

INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT : “CPIS334”



DR. USMAN ALI KHAN & DR ADNAN ALBAR

DEPARTMENT OF INFORMATION SYSTEMS
FACULTY OF COMPUTING &
INFORMATION TECHNOLOGY
KING ABDUL AZIZ UNIVERSITY,
JEDDAH, KSA

Basically S/W engineering consist two major part.

- 1. Making the software**
- 2. Managing the software**

What is a Project ?

A temporary and one-time endeavor undertaken to create a unique product or service, which brings about beneficial change or added/ extra value

A project has a unique purpose. Every project should have a well-defined objective.

Projects are temporary in nature and have a definite beginning and ending date.

Projects are completed when the project goals are achieved.

A successful project is one that meets the expectations of your stakeholders.

PROJECT STAKEHOLDERS

Definition:

People who are directly or indirectly involved in the project activities.

Direct – PM, engineer, labor, consultants..

Indirect – sponsor, customer etc..

What is project and what is operation

Project is non routine one time activity

While operation is ongoing activities.

Basically developing an ODUS+ s/w is project

but running the ODUS+ s/w any time that is

operation.

EXAMPLES OF PROJECT

Building Construction

Software Development

CPIS-334

Satellite Launching

A project has the following characteristics:

A start and end date: projects have dates that specify

when project activities start and when they end.

Resources: time, money, people and equipment, used by the project. For example, to produce a brochure you will need a team (designers, copywriters, creative directors, etc.), equipment (computers, printers, paper, delivery trucks, etc.) and money to pay the salaries/fees, buy equipment, and so on.

An outcome: a project has a specific outcome such as new highway, a satellite, a new office building, a new piece of software, and so on.

Why are organizations using project management?

- Today's highly competitive business environment forces organizations to make high-quality products at a lower cost and in a shorter duration.
- Organizations therefore are increasingly using project management because it allows you to plan and organize resources to achieve a specified outcome within a given timeframe. The techniques of project management also help you manage and anticipate risks in a structured manner. Surveys of organizations using project management have shown that project management allows for better utilization of resources, shorter development times, reduced costs, interdepartmental cooperation that builds synergies across the organization, and a better focus on results and quality.

What is Project Management?

Project Management is the application of **knowledge, skills, tools and techniques** to project activities to meet project requirements.

Effective project management requires that the project management team acquire the following three dimensions of project management competencies:

Project Management Knowledge Competency: This refers to what the project management team knows about project management.

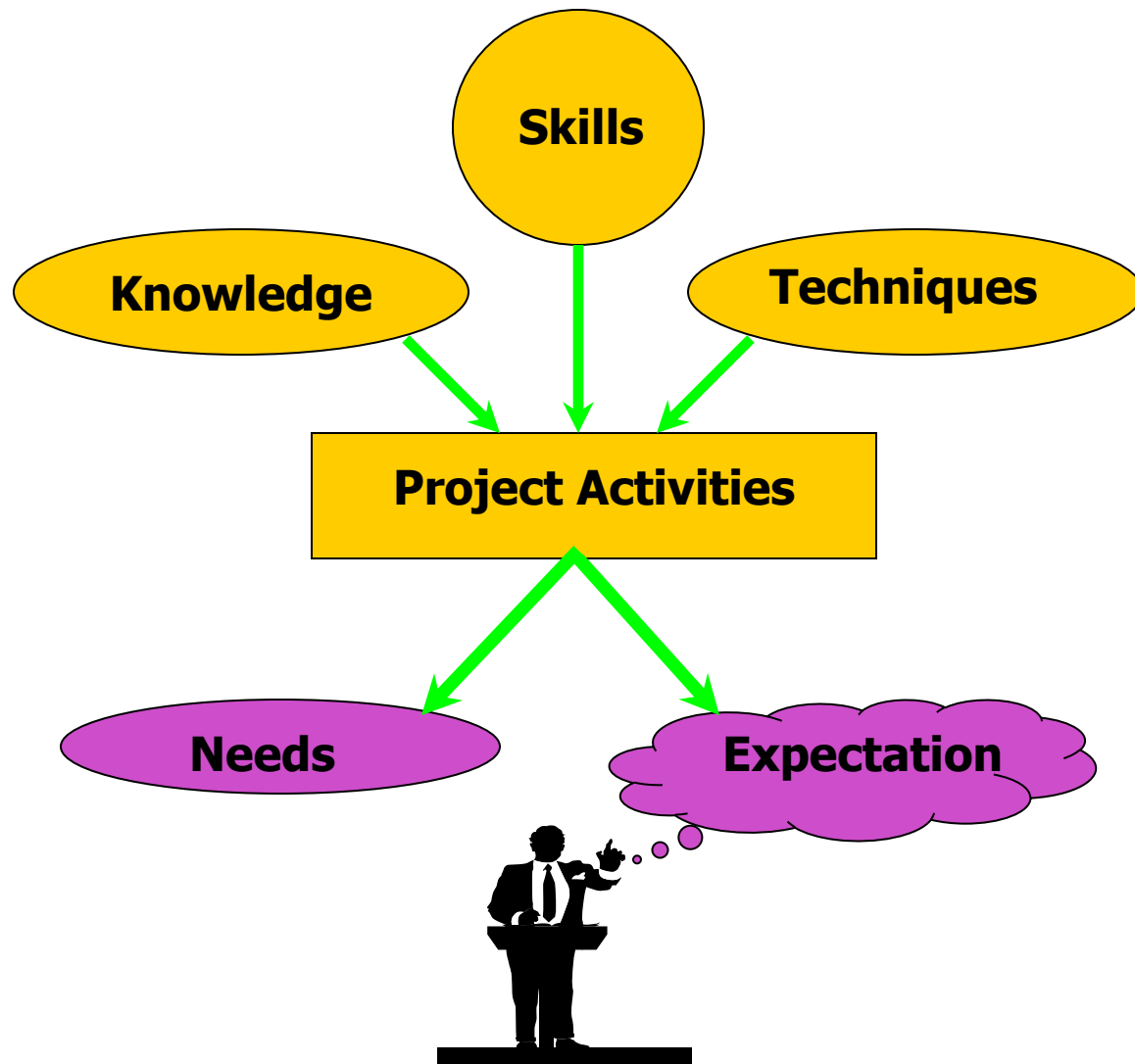
Project Management Performance Competency: This refers to what the project management team is able to do or accomplish while applying their project management knowledge.

Personal Competency: This refers to how the project management team behaves when performing the project or activity.

