



MASTER IN ENTREPRENEURSHIP  
INNOVATION MANAGEMENT  
IN COLLABORATION WITH **MIT SLOAN**

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UNIVERSITÀ DEGLI STUDI DI NAPOLI  
**PARTHENOPE**

MASTER MEIM 2021-2022

# Project Management Master 2022-2023

Project Management - Introduction and basic elements

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# Agenda

- Project: Definition and features
- Success and failures
- Project management
- Project life cycle and PM processes
- Project stakeholders
- Project manager
- Tools for the project management

# Definition of “Project” (1)

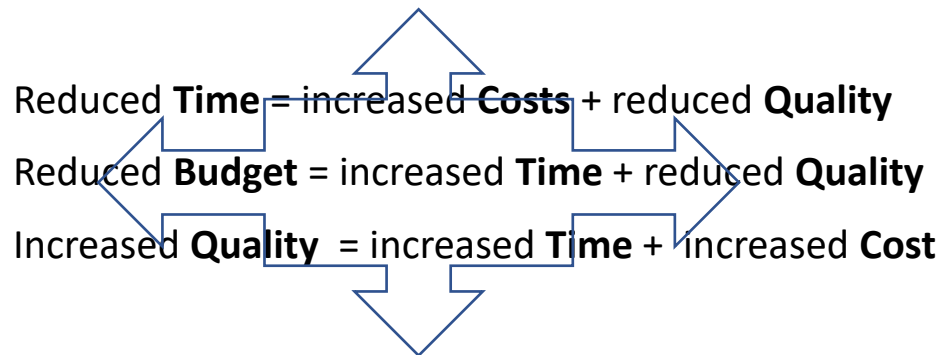
- The term Project refers to any **temporary** endeavor with a definite beginning and end to produce a **unique** product or service  
(Project Management Institute - PMI)
- A project is a **set of tasks** that must be completed in order to arrive at a **particular** goal or outcome.  
(Yarbrough, 2021, <https://www.projectmanager.com>)
- A project is any undertaking, carried out individually or collaboratively and possibly involving research or design, that is carefully **planned** to achieve a **particular** aim. (Oxford Dictionaries).

# Definition of “Project” (2)

A project consists of a **set of processes** that include coordinated and controlled activities, with start and end dates, carried out in order to achieve the objectives of the project itself, **in compliance with interdependent constraints of costs, times and quality** (International Standard UNI ISO 21500)

## The triple constraint

Time, cost and quality are project constraints, interdependent and closely interwoven.



# Main features of a Project

- **Temporary** – Definitive beginning and end

*The start of a project is often subject to the **technical time** required to realize the initial idea and find the resources to start it. Then it is necessary to plan activities to be able to **meet deadlines***

- **Unique/particular** – New undertaking, not repeated, unfamiliar ground.

*The activity of the organizations is articulated in projects (unique and extraordinary) and operations (ordinary, current, daily...)*

**Set of task** (work item or activity) – complexity, competencies, multidisciplinary

# Other features

- ❑ **Complexity:**
  - caused by managing interwoven, probable complex and partially know activities;
  - teams involving different people of different units of the organization or different organizationa
  - comply with the budget and time constraints;
  - to manage stakeholder pressures.
  
- ❑ **Resources:** adoption of different resources (money, people, equipments, supplied materials and services, ...)
- ❑ **Progressive implementation:** A project is generally developed progressively through successive stages having increasing level of detail. Stages are linked by continuity and interdependence relationships.
- ❑ **Repetetion/recurring:** Given its unique nature, the Project requires to be managed through a continuous cycle of planning, execution and control
- ❑ **Risk:** failure to achieve the project objectives is more inherent in the early stages

# Project scope

- Part of project planning addressed a list of project goals, deliverables, tasks, costs and deadlines.
- The project's scope is documented in a scope statement
- It addresses the **boundaries** of the project and the **responsibilities** for each team member. By defining the scope of the project, the Project manager is able to achieve the project goals without delay or overload.

what is included and what is not;  
what will be done and what not

*Project scope is a detailed outline of all aspects of a project, including all related activities, resources, timelines, and deliverables, as well as the project's boundaries. A project scope also outlines key **stakeholders**, processes, assumptions, and constraints, as well as what the project is about.*

[M. Alexander, 2020 https://www.cio.com](https://www.cio.com)

The project customer is the beneficiary of the results of the project

Who is the sponsor??



How the customer explained it



How the project leader understood it



How the business consultant described it



How the customer was billed



What the customer really needed

Which issues and problems you can observe?



# When is a project successful?

Customer/stakeholders/sponsor requirements are satisfied

Customer/stakeholders/sponsor expectations are exceeded

Completed within time constraint

Completed within budget constraint

Completed respecting the quality requirements

**Success criteria are defined by the client / sponsor or by a project committee representing the stakeholders**

**A [project sponsor](#) is a person or group who promote the project and provides resources and support for the project**

**Delivered to and accepted by the customer/stakeholders/sponsor**

# When is a project a failure?

Scope creep (subtle deviation of the project from the original scope)

Weak/wrong requirements definitions and gathering

Unfeasible/wrong planning and scheduling

Lack/inadequacy of resources

# Scope creep types

- 1. Business creep:** -organization (project stakeholders) change its mind, roles, or priority  
-PM fails to properly understand the business environment and makes wrong requirement assumptions
- 2. Effort creep:** -a lot of effort and commitment in the project, with no progress.
- 3. Hope creep:** -PM continues to believe that it is able to meet deadlines, requirements and results. Although this is not true.
- 4. Feature creep** -adding unnecessary and unsolicited details and features to the product when no one asked for them and no one will pay for them. Desire for perfectionism.  
Also indicated as **Gold plating**: happens when the team adds extra features that were not part of the original scope of the project

Watch Short Video 1 e 2 and discuss about creep types

VIDEO 1 [https://www.youtube.com/watch?v=u8Kt7fRa2Wc&list=PLKITnphWMK\\_pbfHE4ViIQg3GjVuXJdo5I&index=5](https://www.youtube.com/watch?v=u8Kt7fRa2Wc&list=PLKITnphWMK_pbfHE4ViIQg3GjVuXJdo5I&index=5)

VIDEO:2 Hope creep <https://www.youtube.com/watch?v=BKorP55Aqvg> (indicated by <https://louderthanten.com/>)

## A scope Creep story.

Imagine you run a **small bakery**. There's an order for a birthday cake that needs to be delivered in a day. **You get all the ingredients and begin preparing the cake batter**. After a few hours, you get a call from the same customer asking for a strawberry frosting on the cake. You agree because you haven't baked the cake yet.

You get **another call** from the customer asking for a three-tier cake. **Then another call** telling you to put mickey mouse on the top. **And then another** to put a 'Happy Birthday Matt' on the side. You begrudgingly agree **despite knowing that** the delivery time has become short and it's going to cost you a little more than the originally agreed-upon price.

### So, what went wrong here?

The scope of the project was not clearly defined at the beginning and the baker accommodated small changes without modifying the budget or the expected timeline. This is called scope creep and project managers deal with this all the time while managing projects.

<https://kissflow.com/>

# The project management (definition) (1/2)

“The systemic management of a complex, single and fixed-term company aimed at achieving a clear and predefined objective through a continuous process of differentiated planning and control and interdependent cost-time-quality constraints”.

Russel D.Archibald

Project management is the use of specific knowledge, skills, tools and techniques to deliver something of value to people. The development of software for an improved business process, the construction of a building, the relief effort after a natural disaster, the expansion of sales into a new geographic market —these are all examples of projects.

