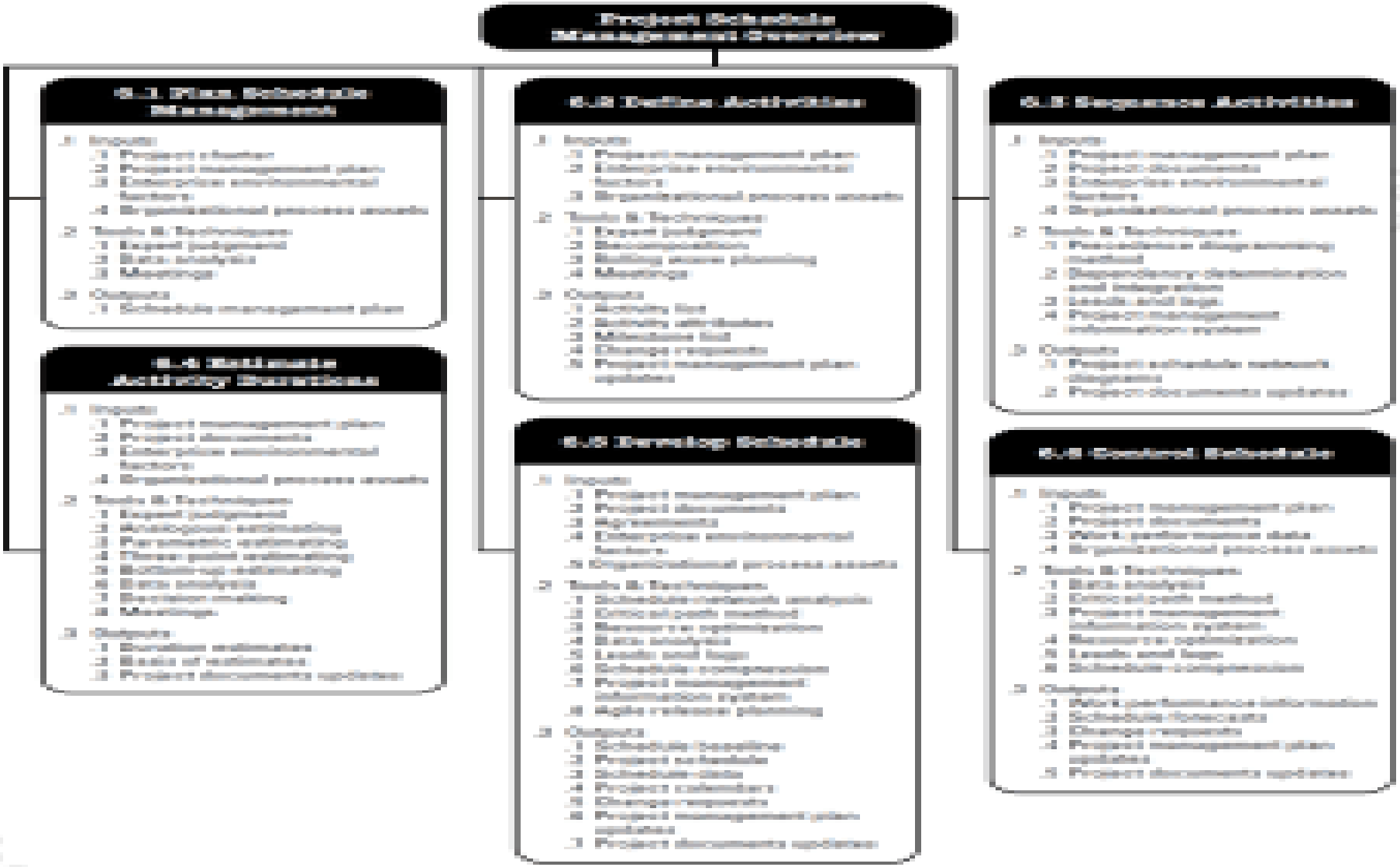
Project integration management



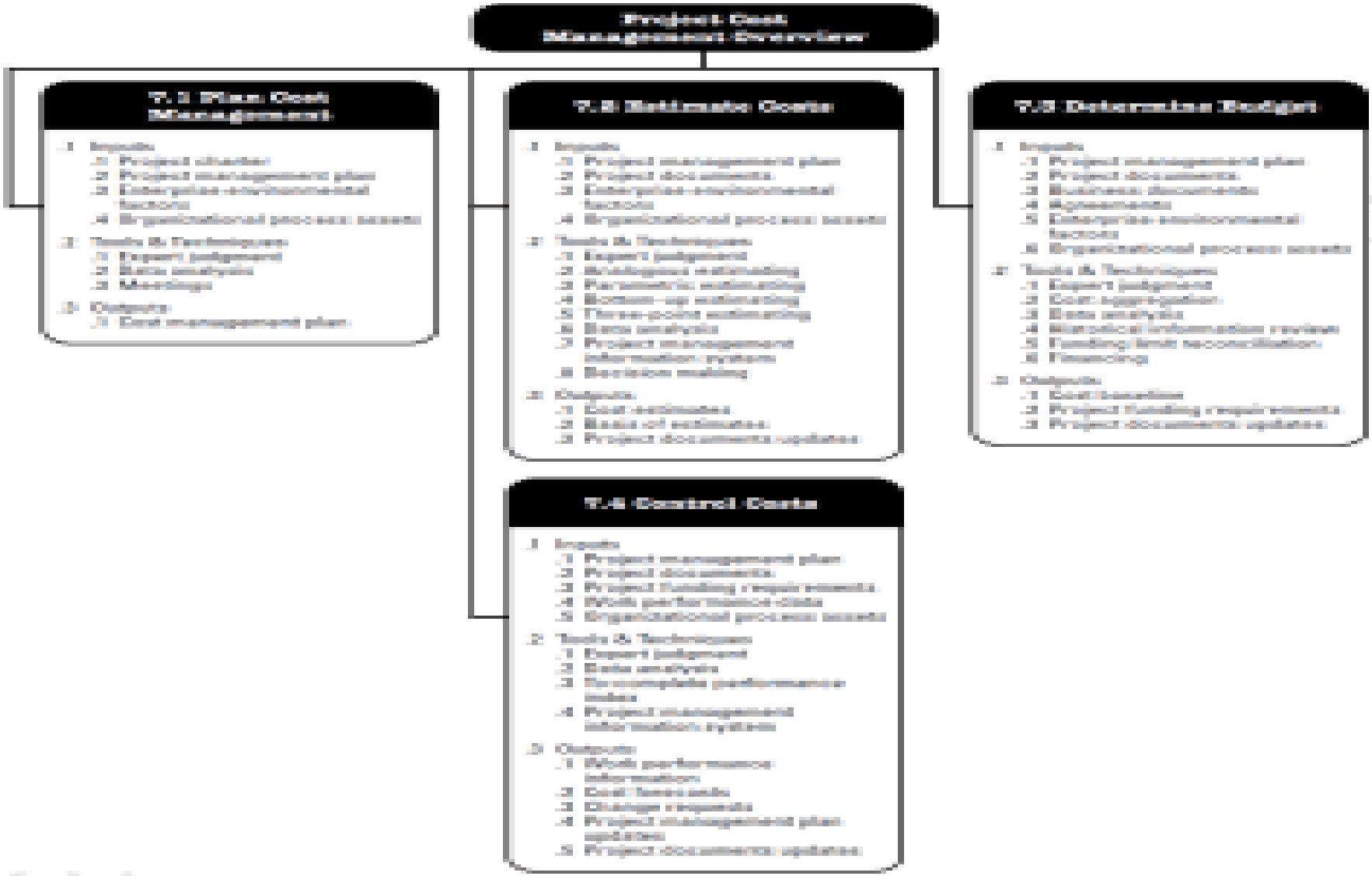
Project scope management



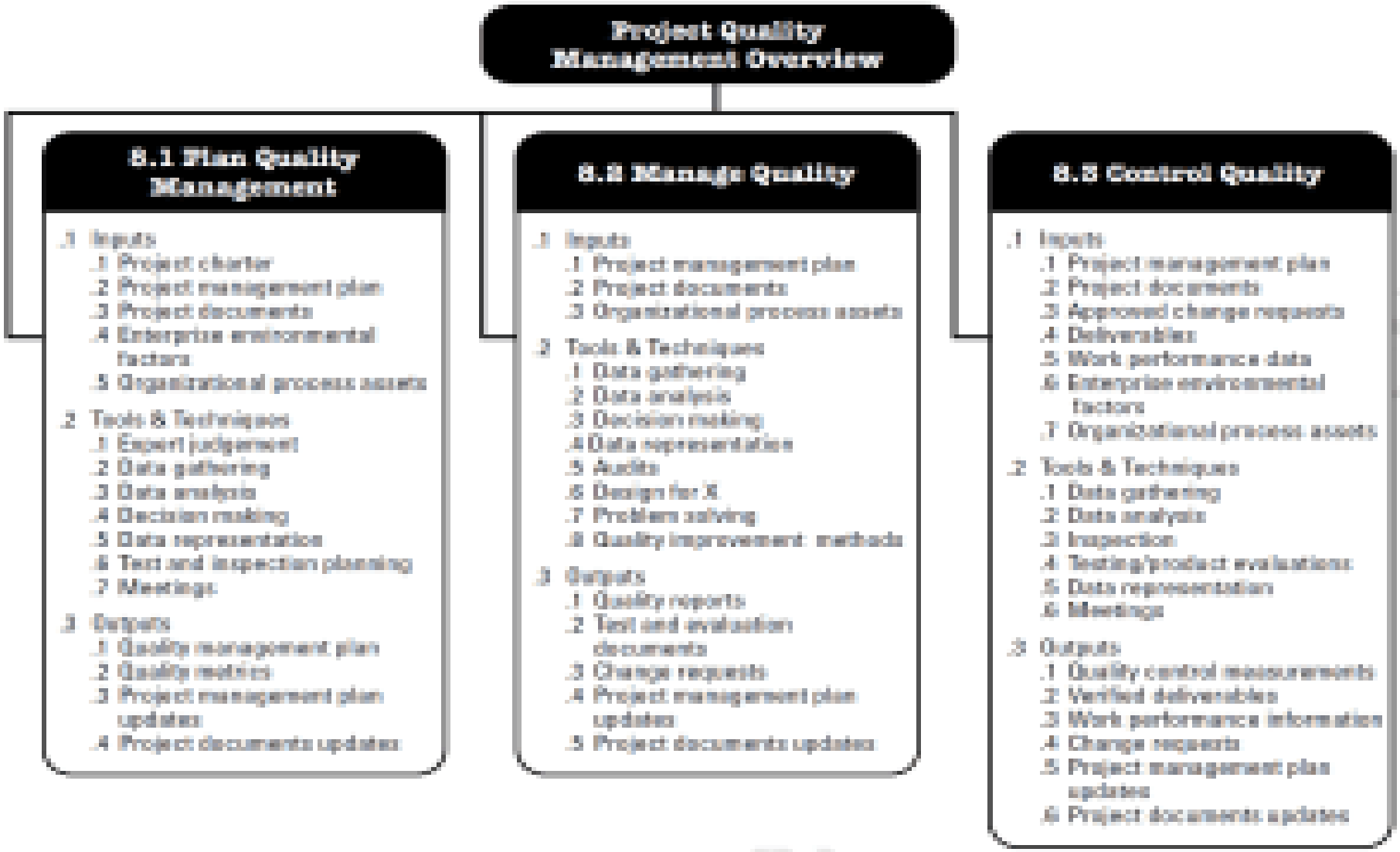
Project schedule management



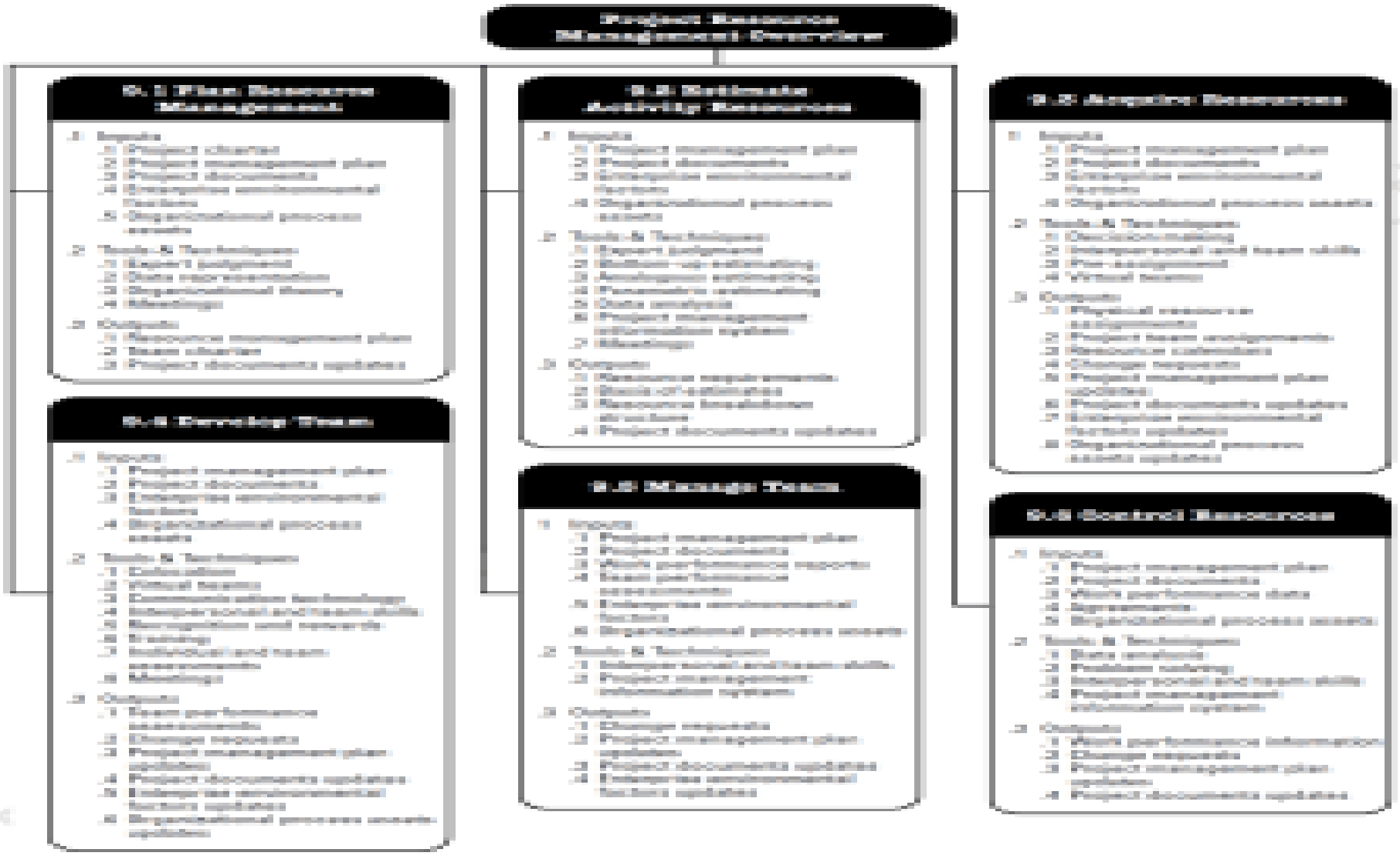
Project cost management



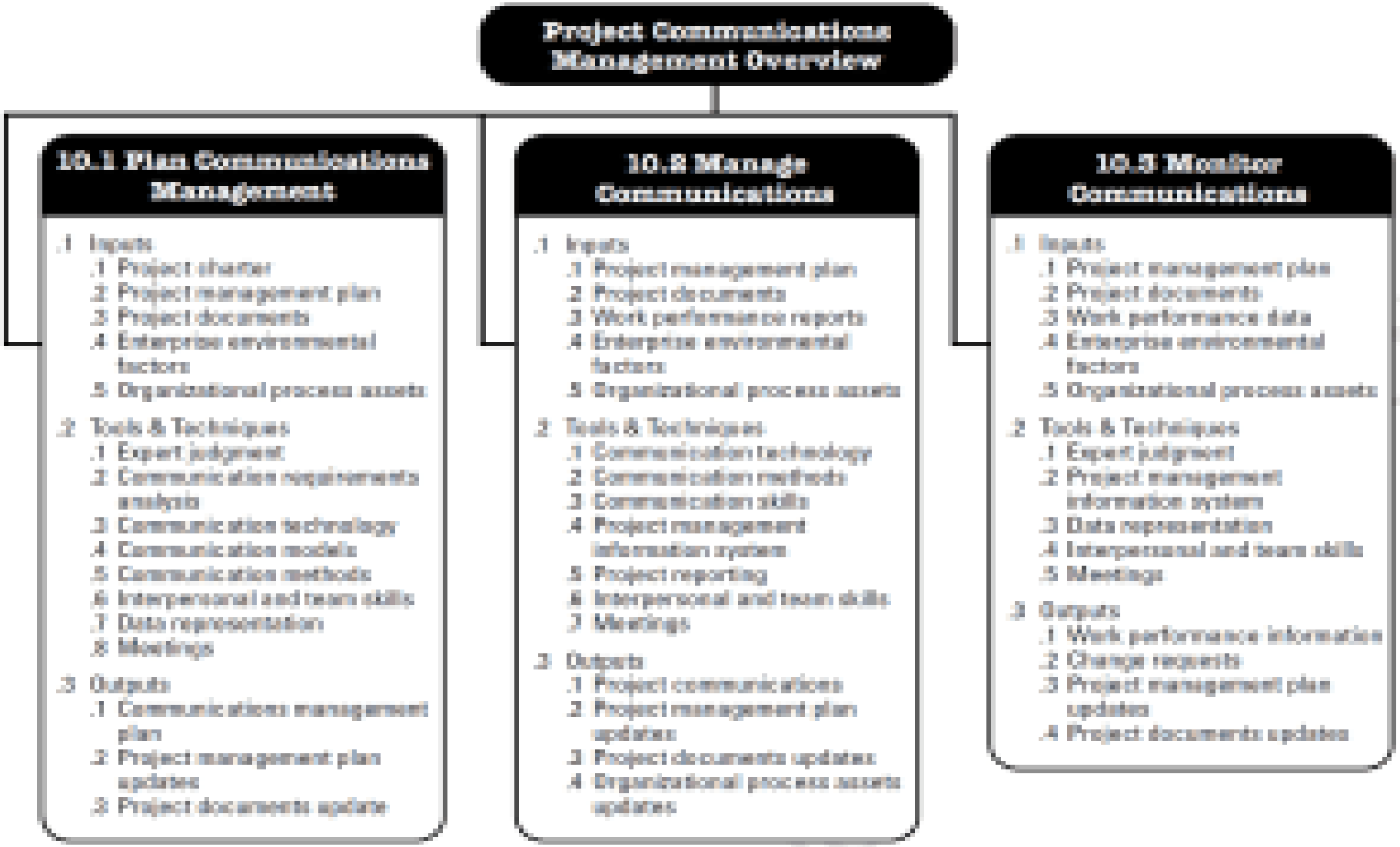
Project quality management



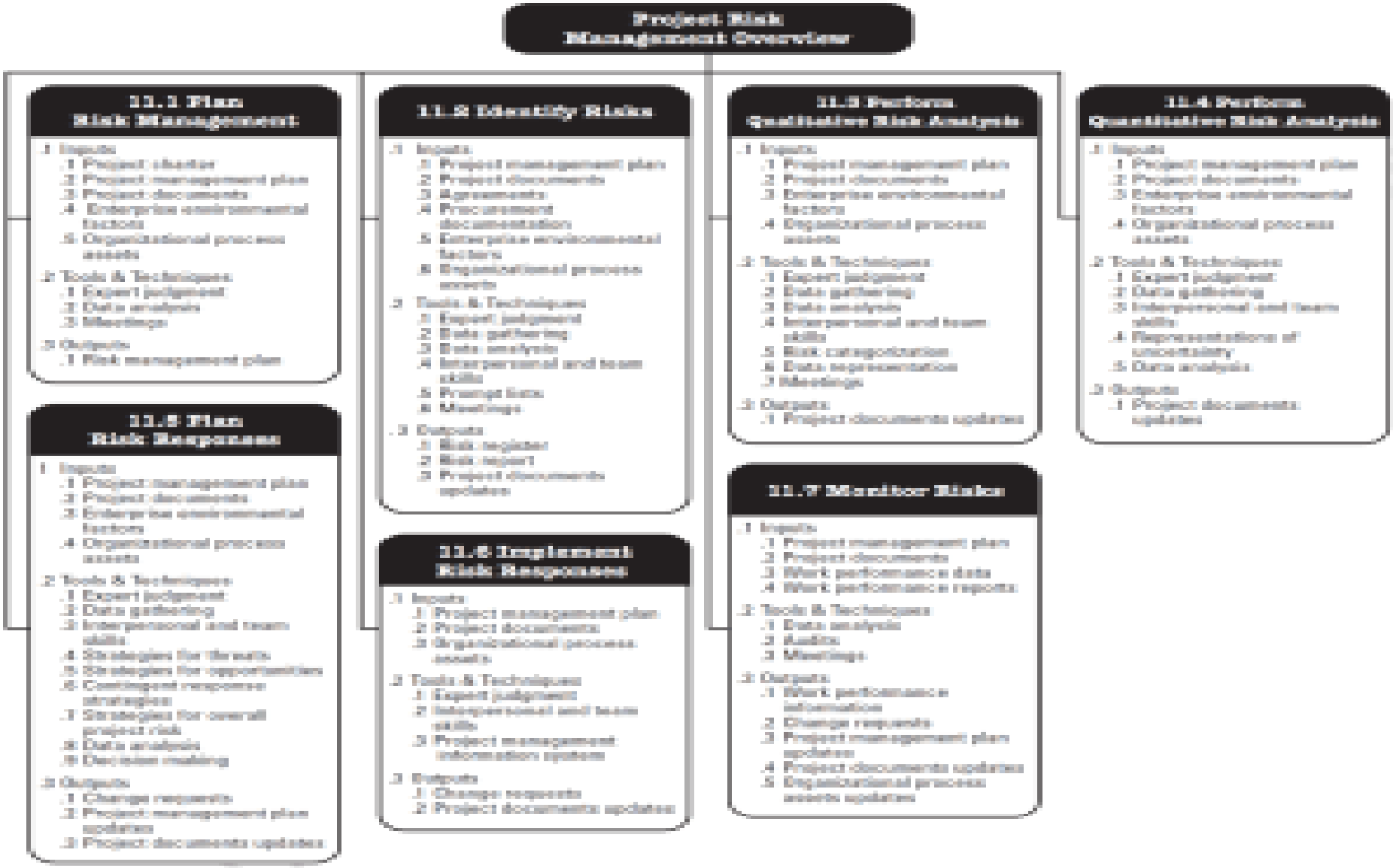
Project resource management



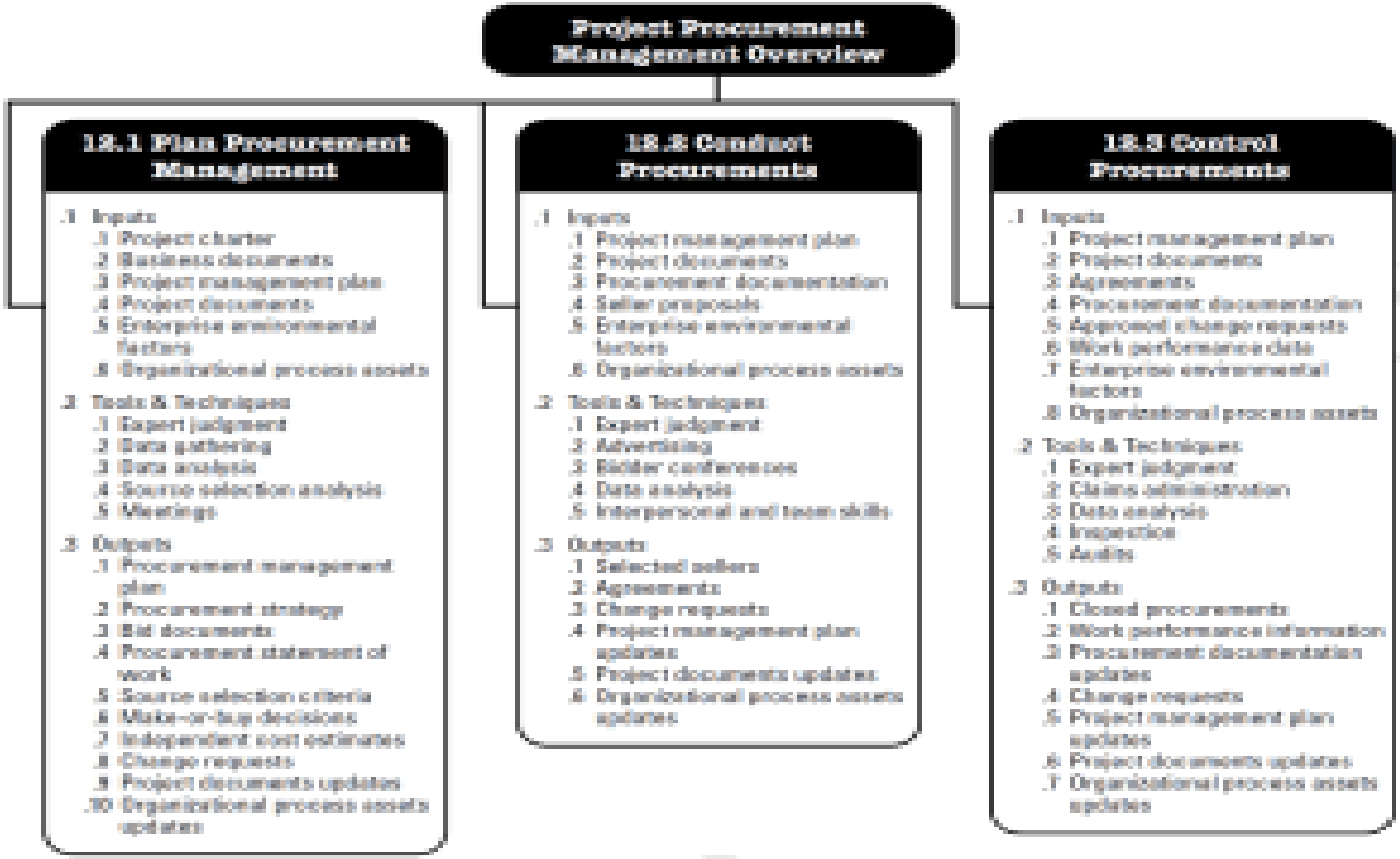
Project communications management



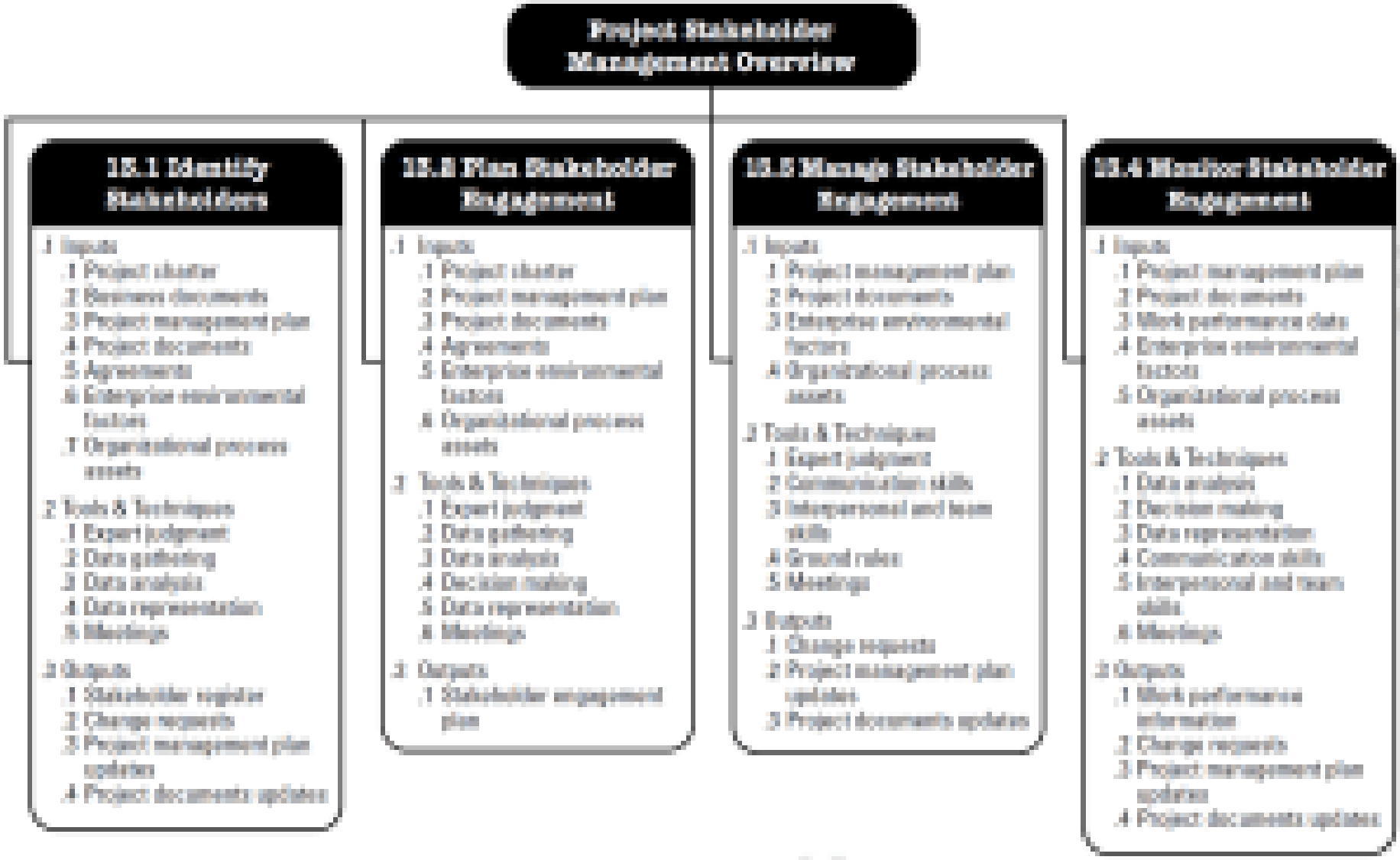
Project risk management



Project procurement management



Project stakeholder management

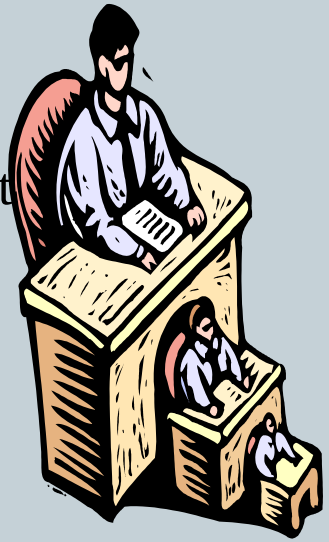


Key project stakeholders

Client / sponsor

Management

Internal support



Project manager

Projet team

External support

Why is it so important to understand project stakeholders expectations?

- By essence, they have vested interest in the project
- They have to be informed about project
- They may have a say in the project planning or approval
- They want to be informed on the project status

Therefore, there is a need not only to list and evaluate project stakeholders but determine their implicit and explicit expectations and try to influence or manage them.

Project management methodology: a requirement for success ?

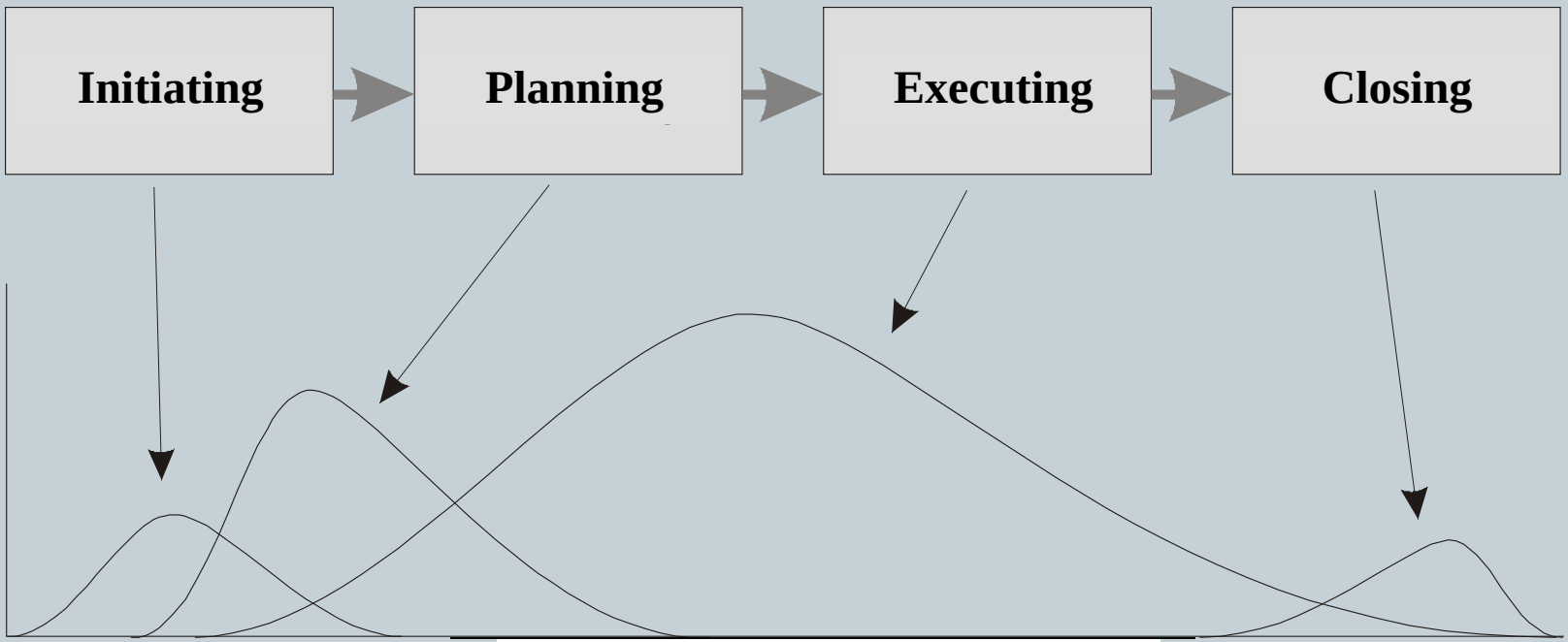
- This is a great debate: Is a formal project management methodology useful or isn't it?
- No ever methodology can and will undisputedly warrant success !
- Be aware of project management fallacies
- The answer is certainly: it depends

Source: Mingus (2006) and others.

Another great debate: technical or non-technical project manager

- " There is no such thing as a generic PM… Background determines who should lead a project " (Hall and Johnson, 2003, p. 43)
- What do you think? Please weigh in the debate!
- Technical: advantages and disadvantages
- Non-technical: advantages and disadvantages

Project management lifecycle



PM lifecycle

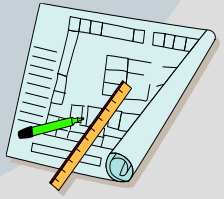
Project Lifecycle and Deliverables

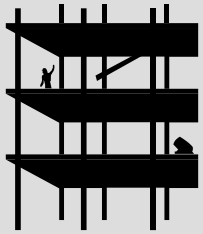
Phases	Key Deliverables
Initiating	**Project statement (Charter)**
Planning	**Project plan**
Executing	**Products / Services**
Closing	**Implementation Report ; Ex-post evaluation**
Operations and maintenance	

Project Lifecycle in Different Sectors

Initiating, Development
Feasibility, Formulation

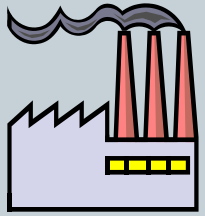
Planning





Executing

Closing



Operational phase

I II III IV

Construction (2-3 years)

Aeronautics (5-6 years)

Pharmaceutics (10 years)

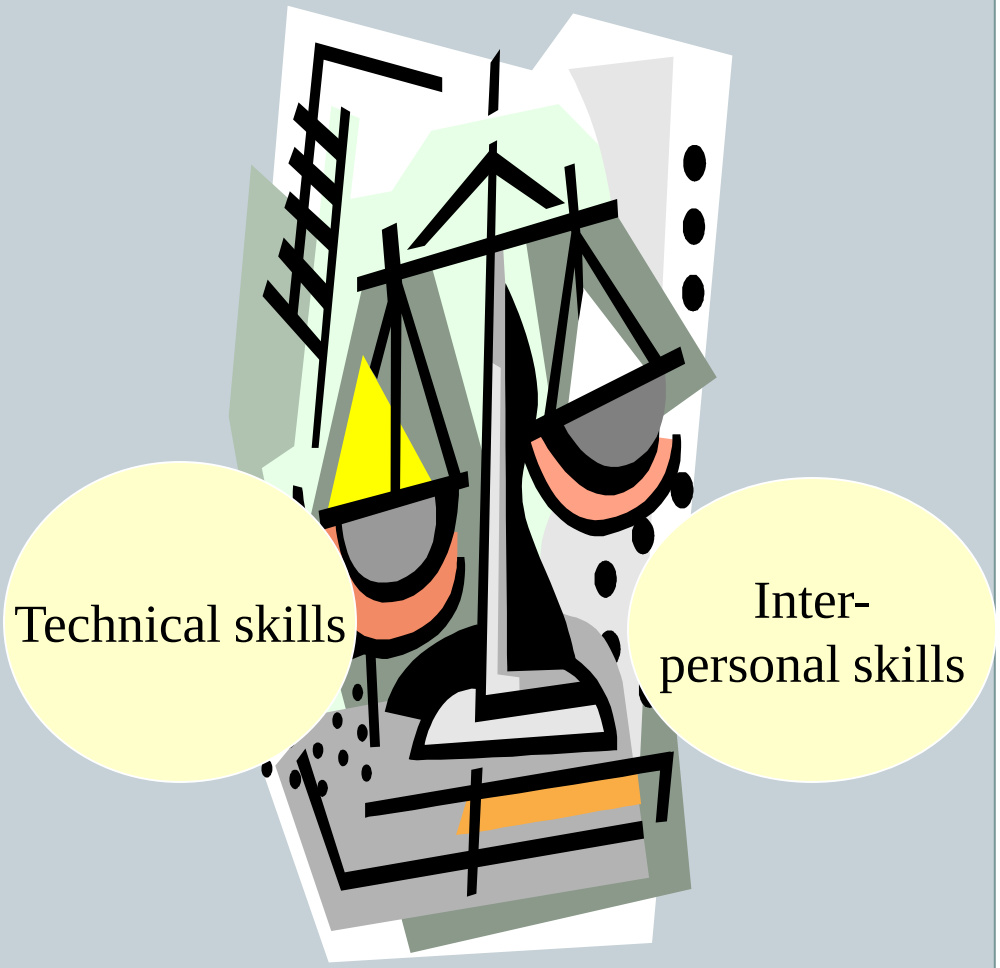
Attention : Project management is not only a science but also an art !!!

In fact, it requires :

- **Technical skills**
- **And interpersonal skills**

