MASTER OF COMPUTER SCIENCE/
MASTER OF SCIENCE IN COMPUTER SCIENCE

MCS 4204 – Software Project Management and Quality Assurance

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About The Course

- Credits – 03
- 04 Lecture Hours per week: 30 Hours (7-8 weeks)
- Practical (Activity) Hours: 15 Hours
- Evaluation – 40% Assignments, 60% Exam Paper
- Assignments =~ 5 (In-class tests and Take Home Assignments)
- Exam Paper – 02 Hours
  - 4 Compulsory Questions

References/Recommended Text

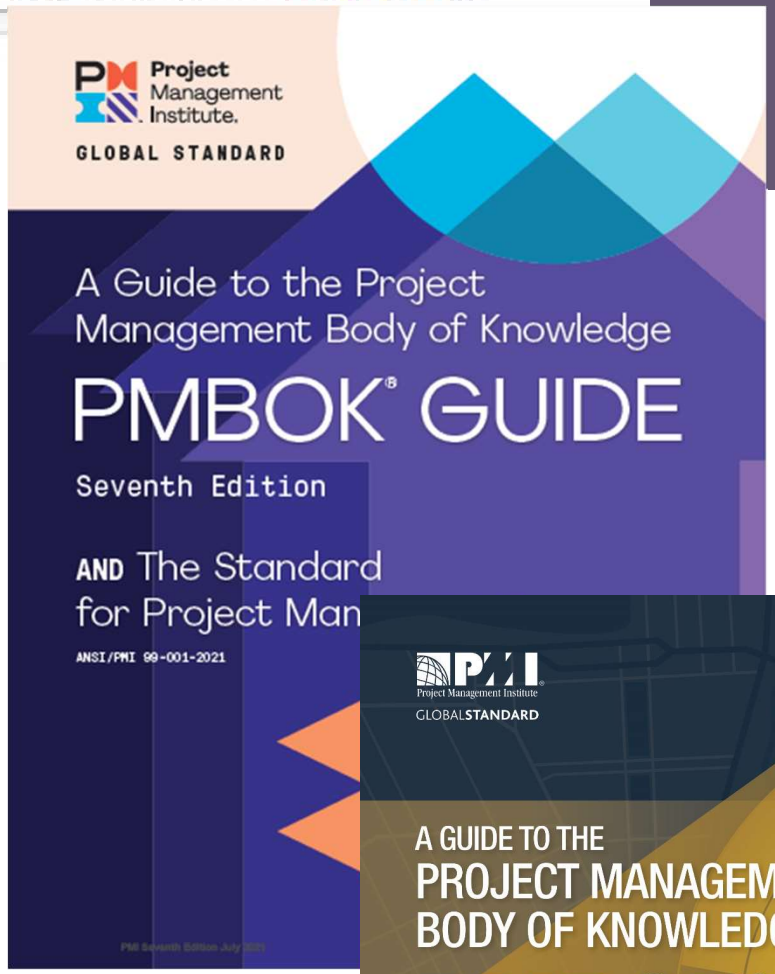
- A Guide to the Project Management Body of Knowledge (*PMBOK® Guide*)—Sixth Edition, 2017 and Seventh Edition, 2021.
- Information Technology Project Management, 8th Edition
- Software Quality Assurance: From Theory to Implementation 1st Edition (ISBN-13: 978-1285847092, ISBN-10: 1285847091) Chapter 1-4 and Chapter 10

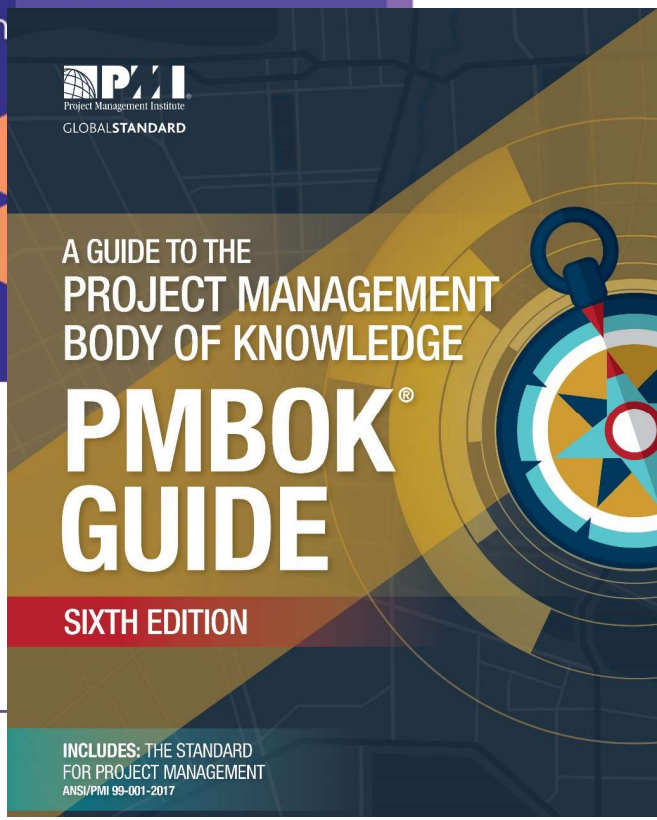
https://www.pmi.org

Project Management Institute

PMBOK® Guide – (https://www.pmi.org/pmbok-guide-standards/foundational/pmbok)