Project Management Institute – PMI

# The project management (definition) (2/2)

**Project management is the application of processes, methods, skills, knowledge and experience to achieve specific project has final deliverables that are constrained to a finite timescale and budget.**

**Association for Project Management (APM)**

**Simplest level: the discipline managing projects successfully ( APM, 2000)**

**Project management is the application of methods, tools, techniques and skills to a project (Standard UNI ISO 21500)**

**Project management is the application of knowledge, professional and personal skills, methods, techniques and tools to project management activities, in order to meet the requirements**

**(Istituto Italiano di Project Management - ISIPM)**

# Project management key elements

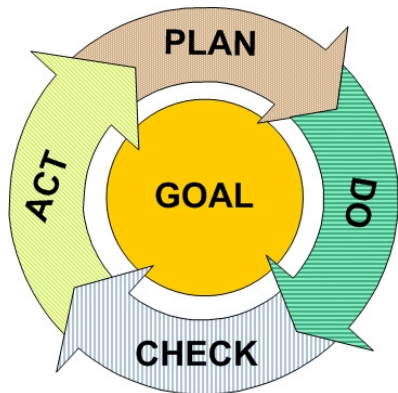
**COST MANAGEMENT:** aimed at ensuring that the project is carried out within the foreseen budget

- The budget is addressed to resources acquisition: people/competencies; materials, equipments, tools, services,....
- The project cost estimate is based on the cost analysis of the resources useful to complete the project.
- Estimate by type: human resources, materials, equipment, tools, ....
- Estimates by nature: direct, indirect, fixed, variable.
- Bottom-up and top – down cost estimates

# Project management key elements

**QUALITY MANAGEMENT:** set of activities/processes aimed to ensure that the project meets the needs

- ❑ QM must be performed according to the reference models of international standards adopted (UNI ES ISO)
- ❑ Elements of the QM are: Project quality Goals, quality Policy, quality Plan, quality Assurance, quality Control



## Deming cycle

-Continuous improvement cycle

## Definitions of quality

Conformance to requirements (F.Crosby)

Fitness for use (J.Juran)

..different definitions of quality are appropriate under different circumstances (Garvin, 1984; Reeves and Bednar, 1994; Seawright and Young, 1996; Russell and Miles, 1998; Beaumont and Sohal, 1999; Sebastianelli and Tamimi, 2002; Ojasalo, 2006). Indeed, quality has been defined as [excellence](#) (Tuchman, 1980), [value](#) (Feigenbaum, 1951), [conformance to specifications](#) (Shewhart, 1931; Levitt, 1972), [conformance to requirements](#) (Crosby, 1979), [fitness for use](#) (Juran, 1974; 1988), [product desirable attributes](#) (Leffler, 1982), [loss avoidance](#) (Taguchi, 1987) and [meeting customer expectations](#) (Ryall and Kruithof, 2001; ISO 9000, 2005)

(Elshaer, 2015)



## ISSUE MANAGEMENT

- **An issue consists of a problem that prevents or slows the progress of a project**
  - **Additional work needed by the project manager and team**
  - **Occurs throughout the entire course of the project**
  - **Impact on time, cost , quality and scope (scope creep)**
  - **Register of issues to monitor the issues evolution.**

## COMMUNICATION MANAGEMENT

- **Involves the exchange of information among the stakeholders of the project, team members and sponsors/customers to ensure that the information arrives correctly to each recipient appropriately.**
- **Project managers devote a large part of their working time to communication (towards project team members, the sponsor and other stakeholders)**
- **Communication cycle: collection, distribution, archiving, recovery, accessibility, enhancement of project information.**

## RISK MANAGEMENT

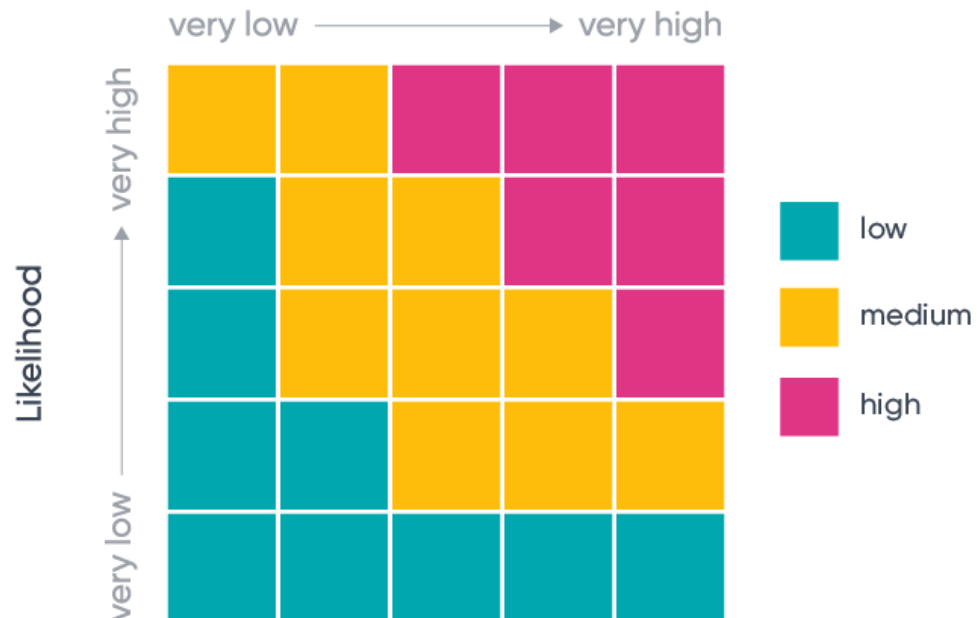
- Risk derive from events that can have a negative impact on the project performace
- Addressed to: decrease the probability and impact of threats (negative events)  
increase the likelihood and impact of opportunities (positive events)
- Identification of the risk and mitigation of the risk
  - qualitative/quantitative analysis of risks ( $\% \text{ likelihood} \times \% \text{ consequences} = \text{Level of Risk}$ )
  - risk response planning and strategies: taking or accepting; avoidance; control (prevention or mitigation); transfer or sharing
  - risk control

# Risk analysis

*Likelihood x Consequence = Level of Risk*

$$L (\%) \times C (\%) = LR$$

Consequences



## Qualitative metric

Likelihood axis: certain, likely, possible, unlikely, rare.

Consequence axis: very low, low, medium, high, extreme

Conducting a risk assessment for day-to-day life:

Some risks from ordinary activities could be:

<u>Activity</u>	<u>Risk event</u>
Reading	Getting a papercut
Travelling	Having a car accident
Eating	Getting food poisoning

In which box in the matrix to input these risks?

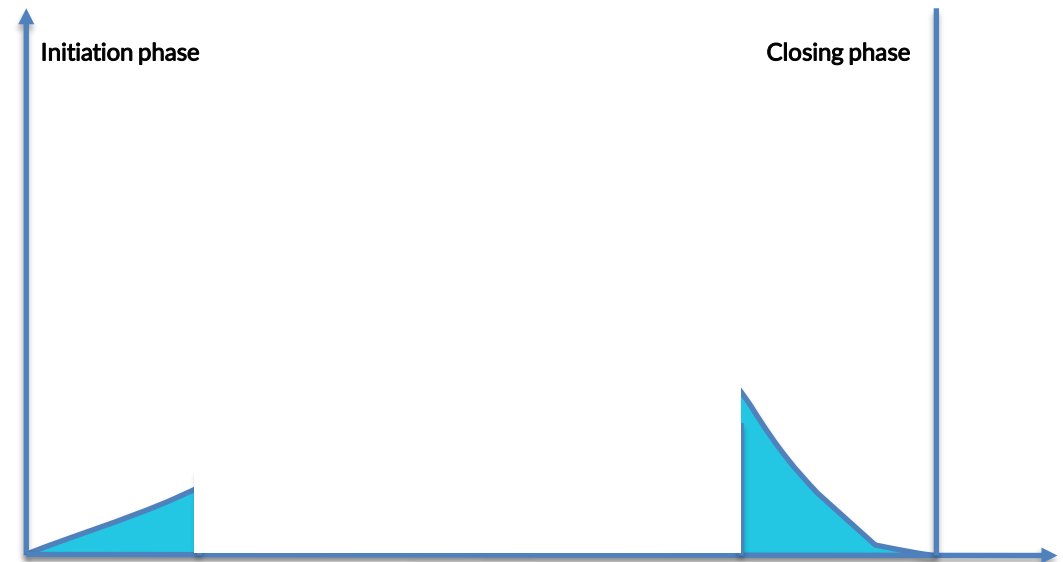
Example from <https://www.ideagen.com>

## CHANGE MANAGEMENT

- includes rules and procedures aimed at defining, identifying, recording and progressively controlling the implementation of the project to ensure that it meets the required requirements.
- aimed at managing any changes to be made to the project.
- monitors the changes that need to be made to the project during its implementation, to maintain consistency, integration, coordination and control in every aspect
- Impact on the change of the scope, the schedule, technical aspects and the configuration\* (\*a defined state of the product/service deriving from project)
- change management system
- prior communication to and approval of the sponsor.

