



# Advanced Project Management

## 1

Concepts – Approaches and Standards – Process Groups

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2025



# CONCEPTS



# Concepts

- **Project:**
  - A project is a temporary endeavor undertaken to create a unique product, service or result

PMBOK, PMI



# Concepts

- **Project**: a unique group of processes, and coordinated and controlled activities, aimed at achieving an objective

Standard ISO 21500



# Concepts

- **Project:** a non routine, non repetitive, one of a kind undertaking usually with discrete time, financial and technical performance goals



# Concepts

- Examples:
  - New product (service) development
  - Organizational change
  - Information systems
  - Building construction
  - New business model implementation
  - ...



# Concepts

- Characteristics
  - Owner, size, scope
  - Relevant means, dynamic
  - Discontinuity
  - Irreversibility
  - External influences
  - Uncertainty, risk

# Project Management

## Concepts



- Project: characteristics

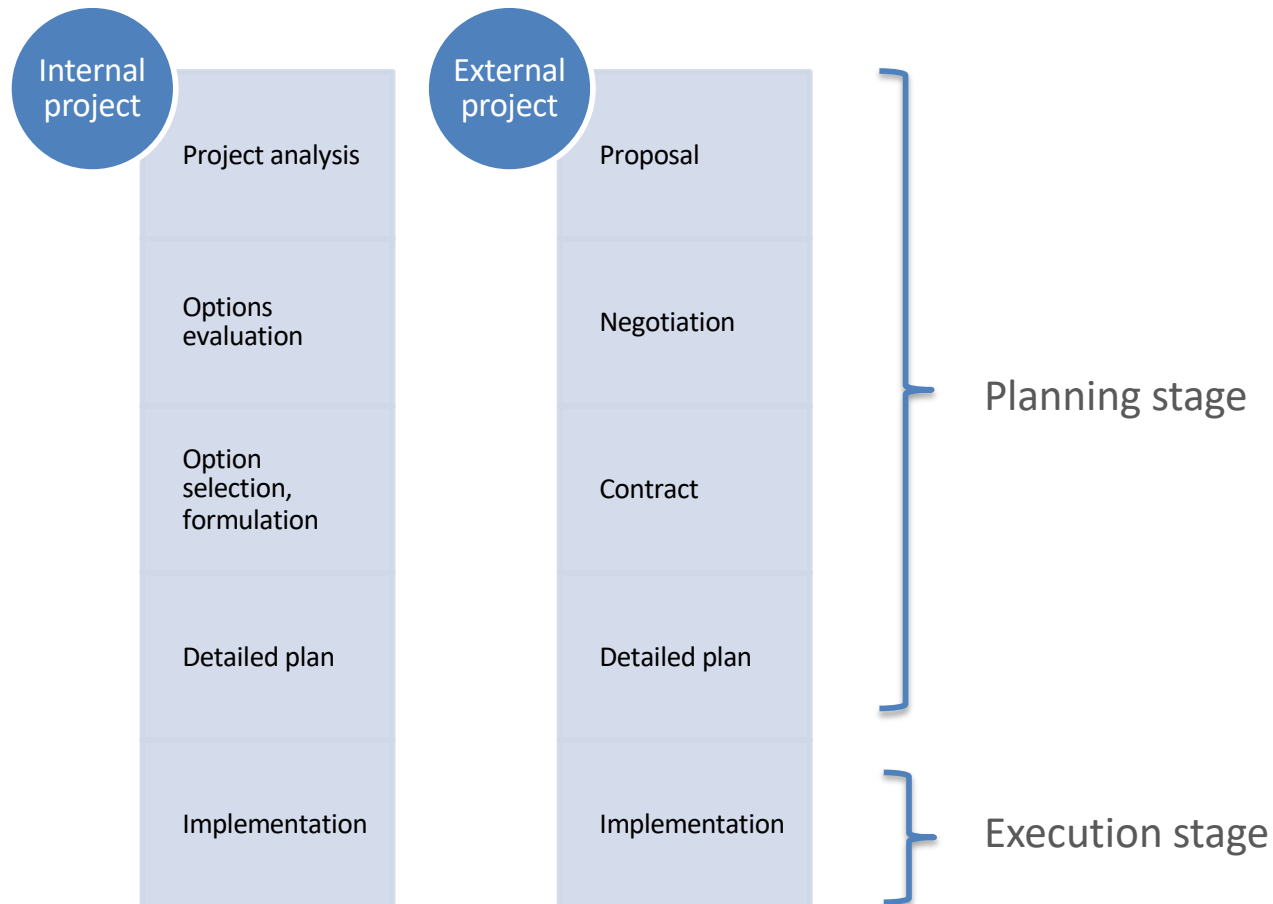
Non Project	Project
Repititive tasks and processes	New processes / tasks
Continuous processes	Limited life-cycle
More homogeneous and defined team	A heterogeneous team, formed specifically to integrate efforts and required skills
Little uncertainty in performance, cost and time estimates	Great uncertainty in performance, cost and time estimates
Integrado na cadeia de operações	Integrated in the chain of operations



# Project Management Concepts



- Internal / External



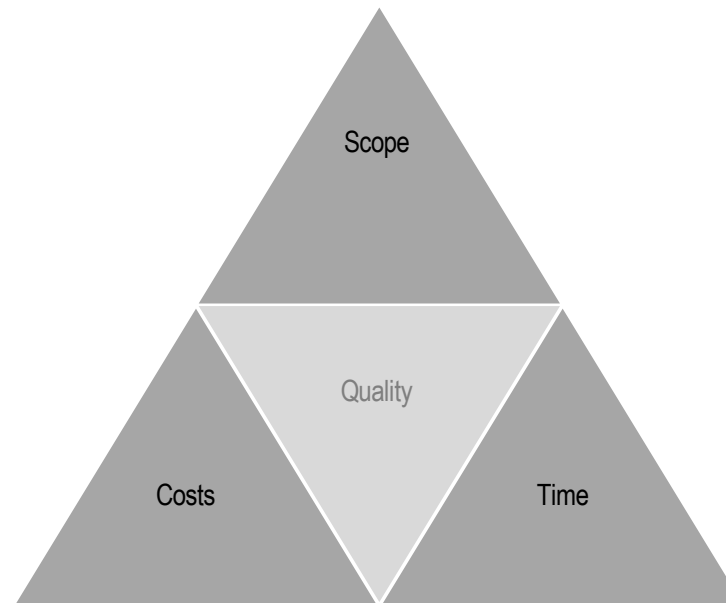


# Concepts

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



- **Project Management Basic Dimensions**

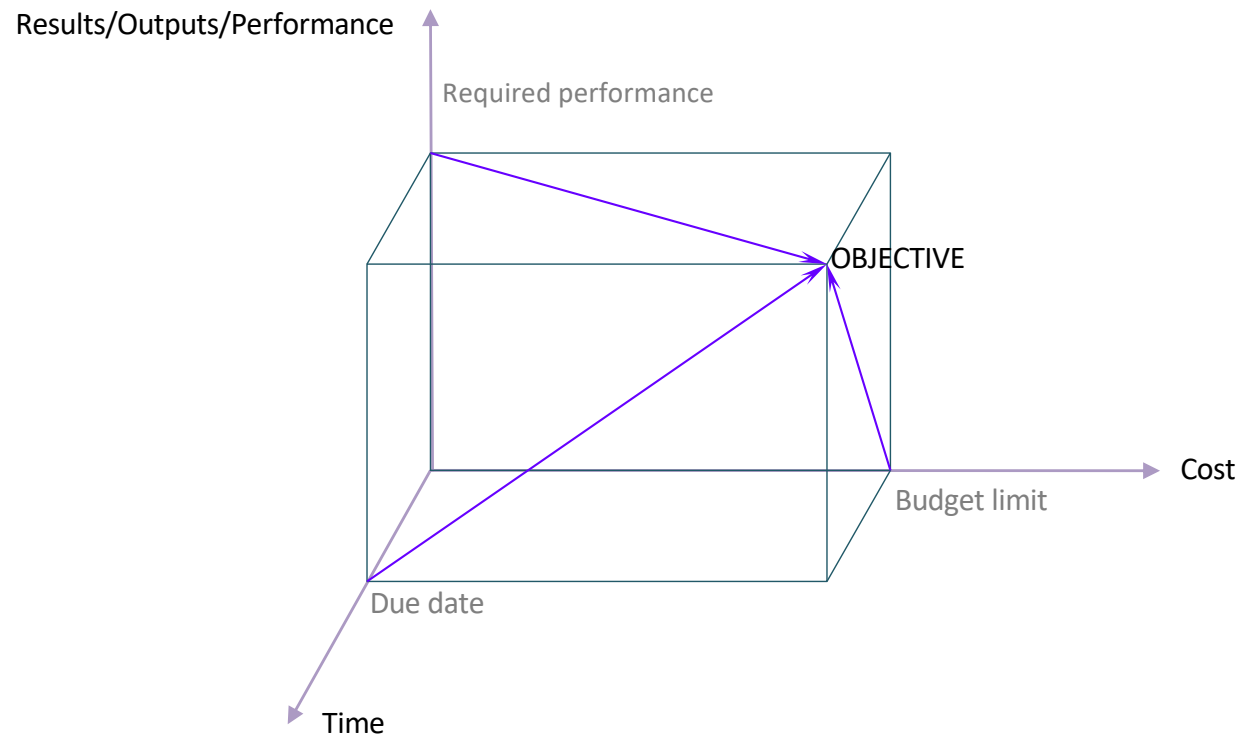


*Iron triangle*

# Project Management Concepts



- Project Management Basic Dimensions





# Concepts

- Benefits of Project Management (1/2)
  - Achieving business goals;
  - Satisfying stakeholder's expectations;
  - Increasing predictability;
  - Increasing the odds of success;
  - Delivering on time;
  - Solving problems and conflicts;
  - Effectively managing risks;
  - Optimizing the use of organizational resources;
  - Good decision making regarding projects in difficulties



# Concepts

- Benefits of Project Management (2/2)
  - Managing time, cost, resources and scope constraints;
  - Managing change;
  - Linking results to business objectives;
  - Increasing markets competitiveness;
  - Sustaining the organization;
  - Quickly reacting to competitive change through project planning review