Isn't project success the result of a sound combination of both ?

" **No ever *technique can replace the heart, guts and mind of people!*** "



Hands-on Workshop or Apply what you are learning…

- As a team, pick one industry-sector of your choice and :
  - Highlight project management challenges and constraints in that area;
  - Identify project lifecycle;
  - Identify project management methodologies if any;
- And share your thoughts with the class.

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1.2 PROJECT SELECTION

How to pick the right one from the get-go?

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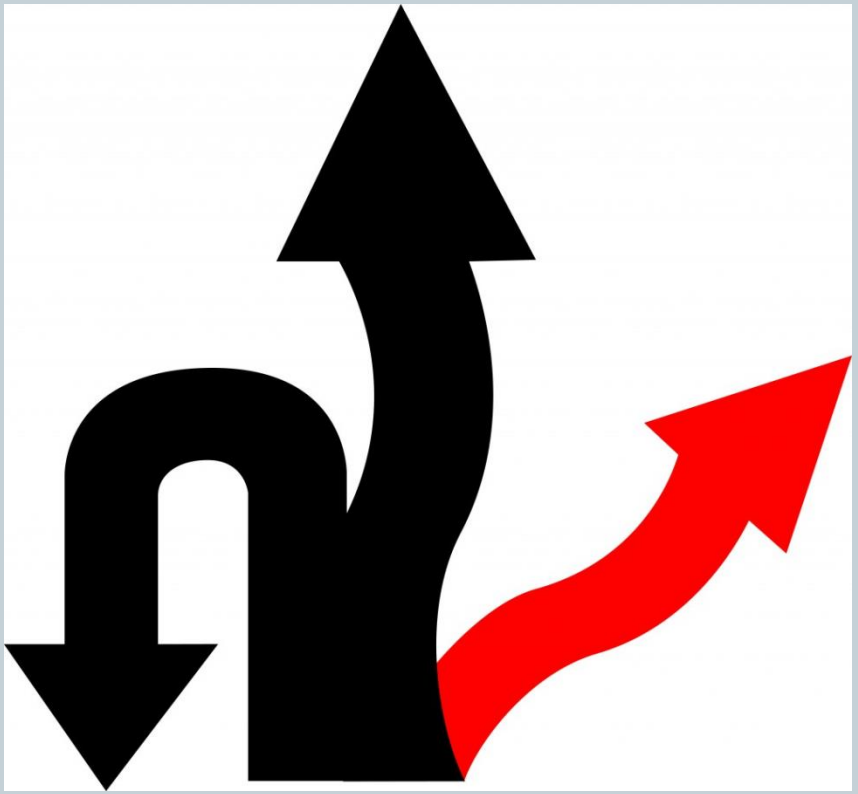
How to choose the right project?

Methods

- Ad hoc (sacred cow; intuition; compatibility with the portfolio; binary comparison)
- Financial (NPV, IRR, etc…) V. Non-financial

Source: Larson and Gray, 2011



Multicriteria Evaluation Sheet

Totally agree: 5
Totally disagree: 0

Compatibility with:	
organization's mission?	☐
organization's stratery?	☐
Respect of:	
municipal rules?	☐
environmental norms?	☐
Resources:	
technical?	☐
financial?	☐
humans?	☐
Total	/35

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2 PROJECT INITIATION

How to document a project idea? Or how to well start a project?

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Introduction to Project Initiation

2.1 INTRODUCTION TO PROJECT INITIATION AND NEEDS ANALYSIS

What does the project initiation process entail?

&

Why does it matter?

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Project Initiating

What it is

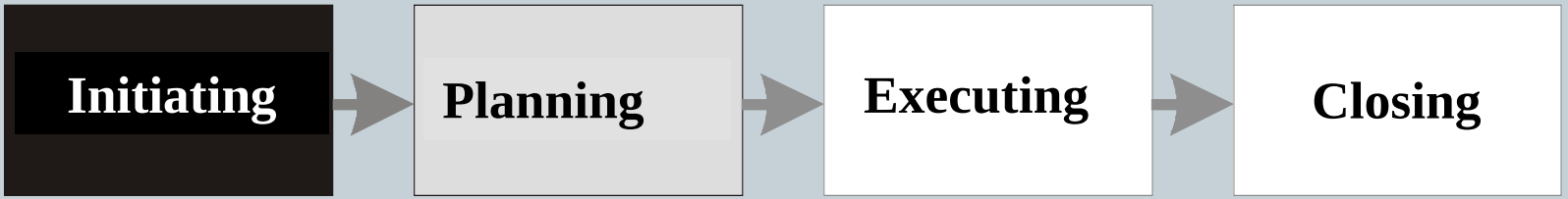
- The first phase in a project lifecycle is project initiating or project design
- It leads to a document often called business case, project charter, project proposal, terms of reference, etc.
- Although there may be some differences between those terms, project proposal will be used throughout the course here.

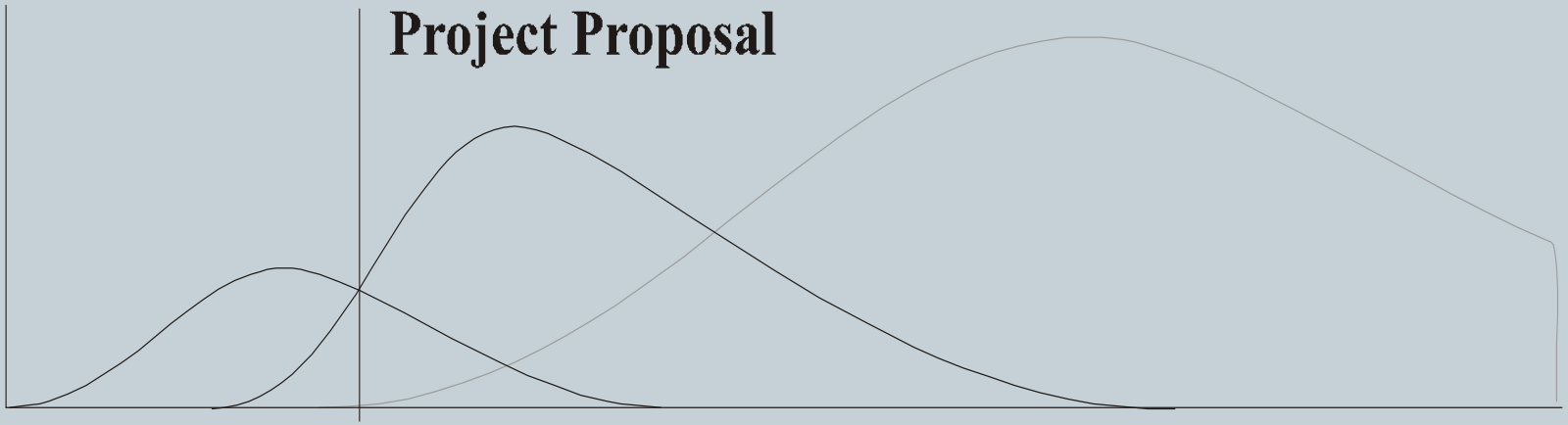
Why is it so important to create a project proposal?

- To avoid the recurring but erroneous belief that the project is just in the heads of everybody
- Because, it seems all in their heads but they all have slightly different versions of project scope, goals and so on
- Hence, the popular saying: " If it isn't in writing, it hasn't been said" (Hall & Johnson, 2003, p. 20)

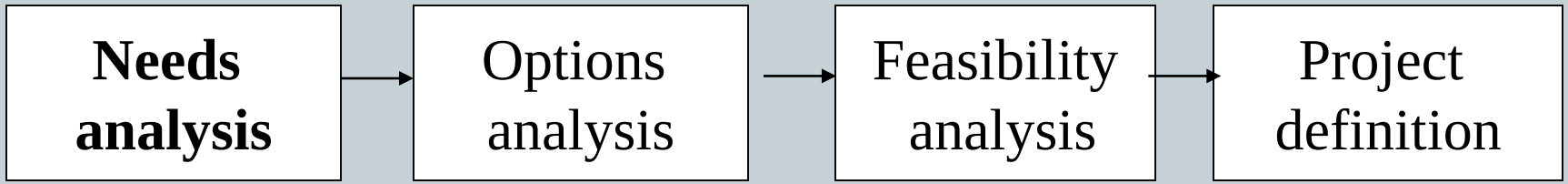
Project Initiating

Project initiating: first step in PM process





A Project Initiating Process



Why is it necessary to start a project with a list of needs?

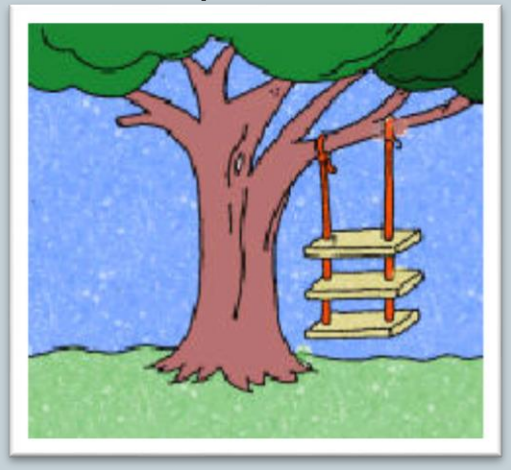
- One should uncover the need one thinks a project can or will satisfy.
- Otherwise, projects are ill defined and they fail before they start !
- Yet the common approach is the **plunge anyway approach**
- Here, we will avoid that approach.