OBJECTIVE SHOULD BE SMART

- S – specific, that is, concrete/ real and well-defined**
- M – measurable, that is, satisfaction of the objective can be objectively judged**
- A – achievable, that is, it is within the power of the individual or group concerned to meet the target**
- R – relevant/ related, the objective must be relevant to the true purpose of the project**
- T – Time constrained: there is a defined point in time by which the objective should be achieved**

PROJECT MANAGEMENT



The management of interpersonal relationships includes:

Effective communication: The exchange of information

Influencing the organization: The ability to "get things done"

Leadership: Developing a vision and strategy, and motivating people to achieve that vision and strategy

Motivation: Energizing people to achieve high levels of performance and to overcome barriers to change

Negotiation and conflict management: Conferring with others to come to terms with them or to reach an agreement

Decision Making: Ability to take decision independently.

Political and cultural awareness: Important to handle various personal and professional issues.

Team Building: Ability to create a productive team.

MANAGE THE PROJECT

Successful project management is delivering a quality product that meets the customer's requirements within time, scope, and budget.

Scope: What work will be done as part of the project? What unique product, service, or result does the customer or sponsor expect from the project? How will the scope be verified?

Time: How long should it take to complete the project? What is the project schedule? How will the team track actual schedule performance? Who can approve changes to the schedule?

Cost: What should it cost to complete the project? What is the project's budget? How will costs be tracked?

PM TRIPLE CONSTRAINTS

Time

Cost

Scope



PROJECT MANAGER

- ❖ **Manages the project.**
- ❖ **Accountable for project failure**
- ❖ **Understand professional responsibility**
- ❖ **Need not be a technical expert**
- ❖ **Controls the project (measuring performance/ corrective action)**
- ❖ **In charge of the project, but not necessarily the resources. Project managers are automatically in some form of a leadership position – they are controlling the project activities for their initiatives/plan/proposal. In many cases they may not control the resources, but this doesn't stop them from being leaders.**

Project management Responsibilities

1. find and hire the right people,
2. ensure that they have the tools they need,
3. keep up with the latest technology,
4. develop and maintain complete plans,
5. negotiate compromises with other managers,
6. make presentations to executive management,
7. spend some time with each of the project personnel during social activities.
8. handle many other responsibilities.

LIFE CYCLE

2 types

Project Life cycle

Project Management Life cycle

PROJECT LIFE CYCLE

For a construction Project

- Mobilization
- Excavation
- Foundation
- Walling
- Roofing
- Plastering
- Painting etc... PROJECT SPECIFIC

Project Management Life Cycle

Project management is accomplished through the use of the processes such as:

Initiation

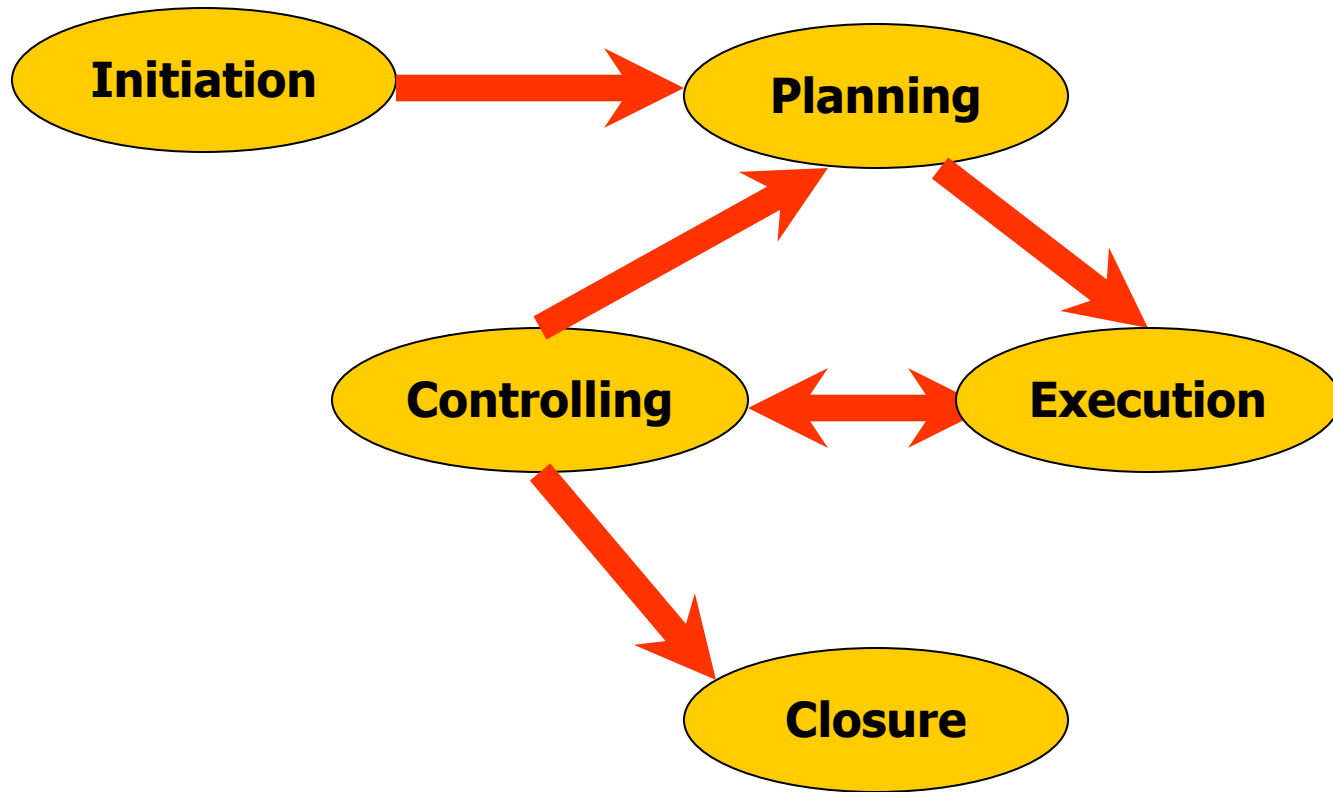
Planning

Execution

Controlling

Closing

PROJECT MANAGEMENT LIFE CYCLE



There are nine knowledge areas

- 1. Project Integration Management**
- 2. Project Scope Management**
- 3. Project Cost Management**
- 4. Project Time Management**
- 5. Project Risk Management**
- 6. Project Quality Management**
- 7. Project HR Management**
- 8. Project Communication Management**
- 9. Project Procurement Management**

Each Knowledge area has further Processes. There are a total of 42 processes. Each process has following three important parts.

Inputs

Tools & Techniques

Outputs

KNOWLEDGE AREAS



Project Management. Many focus areas in Project Management are shared by companies, but some are unique to government organizations. Companies are moving from conventional Project Management to modernized Project Management. Cost, Timelines, Quality, Risks etc are the highly focus areas. Any variation in these could result into disastrous situations.

PROJECT & PROJECT MANAGEMENT

- a) Project, Program & Portfolio Management** - Understand Project & difference between operations & project management. What is Program & Portfolio Management?
- b) Project Initiation** – How a project is initiated with Project Charter. Defining assumptions, risks, broader time lines etc.
- c) Project Planning** – Plan a Project with Scope, Time, Cost, HR, Procurement, and Risks Management.
- d) Project Execution** – Understand how to execute the Projects.
- e) Project Monitoring & Controlling** – Understand controlling timelines, cost & scope of the project along with managing stakeholder's expectations.
- f) Project Closing** – How to close a project with performance appraisals, contracts closure etc.