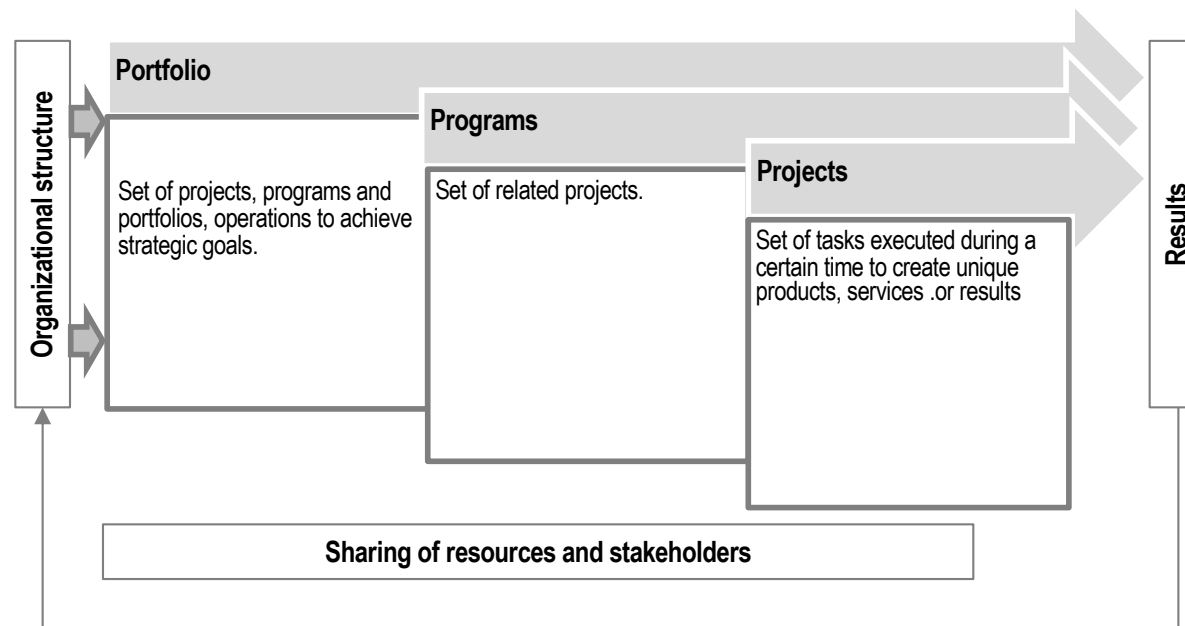
# Concepts

- **Projects, programs and portfolios**
  - **Portfolio:** collection of projects or programs grouped together to facilitate PM to meet strategic business goals.
    - Programs and projects not necessarily interdependent nor directly related
    - PM: ensuring that programs/projects are reviewed to prioritize resource allocation, and that the management of the portfolio is consistent with organizational strategies
  - **Program:** group of related projects
    - Coordination focused on obtaining benefits and control not available from managing projects individually
    - PM: achieving program's strategic goals and benefits
    - Shared governance structure

# Project Management Concepts



- Projects, programs and portfolios

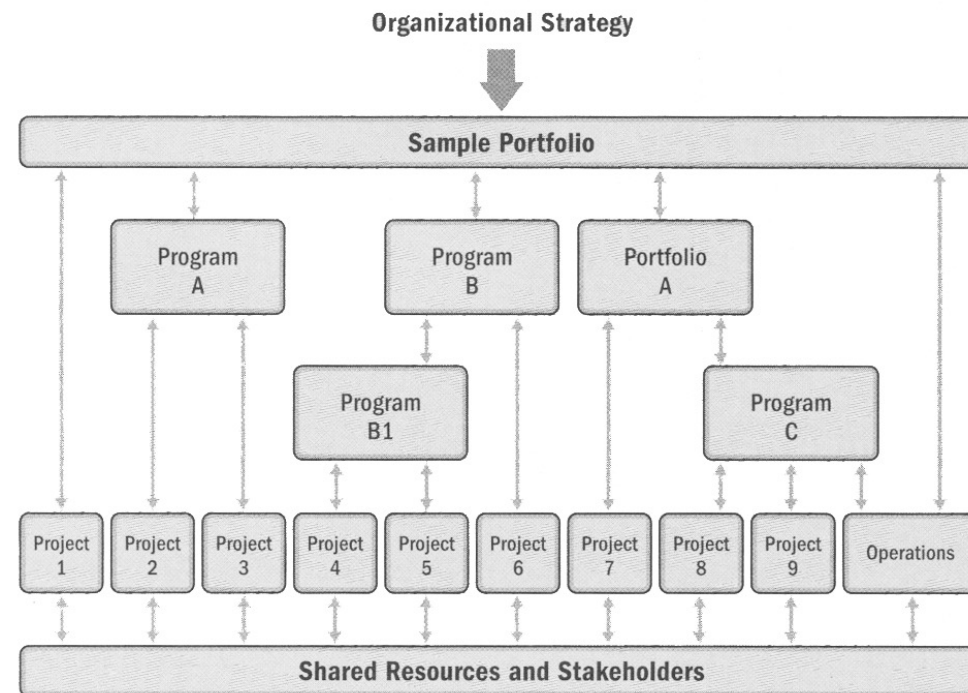




# Project Management Concepts



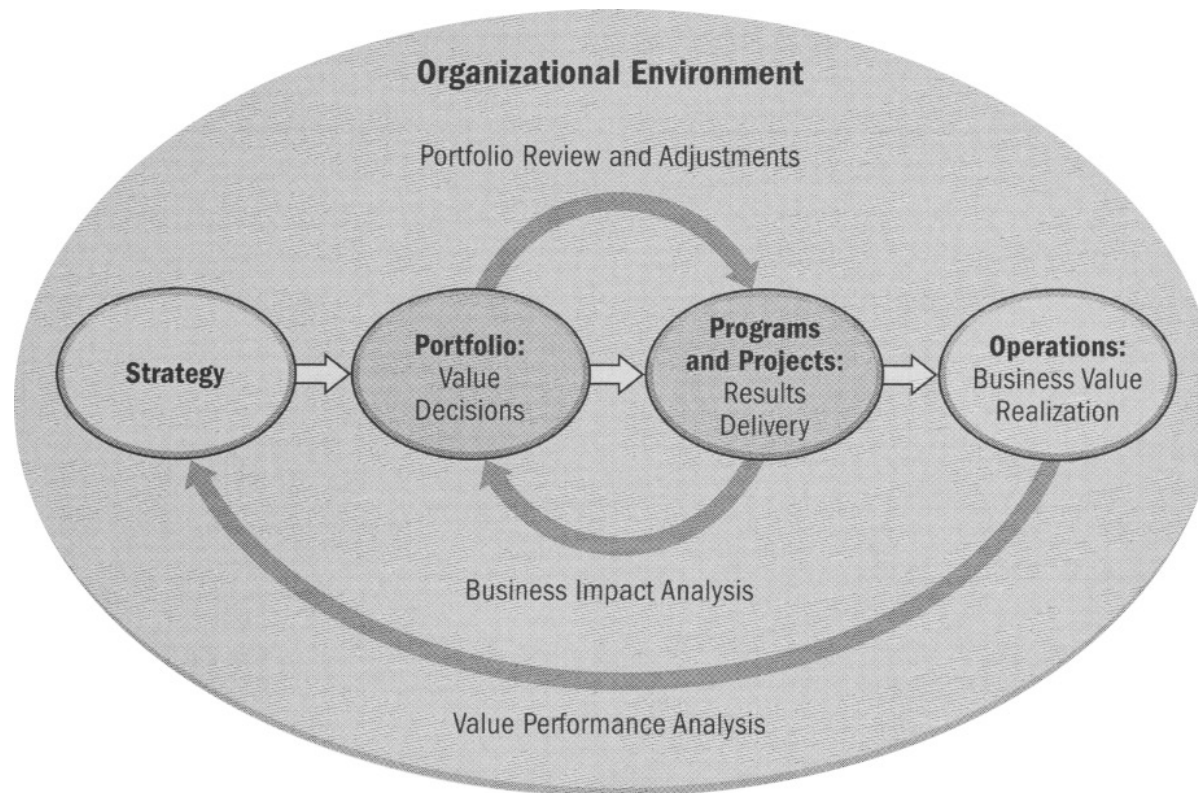
- Projects, programs and portfolios



# Project Management Concepts



- Projects, programs and portfolios



# Project Management Concepts



## Projects, programs, portfolios

	PROJECTS	PROGRAMS	PORTFOLIOS
Scope	Projects have defined objectives. Scope is progressively elaborated throughout the project life cycle.	Programs have a larger scope and provide more significant benefits.	Portfolios have a business scope that changes with the strategic goals of the organization.
Change	Project managers expect change and implement processes to keep change managed and controlled.	The program manager must expect change from both inside and outside the program and be prepared to manage it.	Portfolio managers continually monitor changes in the broad environment.
Planning	Project managers progressively elaborate high-level information into detailed plans throughout the project life cycle.	Program managers develop the overall program plan and create high-level plans to guide detailed planning at the component level.	Portfolio managers create and maintain necessary processes and communication relative to the aggregate portfolio.
Management	Project managers manage the project team to meet the project objectives.	Program managers manage the program staff and the project managers; they provide vision and overall leadership.	Portfolio managers may manage or coordinate portfolio management staff.
Success	Success is measured by product and project quality, timeliness, budget compliance, and degree of customer satisfaction.	Success is measured by the degree to which the program satisfies the needs and benefits for which it was undertaken.	Success is measured in terms of aggregate performance of portfolio components.
Monitoring	Project managers monitor and control the work of producing the products, services or results that the project was undertaken to produce.	Program managers monitor the progress of program components to ensure the overall goals, schedules, budget, and benefits of the program will be met.	Portfolio managers monitor aggregate performance and value indicators.



# Concepts

- Project governance
  - The organization of a project is the temporary structure that includes roles, responsibilities and levels of authority, as well as the boundaries that need to be defined and communicated to all stakeholders in the project. Typically, this organization includes the project manager and the project team, who carry out their activities.

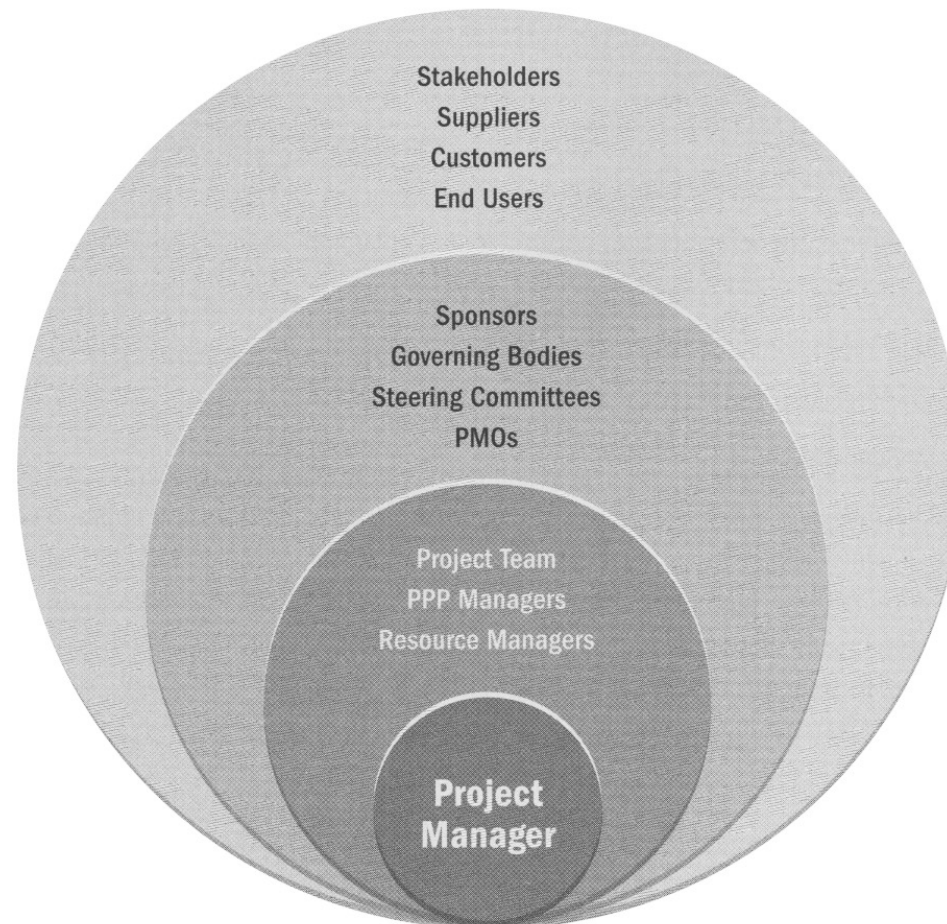
Standard ISO 21500

- Structure
- People
- Information

# Project Management Concepts



- Project governance





# Concepts

- Sponsor
  - Person with the responsibility to ensure and maintain effective communication between the client, the top management, and the project manager, transmitting information about the costs, progress and results inherent to the project.
  - The level of involvement of the sponsor varies according to the stages of project development, having a more active role in the initiation phase, in which he/she effectively leads the project, and until it is formally authorized and ongoing. He/she also assumes a key role in facing conflicts that may arise in the project team.