Why avoid the plunge anyway approach?

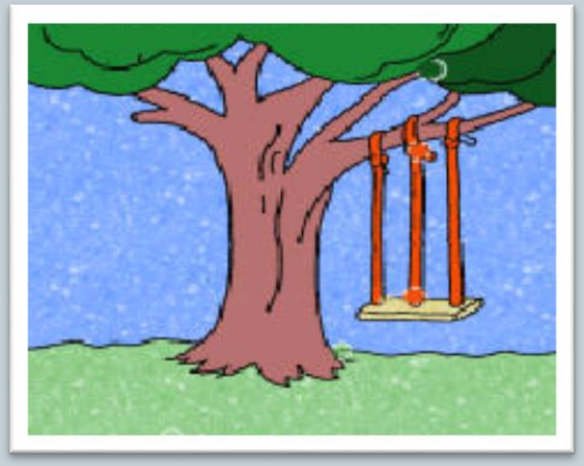
- 30% of products do not meet their needs
- 30% only partially meet their needs
- 30% completely meet their needs
- Yet, very often, projects start without needs analysis (Let us call this *the plunge anyway approach*, Mingus, 2002)
- Thus, projects may not meet the true needs and/or end up costing more than they will earn (e.g., White Elephants)

Difficulties communicating the need

① How the user/client explained it…



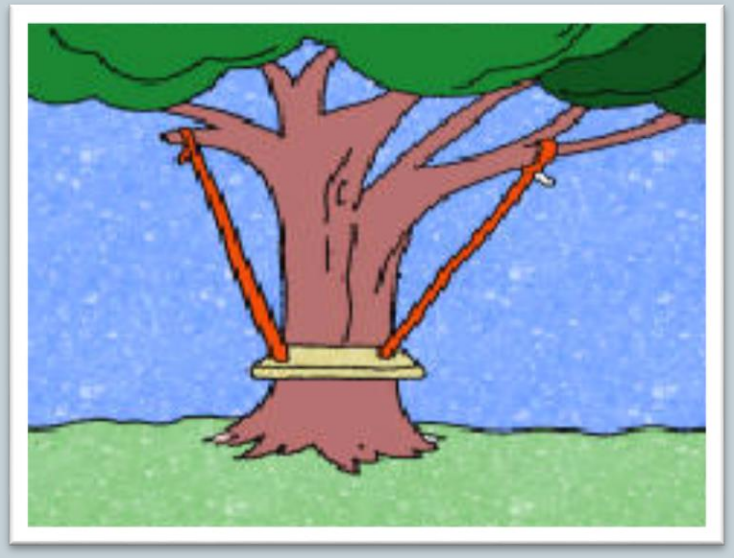
② How the project manager understood it…



③ What was decided…

Difficulties communicating the needs

④ What has been done…



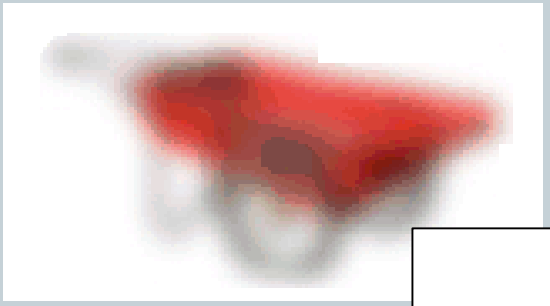
⑤ How it was modified …

Difficulties communicating the needs

⑥ What the user/client really needed…

Another example!

Customer needs :



Customer needs description :

simple, red, robust, with wheels

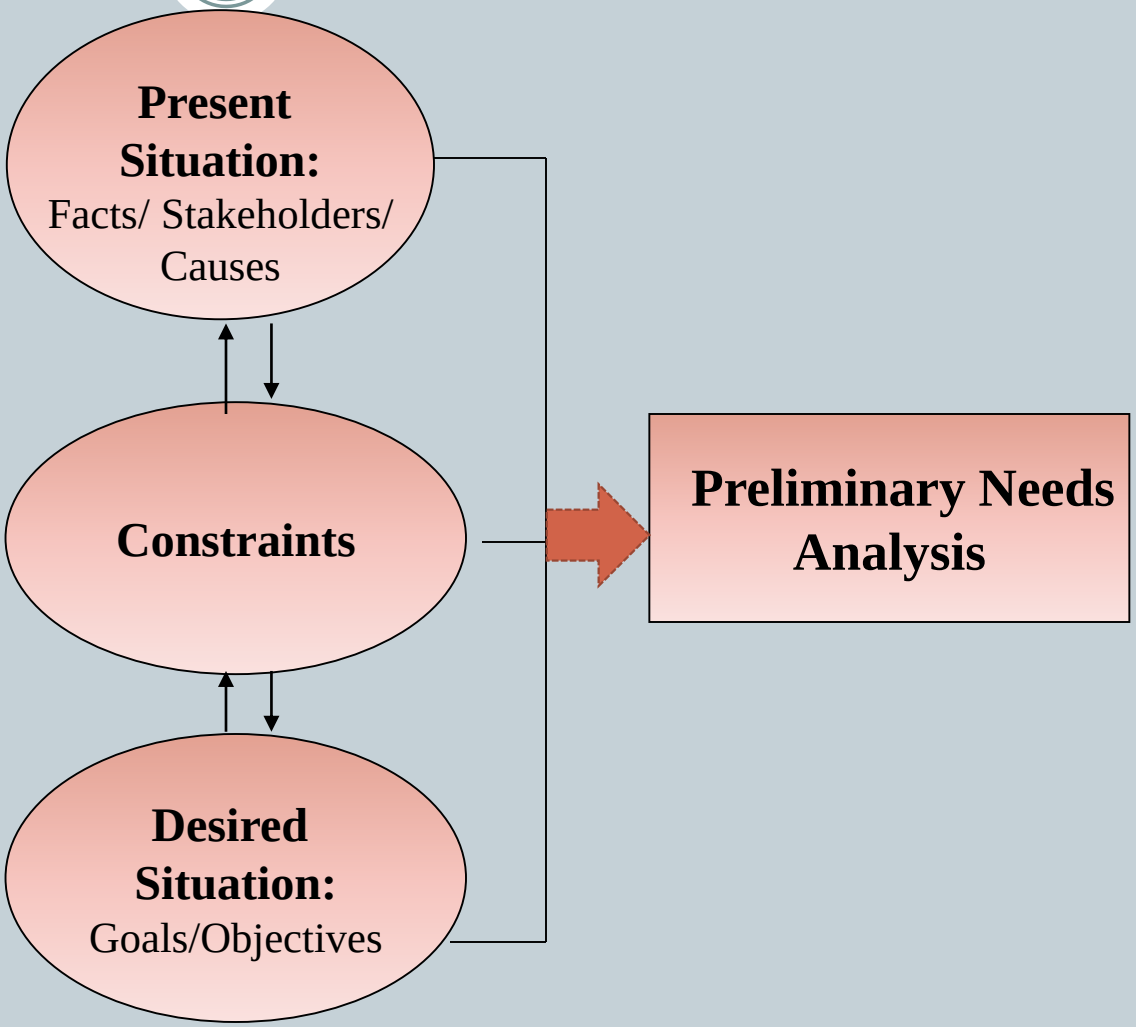
What the architect understands

What is finally developed

What is the manufacturer expected to do

What the architect finally described

Ika's Approach to Preliminary Needs Analysis



Preliminary Needs Analysis

2.2 ANALYSIS OF THE PRESENT AND DESIRED SITUATIONS

The project: Why?

&

For what purpose?

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Present Situation Analysis

- Analysis of Problems

(Beware of project context; SWOT Analysis)

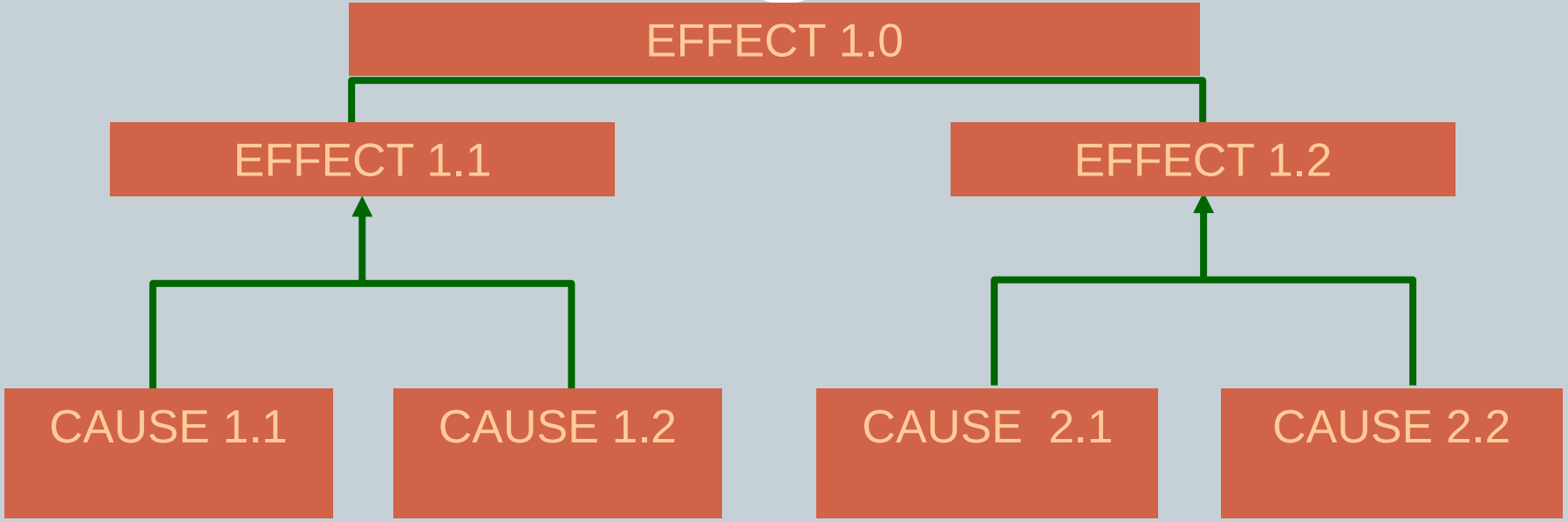
Facts/Causes

Analysis of Problems

- **Identify the key problems**
- **Develop the problem tree with the analysis of the root causes and their effects**
- **Write the project problem statement**

- Beware of **objectives – solutions**

Problem Tree



Problem Solving Techniques

- Problem solving techniques vary according to the:
  - situation
  - company,
  - business sector
- Examples:
  - brainstorming, Advantages /Disadvantages ; Cost/ Benefit Analysis, probabilistic approach, multicriteria approach, Ishikawa and Pareto techniques

Present Situation Analysis

- Stakeholder Analysis

Stakeholders

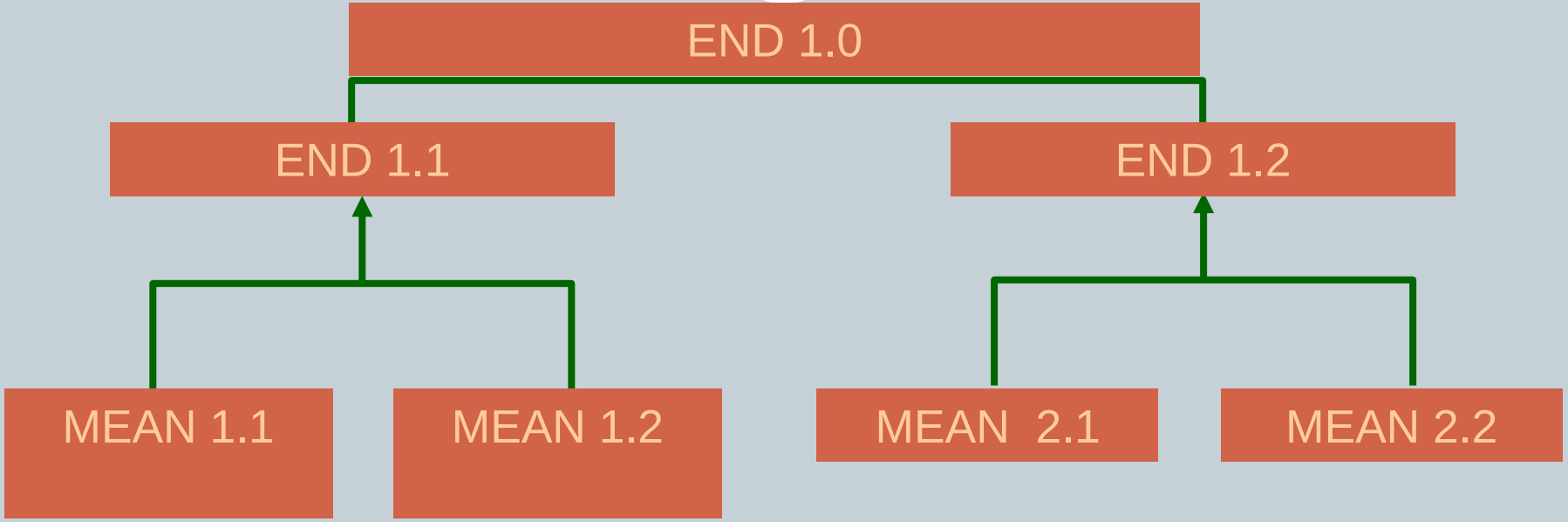
Desired Situation Analysis

Project Goals and Objectives

- The more the problem is understood, the more the objectives are clear and specific
- Transform the problem tree into the objectives tree (mirror image)
- Consider the objectives tree as an "ends –means" diagram.

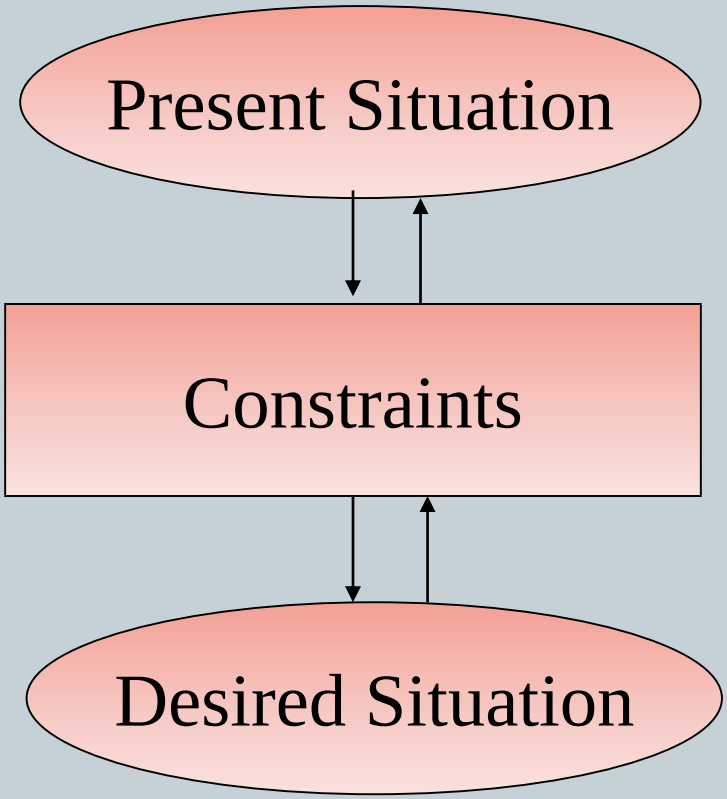
Goals/Objectives

Objectives Tree



Between the Present an Desired Situations, there are Implementation Constraints

The Implementation Constraints



Constraints

Client Priorities with Regards to Project Constraints

	Time	Cost	Quality	Resources
Imperative	ok			
To be optimized		ok	ok	
Flexible				ok

Needs Analysis

2.3 FUNCTIONAL NEEDS ANALYSIS

What's the use?

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Option Analysis

2.4 OPTION ANALYSIS

How to choose the project concept?

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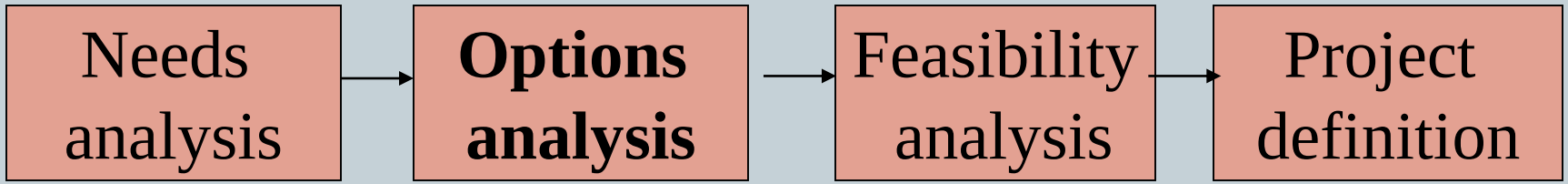
Back to Project Initiation Process



Options Analysis: the Project Concept

A structured approach to project options analysis suggests to:

- Generate possible solutions to satisfy project needs
- Identify solutions selection criteria to evaluate the alternatives
- Analyse the options
- Make a short list of 2 or 3 solutions at most
- Evaluate each solution with regards to project constraints (pre-feasibility)
- Select project concept

Options analysis: the project concept

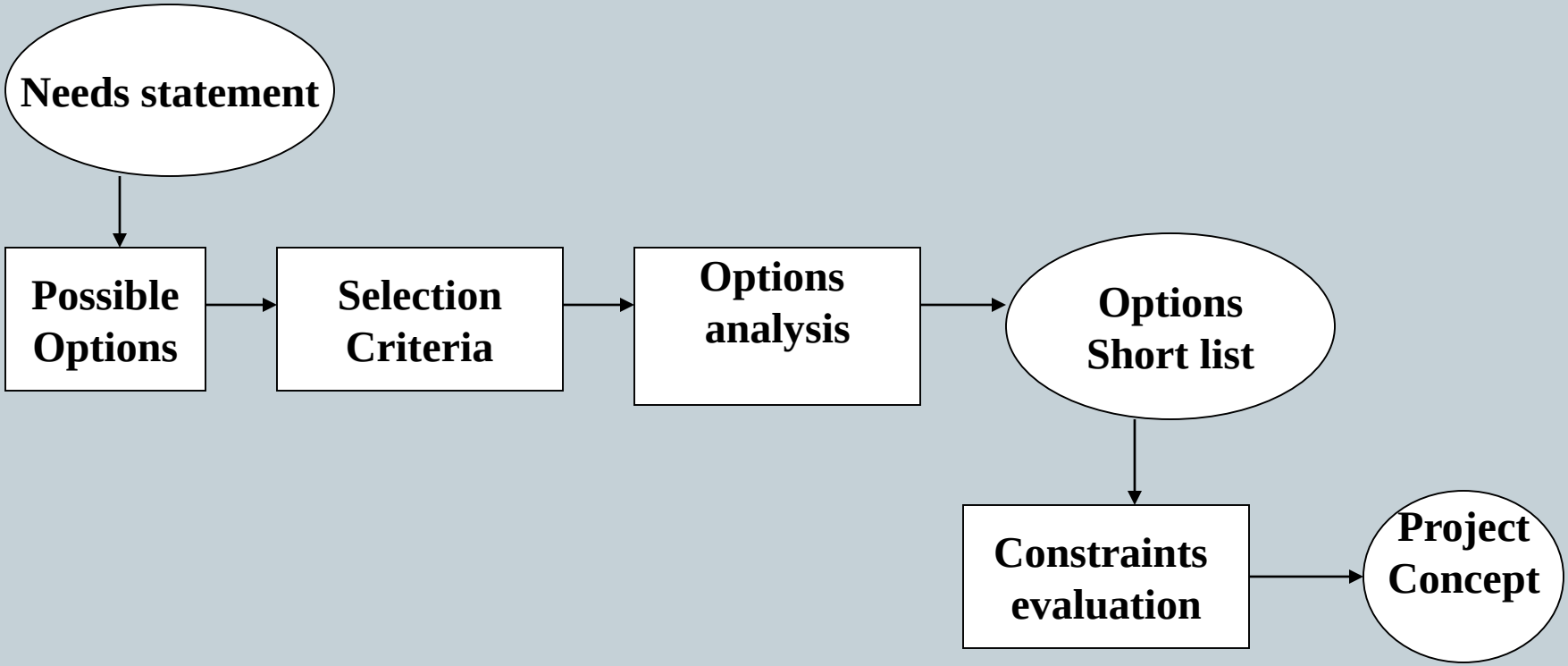


Illustration : Options Analysis

- **Case**: TBD

Logical Framework

2.5 PREPARING THE LOGICAL FRAMEWORK

Can a 4x4 matrix summarize the project initiation information?

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The Logframe Matrix

Project Start : _____
Project End : _____
Date of the Logframe : _____
Project Name: _____

Descriptive levels of the project	Objectively verifiable Indicators	Means of verification	Critical conditions
Overall goal			Spec. Obj. → Overall goal
Specific objective			Outputs → Objective
Outputs			Inputs → Outputs
Inputs			Pre-requisite conditions

O'SHAUGHNESSY, Wilson

Feasibility and Risk

2.6 FEASIBILITY AND RISK

Can the project be done?

&

What can go wrong with the project?

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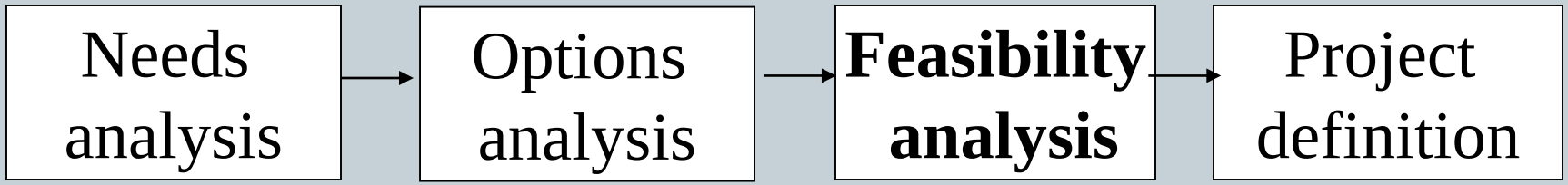
Back to Project Initiation Process



Feasibility Analysis

- As the 3nd step in the project design analysis, feasibility analysis's goal is to:
  - *Examine the project in details*
  - *Decrease the probability of the project failure*

Note: Feasibility studies are only different in scope and level of details from pre-feasibility analysis which are based on gross estimates

Feasibility: Constraints Evaluation

- Market feasibility
- Time feasibility
- Technical feasibility
- Financial feasibility
- Operational feasibility (Does the project fit the way we do business?)
- Geographic feasibility (Are project team members or stakeholders geographically dispersed?
- Resource feasibility (Are there enough and good resources?)
- Legal feasibility (Does the project meet legal, contractual or governmental requirements?)
- Political feasibility (Is there any conflict with either corporate or governmental politics ?)