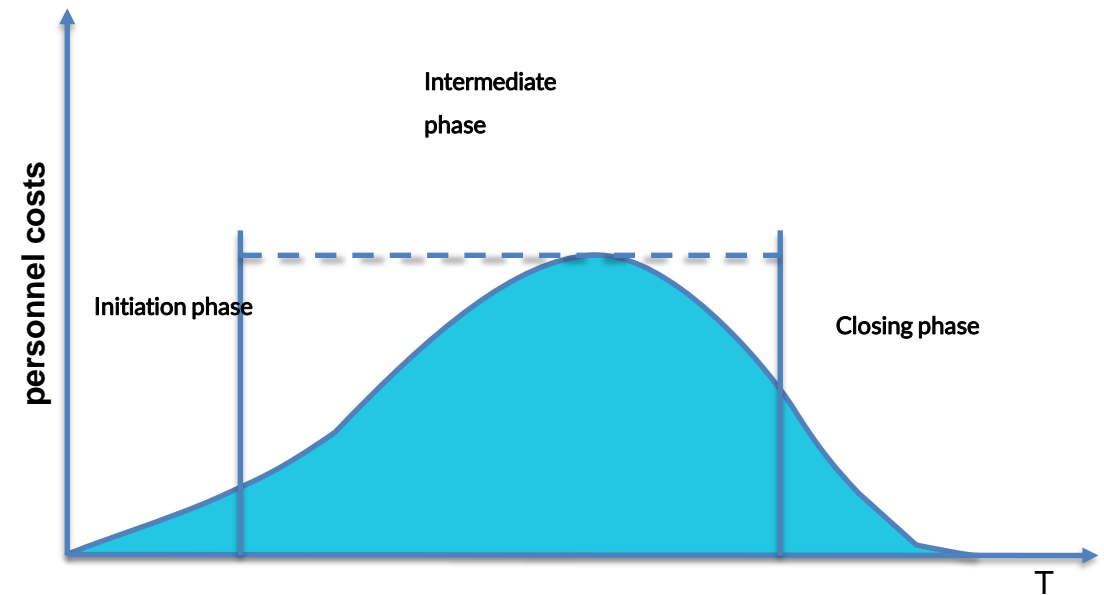
# Phases of the Project

- Project phases (stages) are periods in which a project is broken down
- Facilitate the control and achievement of results.
- The set of phases (and related activities and processes) of a project, from start to finish, are referred to as the **project life cycle**
- Increasingly narrow time horizons, with a greater degree of detail



## LIFE CYCLE OF COST AND RESOURCE COMMITTMENT

- **Initial phase:** *costs and commitments of the personnel and resources involved are generally low*
- **Intermediate stages** of project implementation: maximum value
- **Conclusion phase:** rapid decrease



# Project life cycle



Project management processes (techniques, tools, methodologies, skills....) allows to start, plan, execute, monitor, control and conclude any type of project. (ISIPM 2020)

Figure from <https://kissflow.com/>

PMBOK Guide (Project Management Body of Knowledge) - [PMI](#)



# Project life cycle and PM processes

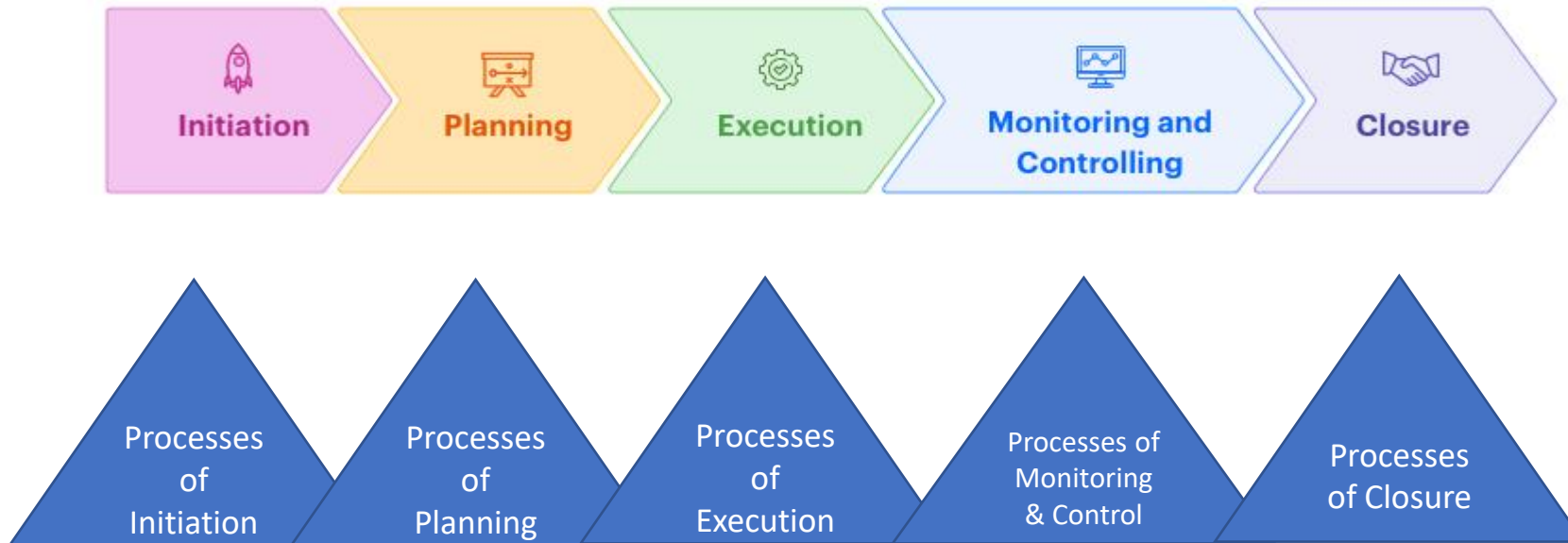


Figure from <https://kissflow.com/>

PMBOK Guide (Project Management Body of Knowledge) - [PMI](#)

# Project life cycle and PM processes

- A project is carried out through numerous processes (PM processes)
- PM processes interact and overlap for the duration of a phase or the entire project.

- Two categories of processes:

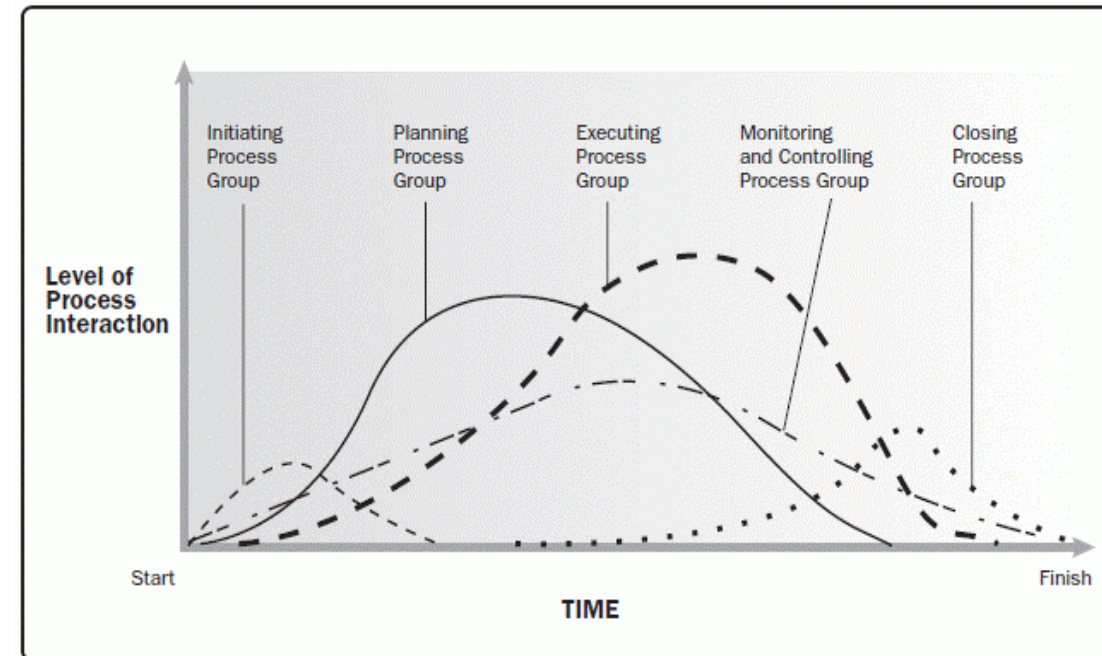
- product/service-oriented processes (delivery).