PROJECT KNOWLEDGE AREAS

Project Integration Management

- 1) Project Scope Management** – Gathering requirements, defining scope.
- 2) Project Time Management** – Learn how to create WBS, Network diagrams, develop schedules.
- 3) Project Cost Management** – Determine costs with Project cost, Management cost, contingency costs etc. Learn earned value techniques.
- 4) Project Quality Management** – What is Quality control and Quality assurance? How this is applicable to the projects.
- 5) Project Human Resource Management** – How to acquire, develop and manage project teams.
- 6) Project Communications Management** – How to manage stakeholders, meeting project reporting requirements etc.
- 7) Project Risk Management** – Understand what are known unknown & what are unknown unknowns. How to manage them,
- 8) Project Procurement Management** – Determine what is to be purchased, how to be purchased, when to be purchased etc

KNOWLEDGE AREA

PROJECT MANAGEMENT PROCESS GROUPS

	INITIATING	PLANNING	EXECUTING	MONITORING & CONTROLLING	CLOSING
<i>Project Integration Management</i>	Develop project charter, Develop preliminary project scope statement	Develop project management plan	Direct and manage project execution	Monitor and control project work, Integrated change control	Close project
<i>Project Scope Management</i>		Scope planning, Scope definition, Create WBS		Scope verification, Scope control	
<i>Project Time Management</i>		Activity definition, Activity sequencing, Activity resource estimating, Activity duration estimating, Schedule development		Schedule control	
<i>Project Cost Management</i>		Cost estimating, Cost budgeting		Cost control	

KNOWLEDGE AREA

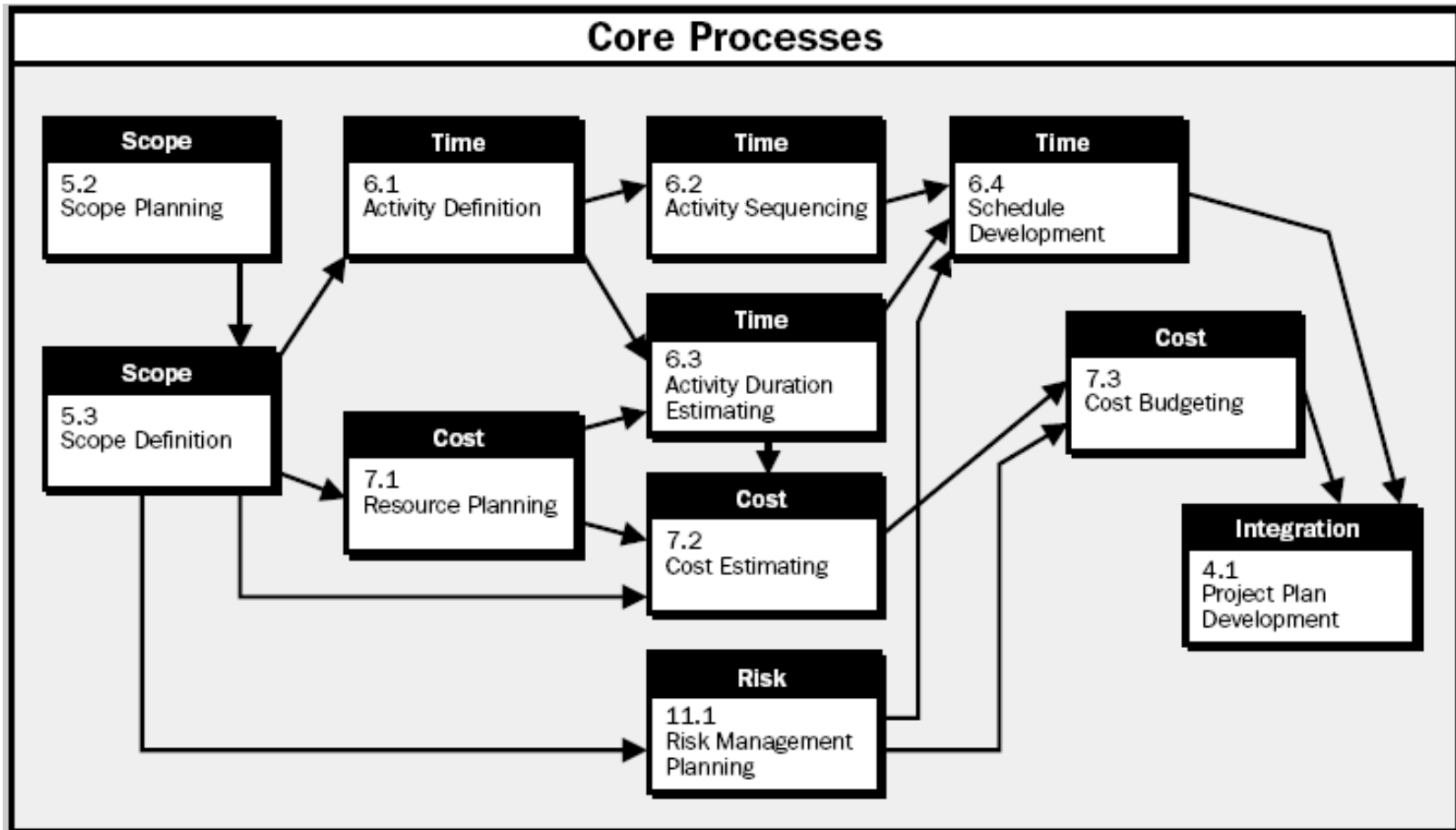
PROJECT MANAGEMENT PROCESS GROUPS

	INITIATING	PLANNING	EXECUTING	MONITORING & CONTROLLING	CLOSING
<i>Project Quality Management</i>		Quality planning	Perform quality assurance	Perform quality control	
<i>Project Human Resource Management</i>		Human resource planning	Acquire project team, Develop project team	Manage project team	
<i>Project Communications Management</i>		Communications planning	Information distribution	Performance reporting, Manage stakeholders	
<i>Project Risk Management</i>		Risk management planning, Risk identification, Qualitative risk analysis, Quantitative risk analysis, Risk response planning		Risk monitoring and control	
<i>Project Procurement Management</i>		Plan purchases and acquisitions, Plan contracting	Request seller responses, Select sellers	Contract administration	Contract closure