Source: Mingus (2002)

Risk Analysis

- What can go wrong with the project ?
- Risk analysis will help for a deep understanding of the project feasibility
- It is critical for problem solving, quicker responses to problems that arise during the project

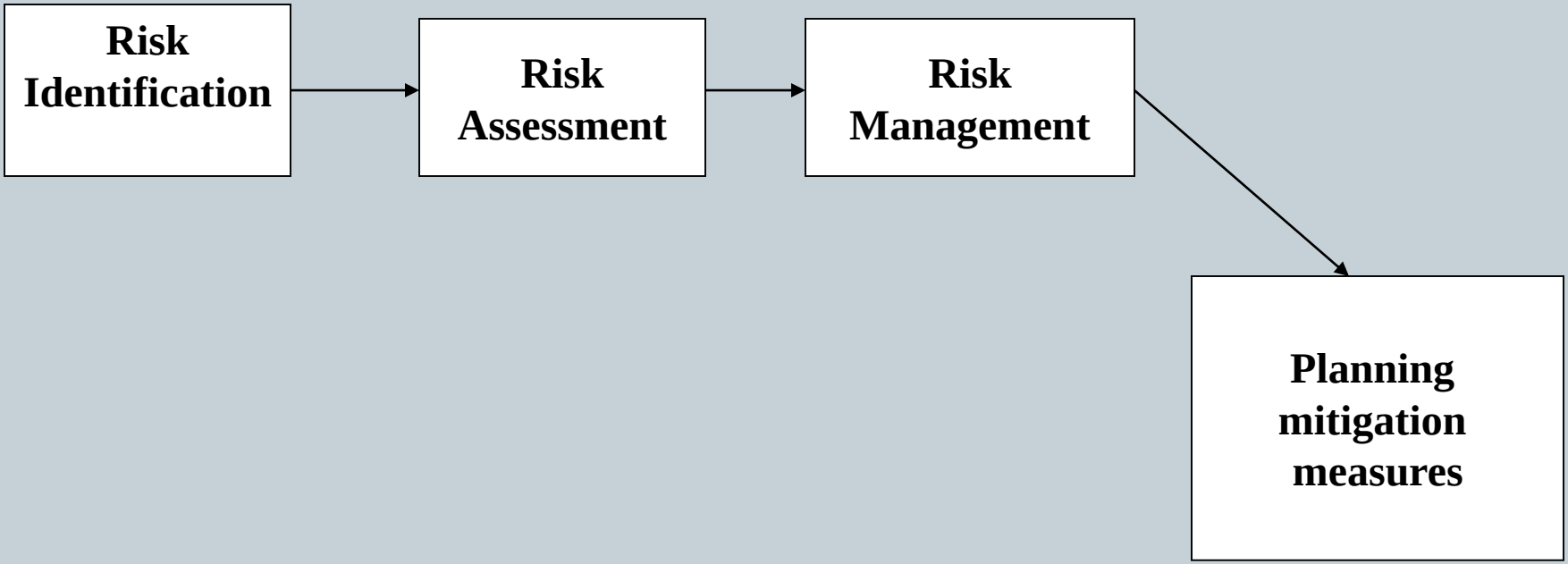
- **Risk Identification**
- The risks can be
  Operational
  Tactical
  Strategic

Risks can be:

- Technical
- Schedule risks
- Budget risks
- Scope risks
- Resource risks

- The risks can also be **:**
  - **Project risks** i.e. inherent to project
  - **Business risk** that may exposes the organization if and when project

Risk analysis



Risk Analysis

- **Risk Assessment**
  - Consequence or impact of an event
  - Probability of occurrence
  - **Risk severity**

(Risk = probability X impact)

Severity / Proba-bility	low	med.	high
low	***low***	***low***	***med.***
med.	***low***	***med.***	***med.***
high	***med.***	***high***	***high***

Hands-on Workshop or Apply What You Are Learning…

- Take the Via Rail Project and write its overall goal and specific objective statements.

- Determine the project deliverables
- What is the scope of the project? Constraints?
- Who is the client and who are the key project stakeholders?
- Then, share your answers with the class.

Hands-on Workshop or Apply What You Are Learning…

- Consider the NBA Official Ball Game Project and discuss stakeholder analysis

- Identify and analyse stakeholders in terms of their power/interest, engagement and expectations

- Then, share your answers with the class.

ADM 4103:Project management

101

3 PROJECT PLANNING

How long will the project take?

&

How much will the project cost?

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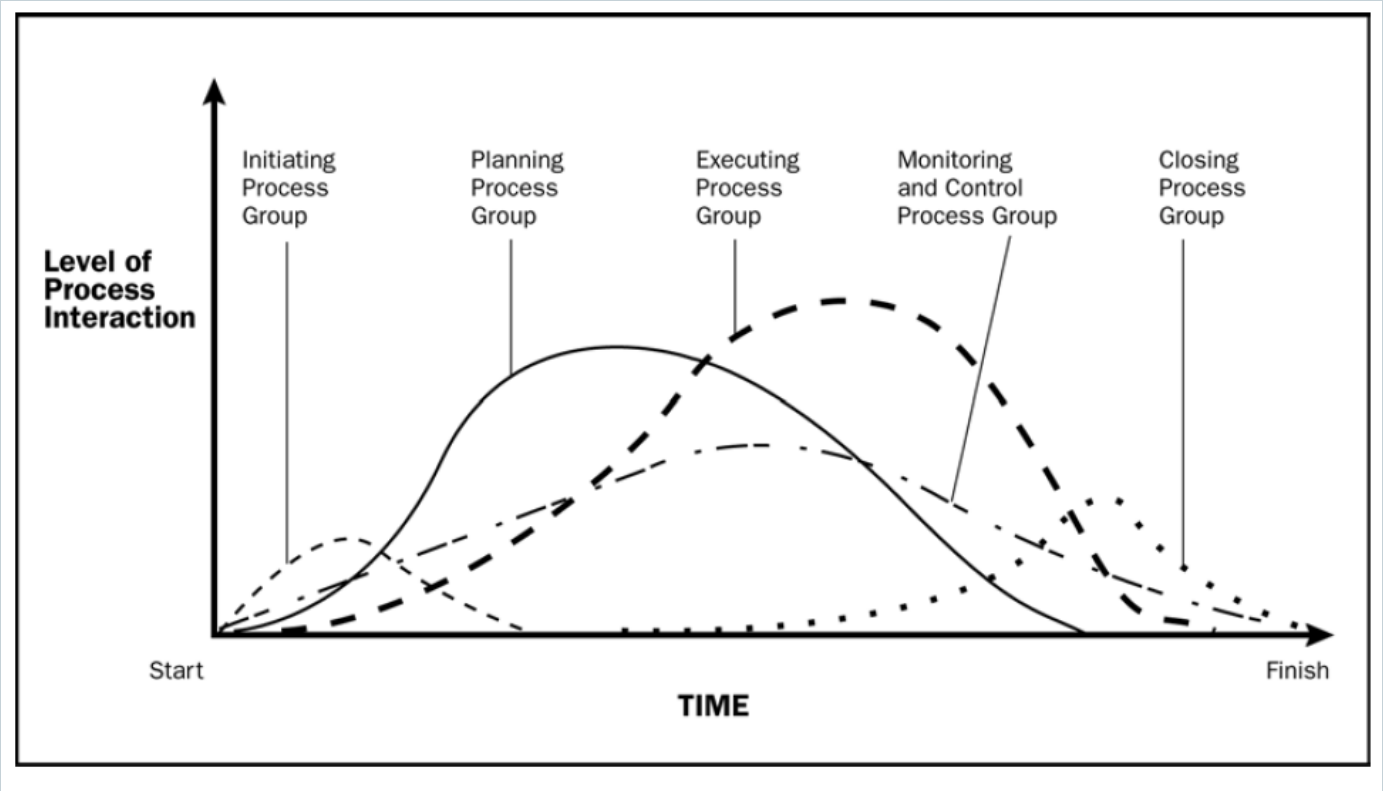
Project Management Phases



Source : PMBOK Guide 3rd Edition

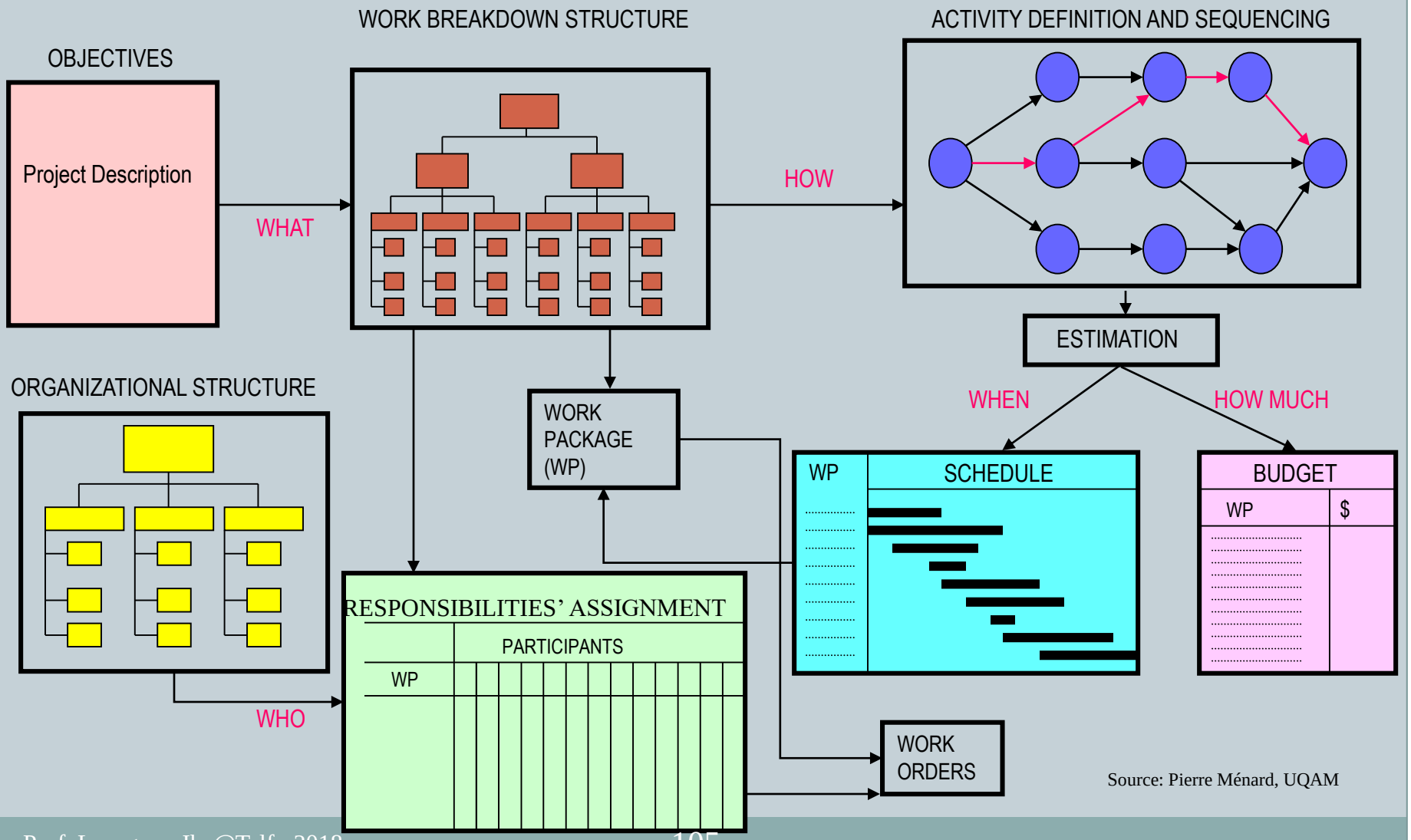
- Overlapping of the phases

- Planning and control efforts throughout the project

Why do you need a project plan?

- Identify, define and perform the tasks that are required to create the project deliverables
- Define the roles and responsibilities associated to these tasks
- Estimate the quantity of resources needed for the performance of the tasks and the moment where these resources will be required
- Establish a required budget for the project
- Measure the project's progress according to the project objectives and periodically assess the level of project success

Project Planning Cycle



Source: Pierre Ménard, UQAM

Structural Planning

3.1 WORK BREAKDOWN STRUCTURE

What do we have to do?

&

How can we have a complete picture of it?

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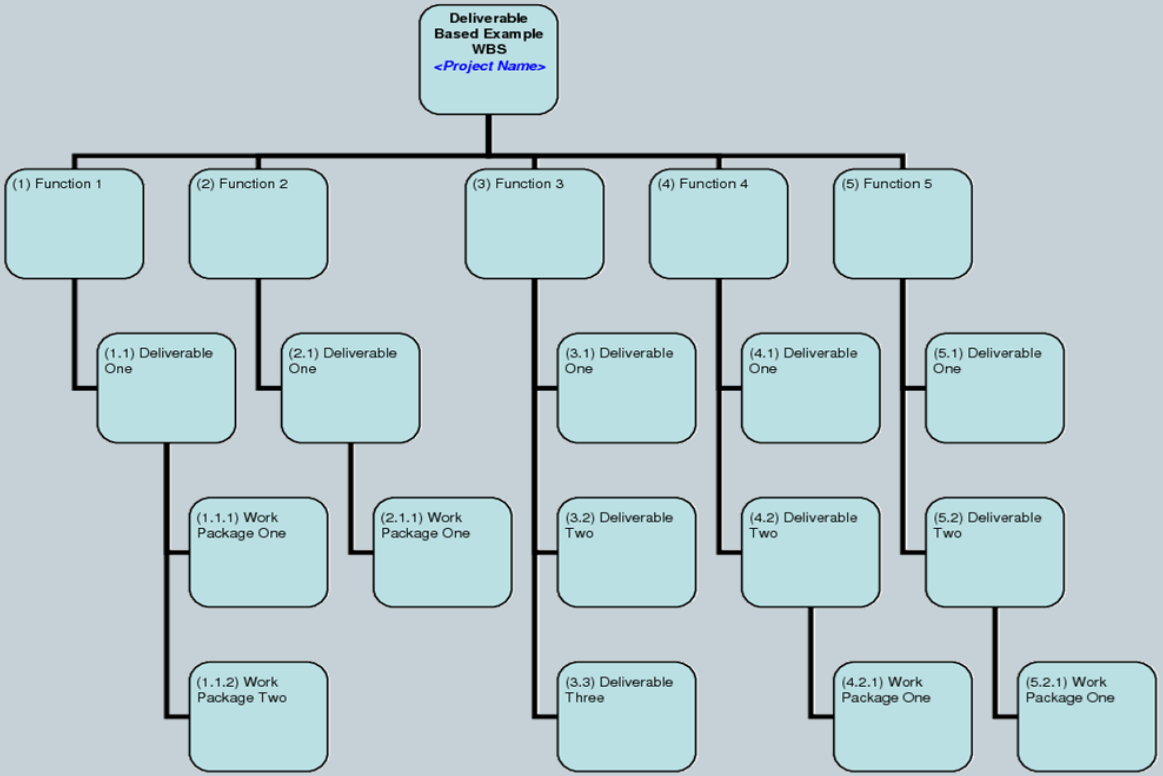
Work Breakdown Structure

- A work breakdown structure (WBS) is a hierarchical representation of all the work packages that comprise a project;
- It divides the total work of a project into manageable units.

WBS Example

Work Breakdown Structure (WBS)

Project Name:	[Insert Project Name]
Project Manager:	<John Doe>
Date:	[mm/dd/yyyy]



Organizational Planning

3.2 ORGANIZATIONAL BREAKDOWN STRUCTURE

What is the right project management structure?
&
Who will do what in the project?

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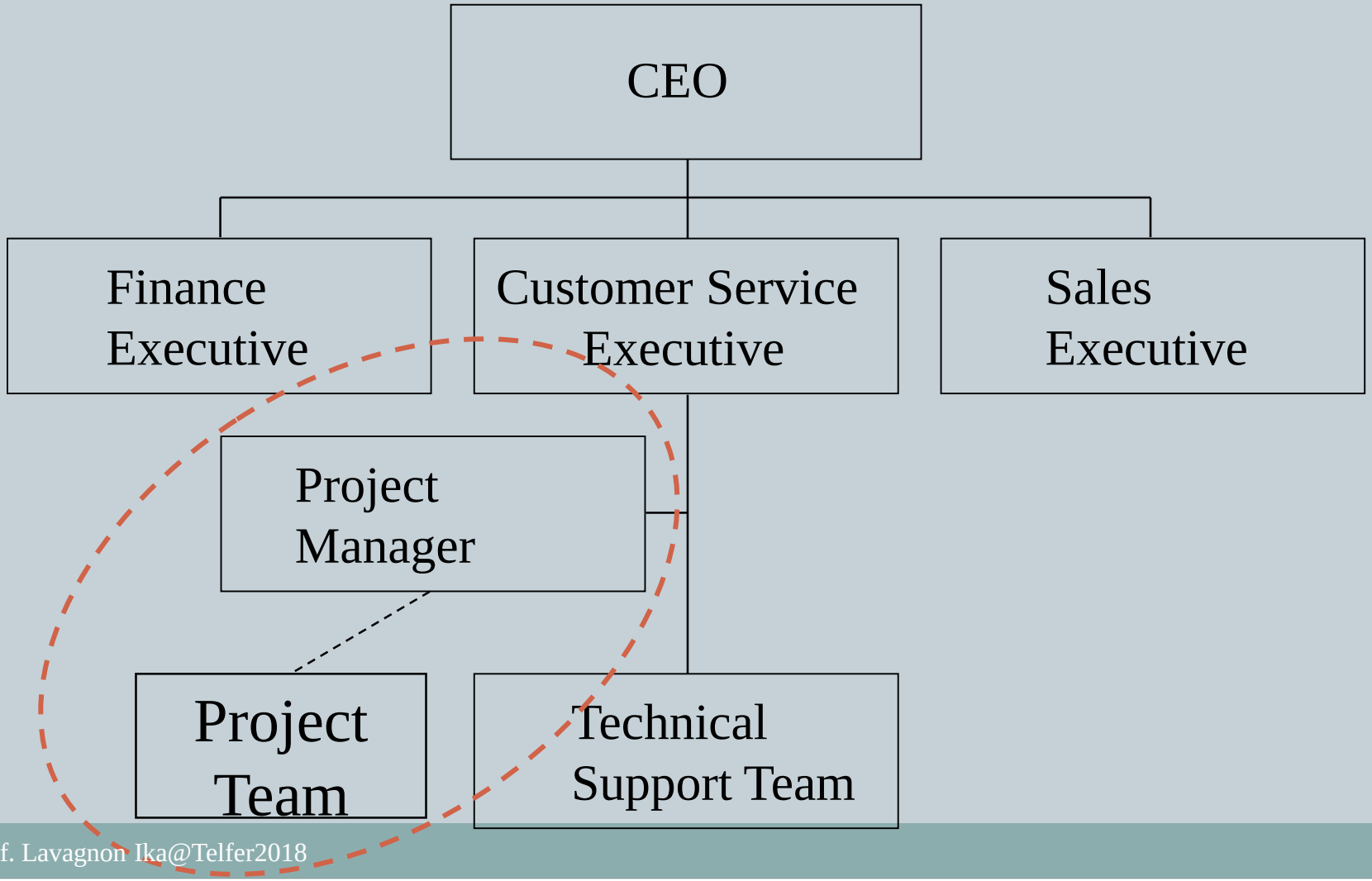
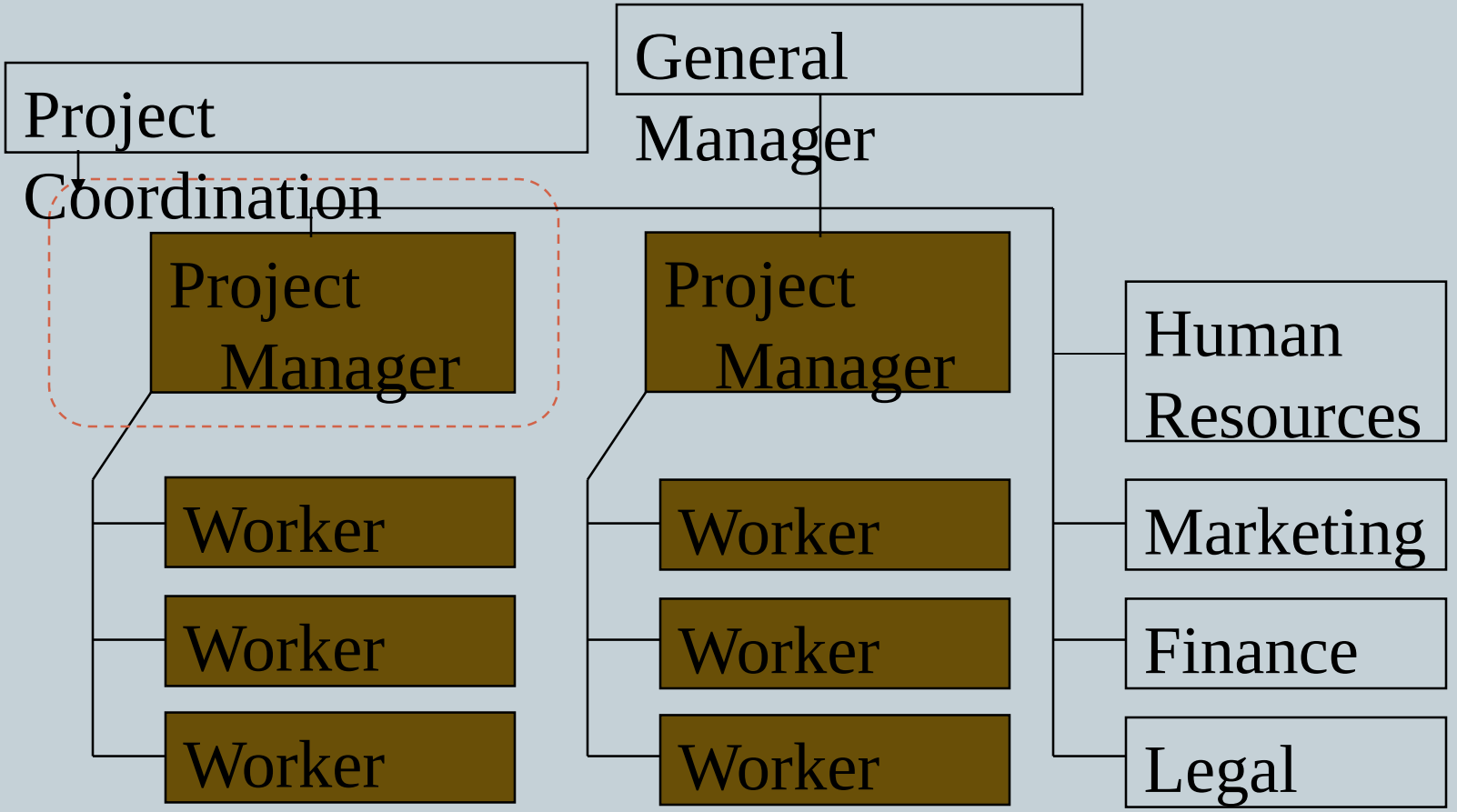
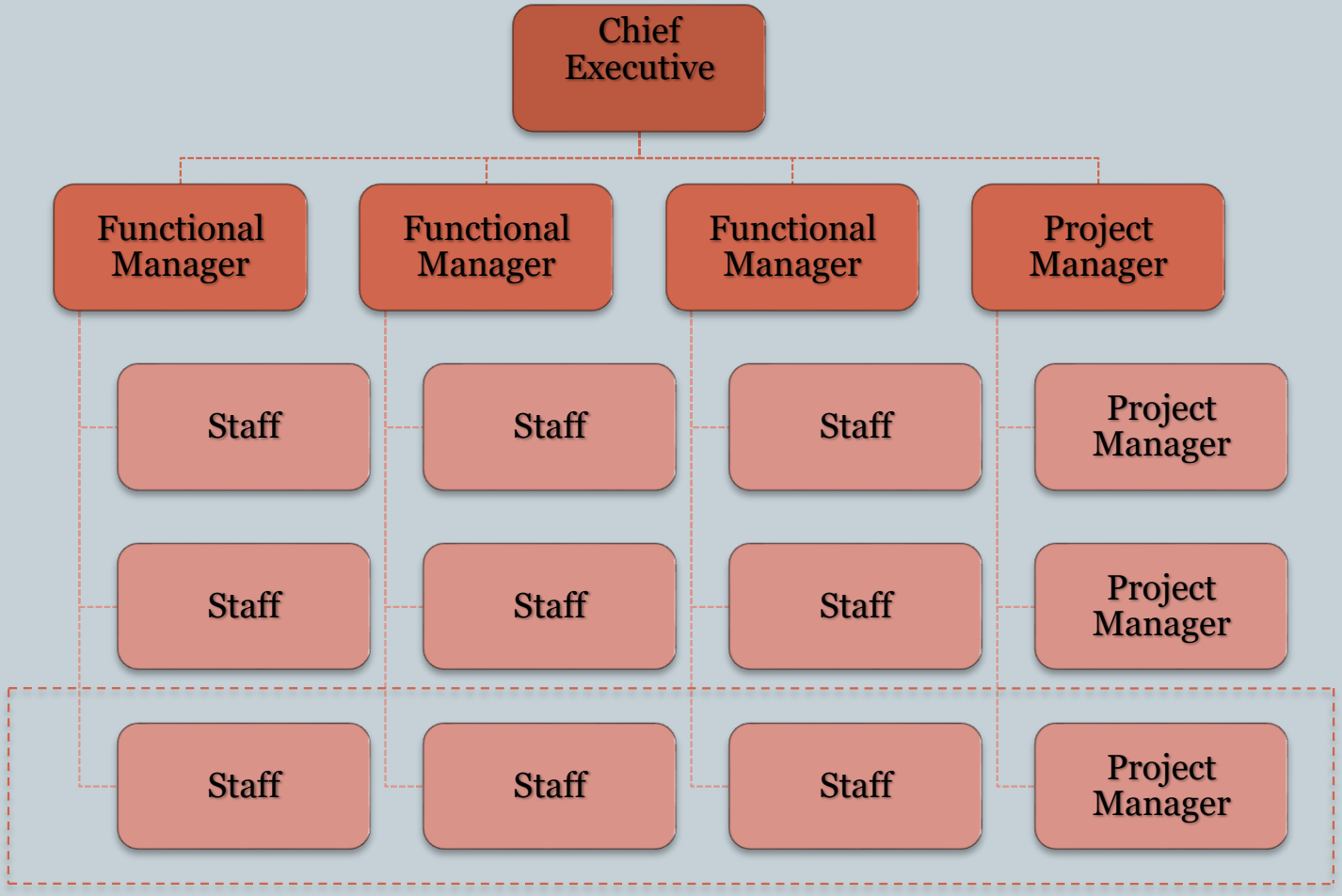
Organizational Planning : Functional Organization Example



Organizational Planning : Projectized Organization Example



Organizational Planning : Matrix Organization Example



Operational Planning

3.3 OPERATIONAL PLANNING

How long the project will take?