- Project Management processes →

(PM processes: do not directly carry out but make (allow) the product/service done)

- The controlling process curve (always operating) rises with the the planning process, and the execution process

- The planning process curve has anticipated interaction effects similar to those of the execution processes



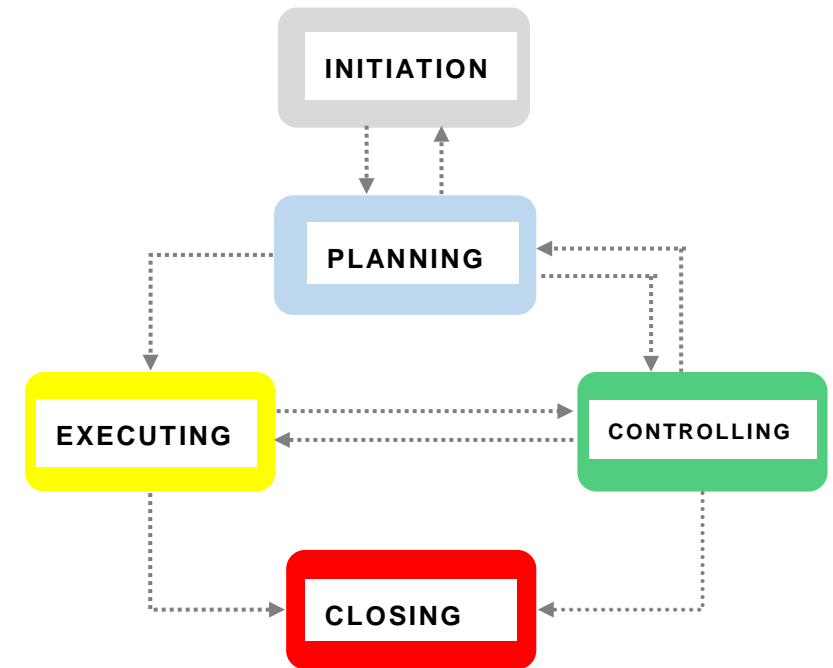
. Process Groups Interact in a Phase or Project

<https://www.projectmanagementonline.it>

# Project life cycle and PM processes

Iterative sequence of project management processes.  
Intermediate results used by subsequent processes.  
Need to repeat certain processes over time.  
Parallelizing or overlapping groups of processes.

Each project phases has its own **repeated** project management processes



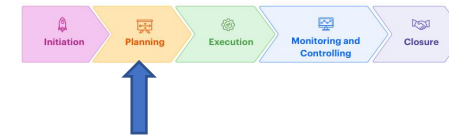
Source: UNI ISO 21500:2013

# Initiation phase (and processes)

- Definition of the needs and formal approval of the project
- Preparatory activities
- Feasibility study (project success and convenience).
- Team preparation
- Budget development
- Project Team preparation
- Project charter (goals, requirements, stakeholders expectations, deliverables, milestone, constraints, budget, project manager, team, main risk, success criteria, ....)
- Preliminary scope definition
- Communication
- Kick-off meeting



# Planning phase (and processes)

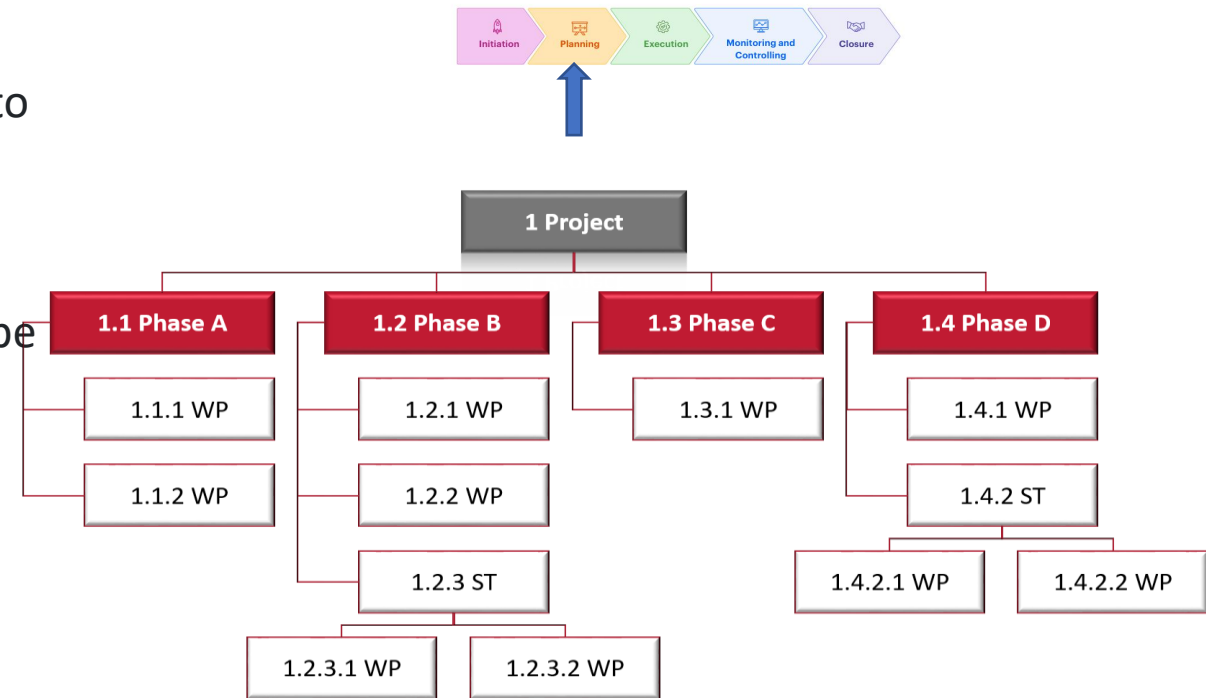


- set of processes used to develop the project plan
- planning of times, costs, quality, and resources in line with established objectives
- definition of project organization, risk (potential impacts), scope
- consider constraints, assumptions, tailoring level.
- definition of the WBS (work breakdown structure) →
- project plan (reference document for the whole project) while remaining a forecast
- baseline is the first official version of the project . Used for the verification in-progress of deviations of the project's. Updated with prior authorization.

When to do?  
 Who does?  
 How to do?  
 Who does what?  
 With what to do?  
 How much does it cost to do?  
 What to do and with what constraints?  
 .....?

# Work breakdown structure (WBS)

- The PMI defines the Work Breakdown Structure as a “a “deliverable oriented hierarchical decomposition of the work to be executed by the project team.” (PMI-PMBOK)
- A visual, hierarchical and deliverable-oriented deconstruction (breakdown) of a project. →
- Supports project managers by breaking down the project scope and visualizes all the tasks to conclude projects
- Work packages (WP): building block of the WBS.
- Support the definition of the steps needed to complete the project. Make the project more manageable
- WPs as sub-projects
- Numerical coding of Work Packages