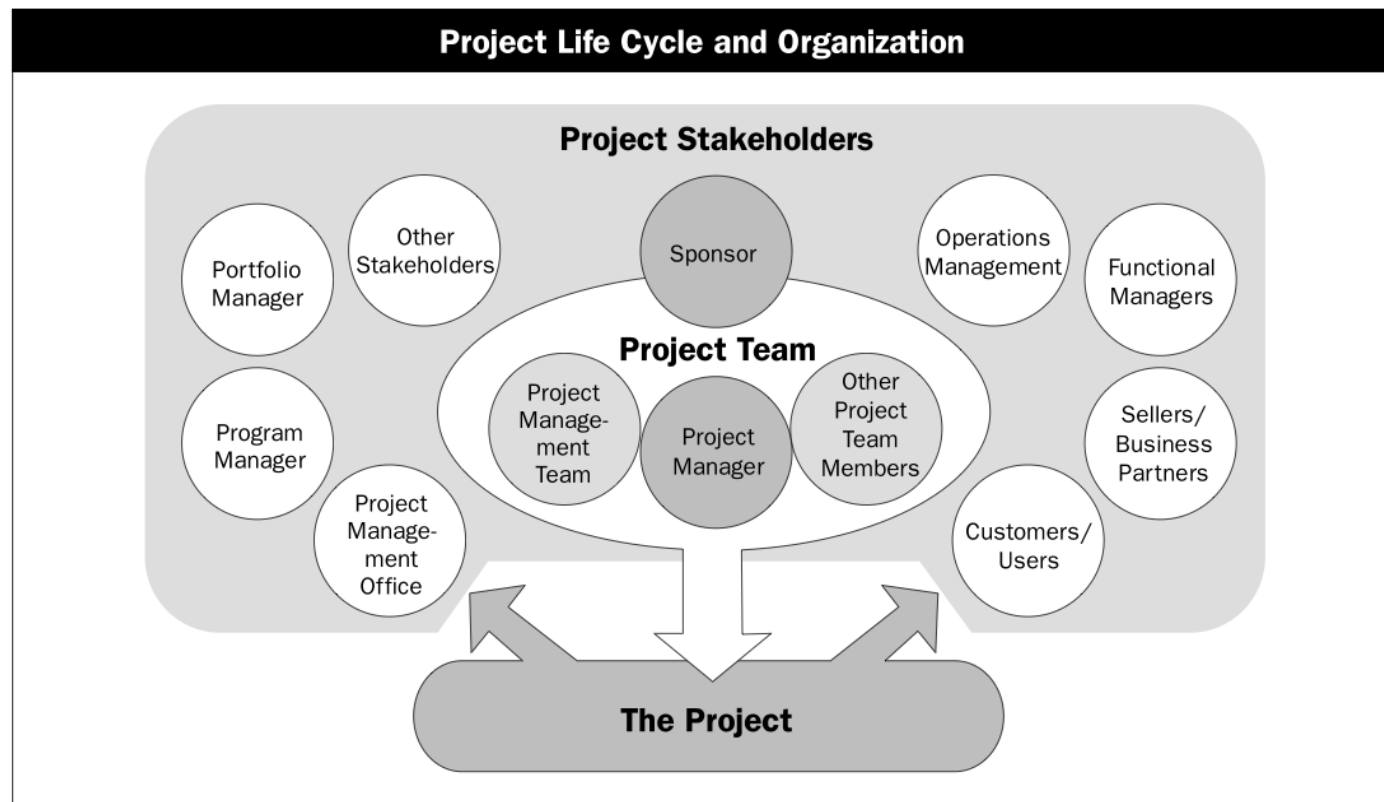
# Concepts

- Stakeholders
  - People or organizations who are actively involved in the project or whose interests may be positively or negatively affected by the performance or completion of the project
  - The project management team should
    - Identify internal/external stakeholders, in order to determine the project requirements and expectations of all the parties involved
    - Manage and influence these stakeholders so as to ensure successful outcome
  - Project manager, clients, team members, sponsors, lobbies, suppliers, banks, insurance companies, ...

# Project Management Concepts



- Stakeholders

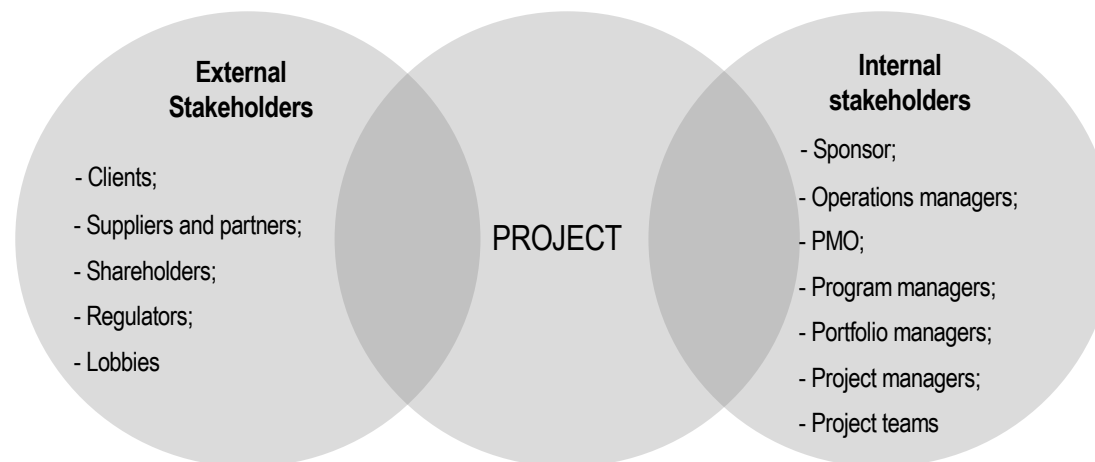




# Project Management Concepts



- Stakeholders





# Concepts

- **Project manager**

- Finance, accounting, sales and marketing, research & development, manufacturing
- Strategic planning, operational planning
- Organizational structure and behavior, HR management
- Ability to manage through motivation, delegation, supervision, conflict management...
- Self-management: time, stress, ...

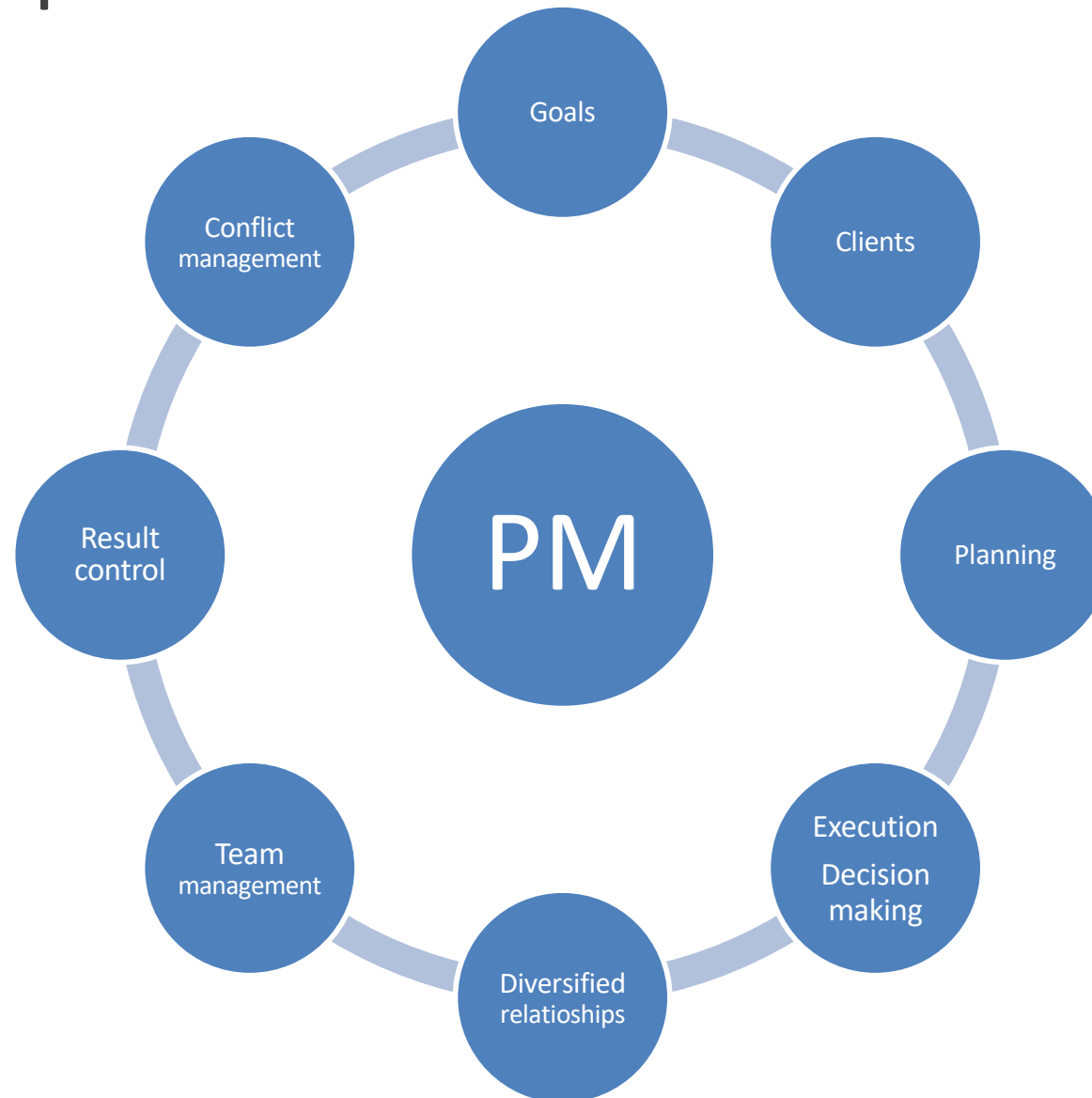


# Concepts

- Project manager
  - Leadership
    - Point path
    - Motivate
    - Inspire
  - Communication
  - Negotiation
  - Problem solving
  - Ability to influence organization; make things happen