&

When and in which sequence can we get it done?

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Work Package

WBS Code	Task	Predecessors	Duration (week)	Resource
1.1.1	A	-	1	Peter
1.1.2	B	A	5	John
1.1.3	C	A	2	Jane
1.1.4	D	A	3	Jane
1.1.5	E	B,C,D	3	Peter

Operational Planning:From the WBS to the Project Network

- The WBS subdivides the project into smaller and smaller work elements; it is a map of the project
- But the WBS does not show the relationships between project activities; it tells you what to do but not how to do it (in which sequence)
- The project network is a visual flow diagram of the sequence, interrelationships, and dependencies of all the activities that must be done to complete the project (Larson & Gray, 2011).

Project Networks

- PERT (Program Evaluation and Review Technique)
  - Set up in 1950s – POLARIS project
  - Task durations are considered probabilistic
- CPM (Critical Path Method)
  - Set up in 1950s - DuPont de Nemours
  - Task durations are considered determinist and directly controllable

Critical Path Identification

- Determine the duration of tasks and their dependencies
- Determine the earliest times (Forward Pass)
- Determine the latest times (Backward Pass)
- Determine the slack of each task
- Identify every critical task (i.e., slack = 0)

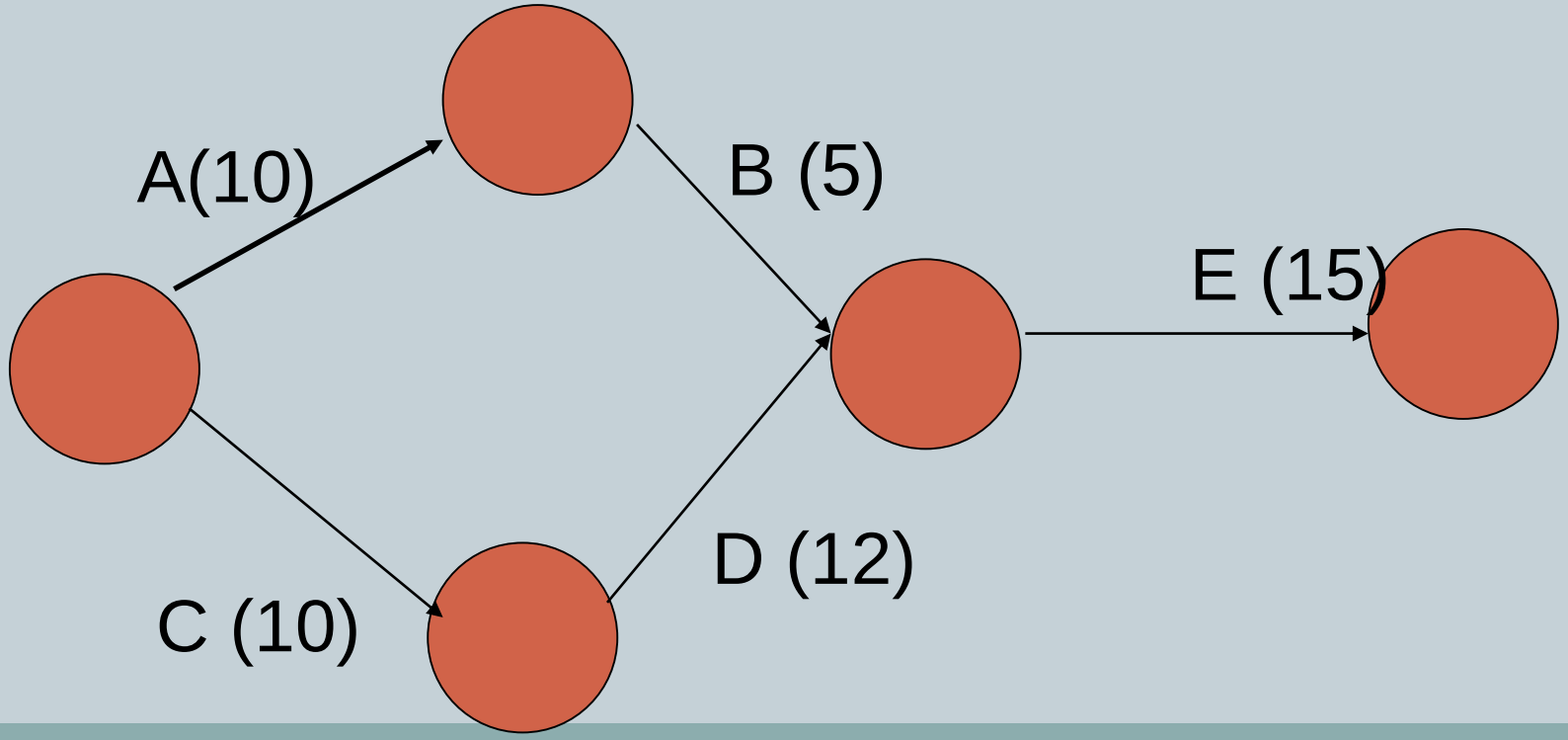
CPM Method: Case Study Alpha Project

Task, Duration and Predecessors

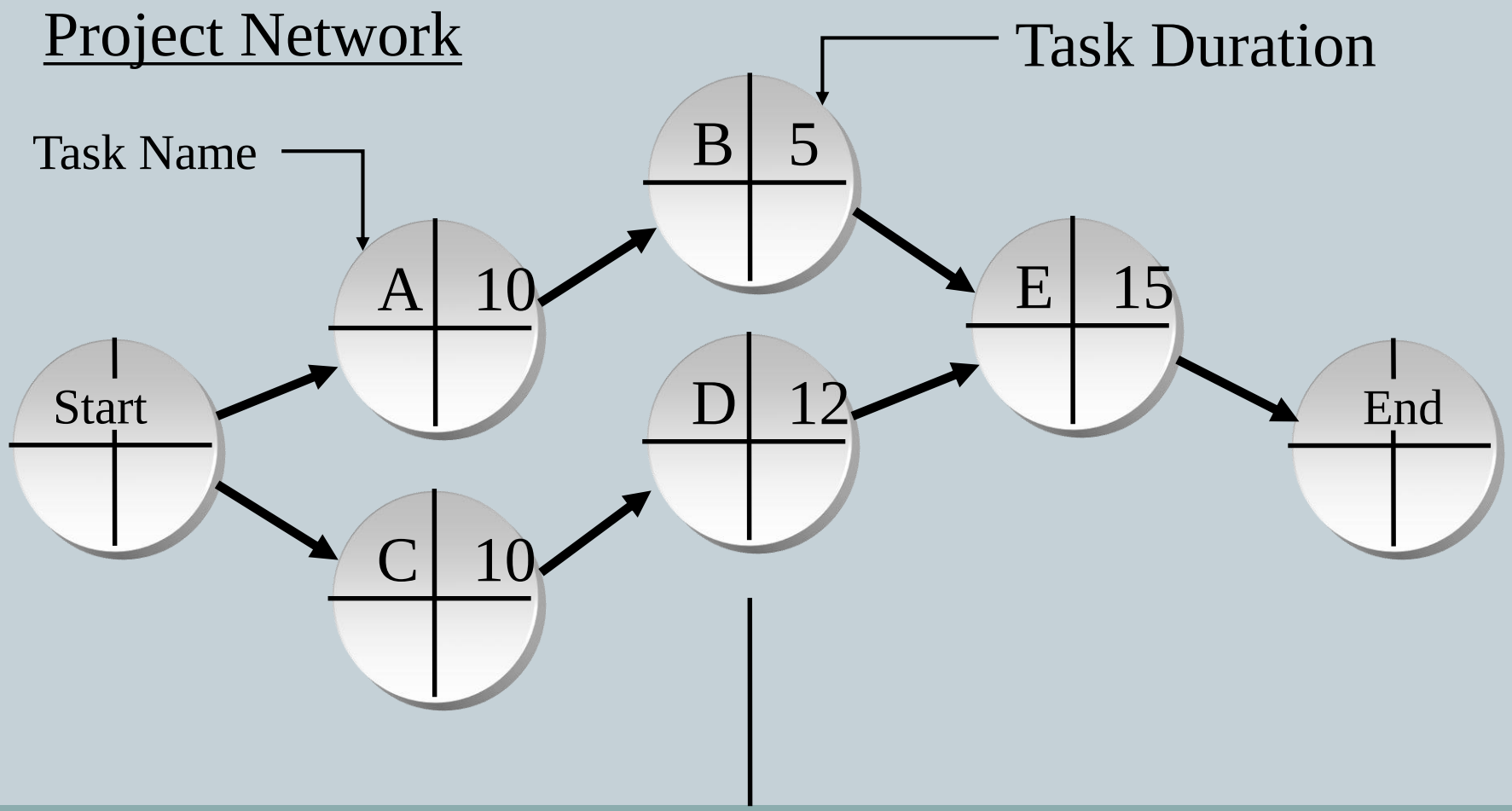
Task	Normal Duration (Day)	Predecessor
A	10	---
B	5	A
C	10	----
D	12	C
E	15	B, D

Activity-on-Arrow Network

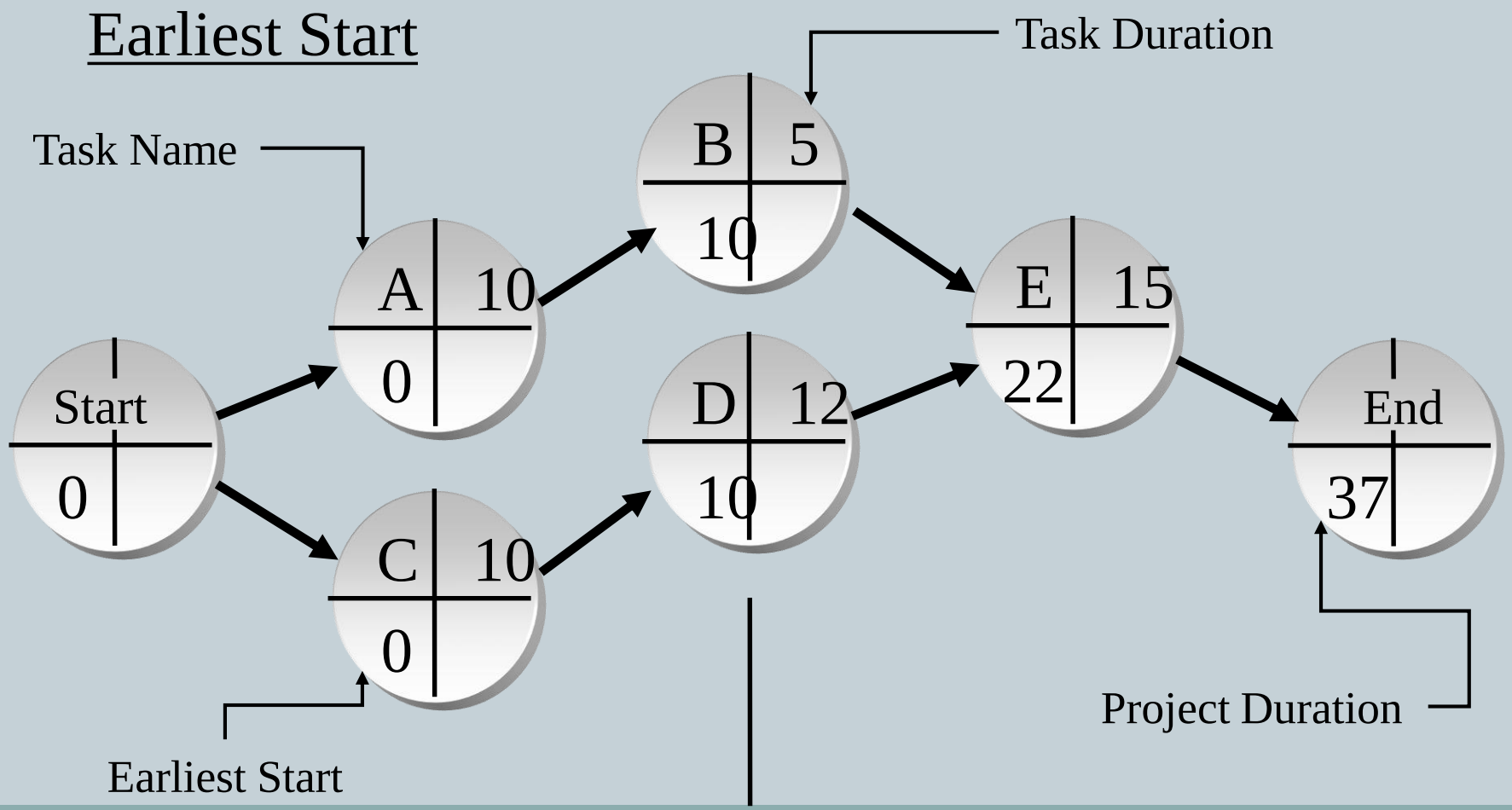
Project Network



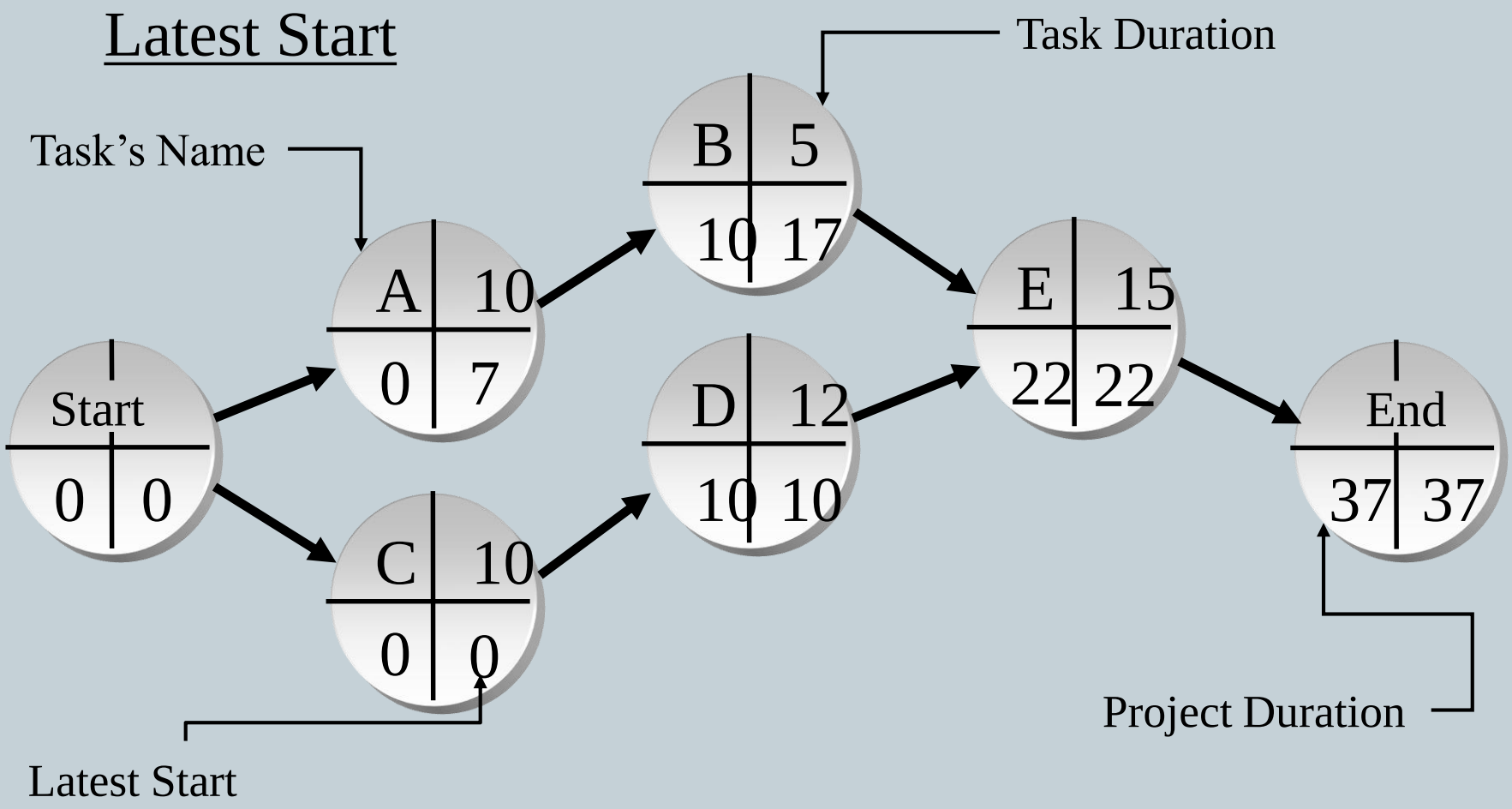
Activity-on-Node Network



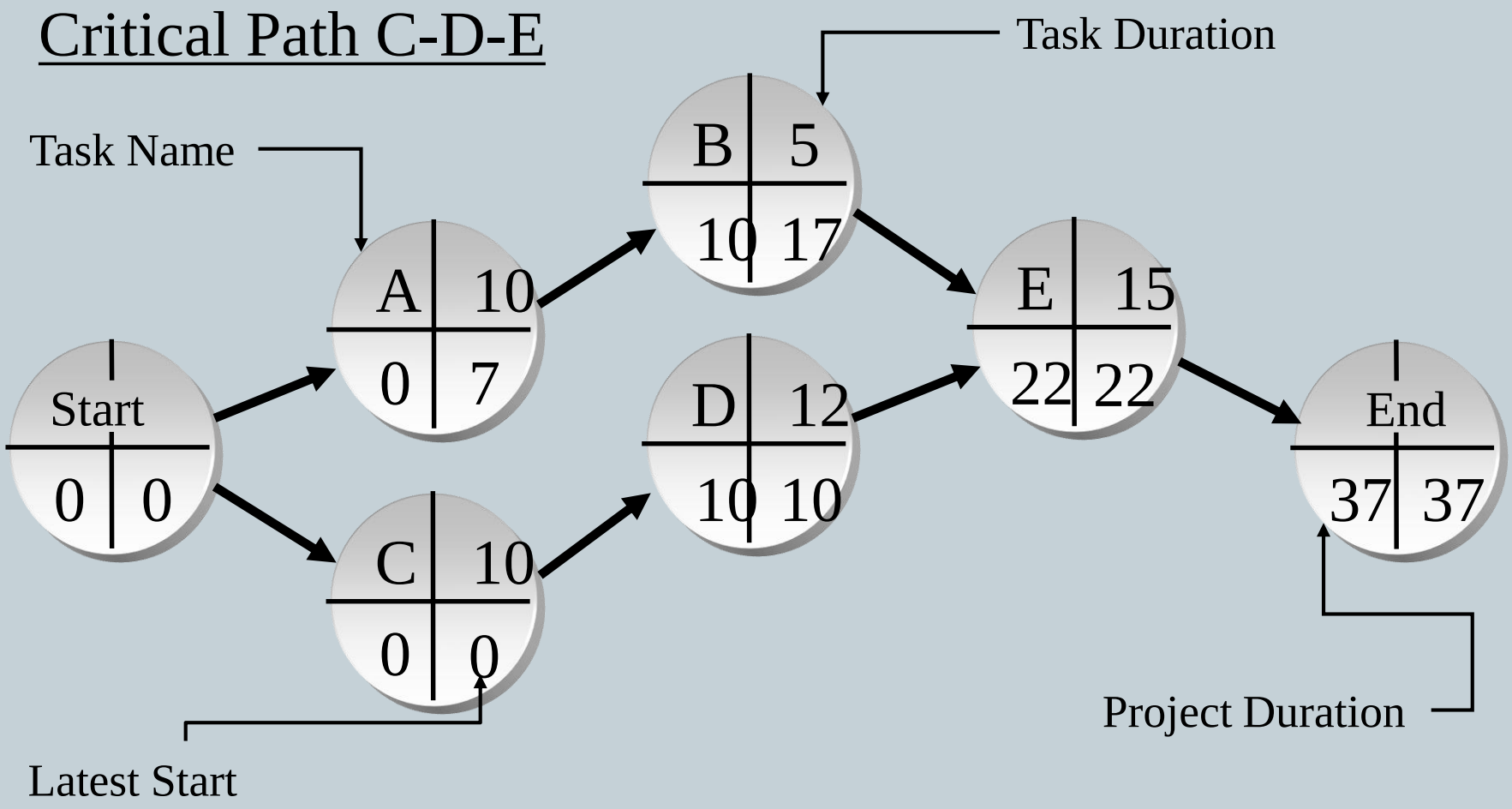
When can the individual activities start and finish (at the earliest) if no delays occur?



When can the individual activities start and finish (at the latest) if no delays occur?



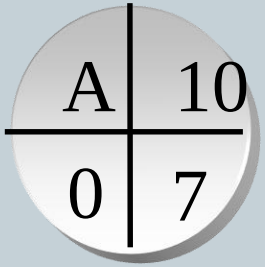
Critical Path Identification

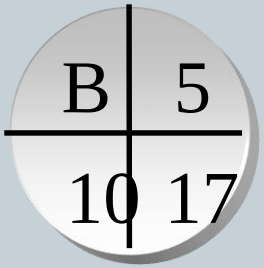


How much delay can be tolerated without delaying project completion?