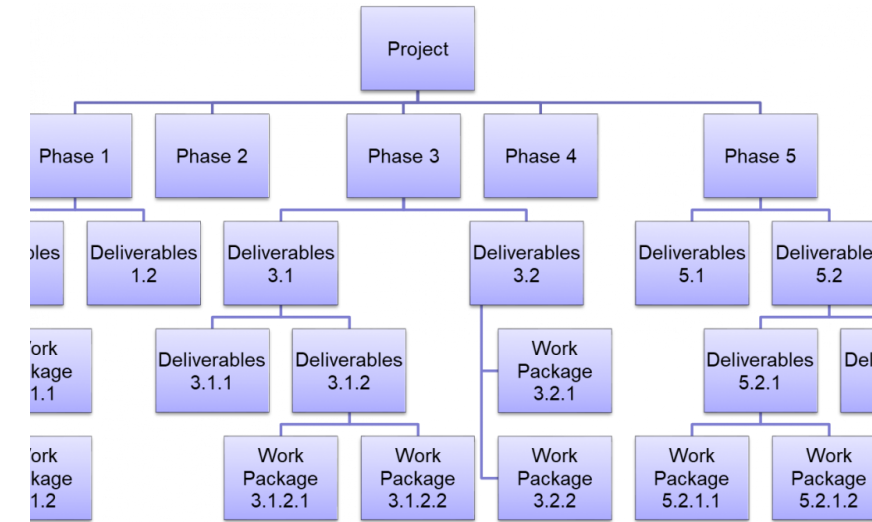


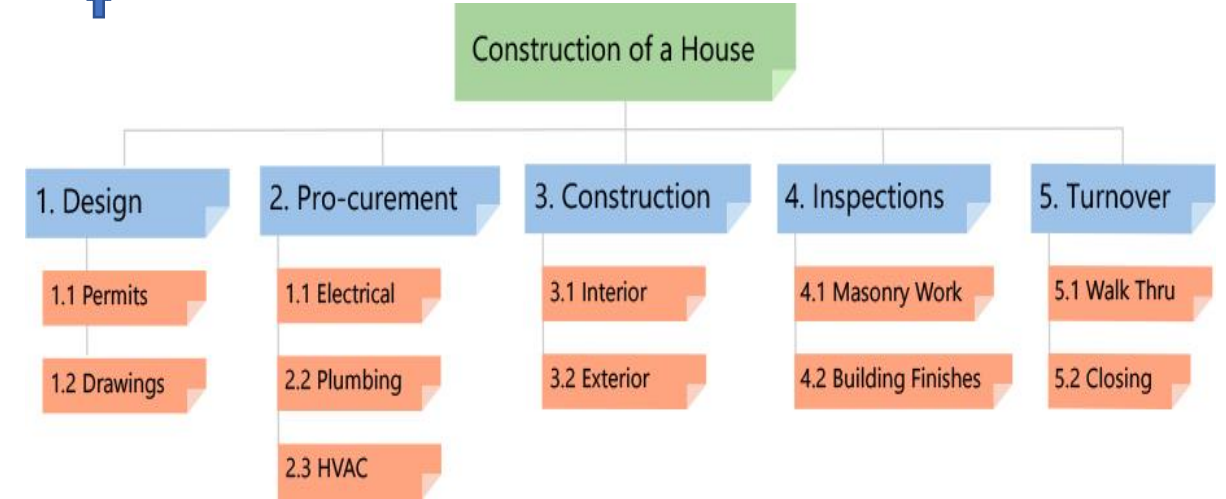
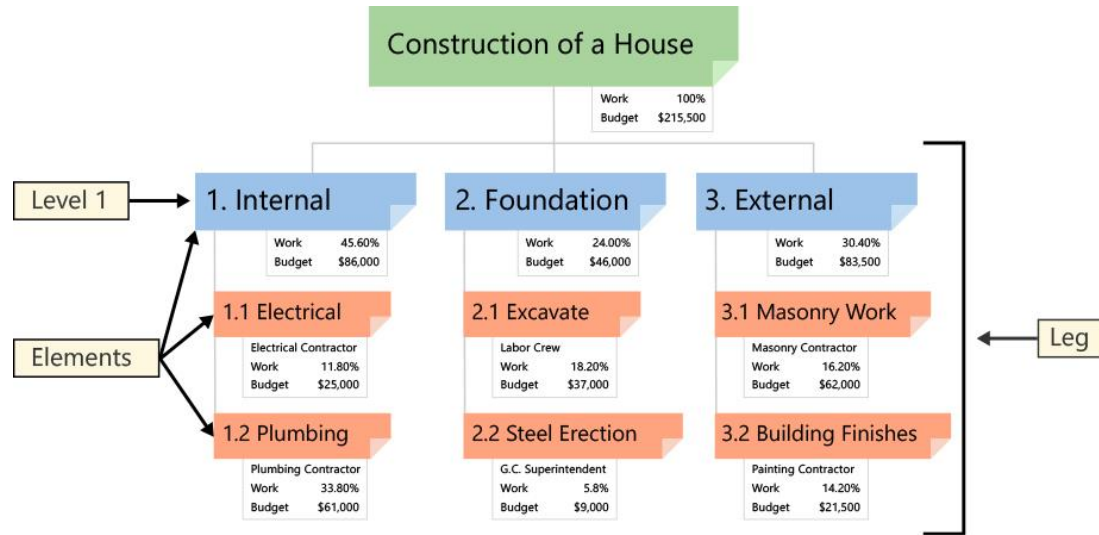
## Planning phase (**Work Breakdown Structure**)

- Detailed definition of everything that must be part of project mission
- Splitting the project into a number of elementary activities.

The project activities are identified through a top-down procedure whose result is the Work Breakdown Structure (WBS)

- Starting from the highest level by dividing the overall task into some macro-activities;
  - Each macro-task is exploded into a number of tasks,
  - Tasks are then exploded into their respective sub-components...
  - Keep going until the desired level of detail is reached
- 
- Two types of WBS: 1) Deliverable-Based and 2) Phase-Based →



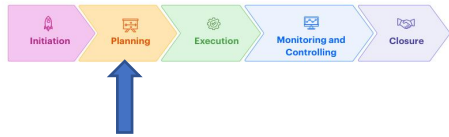


Deliverable-Based Work Breakdown Structure

Phase-Based Work Breakdown Structure

Source: <https://www.workbreakdownstructure.com/>





House Project

1. Interior Deliverables

1.1 Foundation

1.1.1 Forms

1.1.1.1 Excavate

1.1.1.2 Install Forms

1.1.2 Concrete

1.1.2.1 Pour Concrete

1.1.2.2 Finish Foundation

1.1.3 Beams & Joists

1.1.3.1 Install Beams

1.1.3.2 Install Joists

1.2.1 Flooring

1.2.2 Walls

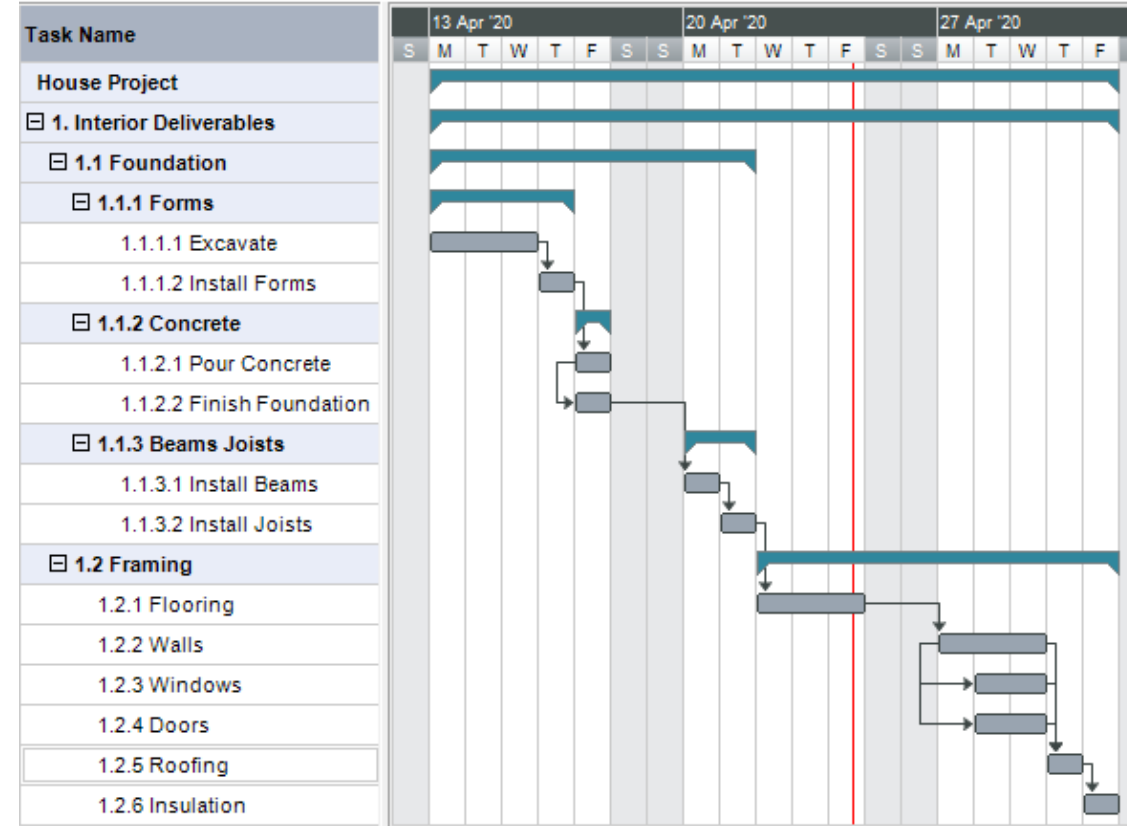
1.2.3 Windows

1.2.4 Doors

1.2.5 Roofing

1.2.6 Insulation

1.2 Framing



From Work Packages to Activities

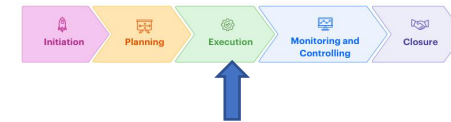
Importance of Numerical coding

From activities to a schedule (GANTT)