... PM = professionalization

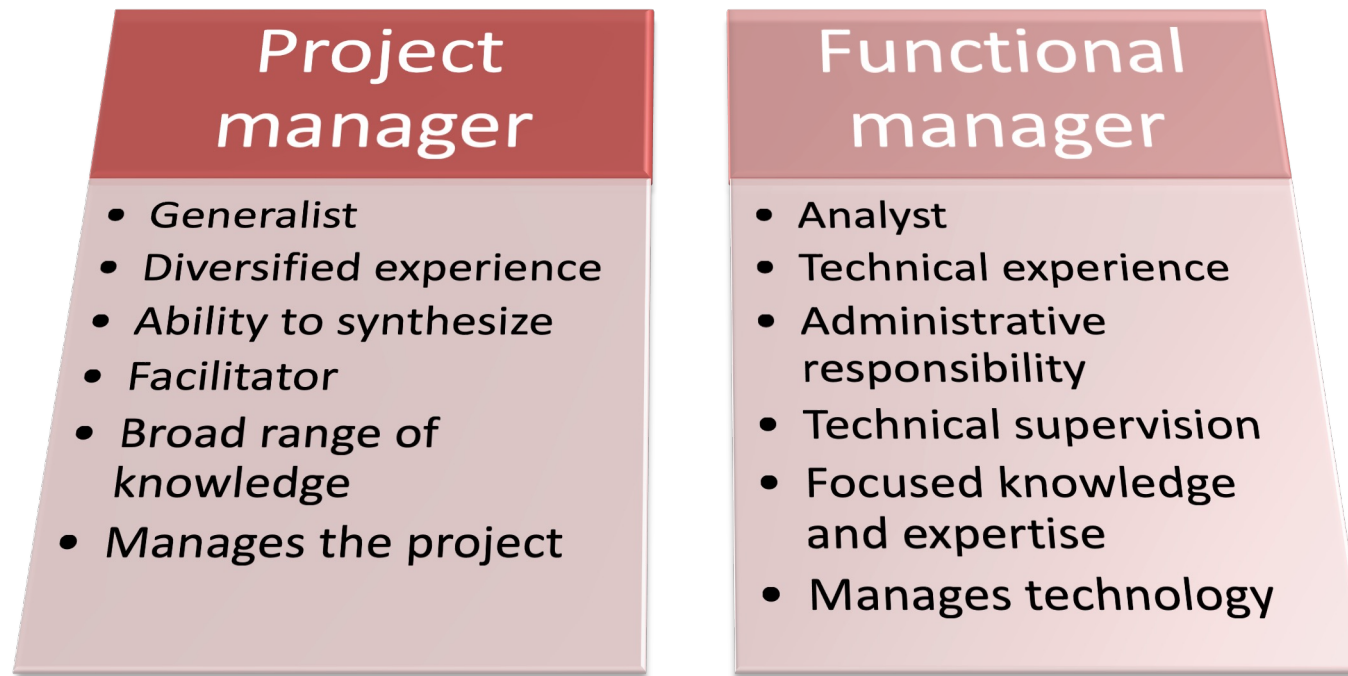
# Project Management Concepts





# Concepts

- The role of the Project Manager



# Project Management Concepts



- The role of the Project Manager



*PMI Talent Triangle*



# Concepts

- **Project Management Office (PMO)**
  - Organizational structure consisting of project managers and staff, oriented to support and manage various projects
    - facilitator
    - technical and administrative tasks of the projects
    - share project management practices, procedures and methodologies
    - training
    - embodies professional project managers, who will then be allocated to the different projects
    - maintains an information repository
    - more suitable to strong matrix or projectized organizational structures



# Concepts

- **Project life cycle**
  - A collection of sequential (sometimes overlapping) phases. The number of phases is determined by the nature of the project, the area of application, and the management and control needs.
  - The phase structure allows the project to be segmented into logical subsets for ease of management, planning and control.
  - Each phase delivers something – result, service or product (deliverable)





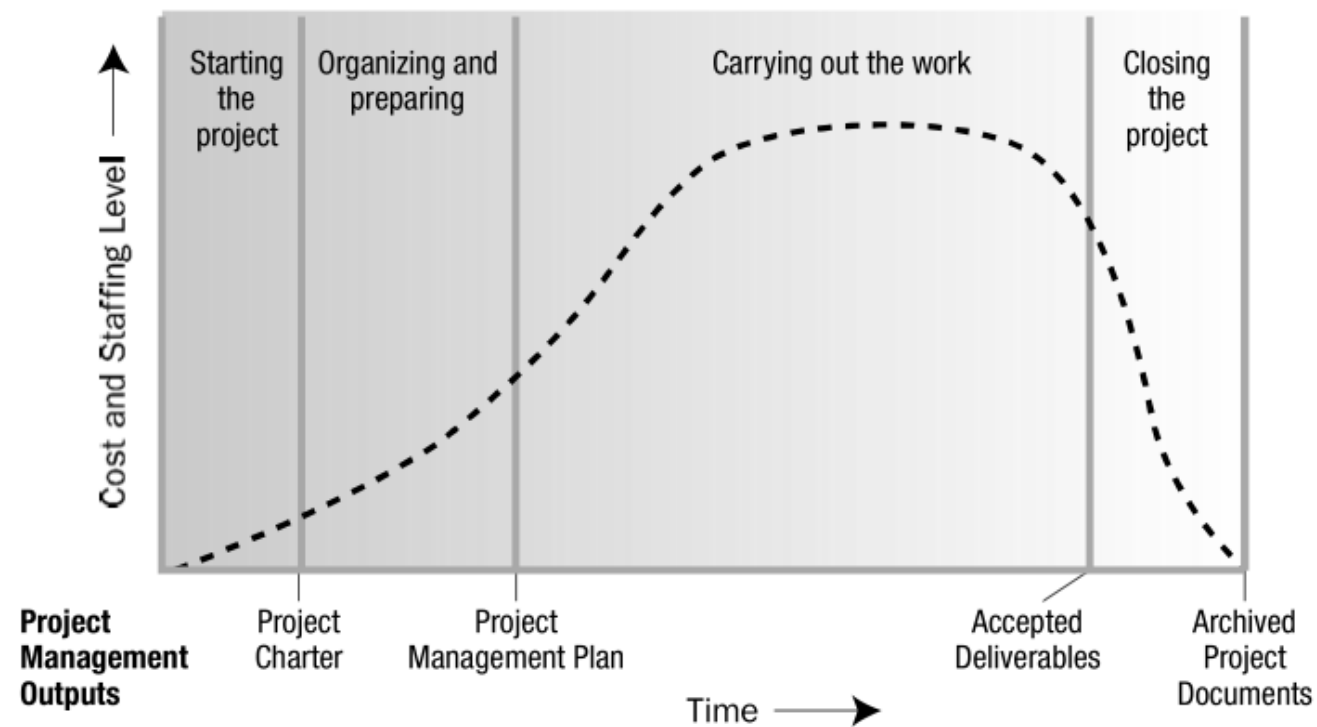
# Concepts

- Project life cycle
  - The closing of a phase usually involves deliverables and performance reviewing/evaluating so as to:
    - Determine if the project should advance to the next phase
    - Identify and correct issues in a technical and cost effective way
    - Closing reviews are generally referred to as ***phase exits, stage gates, or kill points***.

# Project Management Concepts



- Project life cycle



*Typical life cycle*



# Concepts

- Project life cycle

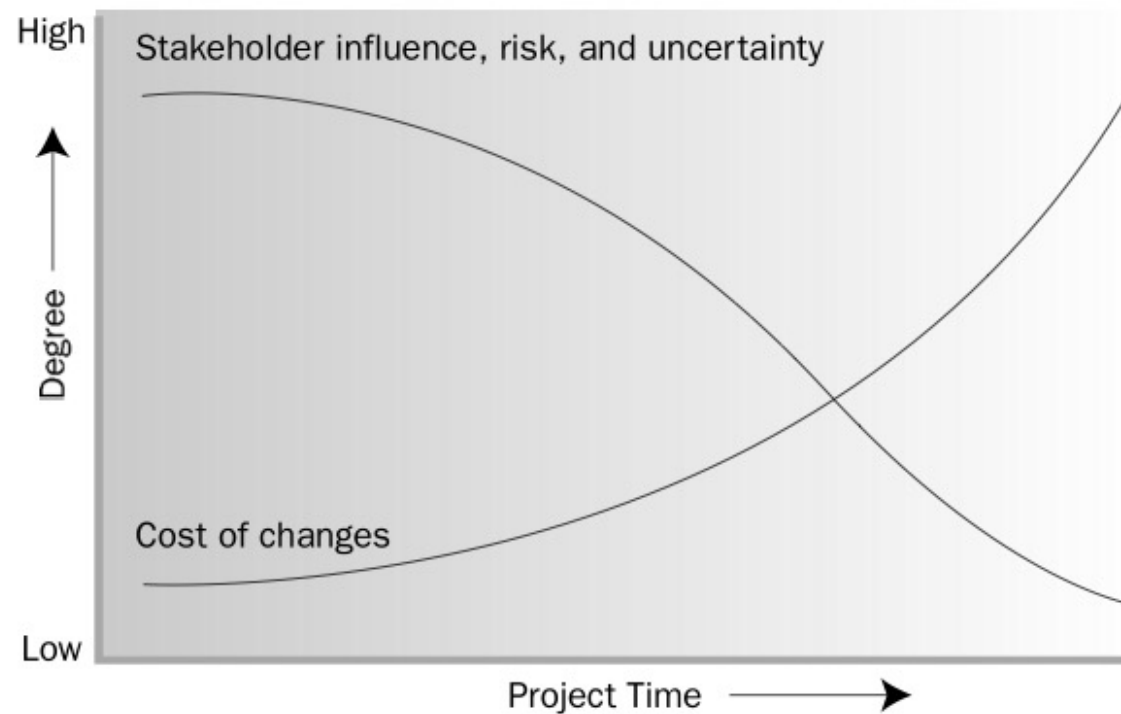
- Usually:

- The involvement of people and costs at the beginning of the project are lower, then higher, and drop significantly at completion
    - The probability to successfully complete the project increases towards completion
    - Stakeholders ability to influence the project decreases towards completion (cost of changes and error correction increases)