Table 3-1. Project Management Process Groups and Knowledge Areas Mapping

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring & Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Execution	4.4 Monitor and Control Project Work 4.5 Perform Integrated Change Control	4.6 Close Project or Phase
5. Project Scope Management		5.1 Collect Requirements 5.2 Define Scope 5.3 Create WBS		5.4 Verify Scope 5.5 Control Scope	
6. Project Time Management		6.1 Define Activities 6.2 Sequence Activities 6.3 Estimate Activity Resources 6.4 Estimate Activity Durations 6.5 Develop Schedule		6.6 Control Schedule	
7. Project Cost Management		7.1 Estimate Costs 7.2 Determine Budget		7.3 Control Costs	
8. Project Quality Management		8.1 Plan Quality	8.2 Perform Quality Assurance	8.3 Perform Quality Control	
9. Project Human Resource Management		9.1 Develop Human Resource Plan	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
10. Project Communications Management	10.1 Identify Stakeholders	10.2 Plan Communications	10.3 Distribute Information 10.4 Manage Stakeholder Expectations	10.5 Report Performance	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses		11.6 Monitor and Control Risks	
12. Project Procurement Management		12.1 Plan Procurements	12.2 Conduct Procurements	12.3 Administer Procurements	12.4 Close Procurements

PLANNING PROCESS



SCOPE PLANNING

First planning process

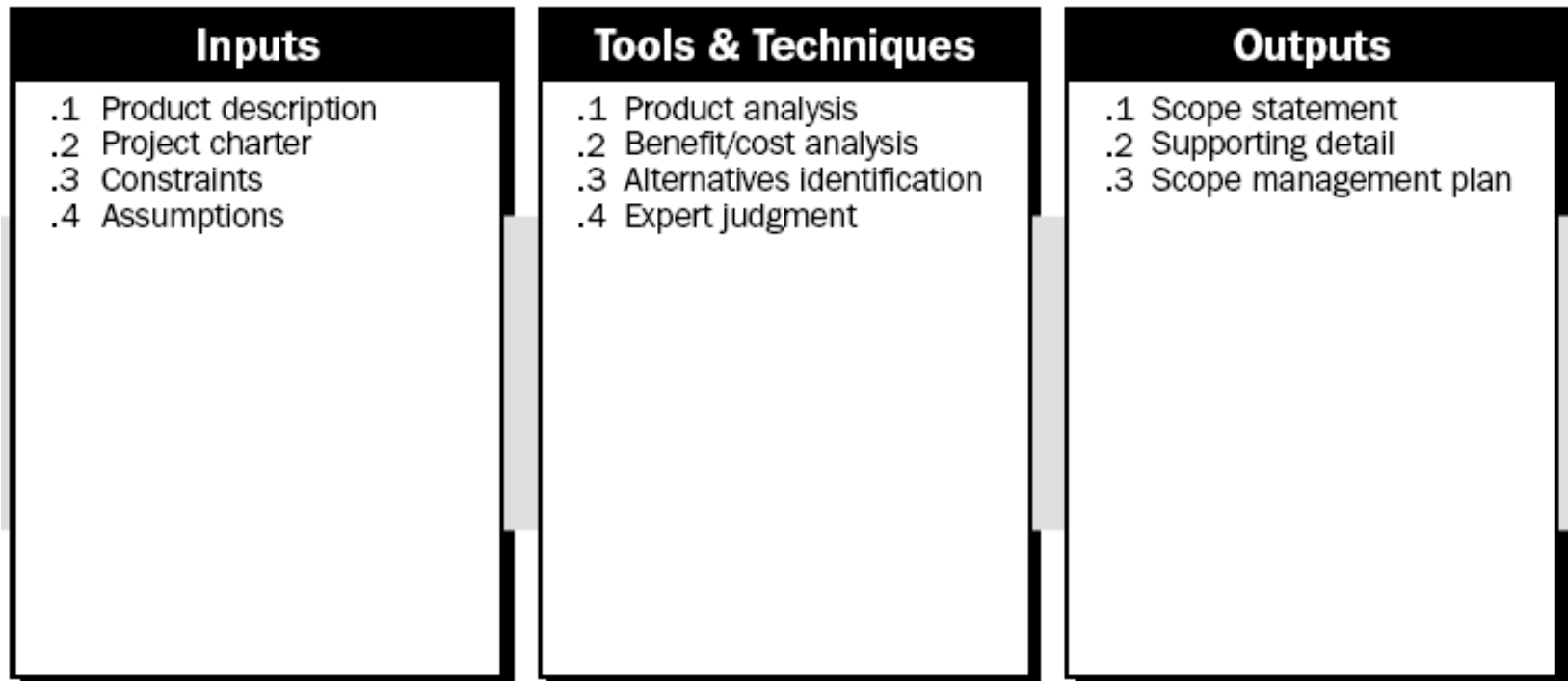
Product Scope- the features & functions of the product

Project Scope – the work that must be done to deliver a product with specified features & functions

Project charter is primary input

Scope Statement is created after having better understanding of the Project

SCOPE PLANNING LAYOUT



SCOPE STATEMENT

Output of the process(after detail study of the product)

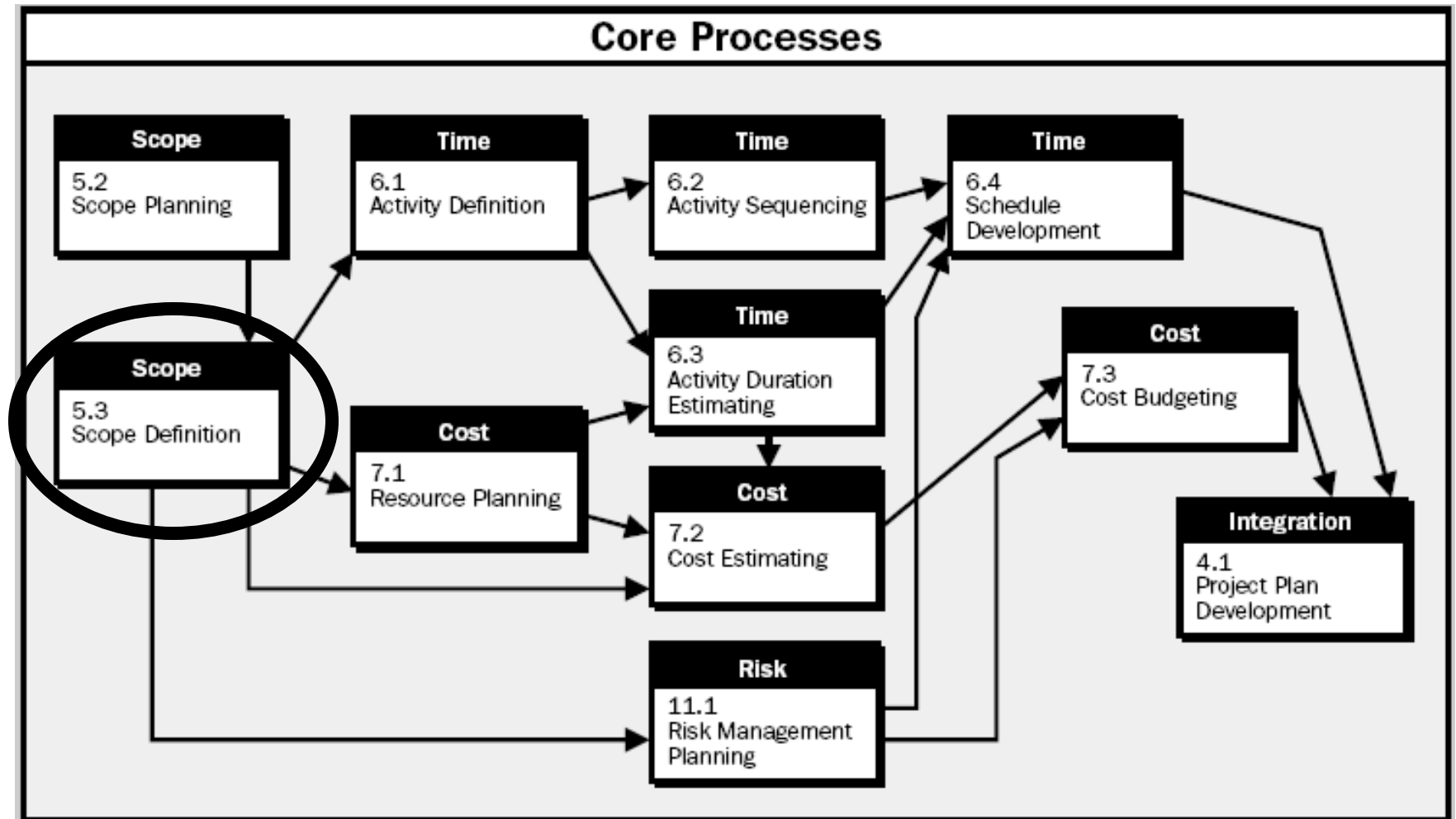
The primary input for the next planning process