Source: <https://www.workbreakdownstructure.com/>

# Execution phase (and processes)

- concerns the set of activities that make it possible to ensure the realization of what planned, provide required deliverables, use resources provided, communicate with stakeholders
- execution of the project plan
- Starts from the planned acquisition of internal and external human and material resources. Training plan.
- In progress verification of the compliance of the products obtained with requirements, plans, and steps for project implementation (quality assurance)
- most relevant costs due to deliverables produced. Involves the largest number/amount of resources

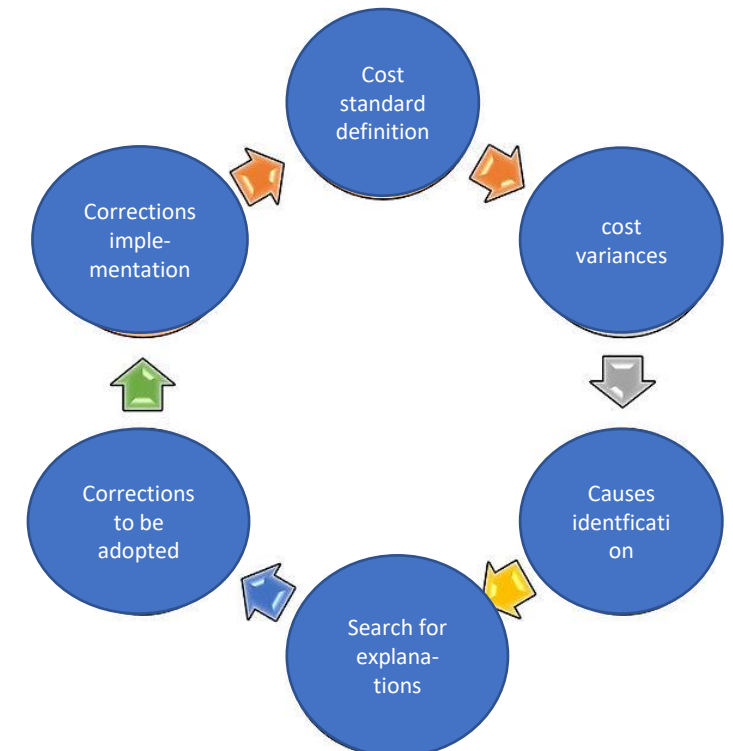


# Controlling phase (and processes)

- addressed monitoring, measurement and control of project performance,
- identification of deviations, implementation, corrective actions (similarities with the Cost Management System of companies) →
- i.s. UNI ISO 21500: process control addressed to: project works, modifications, scope, resources, project team, scheduling, costs, risk, quality, purchasing, communications.
- iterative steps:
  - monitoring;
  - comparison between measured and planned values;
  - deviations analysis;
  - identification of the causes;
  - redefinition of the final estimates;
  - re-planning of times, costs, resources;
  - verification of the success criteria consistency.

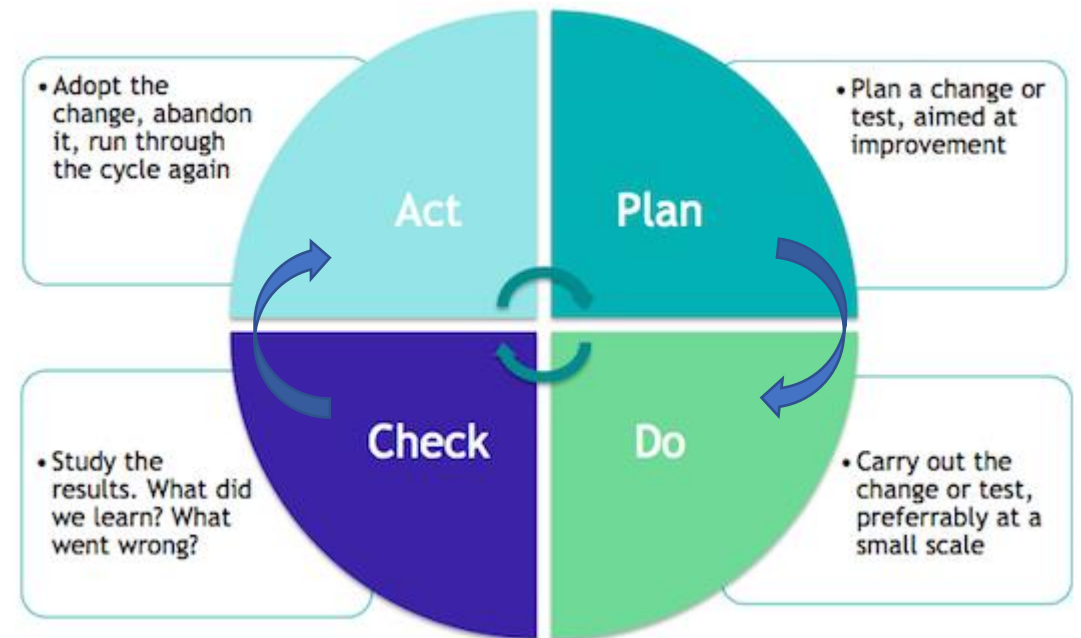
-baseline updating

-Plan-Do-Check-Act (PDCA) – Deming cycle



## Plan-Do-Check-Act (PDCA)

- introduced by Deming for the improvement of manufacturing processes
- project planning tool.
- four-step model for implementing the change.
- no end. Repeated again and again to perform the continuous improvement.
- distinguish monitoring and control.



Source: <https://ictinstitute.nl/>

# Closing phase (and processes)

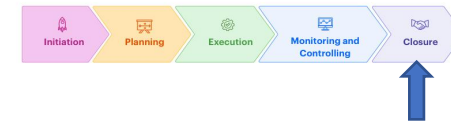
-allows the project to be concluded in a complete manner

-closure requirements

- all expected results (products / services) formally accepted by the customer
- administrative closure: activities created by the project are transferred to others, archiving of project data (including lesson learned), release of the human and material resources used
- contract closure: the contractual obligations and the obligations have been fulfilled

-the lessons learned to improve the (organization and team) PM competencies

-close-out meeting, with the aim of highlighting the strengths and weaknesses of the management of the project concluded



# Main Project stakeholders

## INSIDE

the sponsor

**the project manager**

the project management team

the Project Management Office

the organization (company, association...)

the internal customer

internal end users

## OUTSIDE

external customer

external project team members

external end users

business partners and / or suppliers

authorities including government bodies

economic or social interest groups

# The Project Manager

Is responsible for coordinating and integrating all project activities, aimed at achieving the objectives of the project.

The project manager:

- is responsible for the application of the PM processes, for the project completion, and for disseminating information to all stakeholders
- directs, manages, and directs the activities and resources assigned
- responds to the sponsor (internal “customer”) and is assisted by the PM team

A **project sponsor** is a person or group who promote the project and provides resources and support for the project

## ABILITIES, COMPETENCIES, SKILLS

Communication  
Leadership and team building  
Problem solving;  
Managing relationships;  
Motivate/evaluate / manage resources;  
Technical skills and knowledge  
Methodological skills and knowledge;  
Negotiation abilities  
General management knowledge;  
Project context.



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## Tools for the Project Management

Planning and controlling processes.

Graphical representation of a project's timeline addressed to make projects more effective and efficient.



**PM: adoption of Reticular Techniques** (programming), to represent the project on oriented graphs (diagrams) according to two different approaches:

- activity on nodes
- activity on arcs.

Diagrams represent the optimal development of the activities bound to the shortest time and/or the lowest cost

Reticular Techniques developed since 1958

Most relevant are:

- Program Evaluation and Review Technique (PERT)
- Critical Path Method (CPM).