# Project Management Concepts



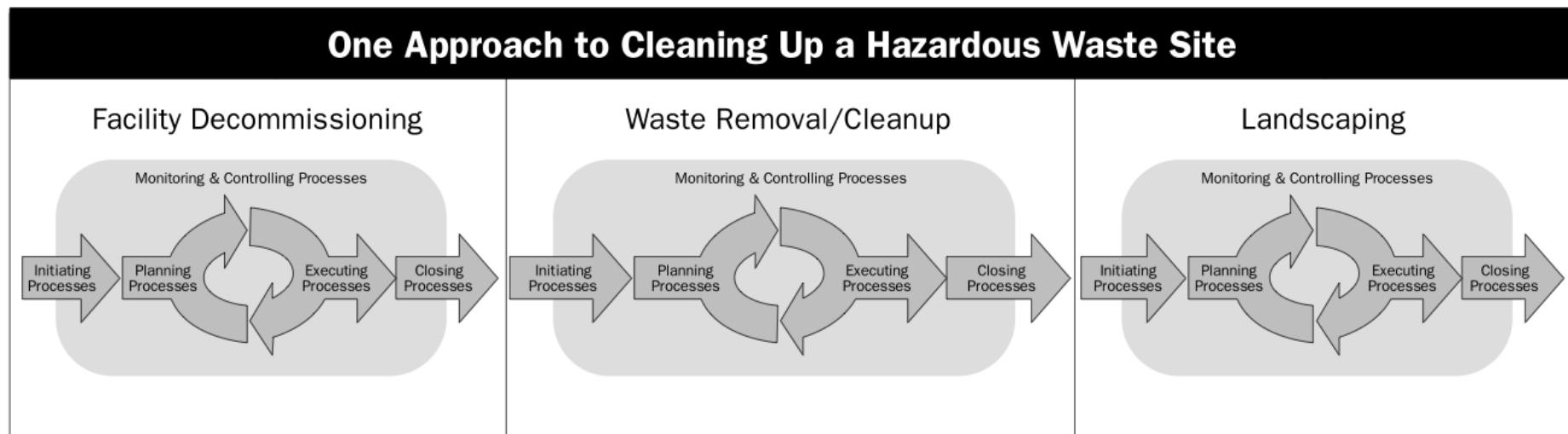
- Project life cycle



# Project Management Concepts



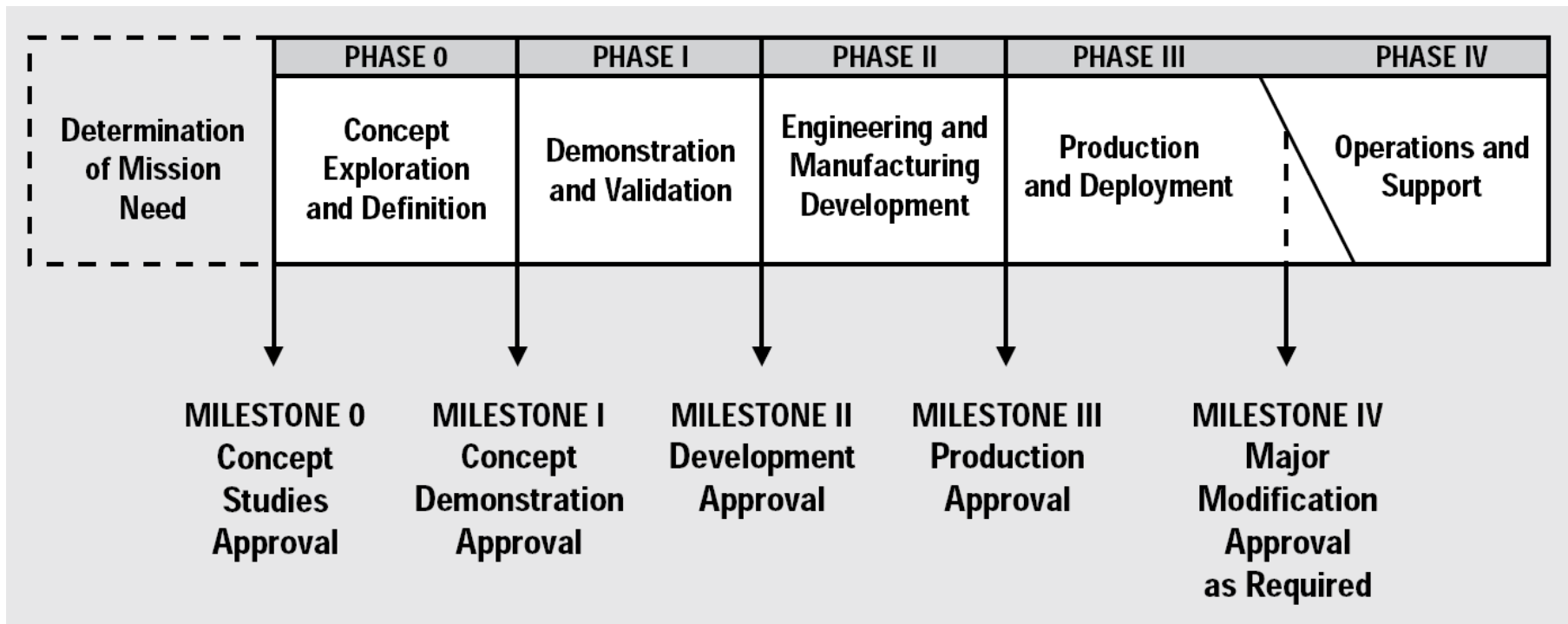
- Project life cycle
  - Phases/stages





# Concepts

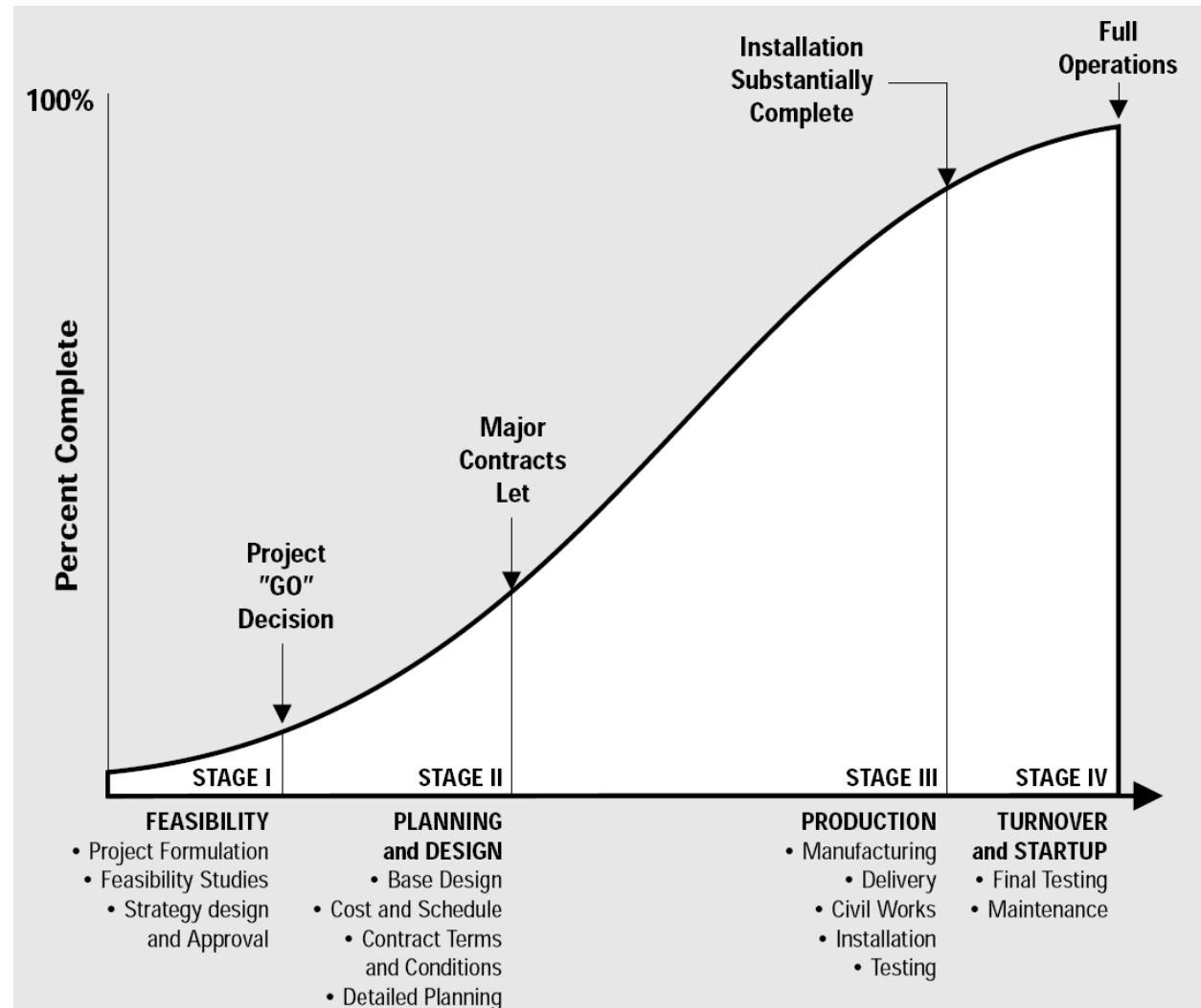
- Project life cycle
  - Phases/stages



# Project Management Concepts



- Life cycle



# Project Management

## Concepts



- Projects in the organizational context

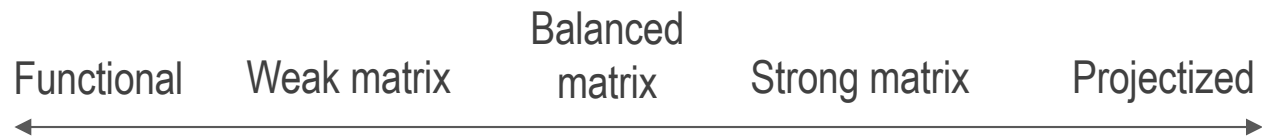
Internal factors	External factors
<ul style="list-style-type: none"><li>• Structure and organizational culture</li><li>• Location of facilities and resources (e.g., virtual teams)</li><li>• Infrastructures;</li><li>• Information systems and technologies;</li><li>• Resources availability and skills</li></ul>	<ul style="list-style-type: none"><li>• Market conditions;</li><li>• Social and cultural influences;</li><li>• Legal constraints;</li><li>• Financial constraints;</li><li>• Specific sector regulation (e.g., union agreements);</li><li>• Sector's R&amp;D and technological state of the art</li></ul>