Includes details like

- Projects product (Building)
- Project deliverables (sub structure, superstructure....)
- Project Justification (customer request)
- Project objective (cost & time etc...)

SCOPE DEFINITION

Core Processes



SCOPE DEFINITION

Scope Definition involves further subdividing of the major project deliverables into smaller more manageable components

Primary input is Scope Statement

WBS is the output of the process

WBS helps in

- **Improved Cost Estimates**
- **Duration Estimation**
- **Resource Assignment**

WORK BREAKDOWN STRUCTURES

Documenting the overall work to be performed by

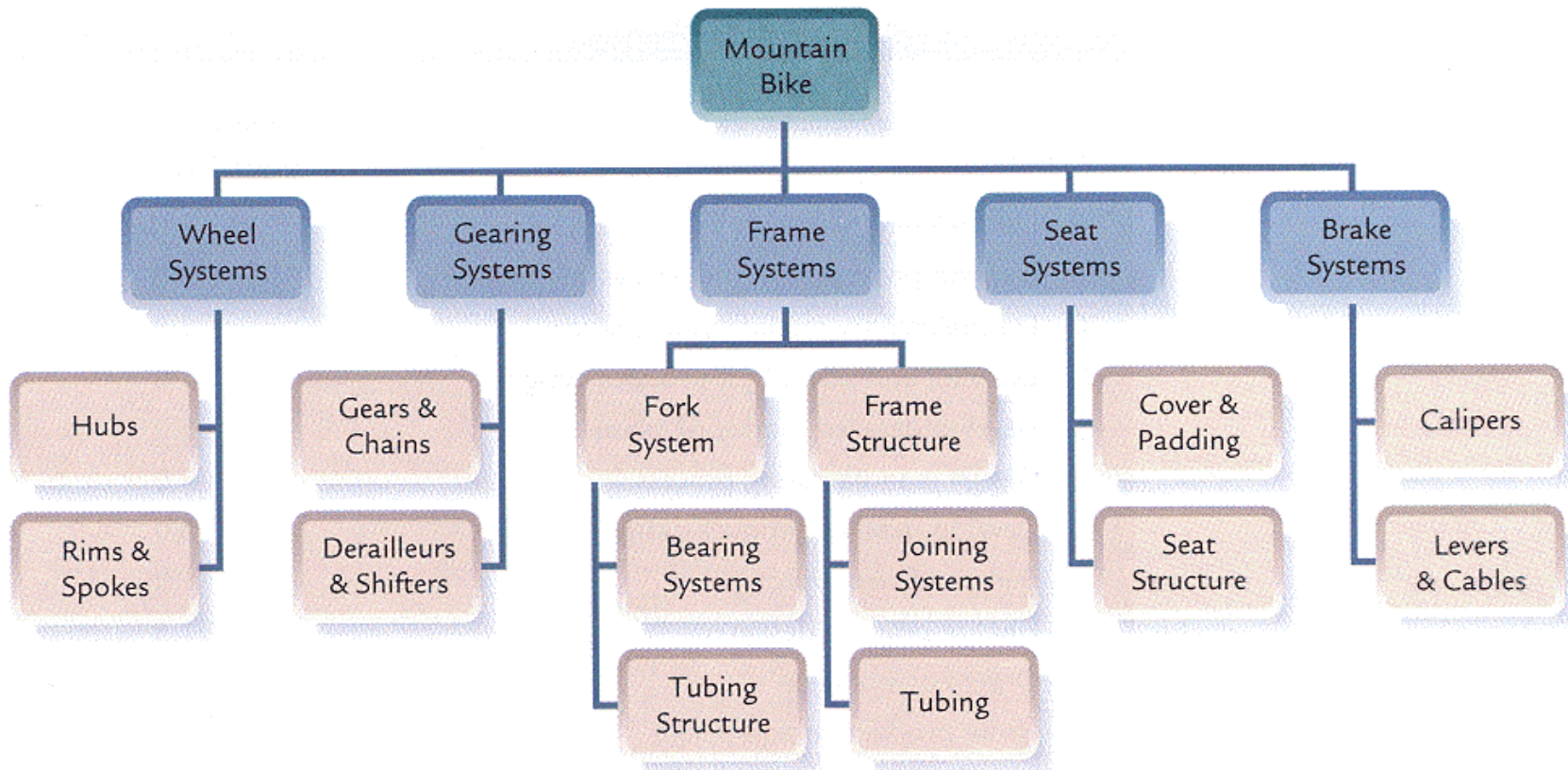
- developing Work Breakdown Structure (WBS)