- Noncritical tasks (A, B)
  - Certain tasks can be delayed without delaying project completion

  (→ non critical tasks)
- Slack = Latest Start – Earliest Start





Slack = 7 - 0
= 7

Slack = 17-10
= 7

The PERT's Three-Estimate Approach

The formula

- PERT three-estimate approach
  - *m = most likely estimate,*
  - *o = optimistic estimate,*
  - *p = pessimistic estimate.*

$$Mean = \mu = \frac{a + 4m + b}{6}$$

$$\text{Variance} = \nu = \left(\frac{b - a}{6} \right)^2$$

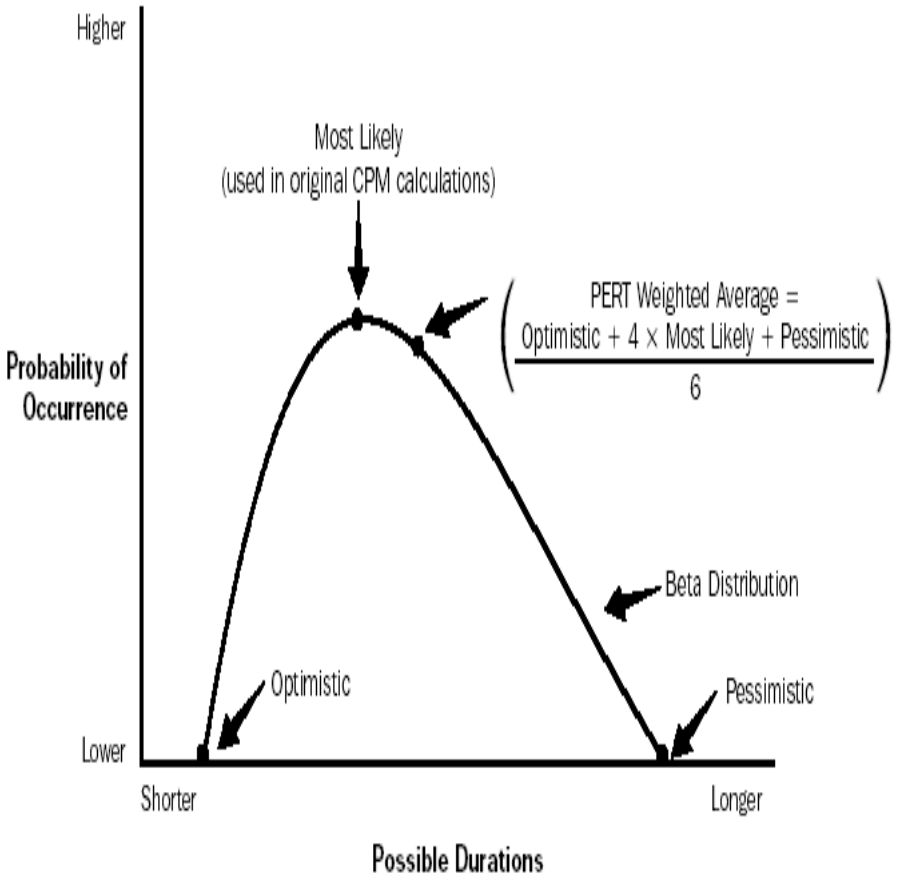


Figure 6-4. PERT Duration Calculation for a Single Activity

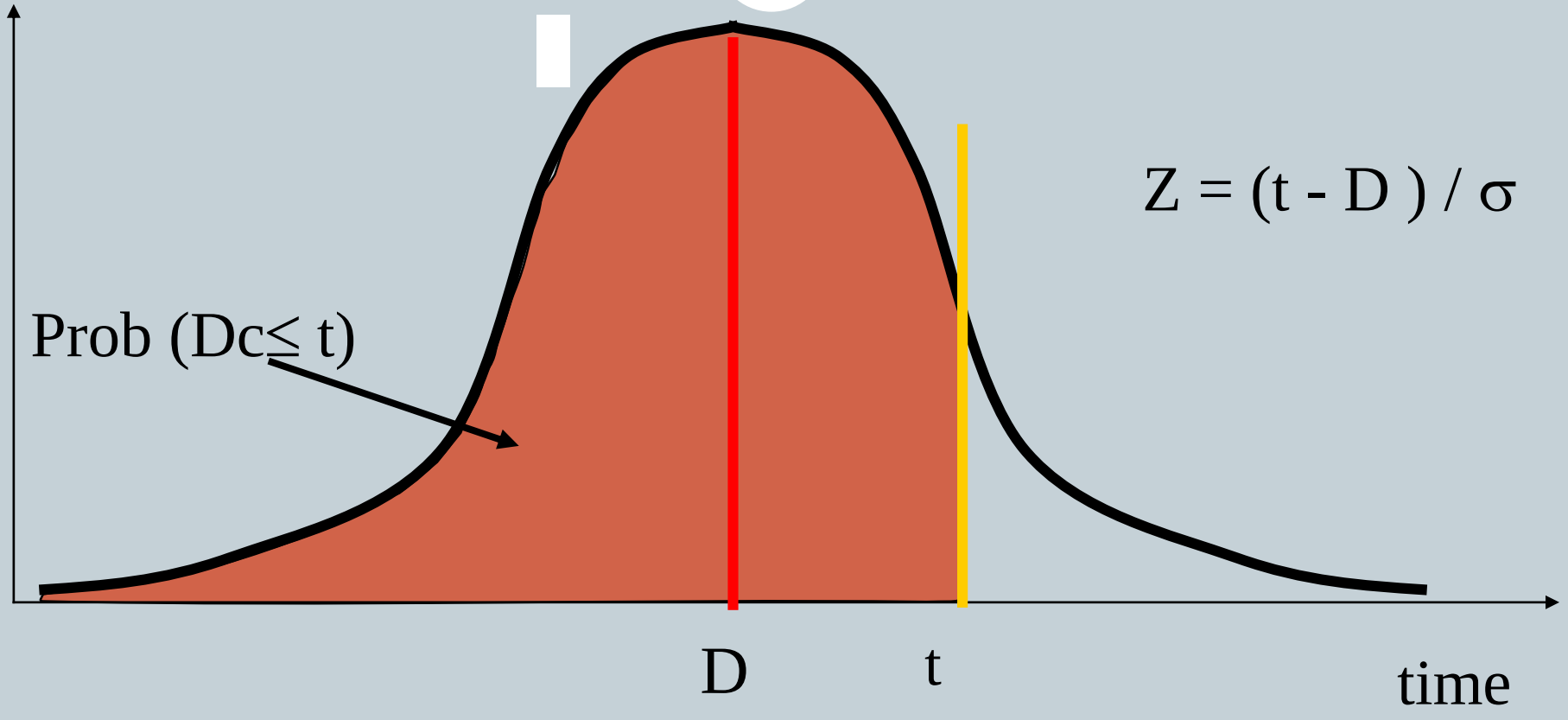
PERT : Estimation of the Project Duration

- ***PERT*** *assumes that task duration follows a beta probability distribution*
- ***Project duration distribution (the duration of the critical path Dc): The sum of many independent random variables with the same distribution converges towards a random variable of a normal distribution;***

D= Sum of the task durations on the critical path

V = Sum of the task duration variances on the critical path

Probability the project will be completed in time



Prob (Dc≤ t), compute Z and use the standardized normal distribution

PERT Method : Case Study Alpha Project

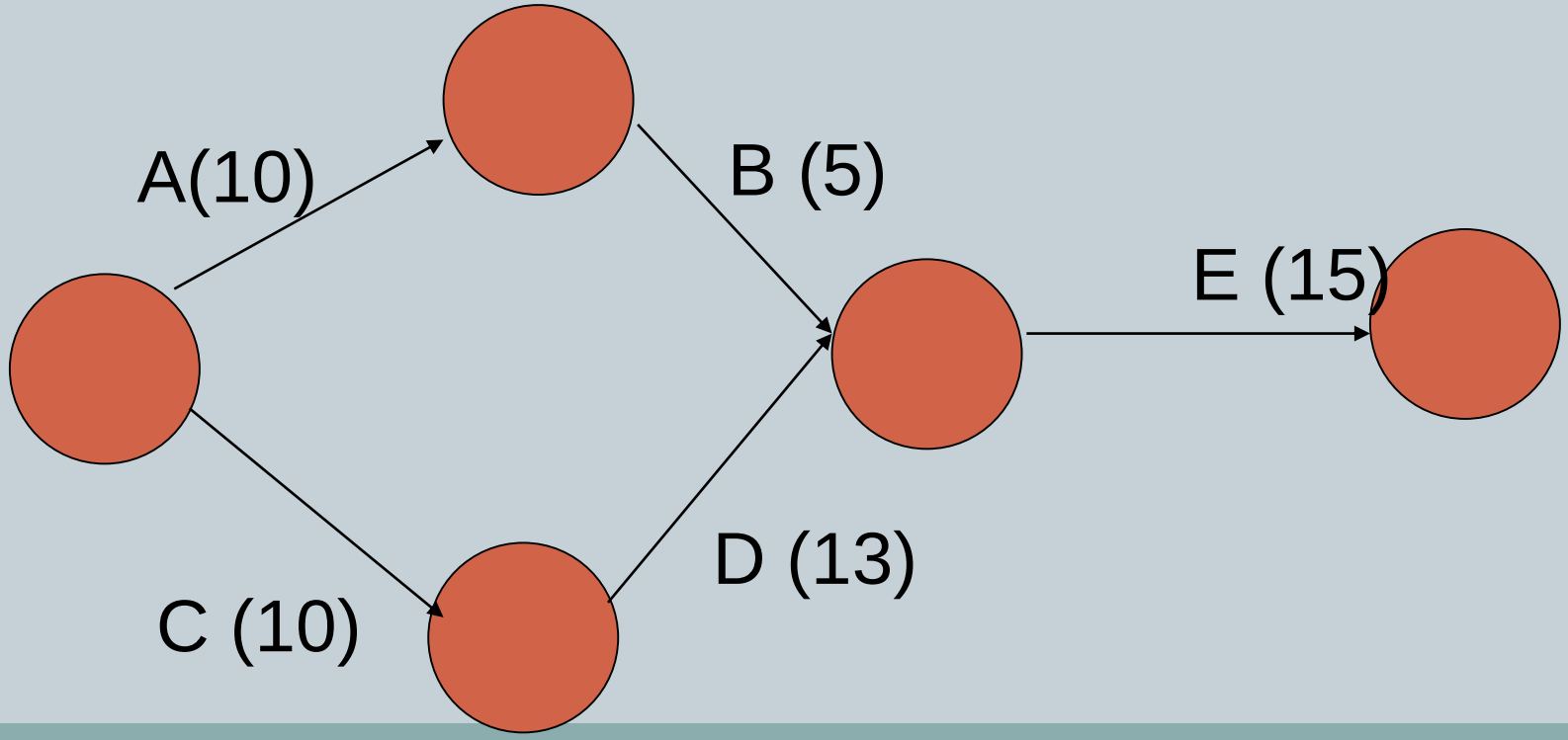
Task	Optimistic Time	Most Likely Time	Pessimistic Time	μ
A	8	10	12	10
B	4	5	6	5
C	8	10	12	10
D	10	12	20	13
E	14	15	16	15

(Estimated) Project Duration

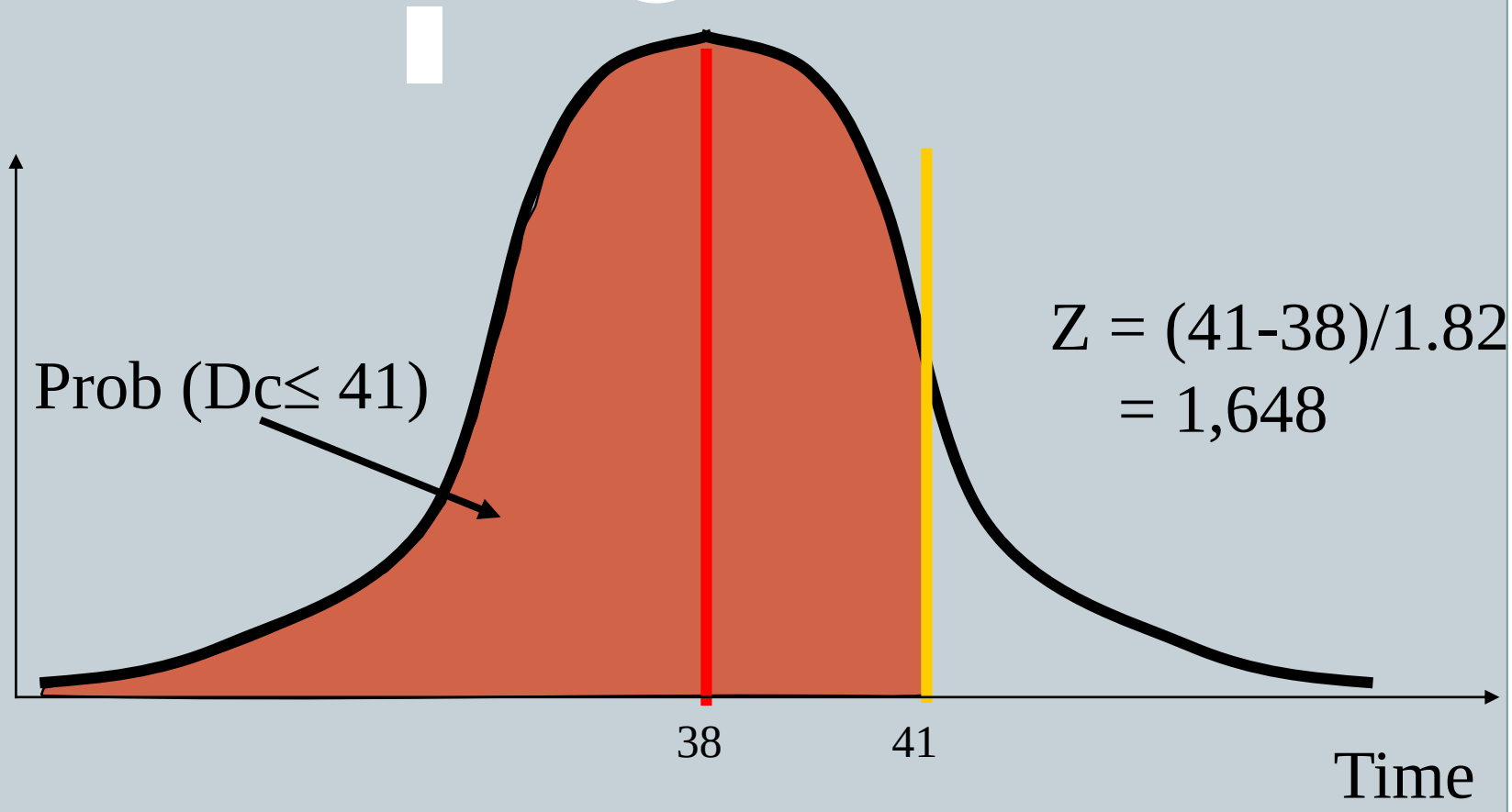
Critical Path: C-D-E;

Dc = 38

Vc =3.33



What is the probability the project will be completed within 41 days?



at Z = 1,65 Prob (Dc≤ 41) = 95%

Budget Planning

3.4 BUDGET PLANNING

How much will the project cost?

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Resource Scheduling

3.4.1. RESOURCE SCHEDULING

Do we have the right resources?

&

How much flexibility do we have in using them?

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Resource Scheduling Problems

- Project network times are not a schedule until resources are assigned but projects may have limited resources.
- **Either Resource Smoothing/Leveling**: Resources are adequate but their demand may vary a lot over the project lifecycle; so, evening out resource demand by delaying noncritical tasks (using slack) to lower peak demands and thus, increase resource utilization; is the way to go
- **Or Resource-Constrained Scheduling**: resources not adequate to meet peak demands, then late start of tasks must be delayed and project duration increased
- Source: (Gray & Larson, 2011)

Resource Scheduling and Smoothing : Case Study Alpha Project

Let us consider the time-constrained Alpha project (i.e., project duration fixed and resources flexible) (see the following resource constraints table)

Let us then assume that a maximum of 4 programmers can work each week throughout the project duration.

Question: Do you think there is a resource over-allocation?

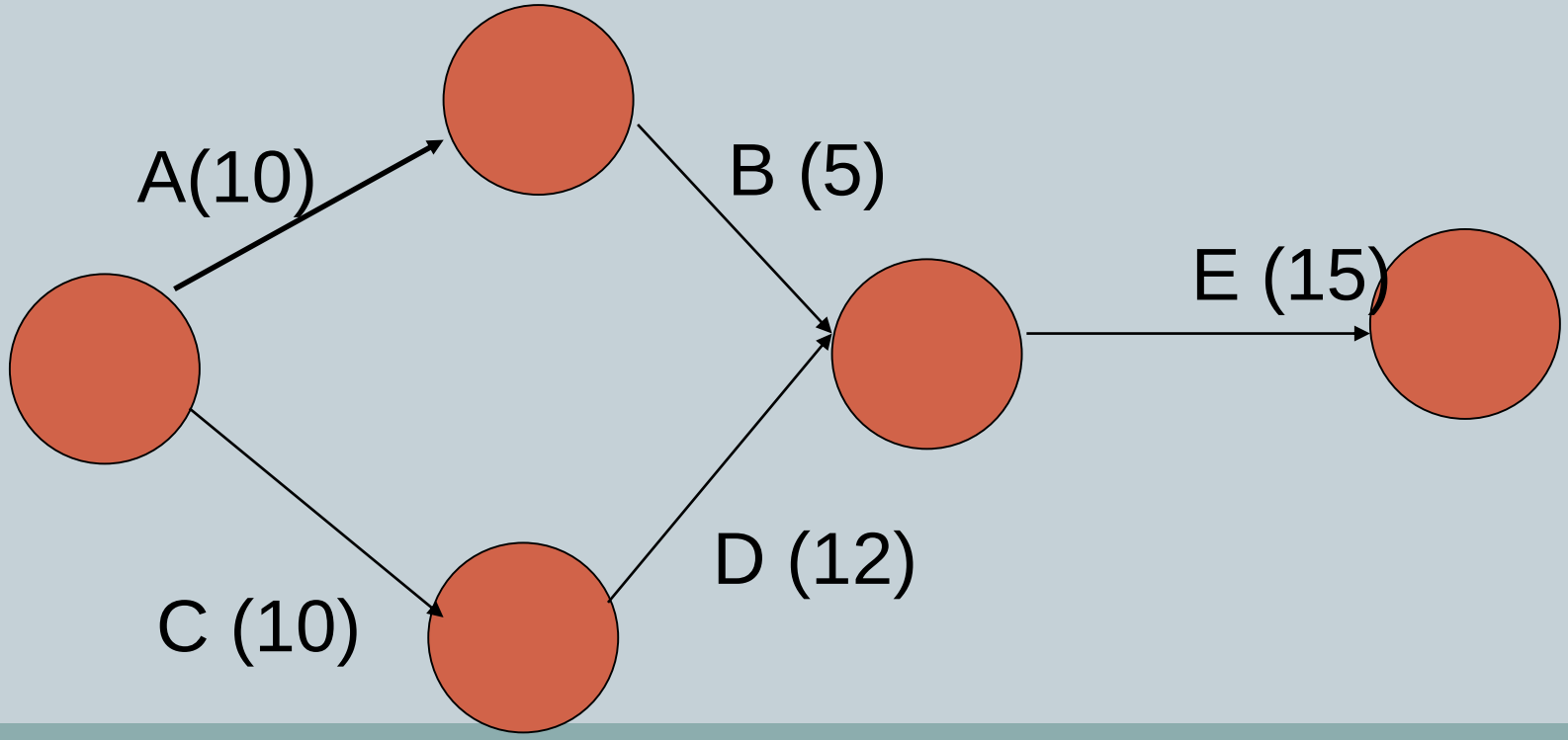
If so, even out the resource (programmers) allocation so that this constraint of 4 programmers per week maximum be met.

Resources Constraints

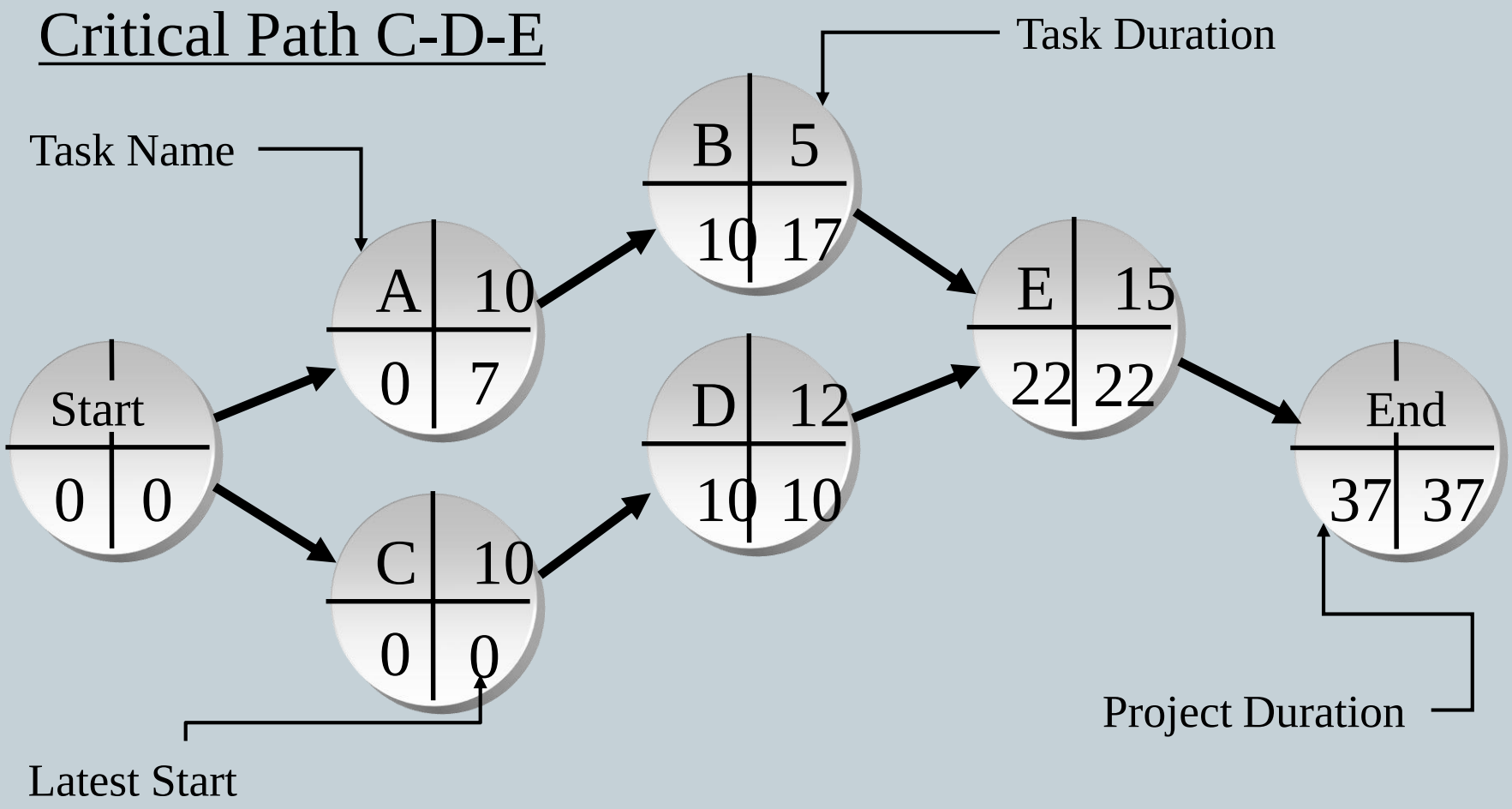
Task	Resources Required	
A	1P 1st week	2P 2nd week
B	2P	
C	1P 1st week	2P 2nd week
D	1P	
E	1P	

Alpha Project Network

Project Network



Critical Path Alpha Project



Resource Smoothing: Initial Schedule

Week / Task	1	2	3	4	5	6	7	8
A	1P	2P						
B			2P					
C	1P	2P						
D			1P	1P	.4P			
E					.6P	1P	1P	.4P
Total	2P	4P	3P	1P	1P	1P	1P	.4P

Resource Smoothing : Final Scheduling

Week / Task	1	2	3	4	5	6	7	8
A		1P	2P					
B				2P				
C	1P	2P						
D			1P	1P	.4P			
E					.6P	1P	1P	.4P
Total	1P	3P	3P	3P	1P	1P	1P	.4P

Budget Planning

3.4.2. BUDGET PLANNING

How much will the project cost?

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Budget

- **Sum of these 3 elements** :
  - **Variable costs**, i.e., that rise directly with the size of a specific project task (material; labor, wages etc.)
  - **Fixed costs**, i.e., incurred directly by a specific task (PM's salary; insurance; taxes; etc.)
  - **Contingency Reserve** (overheads; profits, etc.)