https://www.oreilly.com/library/view/a-guide-to/9781628256642/





Project Management Body of Knowledge (PMBOK)

- Is a widely accepted standard of project management.
- Provides guidelines, rules and characteristics for project management
- When it is consistently applied, it helps you, your global peers and your organization to achieve professional excellence.

Course Outline

1. Introduction to Software Project Management	2 hrs
2. Project Integration Management	2 hrs
3. Project Project Scope Management	2 hrs
4. Project Project Time Management	2 hrs
5. Project Cost Management	2 hrs
6. IT Project Quality Management	4 hrs
7. Project Communications Management	2 hrs
8. Project Human Resource Management	2 hrs
9. Project procurement Management	2 hrs
10. Project Risk management	2 hrs
11. Financial calculations for project appraisals	2 hrs
12. Software quality assurance	6 hrs

1. Introduction to Software Project Management

After following this section, you should be able to;

- Define what s/w project management is
- Compare s/w projects and other types of projects
- Describe typical issues of s/w projects
- Define the usual stages of a software project and management
- Identify the stakeholders and their roles
- Define the success criteria for a s/w project

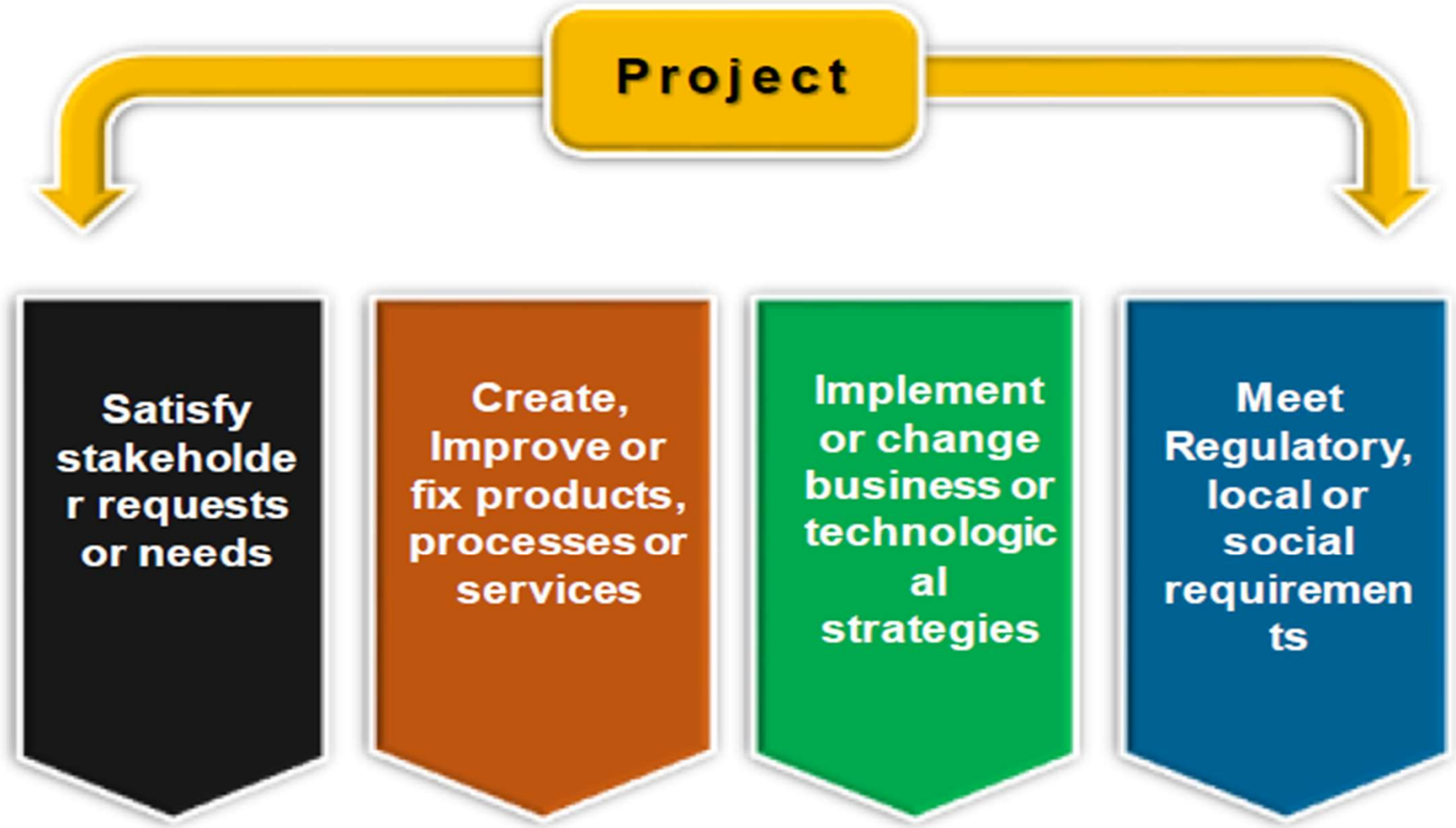
What is a Project?