WBS is a decomposition of the entire project effort into smaller pieces

You need a very high-level idea about how you are going to build the system

You need a preliminary design

WBS



LEVELS IN WBS

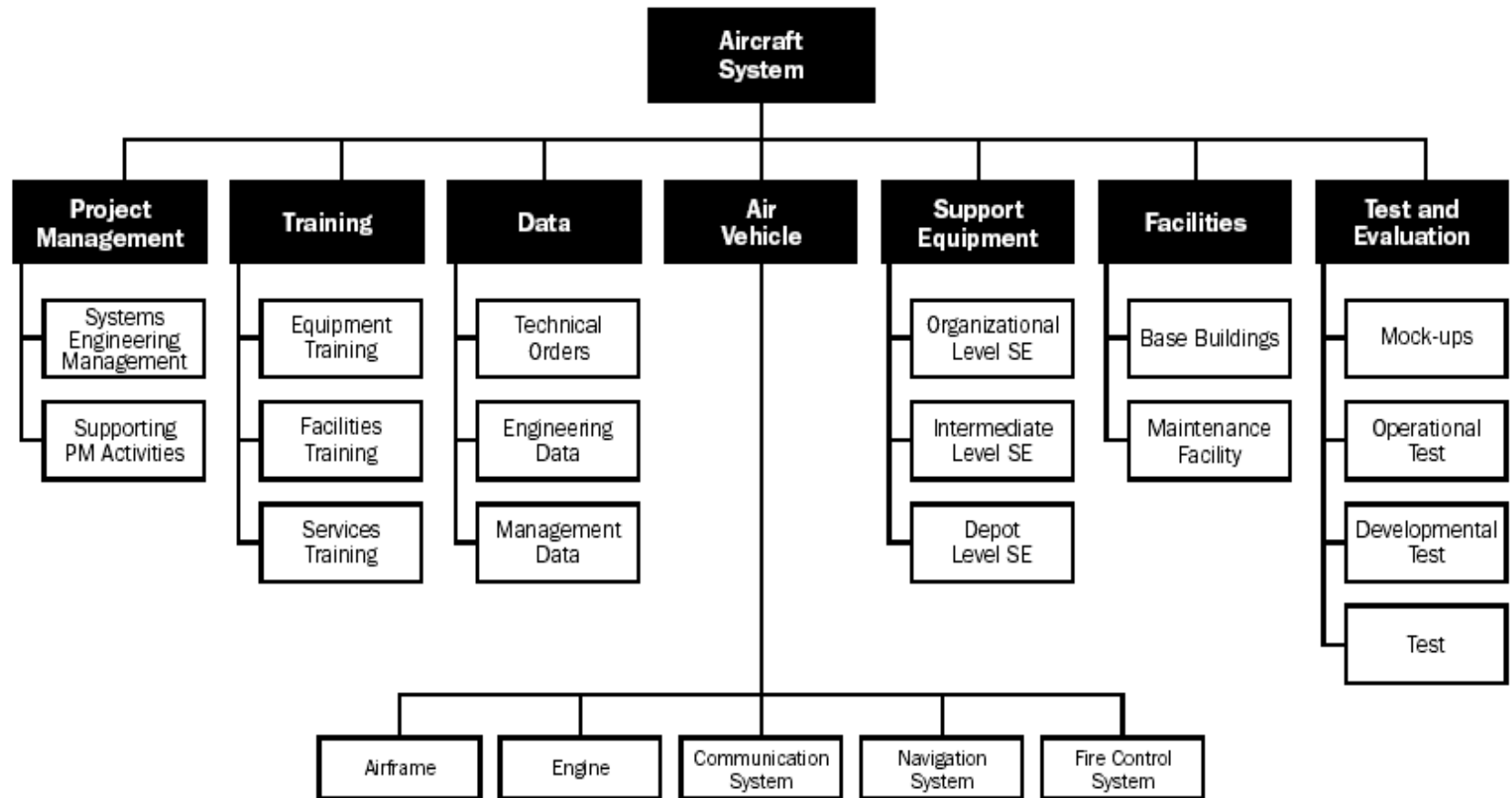
Level 1 : Name of the project

Level 2: Main Deliverables

Level 3: Sub components

The lowest level in WBS is Work Packages

SAMPLE WBS 2



This WBS is illustrative only. It is not intended to represent the full project scope of any specific project, nor to imply that this is the only way to organize a WBS on this type of project.

Sample Work Breakdown Structure for Defense Material Items

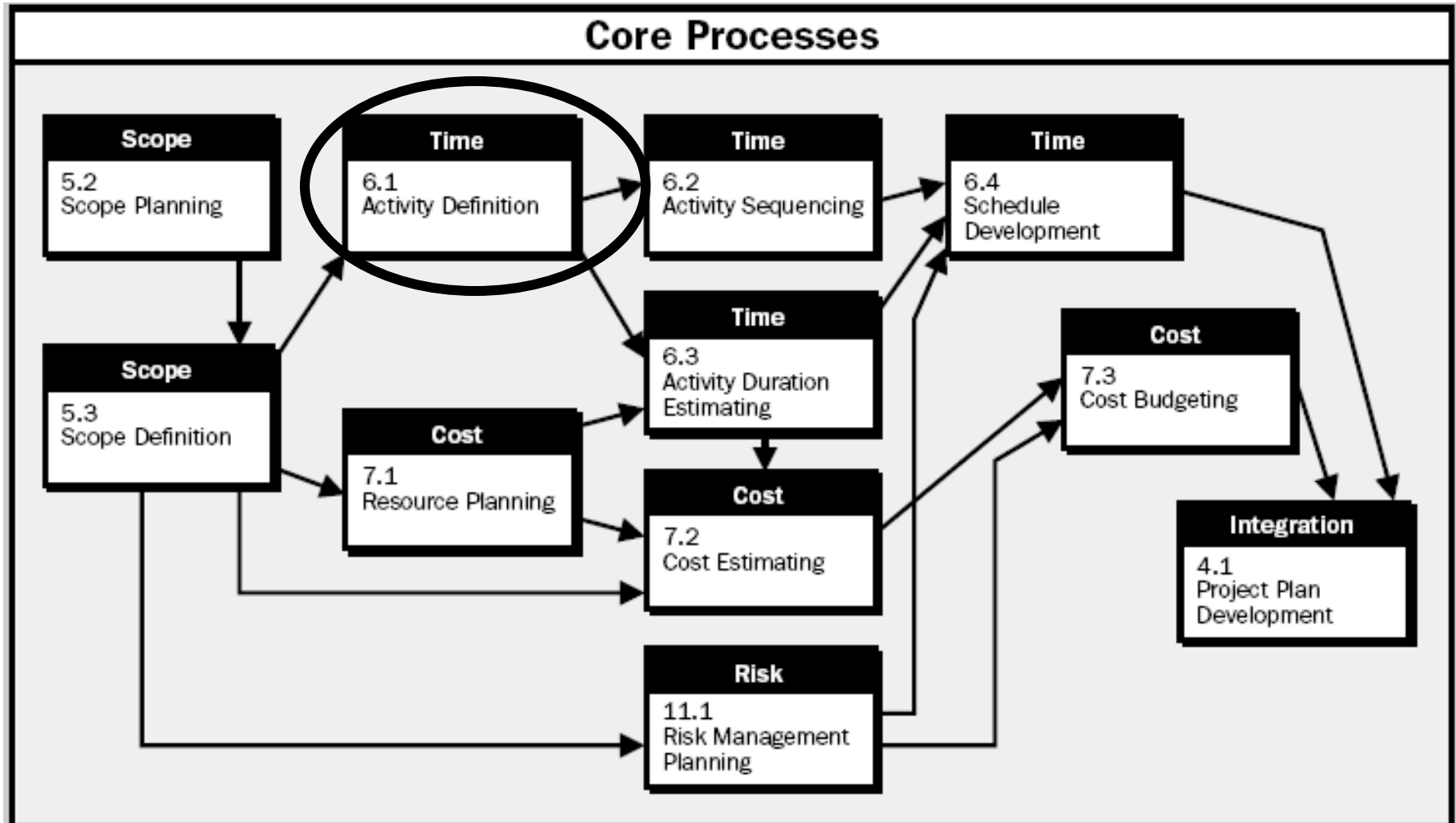
RESOURCE BREAKDOWN STRUCTURES

Focus on the organizations, divisions, programs, projects, teams, and individuals who will be performing the work