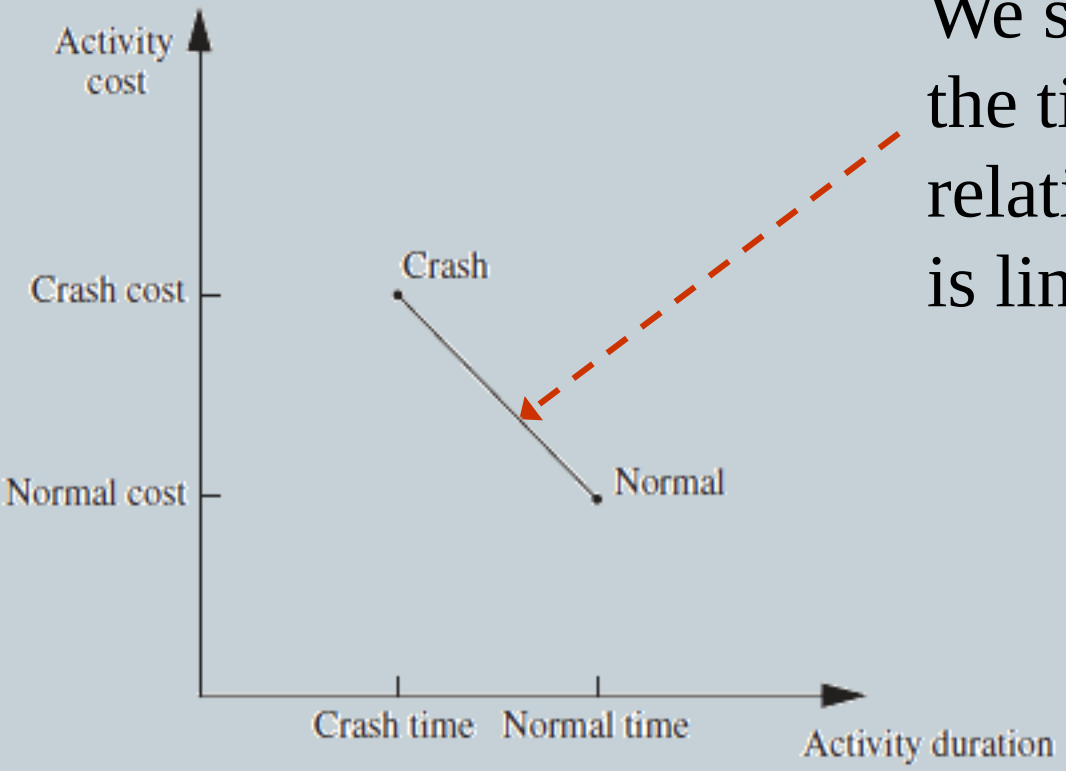
Estimating Task Cost

- Establish the WBS and project network
- Find valid cost estimate per task
- Calculate cost per time unit of each task
- Determine total cost per time unit
- Optimize costs

Note: Consider every type of cost :

- Fixed vs. variables
- Direct vs. indirect
- Distribution between tasks; and in time

Time-cost graph for an activity



We suppose that the time-cost relation of a task is linear.

Time-cost Trade-off

- Consider that the estimated completion of your project is beyond what your boss publicly promised an important customer.

- You will then have to reduce project duration but at the least possible cost: this is called project "crashing"

Crashing a Project

- Only consider critical tasks
- List all of the alternatives
- Choose the most rewarding alternative or the cheapest
- Reduce one or more alternative tasks' duration until either :
  - Time objective is reached
  - A task duration may not be reduced further
  - A task that wasn't critical becomes critical
- Repeat the process until one alternative meets the final target

Crashing the Alpha Project

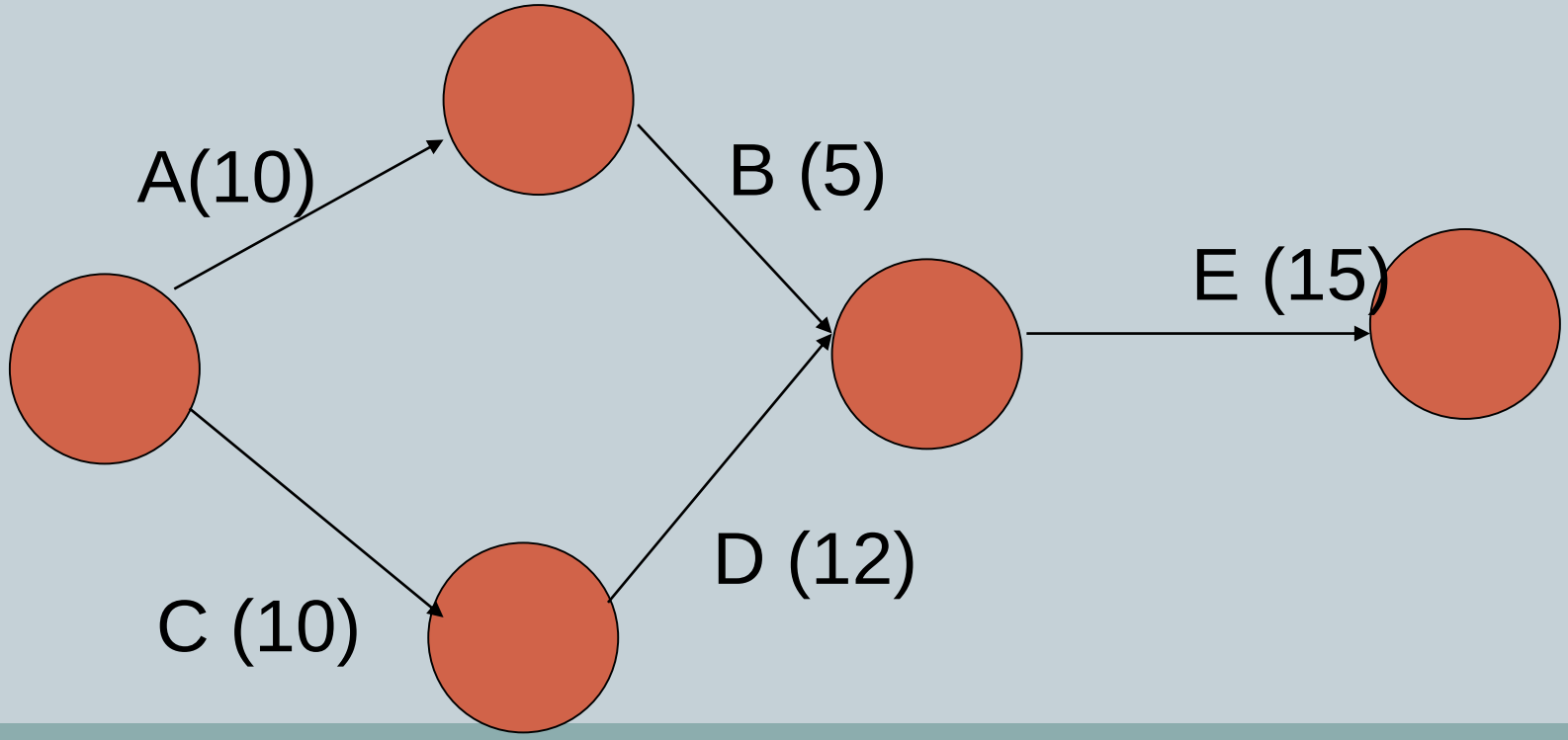
Alpha Inc. would like to win a governmental software contract

This contract estimates 32 days for the project completion and, if a delay occurs, sets the penalty at 10 000$ per day.

Question: Should the project manager accept the penalty or consider the alternative?

Alpha Project Network

Project Network



Alpha Project Estimates

Task	Crashed Duration	Normal Duration	Possible Reduction	Normal Cost	Marginal Cost/day
A	8	10	2	20 000	10 000
B	4	5	1	5 000	2 500
C	8	10	2	5 000	2 500
D	10	12	2	10 000	5 000
E	14	15	1	15 000	7 500

Solution

- Normal Cost= 55 000
- Crashing C (2), D (2) and E(1) (5 days total)
- Crash Time: 32 days
- Crash Cost: 22 500
- Total Crash Cost: 77 500

From where we say time-cost trade-off…

Time-Cost Trade-Off

Plan 1: time 37 days, cost 55 000 $

Plan 2: time 32 jours, cost 77 500 $

Comments ?

Is the planning over? Not really…You may also need the control plans!

- Communication management plan
- Quality management plan
- Change management plan
- Risk management plan
- Procurement management plan

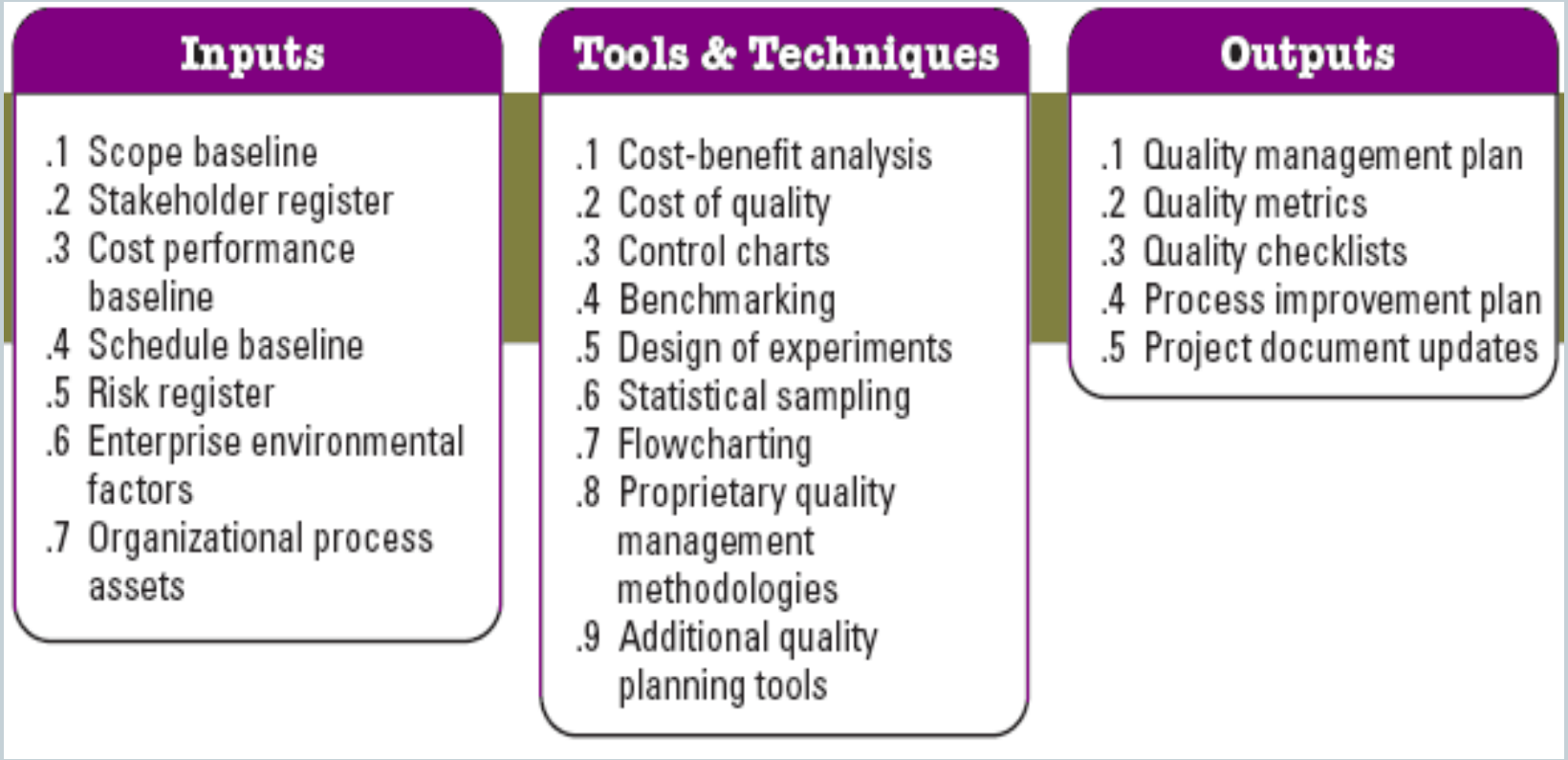
Project Communication Plan: The Matrix

From	To	Frequency	Format	Media
Project Manager	Management	Weekly	Status Report	Meeting, Memo
Project Manager	Core Team	Weekly	Questions and follow-ups	Email
Core Team	Project Manager	Weekly	Status Report	Email or meeting
Employees	Core Team	As requested	Time Sheet	Paper Document

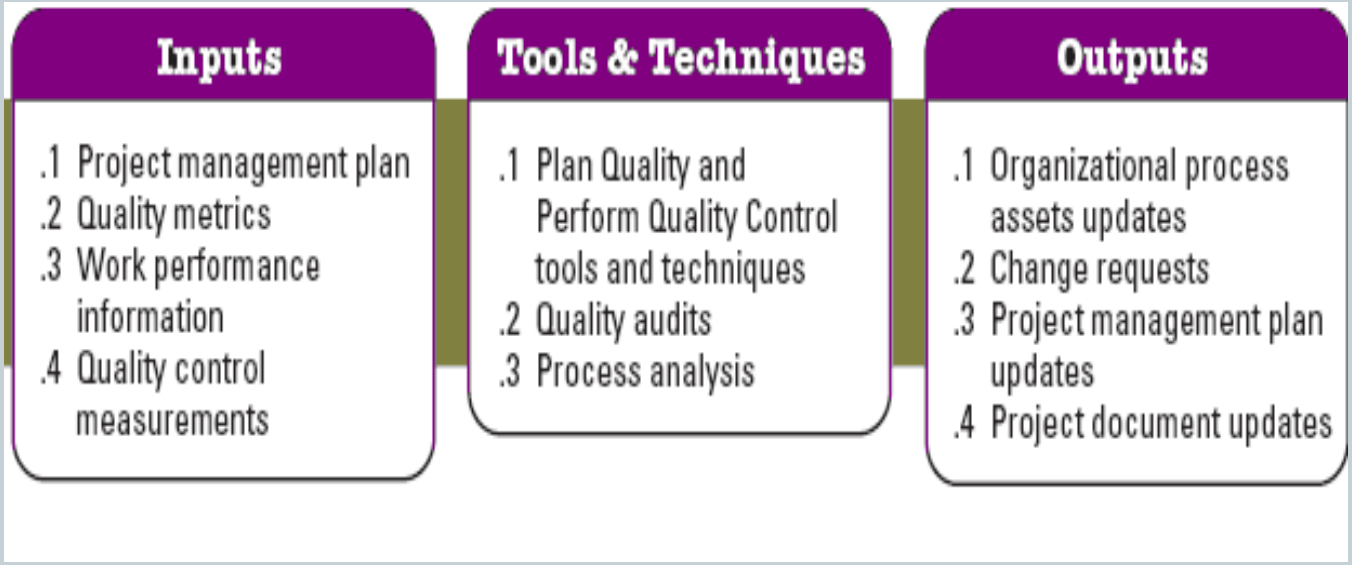
Project Change Management: The Change Request Form

Change Request Form 157	
Project Name	
Project Number and Date Requested	
Requestor's Name	
Part 1: Change notification (to be completed by Project Manager)	
Description of Change	
Reasons and Benefits for Change	
Part 2: Impact on Schedule, Cost, Resources and Quality	
Impact on Schedule	
Impact on Resources and Costs	
Impact on Deliverables Quality	
Part 3: Change Resolution (to be completed by Requestor)	
❑ Change Approved ❑ Change Approved with Comments ❑ Change Not Approved Mark as Appropriate	**Project Manager or Sponsor**
For Action or Comments	

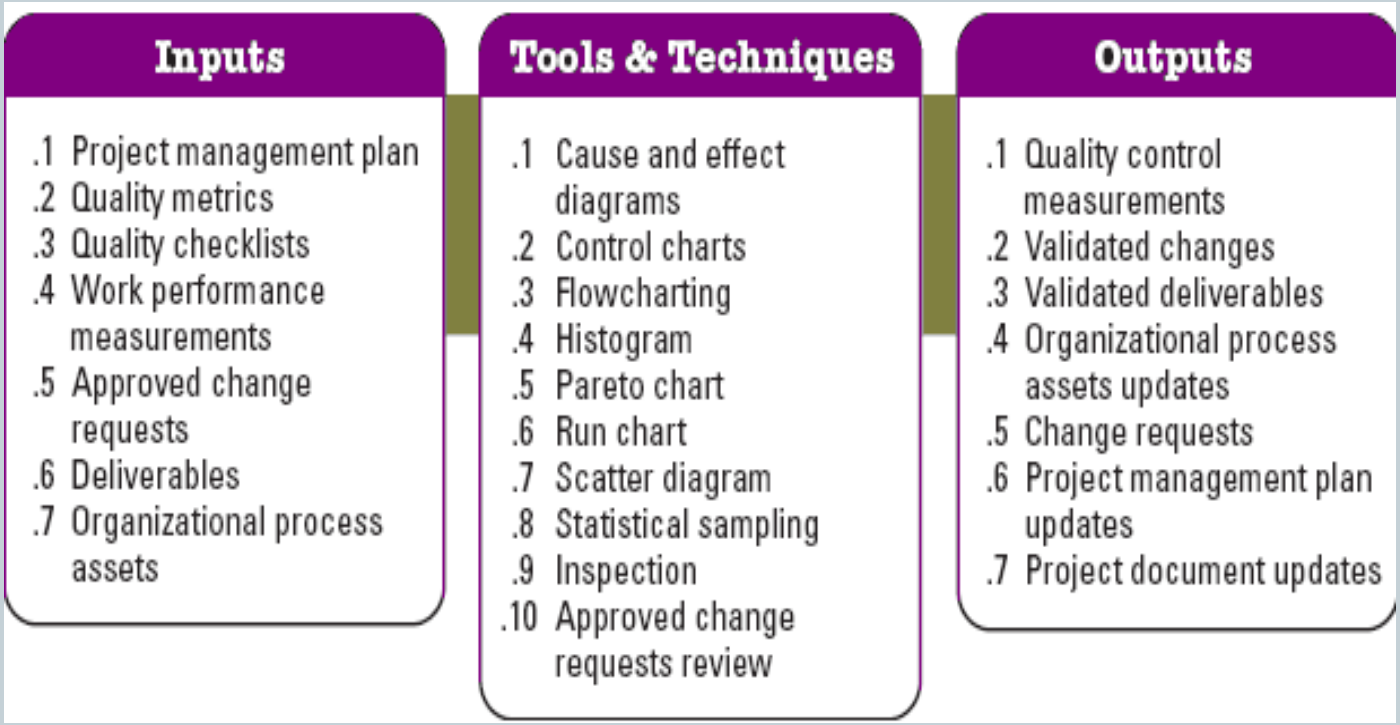
Quality planning flowchart



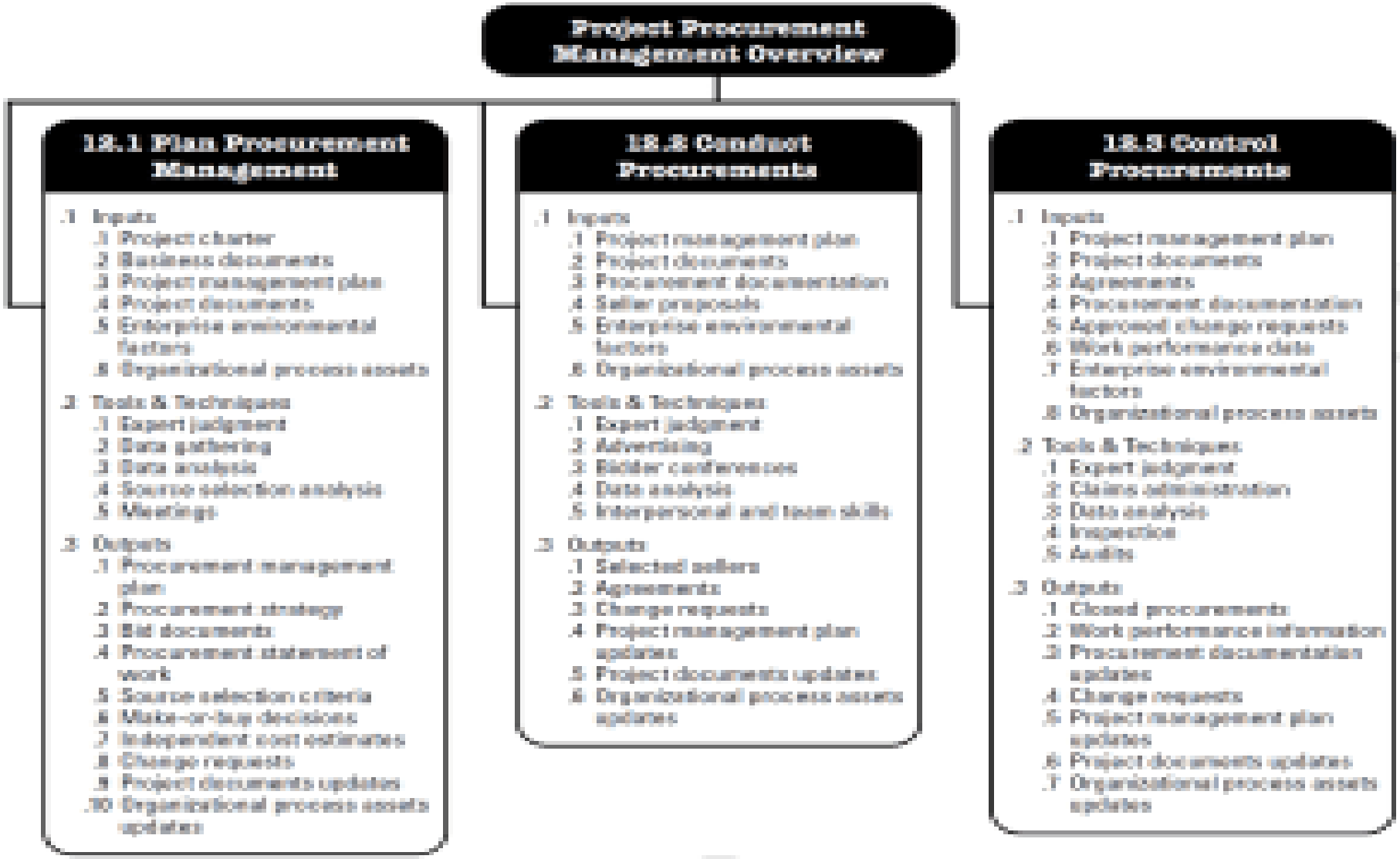
Quality Assurance Flowchart



Quality control flowchart



Project procurement management



Hands-on Workshop or Apply What You Are Learning…

- Take the Via Rail Project and discuss its planning

- Then fill in a few key sections of its project plan and share your answers with the class.

ADM 4103:Project management

IV PROJECT EXECUTION & CLOSING

How to do the work?

&

How to finish it well?