Both techniques help design networks and determine a project's critical path

Differences:

PERT concentrates on time

CPM stresses on the time-cost trade-off.

## PERT

A project management technique, used to manage uncertain activities of a project.

A graphical representation of a project's timeline that displays all of the individual tasks needed

Used when the randomness in the duration of the activities is high. It is assumed that the durations of the activities are random independent variables between their (having variances and expected values easily calculable).

## CPM

A statistical technique of project management that manages well defined activities of a project

Employed in the case the randomness in the duration of the activities is low

## Factors characterizing each activity of a project

1. the duration (deterministic or random) (starting/ending time)
2. the resources necessary for its execution;
3. the cost;
4. precedence over other activities;
5. time constraints on the start and end dates of the activities.

## Critical Path Method. Application

Employed when the randomness in the activities duration is low

- no constraint related to the resources availability
- precedence constraints between activities are simple: an activity can start only if the previous activities is terminated (finish-start precedence)
- goal: minimize the *makespan* (completion time of the project)

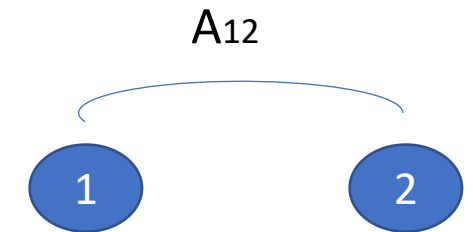
## Reticular Techniques

### 1) Activity-on-Arc (AoA)

- Arcs represent activities
- Nodes represent the precedence constraints.

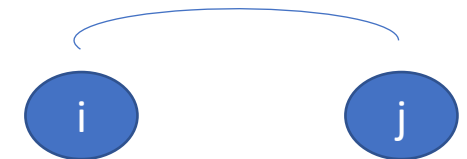
In particular, the nodes correspond to events, such as the completion of some activities (eg: activities corresponding to arcs entering the node) and the beginning of others (the corresponding ones with outgoing arches).

An activity (I, j) cannot start before all activities entering node i are terminated, while no outgoing activity from node j can start before it is terminated



### 2) Activity-on-Node (AoN). (Precedence diagramming method)

- Nodes represent the activities,
- Arcs represent precedence.
- An arc from i to j indicates that activity j cannot start before i is finished. (finish-to-start precedence)
- Depicts a logical progression of the dependencies between schedule activities



## Activity-on-Arc (AoA)

Modelling a project management problem as a graph problem with AoA

- ❖ identify all project activities associate an arc to each activity, whose extreme nodes represent the beginning and end of an activity
- ❖ for each activity it is necessary to know those tasks that have the precedence (to be completed before starting an activity).
- ❖ model precedence through (dummy) arcs;
- ❖ insert a dummy node (0,1 ) as the starting point of the project;
- ❖ number all other nodes such that if an arch exists directed from node  $i$  to node  $j$  results  $i < j$  (topological sort)
- ❖ insert an ending project node
- ❖ delete dummy arcs if this does not create new unuseful precedence

## Application (AoA)

A company wants to launch a new chair on the market based on two components. For the launch of the chair are needed:

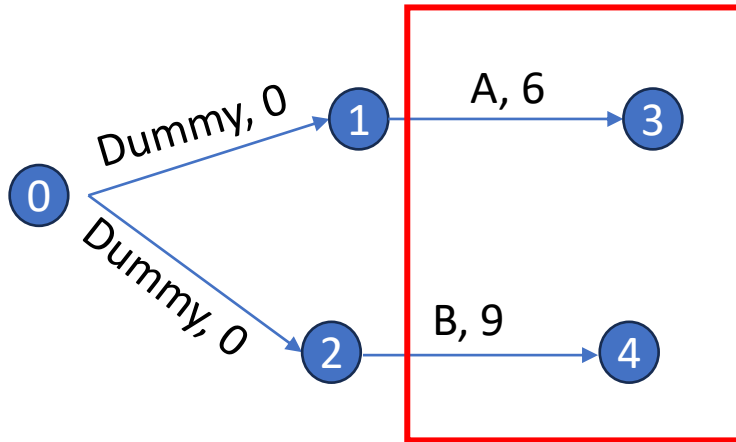
- a series of preparatory activities,
- a production activity which assembly of two different components.

Activities	Predecessors	duration Days
A (Training)	-	6
B (Raw materials purchasing)	-	9
C (Component 1: production)	A, B	8
D (Component 2: production)	A, B	7
E (Component 2: Q. Control)	D	10
F (Product Production)	C, E	12

Activities to be performed

Source of application: derived from P. Dotti (Unisienna)

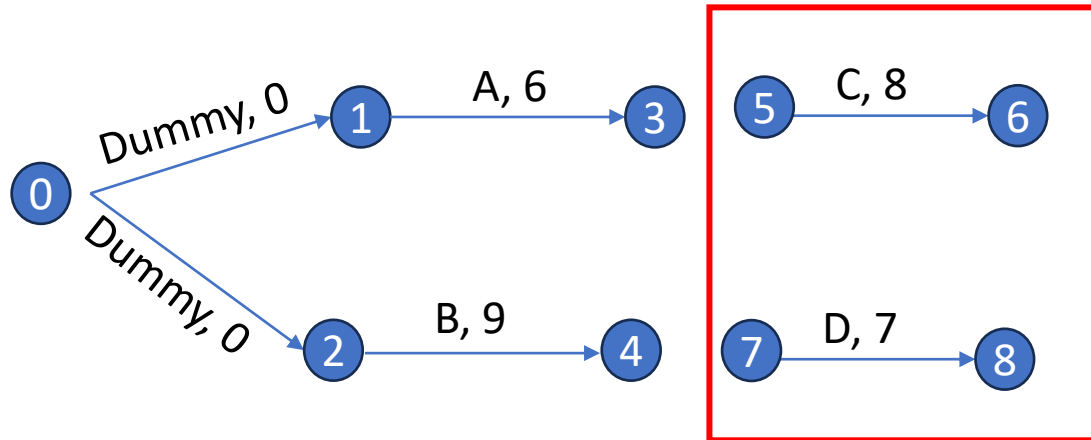
## Application (AoA) - step 1



Activities	Predecessors	duration Days
A (Training)	-	6
B (Raw materials purchasing)	-	9
C (Component 1: production)	A, B	8
D (Component 2: production)	A, B	7
E (Component 2: Q. Control)	D	10
F (Product Production)	C, E	12

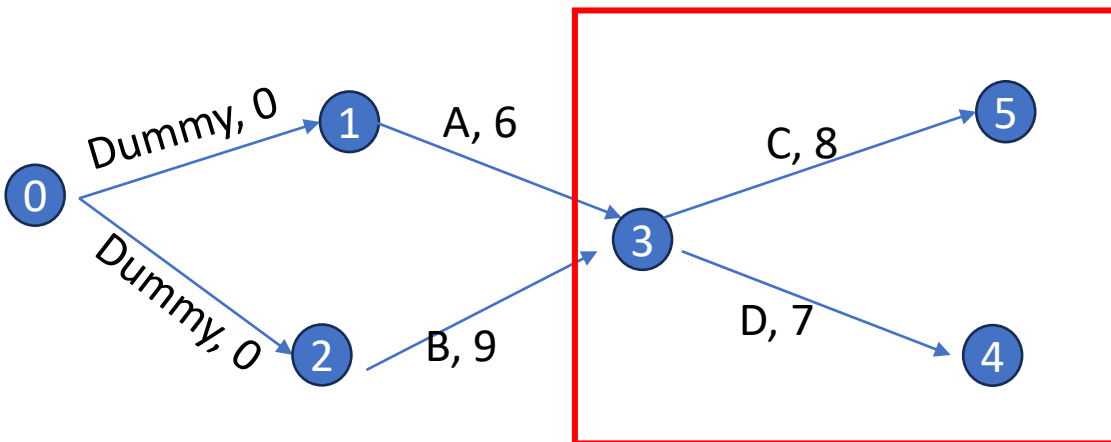
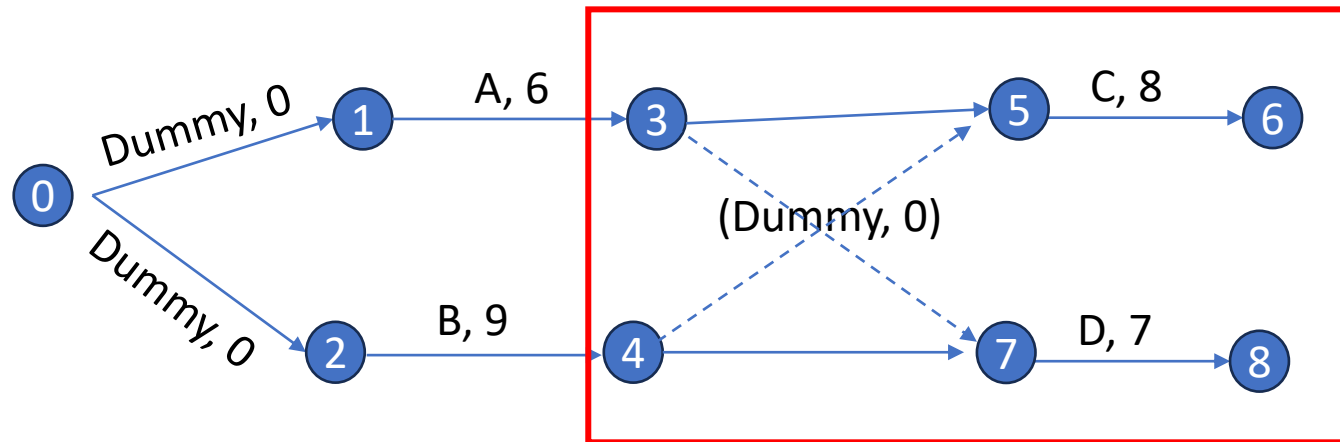