A common problem, the organizational relationships of who manages whom, who reports to whom, and who supports whom become highly confusing

It is helpful if the resource breakdown structure shows a similar decomposition to the WBS

ACTIVITY DEFINITION



Project Time Management

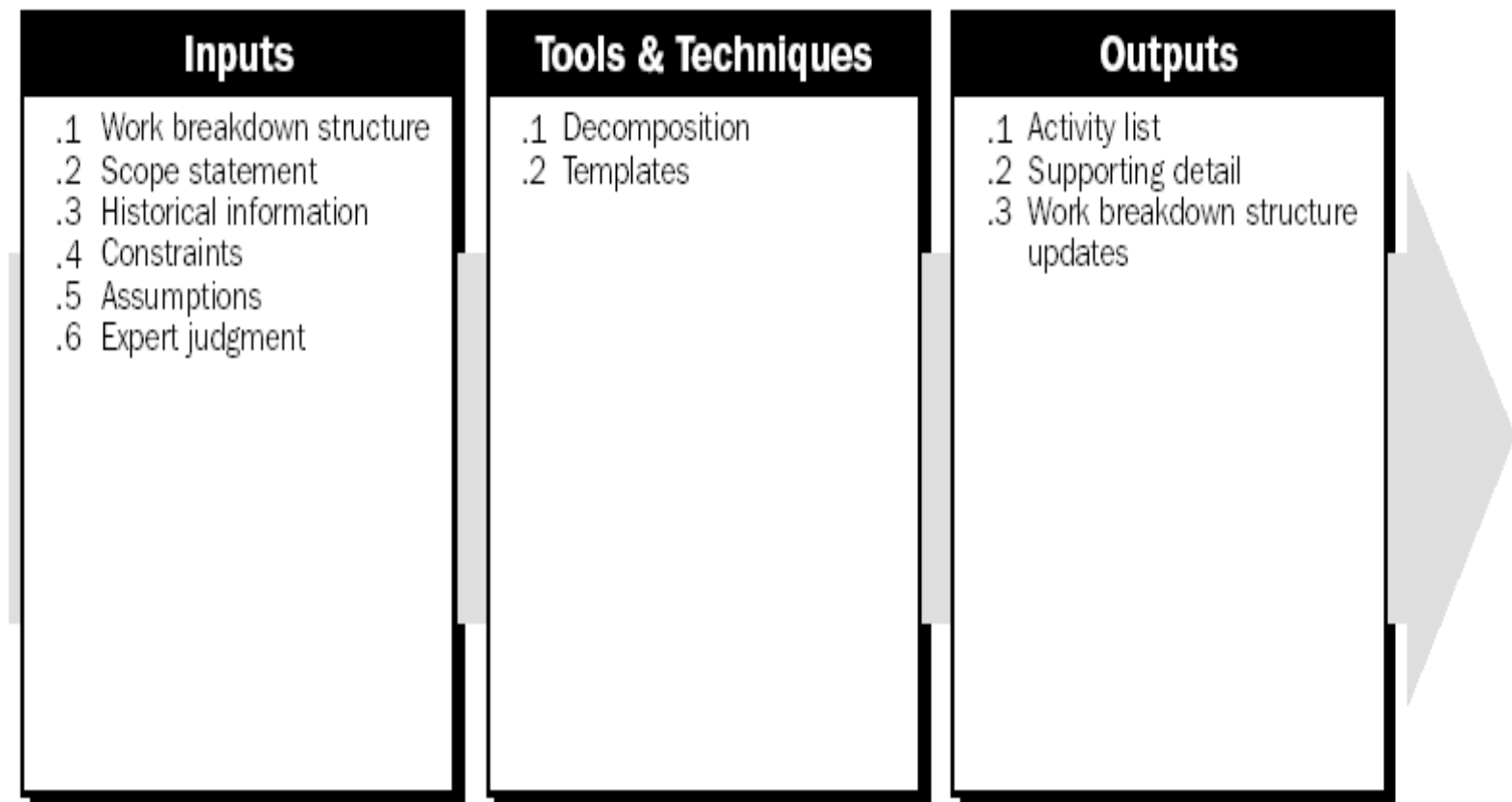
Processes required to ensure timely completion of the project

Time Management – In small projects Activity Definition, Sequencing, Resource Estimation, Duration Estimation and Schedule development are so tightly linked that they are viewed as single process.

ACTIVITY DEFINITION

- Identifying the specific activities that must be performed to produce various project deliverables
- The activity list must include all activities that will be performed on the project.
- An extension to WBS
- The activity list should include descriptions of each activity to ensure that the project team members will understand how the work is to be done.

ACTIVITY DEFINITION



- **Activity Definition**: Identifying the specific schedule activities that need be performed to produce the various project deliverables.
- **Activity Sequencing**: Identifying and documenting dependencies among schedule activities
- **Activity Resource Estimating**: Estimating the type and quantities of resources required to perform each schedule activity
- **Activity Duration Estimating**: Estimating the number of work periods that will be needed to complete each schedule activities.
- **Schedule Development**: Analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule.
- **Schedule Control**: Controlling changes to the project schedule.