# Concepts

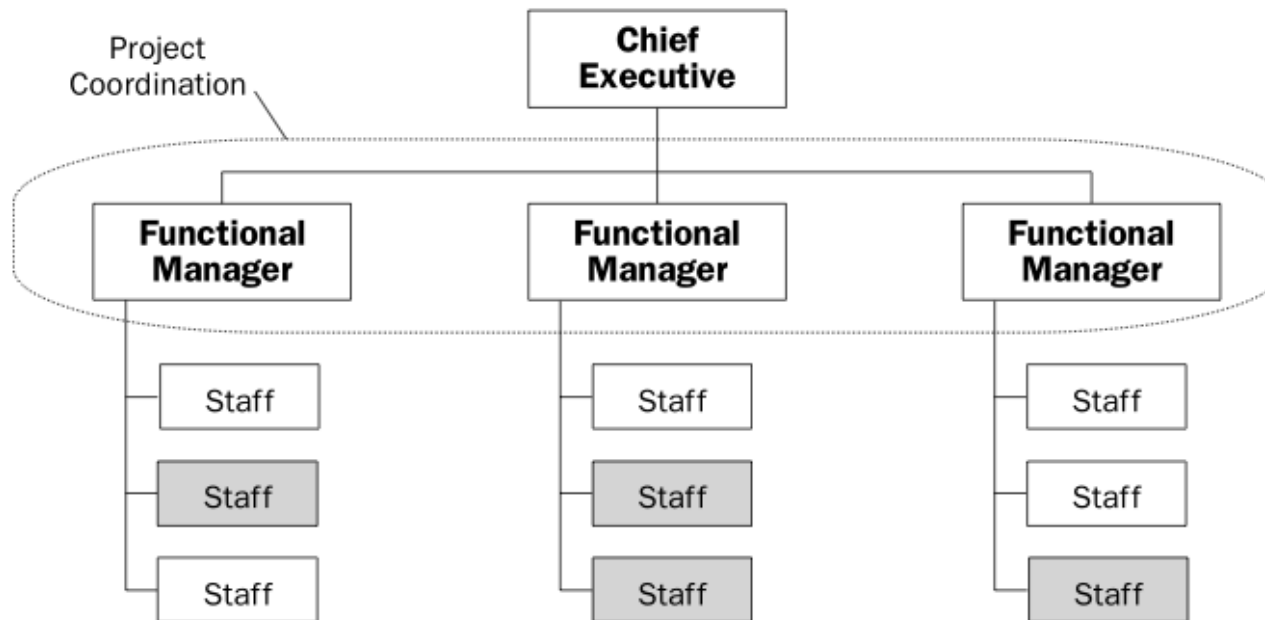
- Organizational structure



# Project Management Concepts



- Functional

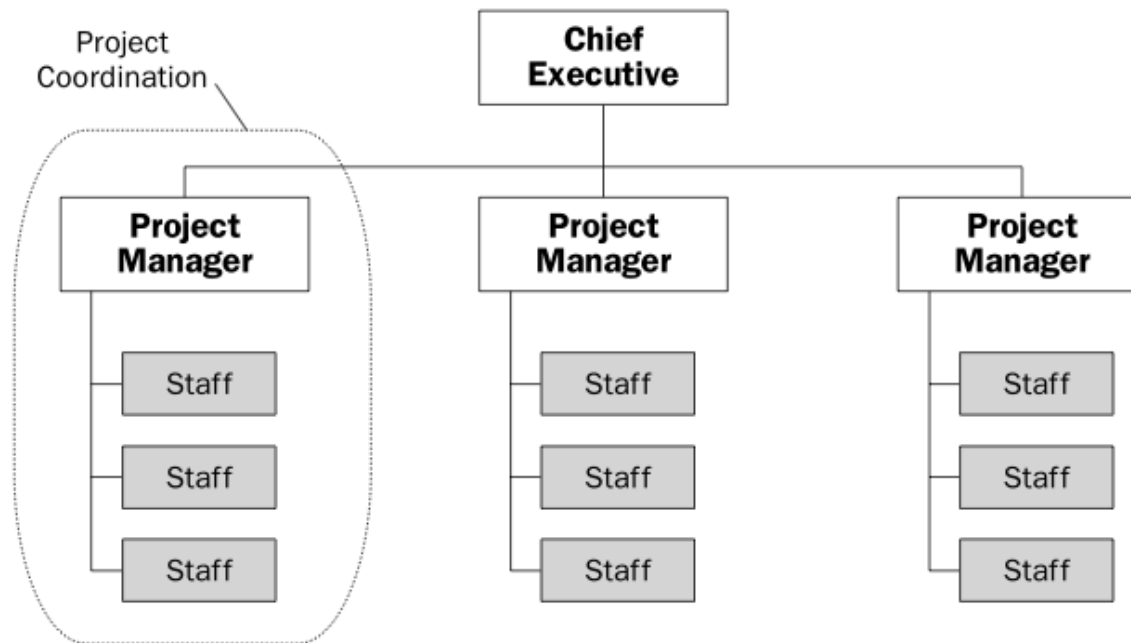


(Gray boxes represent staff engaged in project activities.)

# Project Management Concepts



- Projectized

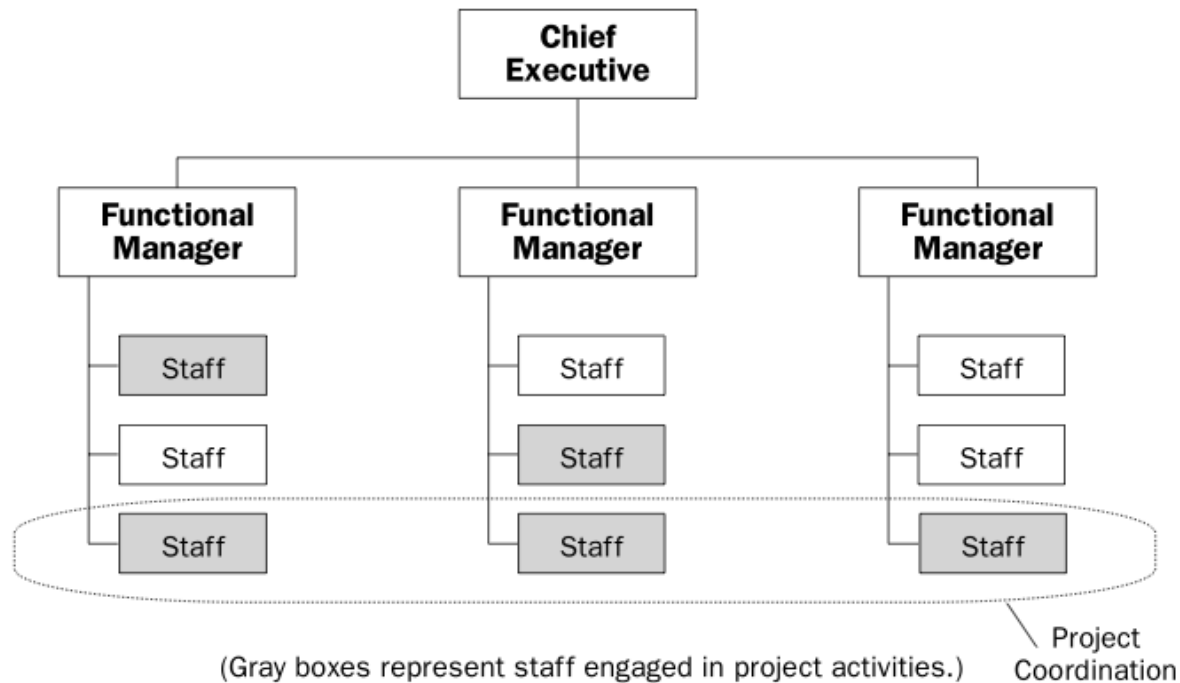


(Gray boxes represent staff engaged in project activities.)