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ADM 4103:Project management

4.1 PROJECT EXECUTION

Creating project deliverables

&

Controlling and monitoring the work

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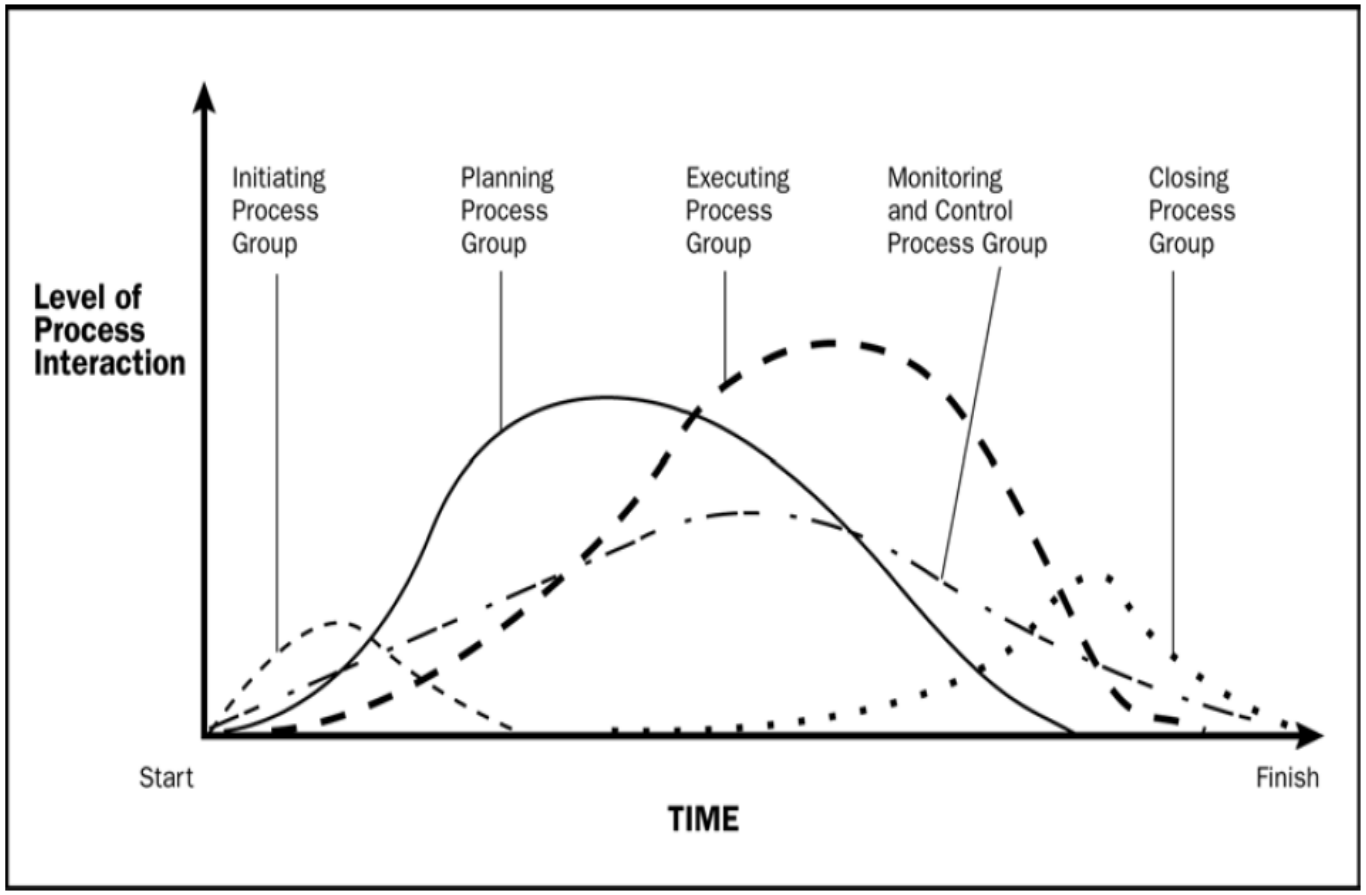
Project Execution Phase



Source : PMBOK Guide 3rd Edition

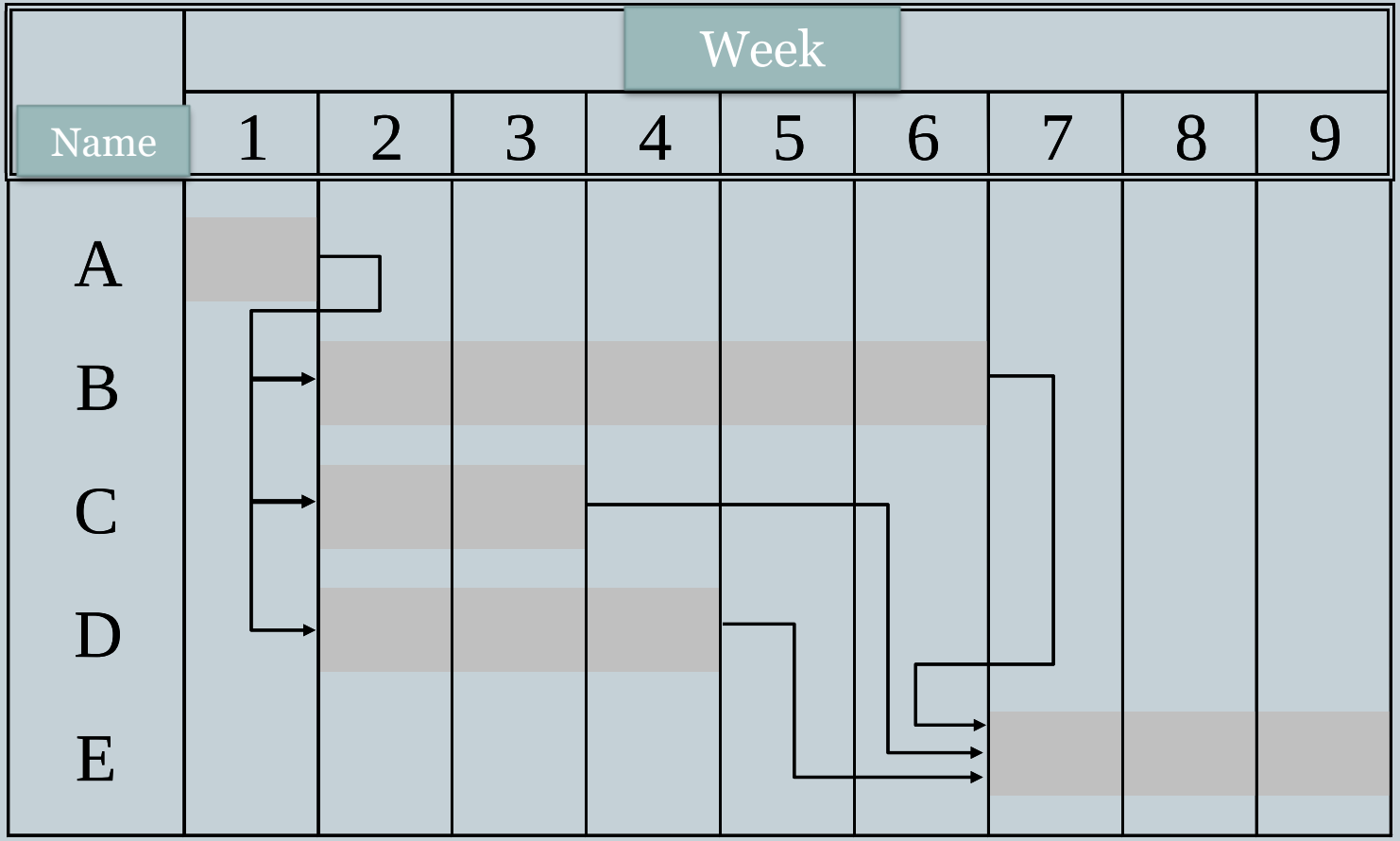
- Building the physical project deliverables and presenting them to your customer for signoff
- The longest phase of the cycle and the most expensive in terms of resources and energy

Doing the work

- Obtaining authority to proceed.
- Setting project baselines.
- Assembling project team.
- Creating work packages.
- Holding kickoff meetings.
- Monitoring work.
- Developing the team.

Source: Mingus (2002)

Baseline Plan



Project Control and Monitoring

- Review and update control plans (communication; quality; change; risks; procurement)

- Collect appropriate metrics to more effectively plan the next project (schedules, costs, resources, risk level, quality level of deliverables, etc.)

- Evaluate project status
- Compare baseline to actuals
- Apply corrective measures for getting project back on track and review project documentation

Source: Mingus (2002)

Following control plans

- Communication (create logo, slogan, and templates for meetings, status reports, etc.)
- Change (gather requests; forward them to whom it may concern; getting approval or denial ; and communicating that, etc.)
- Quality (review standards; quality control; perform any necessary updates, etc.)
- Procurement (RFPs or bid announcements; gather and evaluate proposals; and select contractors; secure contractor reports)
- Risks (review plan, reevalute contigency plan, update risk plan, etc.)

Status Report

Portfolio Status Report

as of 17 August 2010

Project Name	Time	Resource	Risks	Issues	Changes	Cost
Project 1						
Project 2						
Project 3						
Project 4						
Project 5						

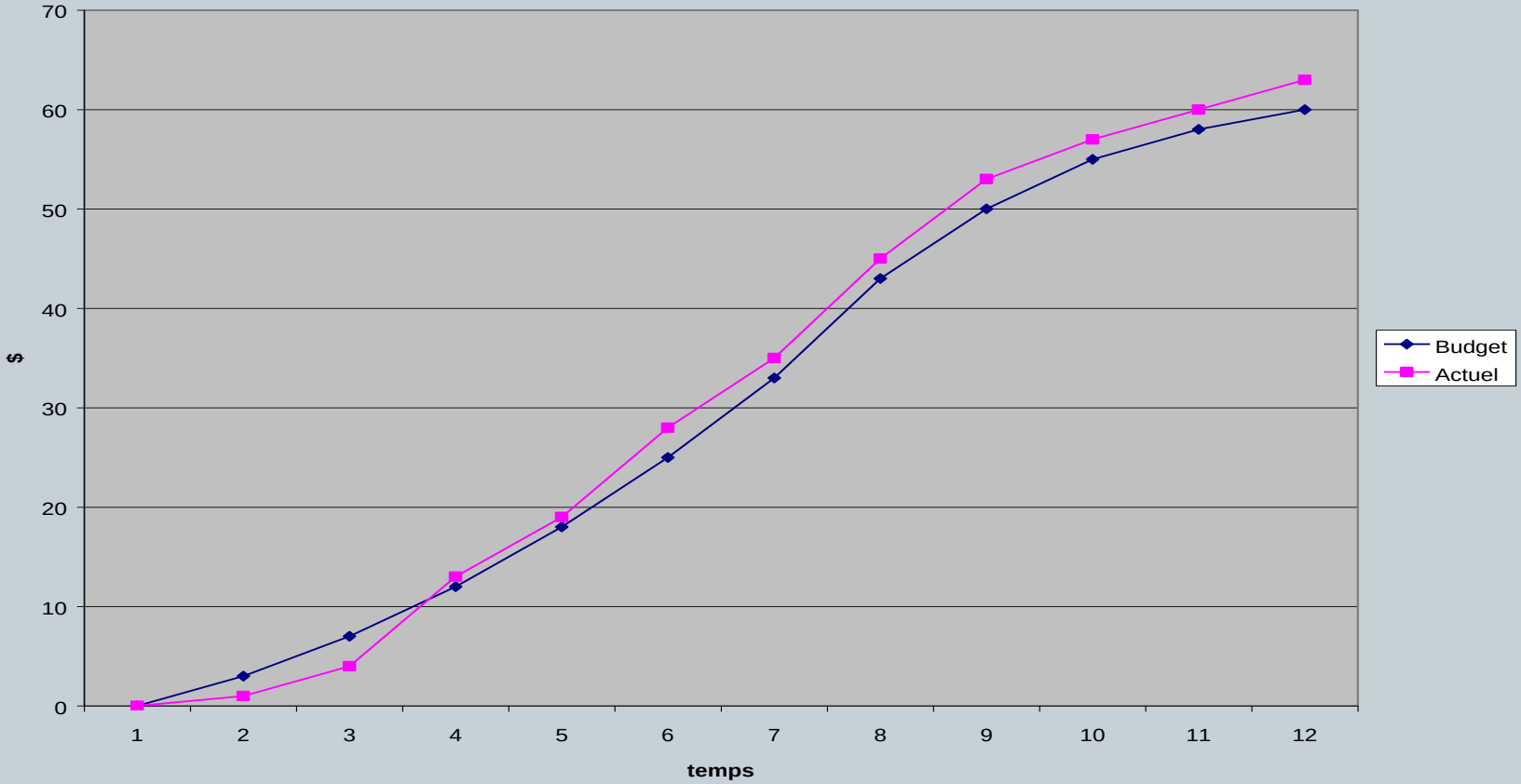
Project	Ahead of Schedule	Percent Complete	Resource Availability	Planned Finish Date	Risks	Issues	Changes	Budget Remaining
Project 1	-58%	42	87%	5/24/2010	3	3	3	-$10,544
Project 2	-60%	40	87%	5/24/2010	0	0	0	N/A
Project 3	-13%	87	87%	5/24/2010	0	0	0	N/A
Project 4	0%	100	87%	5/24/2010	0	0	0	N/A
Project 5	-100%	0	87%	5/24/2010	0	0	0	N/A

Source : Projectmanager.com

Cost control : Is there a budget overrun?

- Actual Cost VS Baseline Cost ?
- What is the actual status of the project?
- According to that status, what is the difference between the actual and the baseline costs? (*earned value or budgeted cost of work performed, BCWP*)?
- Any schedule or cost variances?
- How much will the project exceed the baseline total cost?
- Calculate the estimate at completion
  (**% complete x actual costs to date (in $)**)

Cost Control Objectives



Minimize margin between budget and actual cost

What is earned value or how do we know we have done what we said we would do?

- "Earned Value Analysis" is an industry standard way to measure a project's progress, forecast its completion date and final cost, and provide schedule and budget variances along the way.
- Based on just 3 data points, it can provide consistent, numerical indicators with which you can evaluate and compare projects.
- **Three key metrics**:
- Earned Value or Budgeted Cost of Work Performed (BCWP): How much work was done?
- Planned Cost or Budgeted Cost of Work Scheduled (BCWP): How much work should have been done?
- Actual Cost or Actual Cost of Work Performed (ACWP): What did the work that was actually done actually cost?

Earned Value and the math

- Schedule Variance (**SV**)**:**
  SV = BCWP - BCWS
  Negative means Behind Schedule

- Schedule Performance Index (**SPI**):
  SPI = BCWP / BCWS
  Less than 1.00 means Behind Schedule

- Cost Variance (**CV**):
  CV = BCWP - ACWP
  Negative means Over Budget

- Cost Performance Index (**CPI**)
  CPI = BCWP / ACWP
  Less than 1.00 means Over Budget

Earned Value determination: An example

The house builder Brigil estimates the following schedules and costs for the construction of new Condos (appartments).

- the delivery of 5 units at a cost of $ 100, 000 each in May
- the delivery of 10 units at a cost of $ 100, 000 each in June
- the delivery of 10 units at a cost of $ 100, 000 each in July
- the delivery of 5 units at a cost of $ 100, 000 each in August

However, at the end of June, only 10 units were built and delivered instead of 15 as scheduled, for a total cost of $ 1, 100, 000.

Assignment: Do the math and determine the earned value at the end of June for the project and tell us what it means

Earned Value calculation

BCWP (end June) = 10 condos delivered X 100 000
= $1, 000, 000 (this is what the condos would have cost if the builder had stuck to the budget);
Hence Earned Value = $ 1, 000, 000

BCWS = 15 condos scheduled X 100 000
= $ 1, 500, 000$ (The cumulative budget planned for end of June)

ACWP = $1, 100 ,000$ (Total amount of expenses incurred for the 10 condos delivered at the end of June)

Cost and schedule variances?

- Cost Variance

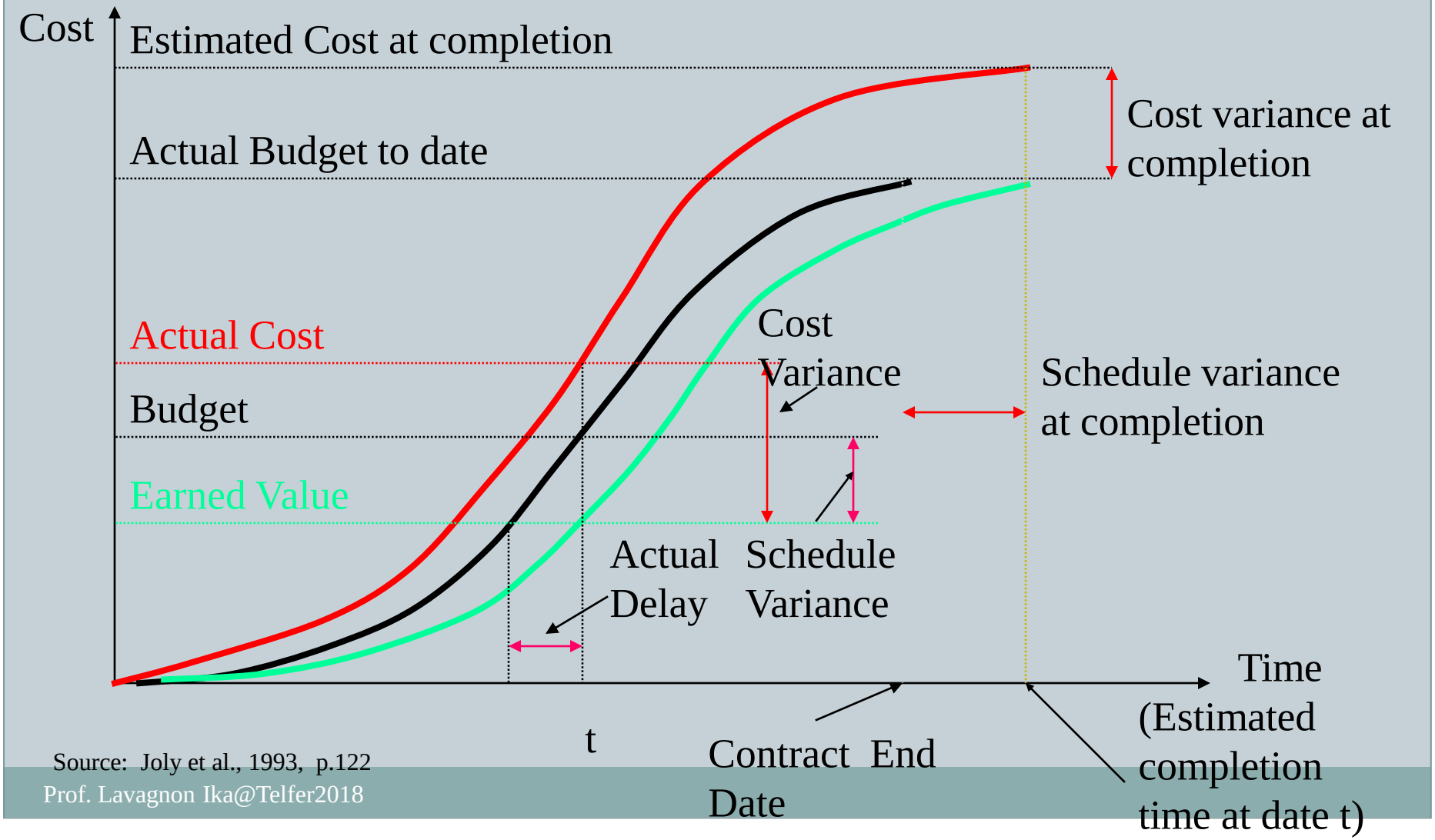
  CV = BCWP – ACWP = 1, 000, 000 – 1, 100, 000 = **- $ 100 000**
  (the buildder has spent $ 100 000$ more than planned)

- Schedule Variance

  SV= BCWP – BCWS = 1, 000, 000 – 1, 5 00, 000= **- $ 500 000**

  (the builder is $ 500 000 late in the work performed as compared to what was scheduled)

Following project status



Source: Joly et al., 1993, p.122

Limitations of Project Control Process

- Project execution relies heavily on the plans developed in the planning phase.
- Allocated time for this phase must be well calculated and added as a resource.
- The control phase costs can be high.
- It isn't a tool to evaluate human resources performance.
- Projects fail due to inattention to basic control principals.
- Controlling the activities, not the persons.
- Validity of metrics collected may be an issue.

ADM 4103:Project management

4.2. PROJECT CLOSING

Killing or terminating the project: when and how?

&

Learning from the experience

Prof. Lavagnon Ika@Telfer2018

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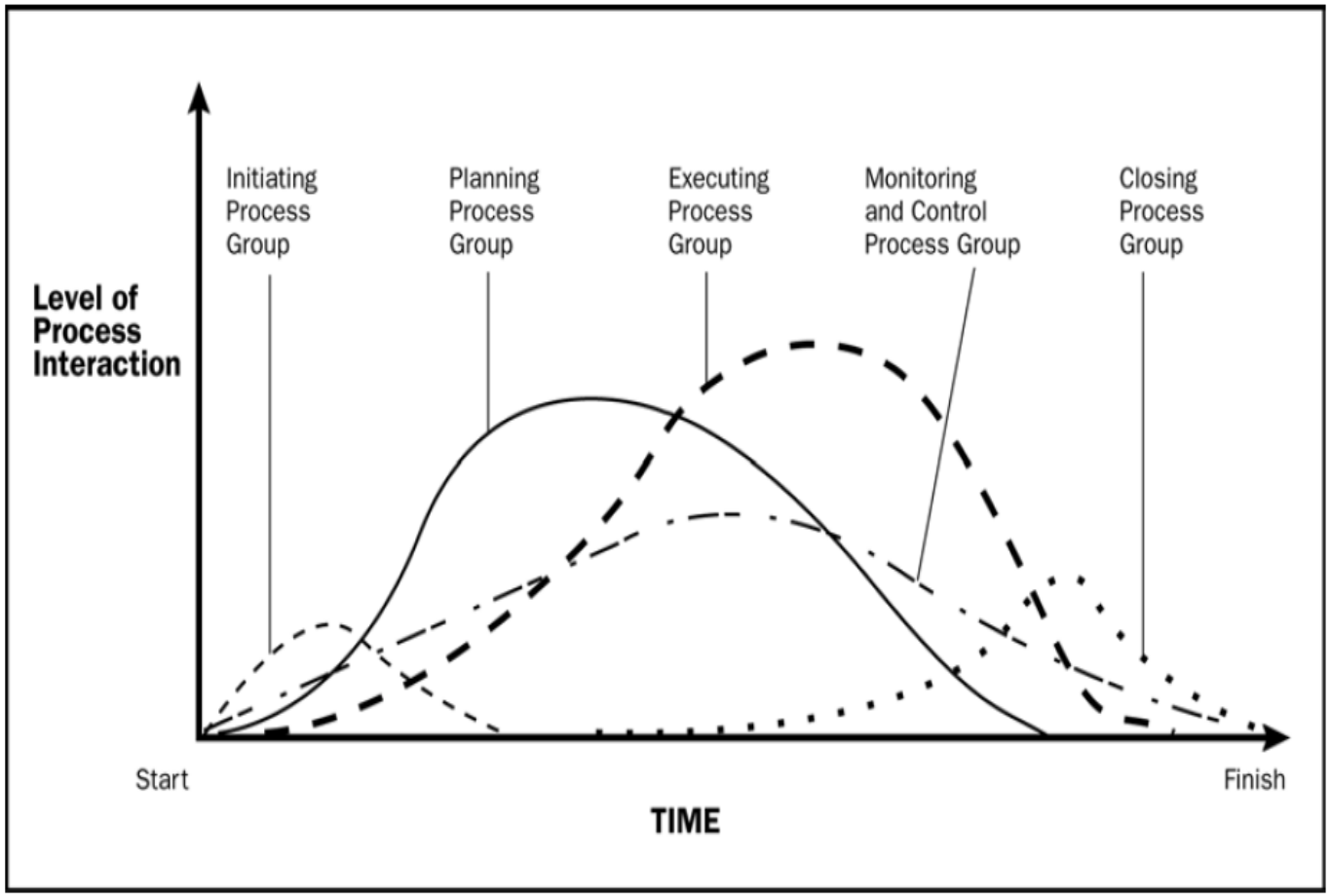
Closing Process



- Last phase of the project life cycle
- It is when the project is put to a formal end

Source : PMBOK Guide 3rd Edition

Two not easy questions to answer to…

- Should we kill the project before its normal end date?
- If so, when should we end it so that the cost doesn't get too high?

Closing Process

- Finishing the work
- Evaluating the project; learning lessons from the project and keeping record of the experience

Source: Mingus (2002)

Finishing the work

- Review and update completion plan
- Review the deliverables, comparing them to the delivrables listed in the project plan, and make sure each matches the quality and completeness requirements also noted in the plan
- Turn over to your client and make sure the delivrables are meeting their quality standards
- Close the contracts
- Pay final invoices
- Getting sponsor or client signoffs and keep all project documention
- Disband the team project and reassign team members to other tasks if necessary

Source: Mingus (2002); Langevin (2007)

Evaluation and Lessons Learned

Objective: Wrapping up the project; collecting project data and thus analyzing project efficiency and effectiveness; and learning from the experience for future reference.

Task:

- Conducting client and team satisfaction surveys
- Performing a lessons-learned session
- Writing a project summary report

Approaches

Short-term formative and summative assessments (objectives, time, and cost)

Outcome evaluation

Source: Mingus (2002)

Evaluation Questions

Outcome Analysis

- What is the project outcomes? Results?
- Compare the projet plan and the outcomes.
- Why are there differences?
- What worked? What didn't work?

Project Management Analysis

- How was the project handled?
- How did the implementation go?
- Did the organizational structure help to the implementation? And how?

Final Report

- Overview of the Project
- Analyse Outcomes
- Analyse Project Management
- Recommendations
- Lessons Learned
- Executive Summary

Sources: Mingus (2002)

Hands-on Workshop or Apply What You Are Learning…

- Take the Via Rail Project and discuss its execution issues and challenges

- Then share your answers with the class.