SCHEDULING MILESTONE

- Schedule showing major project milestones and indicating, in detail, when the various activities will occur and who will be performing them.
- A simple method is to build a precedence network

PRECEDENCE NETWORK

Start with a list of activities to be performed (lowest level boxes from WBS)

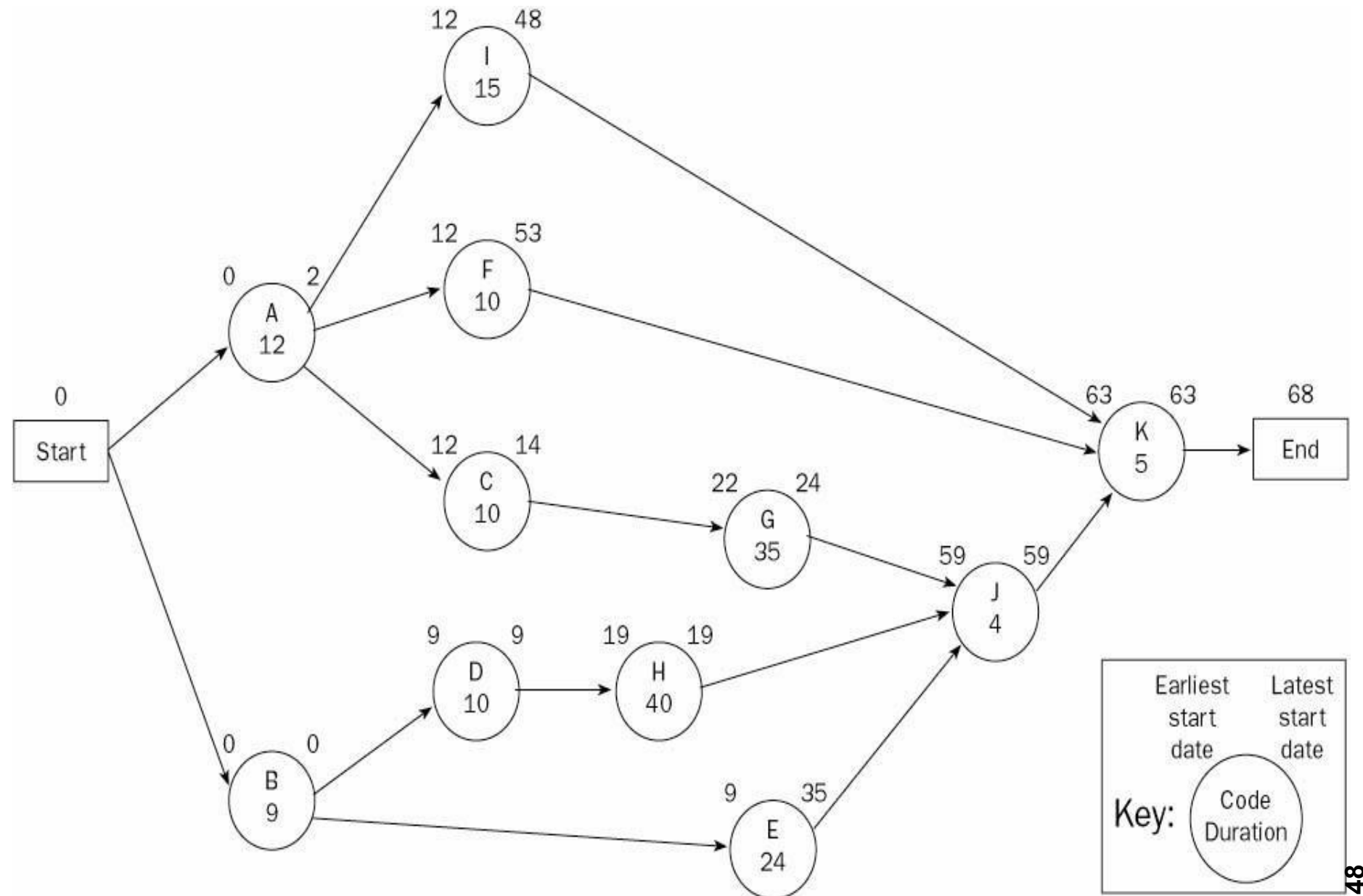
For each activity:

- estimate its duration from
 - size estimates,
 - effort estimates
 - availability of resources
- indicate any predecessor activities
 - activities that must be completed before the given activity can start.

Activity	Code	Duration	Predecessors
Requirements	A	12	None
Design	B	9	None
Test Plan	C	10	A
Documentation	D	10	B
Coding	E	24	B
Risk Analysis	F	10	A
Test Lab	G	35	C
Tech Editing	H	40	D
Marketing	I	15	A
Integration	J	4	G, H, E
User Evaluation	K	5	I, F, J

- Once you have this list, the next step is to **build a precedence network** showing activities as nodes and with lines connecting each activity to its predecessors.
- For each activity, add a number indicating its duration (typically, this is in calendar days).

PRECEDENCE NETWORK



PRECEDENCE NETWORK (CONT.)

- The “start” and “end” boxes
- The earliest start date
- The latest start date
- The earliest end date
- The latest end date
- The critical path
 - is any sequence of activities where, if any activity is delayed, the entire project is delayed
 - There is always at least one critical path.

- Planning the project activities and establishing a schedule for these events is only the beginning of the monitoring and control activities that a project manager needs to carry out.

- The following Table represents the activities of a software project schedule.
- Draw the Precedence Network Diagram for the given project activities and write all path

Activity Descripti on	Activity Description	Duration (weeks)	Precedents
A1	Hardware selection	12	
A2	Software design	8	
A3	Install hardware	6	A1
A4	Code software	8	A2
A5	File Take-on	6	A2
A6	Write user manuals	20	
A7	User Training	6	A5, A6

- **slack time:** difference between the earliest start date and latest start date
- The **critical path** has zero slack time
- If slack time is zero then it is critical path
- **When activity durations are uncertain:**
 - replace the exact duration value with a simple equation intended to give an estimated value
 - A = Likely shortest duration
 - B = Expected duration
 - C = Likely longest duration
 - $D = (A + (3 * B) + (2 * C)) / 6.$

YOU MIGHT EXPECT A GIVEN ACTIVITY TO TAKE AROUND 20 DAYS.

HOWEVER, YOU ARE CONFIDENT THAT IT HAS TO TAKE AT LEAST 15 DAYS, AND YOU ARE SIMILARLY CONFIDENT THAT IT WILL BE COMPLETED WITHIN 40 DAYS.

USING THESE VALUES, THE ESTIMATED DURATION (D)= $(15 + (3 * 20) + (2 * 40)) / 6$ OR 25.83 DAYS.

SCHEDULING RESOURCES

- Start identifying the resources needed to perform the various activities once the milestones are scheduled
- Each activity can be characterized by needing support from one or more roles
- Each role can be characterized by the number of people needed for that role.
- Gain a clearer picture of the staffing, resource analysis, balancing, and load leveling really become your primary effort.

- **SOFTWARE PROCESS:** WHEN YOU BUILD A PRODUCT OR SYSTEM, IT'S IMPORTANT TO GO THROUGH A SERIES OF PREDICTABLE STEPS—A ROAD MAP THAT HELPS YOU TO CREATE A TIMELY, HIGH-QUALITY RESULT. THE ROAD MAP THAT YOU FOLLOW IS CALLED A '*SOFTWARE PROCESS*'.

SOFTWARE ENGINEERING *METHODS* PROVIDE THE TECHNICAL HOW-TO BUILD SOFTWARE.

SOFTWARE ENGINEERING *TOOLS* PROVIDE AUTOMATED OR SEMI-AUTOMATED SUPPORT FOR THE PROCESS AND THE METHODS.