# Project Management Concepts



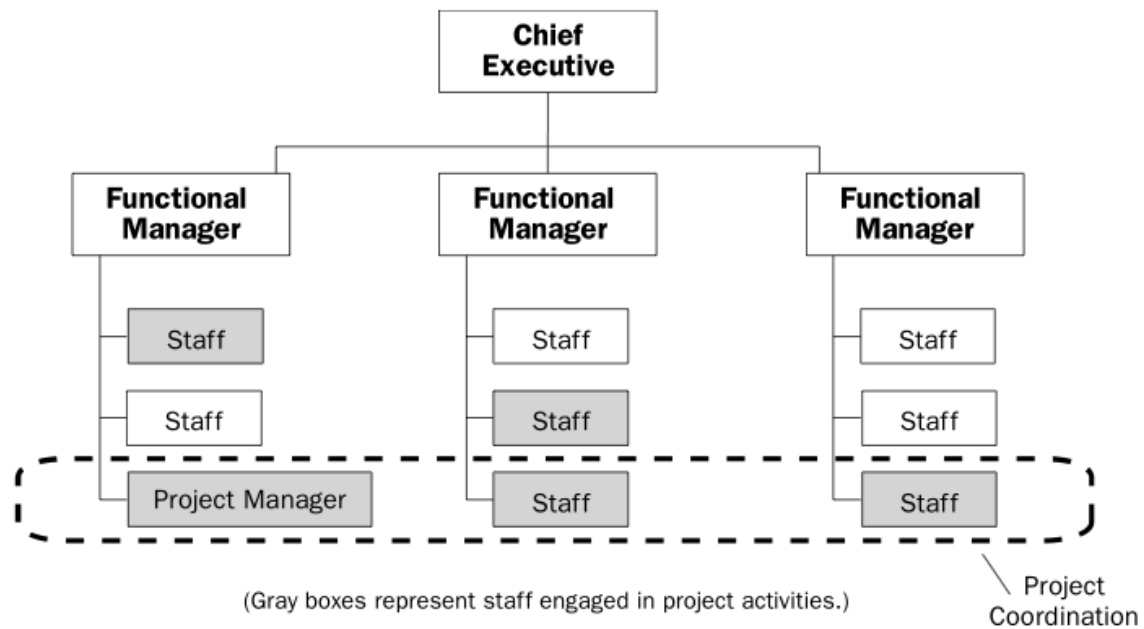
- Weak matrix





# Concepts

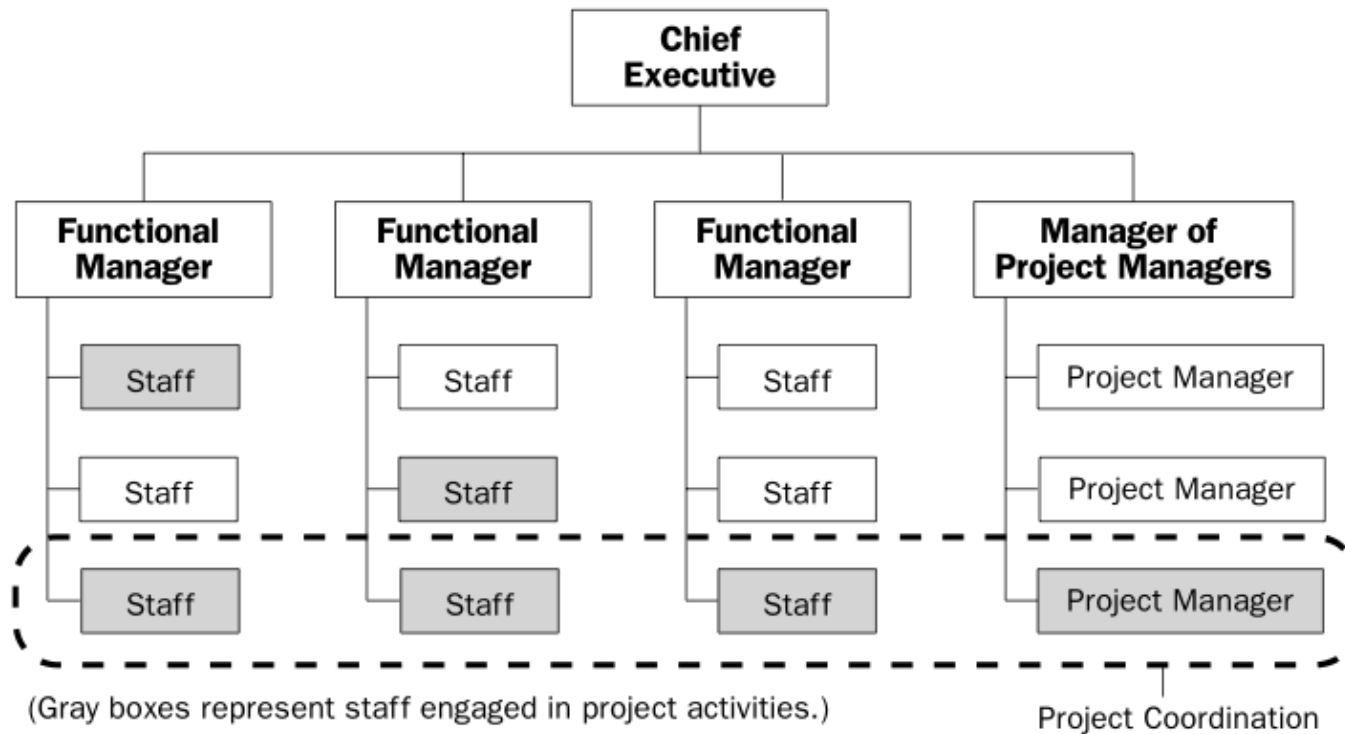
- Balanced matrix



# Project Management Concepts



- Strong matrix



# Project Management Concepts



- Organizational structures

Organizational Structure Type	Project Characteristics					
	Work Groups Arranged by:	Project Manager's Authority	Project Manager's Role	Resource Availability	Who Manages the Project Budget?	Project Management Administrative Staff
<b>Organic or Simple</b>	Flexible; people working side-by-side	Little or none	Part-time; may or may not be a designated job role like coordinator	Little or none	Owner or operator	Little or none
<b>Functional (centralized)</b>	Job being done (e.g., engineering, manufacturing)	Little or none	Part-time; may or may not be a designated job role like coordinator	Little or none	Functional manager	Part-time
<b>Multi-divisional (may replicate functions for each division with little centralization)</b>	One of: product; production processes; portfolio; program; geographic region; customer type	Little or none	Part-time; may or may not be a designated job role like coordinator	Little or none	Functional manager	Part-time

# Project Management Concepts



- Organizational structures

Organizational Structure Type	Project Characteristics					
	Work Groups Arranged by:	Project Manager's Authority	Project Manager's Role	Resource Availability	Who Manages the Project Budget?	Project Management Administrative Staff
<b>Matrix – strong</b>	By job function, with project manager as a function	Moderate to high	Full-time designated job role	Moderate to high	Project manager	Full-time
<b>Matrix – weak</b>	Job function	Low	Part-time; done as part of another job and not a designated job role like coordinator	Low	Functional manager	Part-time
<b>Matrix – balanced</b>	Job function	Low to moderate	Part-time; embedded in the functions as a skill and may not be a designated job role like coordinator	Low to moderate	Mixed	Part-time
<b>Project-oriented (composite, hybrid)</b>	Project	High to almost total	Full-time designated job role	High to almost total	Project manager	Full-time
<b>Virtual</b>	Network structure with nodes at points of contact with other people	Low to moderate	Full-time or part-time	Low to moderate	Mixed	Could be full-time or part-time
<b>Hybrid</b>	Mix of other types	Mixed	Mixed	Mixed	Mixed	Mixed
<b>PMO*</b>	Mix of other types	High to almost total	Full-time designated job role	High to almost total	Project manager	Full-time

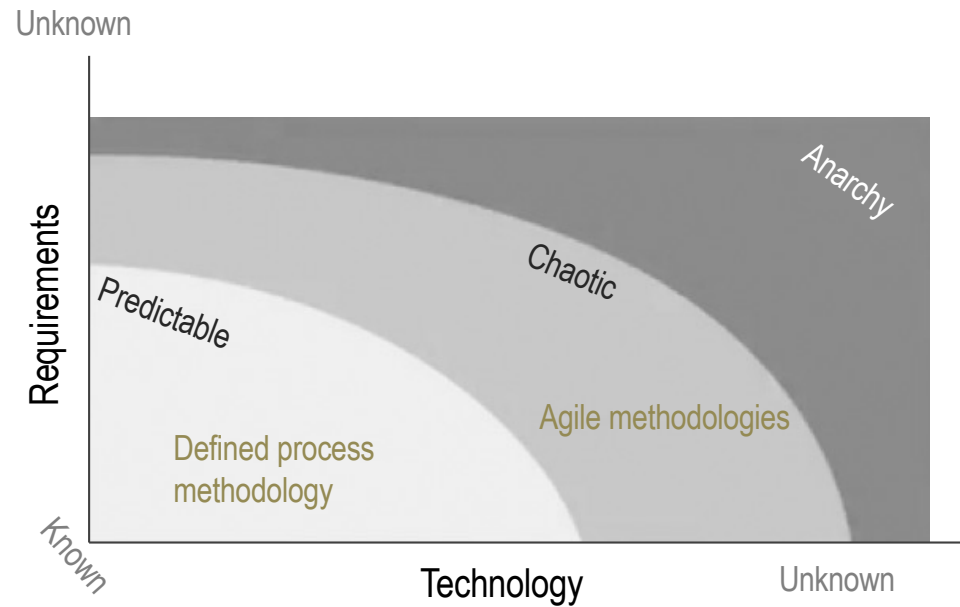




# Project Management Approaches and Standards



- Methodologies

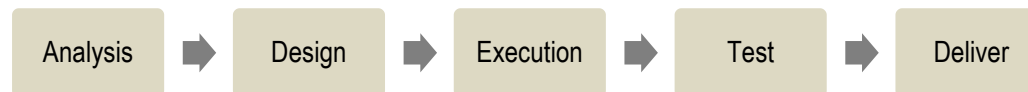




- Project management methodologies

- Predictive (waterfall)

- Planning follows a set of sequential processes
    - Recommended when the project requirements are well defined, there is no great need for changes and reworking
    - The focus of management lies in the control of the planning and costs

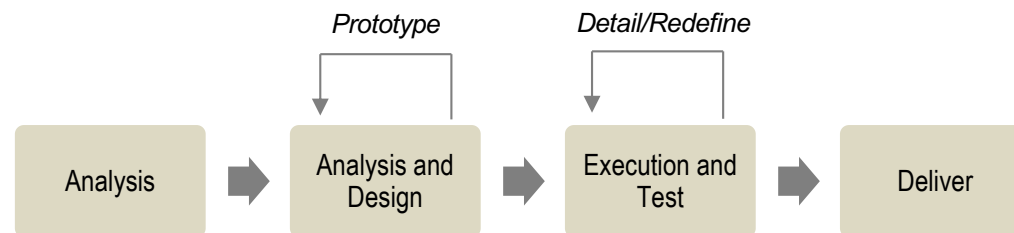




- Project management methodologies

- Iterative (rolling wave planning)

- Focus on feedback that supports the development of the remaining work, allowing its improvement, if necessary
- The requirements are dynamic; activities need rework until approval
- Management is oriented towards providing a correct solution
- Adequate whenever there are still different interpretations and points of view amongst stakeholders, contributing to reduce the uncertainty

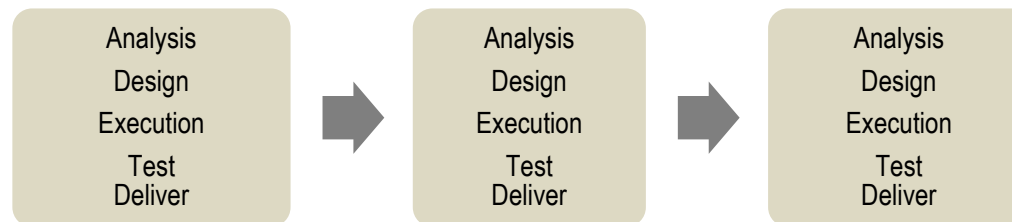




- Project management methodologies

- Incremental

- Partial deliveries to the client (short term)
- Requirements are dynamic; tasks are executed incrementally, so that small deliveries can be made quickly
- Appropriate when priority is given to meeting deadlines and the customer has an urgent need to receive parts of the product or service





- Project management methodologies

- Agile

- Combines iterative and incremental approaches, allowing frequent partial deliveries.
    - There is also planning. The major difference with respect to the predictive approach is its permeability to the information resulting from constant deliverable reviews
    - The team manages the necessary changes, the degree of change being less important than the ability to add value to deliverables over the project life cycle
    - This type of approach reduces the number of rework and increases customer satisfaction



- Project management methodologies
  - Hybrid
    - Combines several approaches
    - The agile methodology can be adopted in stages where uncertainty and complexity are dominant, and then move to the predictive approach at a stage where changes and cost control are more important
    - Predictive and agile approaches can coexist simultaneously throughout the project life cycle, due to the need to apply iteration, feedback, and review cycles at certain project moments
    - Hybrid models may be predominantly predictive agile



- ## Standards

- Project management's first international standard in 2012: ISO 21500 – Guidance on Project Management (Portuguese Standard: NP ISO 21500).
- Effort for standardization driven by professional associations:
  1. **International Project Management Association (IPMA)** – founded in 1965 in Switzerland (in Portugal: APOGEP). IMPA promotes the certification of project management professionals, based on the concept of competence, and sets standards to measure performance in project management. The document that forms the basis for the IPMA certification is the ICB (IPMA Competence Baseline), currently in version ICB4





- ## Standards

2. **Office of Government Commerce / Axelos** – The Office of Government Commerce, initially focused on improving project management in the public sector, has developed (1996) a project management method called Projects in a Controlled Environment - Prince2.

The Prince2® standard is based on seven principles: systematic review of the business case, learning by experience, definition of roles and responsibilities, management by stages, management by exception, focus on results, adaptability to the project context.

3. **Project Management Institute (PMI)** – founded in 1969, is the largest organization involved in project management promotion, standardizing, and certification. The PMI has several standards, the **PMBOK® Guide** being the most widely disseminated, and offers 8 certifications, of which Project Management Professional (PMP)® is the most popular.