## Application (AoA) - step 2



Activities	Predecessors	duration Days
A (Training)	-	6
B (Raw materials purchasing)	-	9
C (Component 1: production)	A, B	8
D (Component 2: production)	A, B	7
E (Component 2: Q. Control)	D	10
F (Product Production)	C, E	12

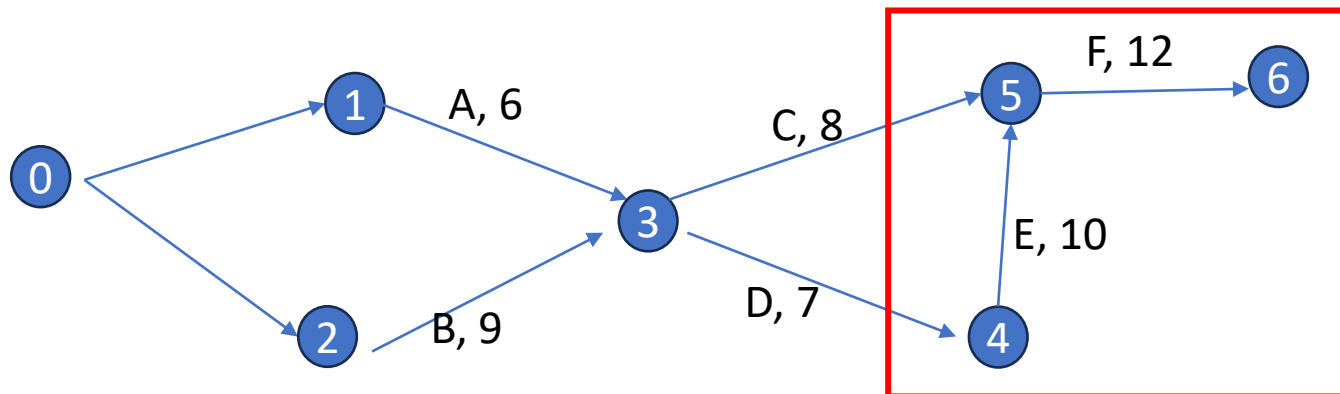
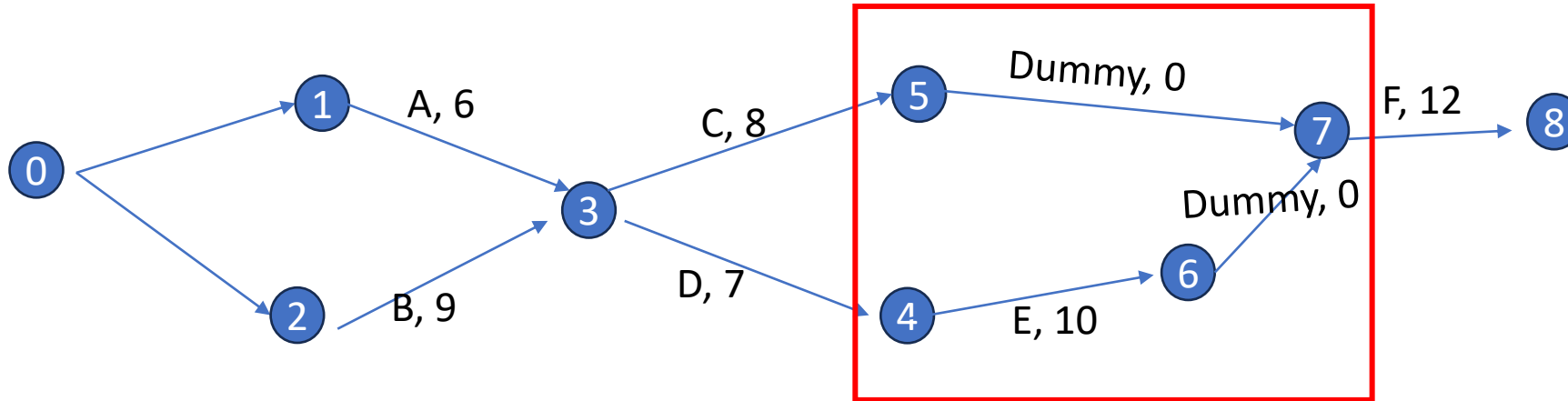
### Application (AoA) - step 3-4



Cutting out of dummy activities

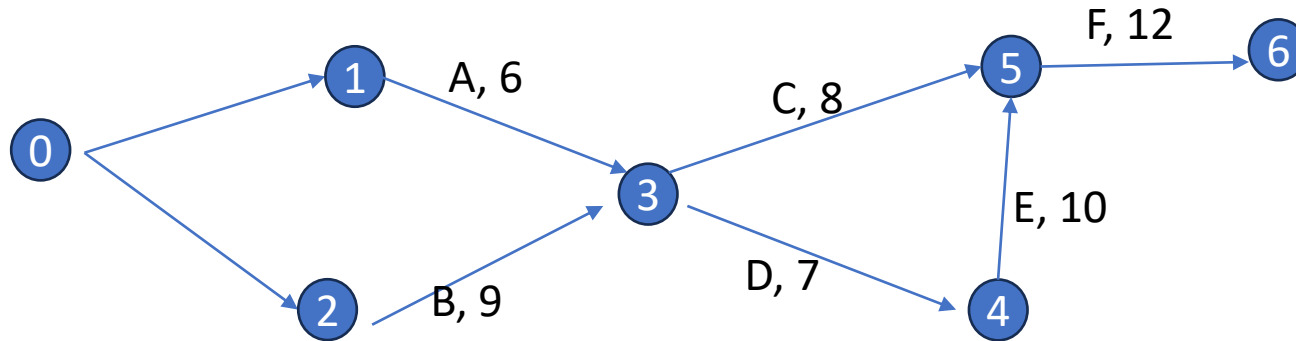
Activities	Predecessors	duration Days
A (Training)	-	6
B (Raw materials purchasing)	-	9
C (Component 1: production)	A, B	8
D (Component 2: production)	A, B	7
E (Component 2: Q. Control)	D	10
F (Product Production)	C, E	12

### Application (AoA) - step 5-6



Cutting out of dummy activities

Activities	Predecessors	duration Days
A (Training)	-	6
B (Raw materials purchasing)	-	9
C (Component 1: production)	A, B	8
D (Component 2: production)	A, B	7
E (Component 2: Q. Control)	D	10
F (Product Production)	C, E	12



Nodes have now a topological sort

Critical activity: if the increase in the duration of the activity creates an increase in the overall duration of the project ( a bottle-neck).

Critical path: path from the Start-node to the End-node made composed only of critical activities.

The *makespan* of a project is the length of time that elapses from the start of work to the end.

It is defined as the minimum value of the difference between the final instant of the final node that concludes the project and the initial instant of the initial node