The PMBOK® Guide is the standard developed by PMI and has been a standard of the American National Standards Institute (ANSI) since 2008. The document was first published in 1996, with subsequent editions in 2000, 2004, 2008, 2013, and 2017. The PMBOK® Guide identifies and describes a set of good practices for managing individual projects, translated into processes, organized into groups of processes



# Project Management Processes



# Project management processes

- **Processes**

- A process is a set of interrelated actions and activities performed to achieve a pre-specified product, result, or service





# Project management processes

- **Processes**
  - 2 types of processes:
    - **Project management processes:** processes that ensure the development of the project, applying project management techniques and tools (e.g., time, cost, risk management ...)
    - **Product-oriented processes:** defined in the life cycle of the project, depend on the area in question and involve specific techniques (for example, of civil construction in the construction of a building)



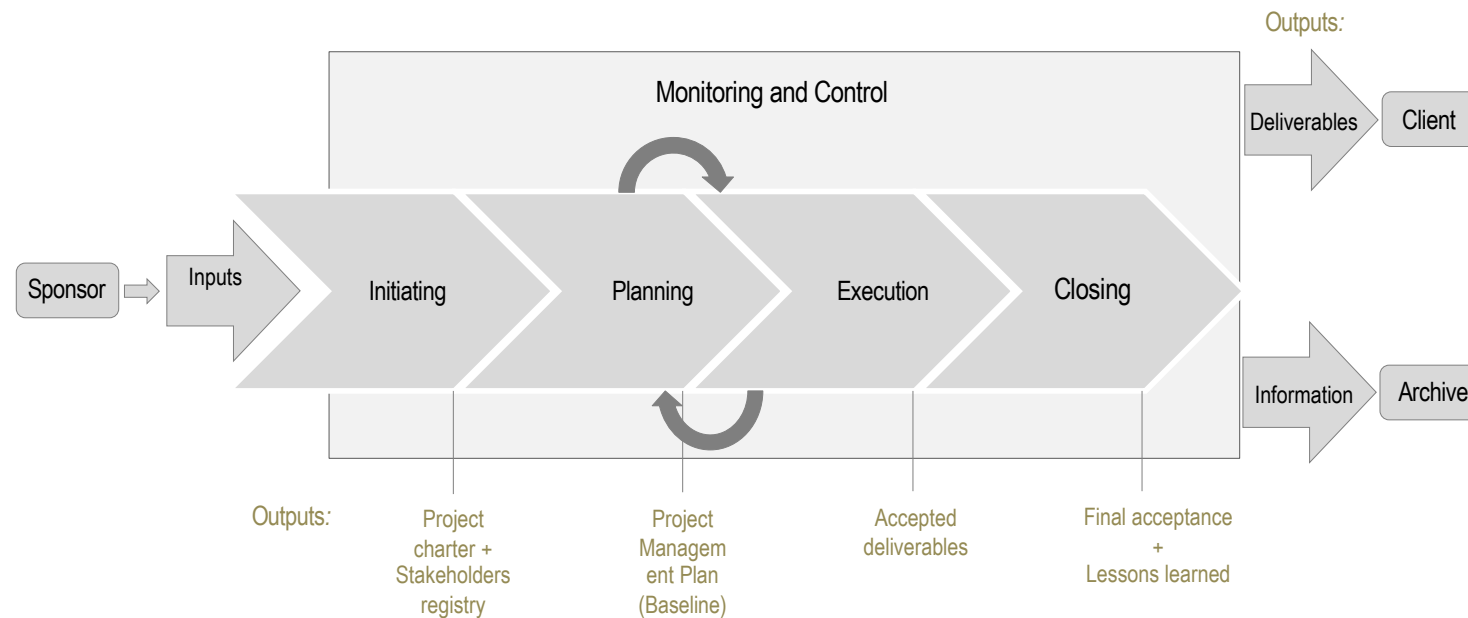
# Project management processes

- Processes
  - 5 groups: *(PMBOK® Guide )*
    - Initiating
    - Planning
    - Execution
    - Monitoring and Control
    - Closing



# Project management processes

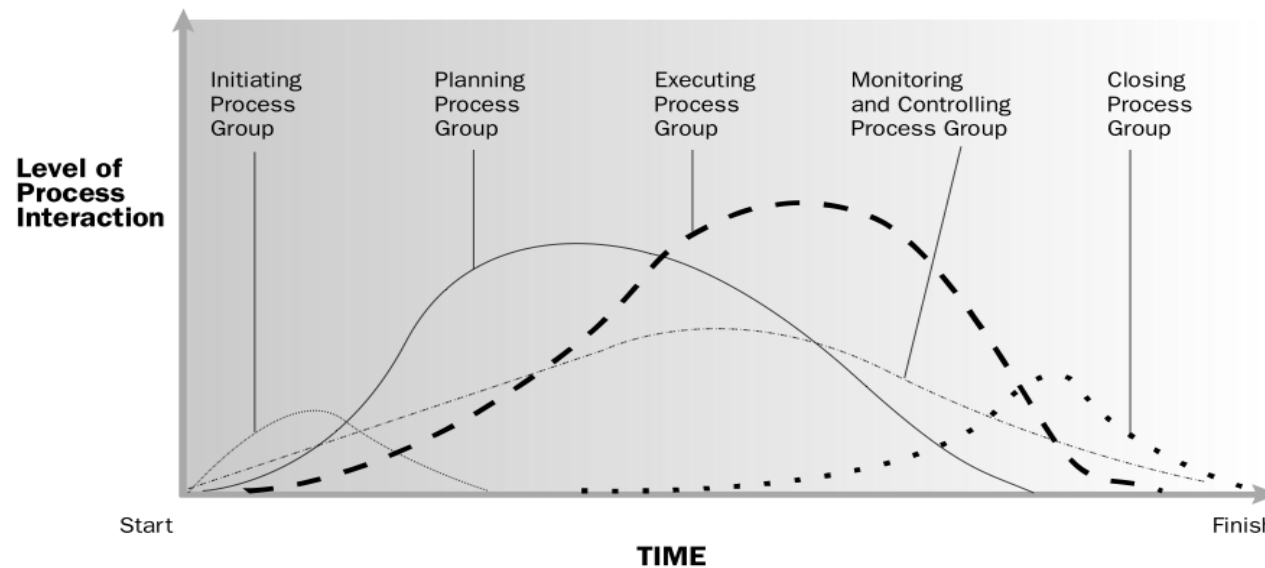
- Processes





# Project management processes

- Processes





# Project management processes

- Knowledge areas (*PMBOK® Guide*)
  - An area of knowledge is a domain of project management defined by its knowledge requirements and described in terms of the components of processes, practices, inputs, outputs, tools and techniques







## Project management processes

- Knowledge areas (*PMBOK® Guide*)

Knowledge areas	Process groups				
	Initiating	Planning	Execution	Monitoring and Control	Closing
Integration management	- Project charter	- Project Management Plan	- Manage project work - Manage project knowledge	- Work monitoring and controlling - Control integrated change	- Close Project or phase
Scope management		- Plan scope management - Collect requirements - Define scope - Build WBS		- Validate scope - Control scope	
Time management		- Plan time management - Define activities - Sequence activities - Estimate activities durations - Define schedule		- Control schedule	
Cost management		- Plan cost management - Estimate costs - Define budget		- Control costs	
Quality management		- Plan quality management	- Manage quality	- Control quality	



# Project management processes

- Knowledge areas (*PMBOK® Guide*)

Knowledge areas	Process groups				
	Initiating	Planning	Execution	Monitoring and Control	Closing
Resource management		<ul style="list-style-type: none"> <li>- Plan resource management</li> <li>- Estimate activity resources</li> </ul>	<ul style="list-style-type: none"> <li>- Acquire resources</li> <li>- Develop team</li> <li>- Manage team</li> </ul>	<ul style="list-style-type: none"> <li>- Control resources</li> </ul>	
Communication management		<ul style="list-style-type: none"> <li>- Plan communication management</li> </ul>	<ul style="list-style-type: none"> <li>Manage communication</li> </ul>	<ul style="list-style-type: none"> <li>- Monitor communication</li> </ul>	
Risk management		<ul style="list-style-type: none"> <li>- Plan risk management</li> <li>- Identify risks</li> <li>- Qualitative risk analysis</li> <li>- Quantitative risk analysis</li> <li>- Plan risk response</li> </ul>	<ul style="list-style-type: none"> <li>- Implement risk responses</li> </ul>	<ul style="list-style-type: none"> <li>- Monitor risk</li> </ul>	
Procurement management		<ul style="list-style-type: none"> <li>- Plan procurement management</li> </ul>	<ul style="list-style-type: none"> <li>- Perform purchases</li> </ul>	<ul style="list-style-type: none"> <li>- Control acquisitions</li> </ul>	
Stakeholders management	<ul style="list-style-type: none"> <li>- Identify stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>- Plan stakeholders involvement and management</li> </ul>	<ul style="list-style-type: none"> <li>- Manage stakeholder's commitment with the project</li> </ul>	<ul style="list-style-type: none"> <li>- Monitor stakeholder's commitment with the project</li> </ul>	



# Project management processes

- **Initiating process group**

- Defining a new project or phase by obtaining authorization to start the project or phase
- In this process:
  - Scope is defined
  - Initial financial resources are committed
  - Stakeholders are identified
  - Project manager is selected
- During the initiating group, large/complex projects may be segmented in separate phases



# Project management processes

- **Initiating**

- Process: develop project charter
  - Develop a document that authorizes a project/phase, and defines the initial requirements that satisfy stakeholders' needs and expectations
- Process: Identify *stakeholders*
  - Identify every people/organization affected by the project, and document relevant information regarding their interests, involvement, and impact on project success



## Project management processes

### PROJECT CHARTER

Name / Department	Date
<input type="text"/>	<input type="text"/>
Project name	
<input type="text"/>	
Project manager: Name	Authority level
<input type="text"/>	<input type="text"/>
Justification: Need/ problem	
<input type="text"/>	
Product description / Project deliverable	
<input type="text"/>	
Specifications	
<input type="text"/>	
Interdependency with other projects	
<input type="text"/>	
Business case / Return on investment	
<input type="text"/>	
Assumptions / Constraints	
<input type="text"/>	
Preliminary budget	
<input type="text"/>	
Stakeholders	
<input type="text"/>	

### Milestones

Milestones	Date
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>

### Resources

Name	Department	Hours	For agreement, Head of dept.
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Total:			<input type="text"/>

### Sponsor

Name / Department

Signature



# Project management processes

- **Planning process group**
  - Define the **scope** of effort and goals, and develop the course of action to achieve those goals
  - Delivers the project management plan and all the necessary documents to carry out the project
  - Iterative process/progressive detailing: revisit planning to consider changes, new information...



# Project management processes





## Project management processes

### PROJECT MANAGEMENT PLAN

Name / Department	Date

Project name

Project manager: Name

#### SCOPE

Justification: Need/ problem

--

Product description / Project deliverable

--

Deliverables	Description

Interdependency with other projects

--

	Work cost	Material cost
Budget		
Deadline		
Required quality		

Milestones	Date

### Resources

Name	Department	Hours	Work period	For agreement, Head of dept.
Total:				

### Documents

- ☐ Project charter
- ☐ Work breakdown structure
- ☐ Schedule
- ☐ Cost performance measurement baseline
- ☐ Schedule performance measurement baseline
- ☐ Responsibility matrix
- ☐ Risk management plan
- ☐ Scope management plan
- ☐ Schedule management plan
- ☐ Quality management plan
- ☐ Communication management plan
- ☐ Change management plan

### Open issues / Pending decisions

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# Project management processes

- Execution
  - Processes performed to complete the work defined in the project management plan to satisfy the project specifications
    - Manage project execution
    - Perform quality assurance
    - Build, develop, manage a project team
    - Distribute information
    - Manage stakeholders expectations
    - Conduct procurements



# Project management processes

- **Monitoring and controlling**
  - Monitor and control project work: processes required to track, review, and regulate the progress and performance of the project (status reporting, progress measurement, and forecasting)
    - Monitoring the ongoing project activities against the project management plan and the project performance baseline
  - Perform change control: identify any areas in which changes to the plan are required; and initiate the corresponding changes
    - Controlling changes and recommending preventive action



# Project management processes

- **Conclusion**

- Processes performed to finish all activities across all processes to formally complete the project, phase or contractual obligations. At project or phase closure:
  - Obtain acceptance by the client (or sponsor)
  - Conduct post-project (phase-end) review
  - Record impacts of tailoring to any process
  - Document lessons learned
  - Apply appropriate updates to organizational process assets
  - Archive all relevant project documents in a PM information system
  - Close out procurements