A project is a temporary endeavour undertaken to create a unique product, service, or result.

A sequence of unique, complex, and connected activities which

- has a goal or purpose and
- must be completed by a specific time,
- should be completed within budget, and
- according to specification.

Project Requirements



Characteristics of a Project in an organization

- **Temporary** – every project must have a defined start and end in time
  - Has a defined scope and resources
- **Unique** – not a routine activity, there should be a goal, a specific set of operations to achieve the goal
- **Business Value Creation** (net quantifiable benefit)– New assets, brand recognition, drive change in the organization

Project Termination

- Terminates when the
  - objectives have been achieved or
  - because its objectives will not/ cannot be met, or
  - need for the project no longer exists.

- The decision to terminate a project requires approval and authorization by an appropriate authority.

Examples for Projects

- Writing a special report
- Setting up a sales kiosk for a professional accounting meeting
- Developing a software
- Writing a new piano piece
- Designing a new product

The outcome of a project in an organization may result in a standard product or a process for the organization

Exercise 1

i) Give three examples for projects and routine activities and discuss how projects differ from routine activities.

ii) Which of the following is a project?

A. Running a donut shop
B. Building another library in your area, which might take a long time
C. Keeping a network up and running in a university department
D. Running a warehouse

Characteristics of a Software Project

- Non-routine tasks are involved
- Planning is required
- Specific objectives are to be met or a specific product is to be created
- The project has a pre-determined time plan
- Work is often carried out for someone other than yourself

Characteristics of a S/W Project contd..

- Work involves several specialism
- People are formed into temporary groups to carry out the task
- Work is carried out in several phases
- The resources that are available for use on the project are constrained
- The project can be large or complex

More the factors apply → the more difficult the task will be.
More staff needs → requires more additional coordination

Exercise 2

- What is the difference between software projects and other types of projects?

Software Projects Vs Other Projects

- Invisibility
  - Physical artefacts such as bridges and roads are visible unlike a software product
- Conformity
  - Other projects interact with physical materials that do not change rapidly while software projects interact only with human clients. People can change their attitudes and beliefs easily.

Software Projects Vs Other Projects Contd.

- Complexity
  - Software projects are more complex due to the Complexity factors and characteristics they possess
- Flexibility
  - Software can be changed easily. Therefore, subject to change according to the needs or changes of other components

Classification of S/W Projects

- Objective-based Vs Product-based
- Compulsory user-based Vs Voluntary user-based
- Information Systems Vs Embedded Systems

Objective based Vs Product based

- An on-line voting system for general public to select the most popular sportsman of the year
- An on-line educational game for primary students

Exercise 3: Categorize the following projects into two groups: Objective-based projects and Product-based projects

1. A payroll system for a business organization
2. An information and news website for a government ministry
3. A software system for a survey to determine the mobile phone usage of selected government servants (in order to consider for a communication allowance)

Compulsory User-based Vs Voluntary User-based

- An on-line home delivery/take away food ordering system
- A payroll system for a business organization

Exercise 4: Categorize the following projects into Compulsory User-based projects and Voluntary User-based projects

1. An information and news website for a government ministry
2. An on-line educational game for primary students
3. A CCTV camera-based surveillance system for a defense authority
4. An on-line registration system for internal students at a university
5. An on-line market survey system for a multi-national company

Information Systems Vs Embedded Systems

- **Information systems** –enable staff to carry out office processes
  - E.g. Stock control system
- **Embedded systems-** control machines
  - E.g. A system to control air conditioning equipment in a building
- **Systems having elements of both**
  - E.g. A stock control system which can control an automated warehouse

What is Project Management?

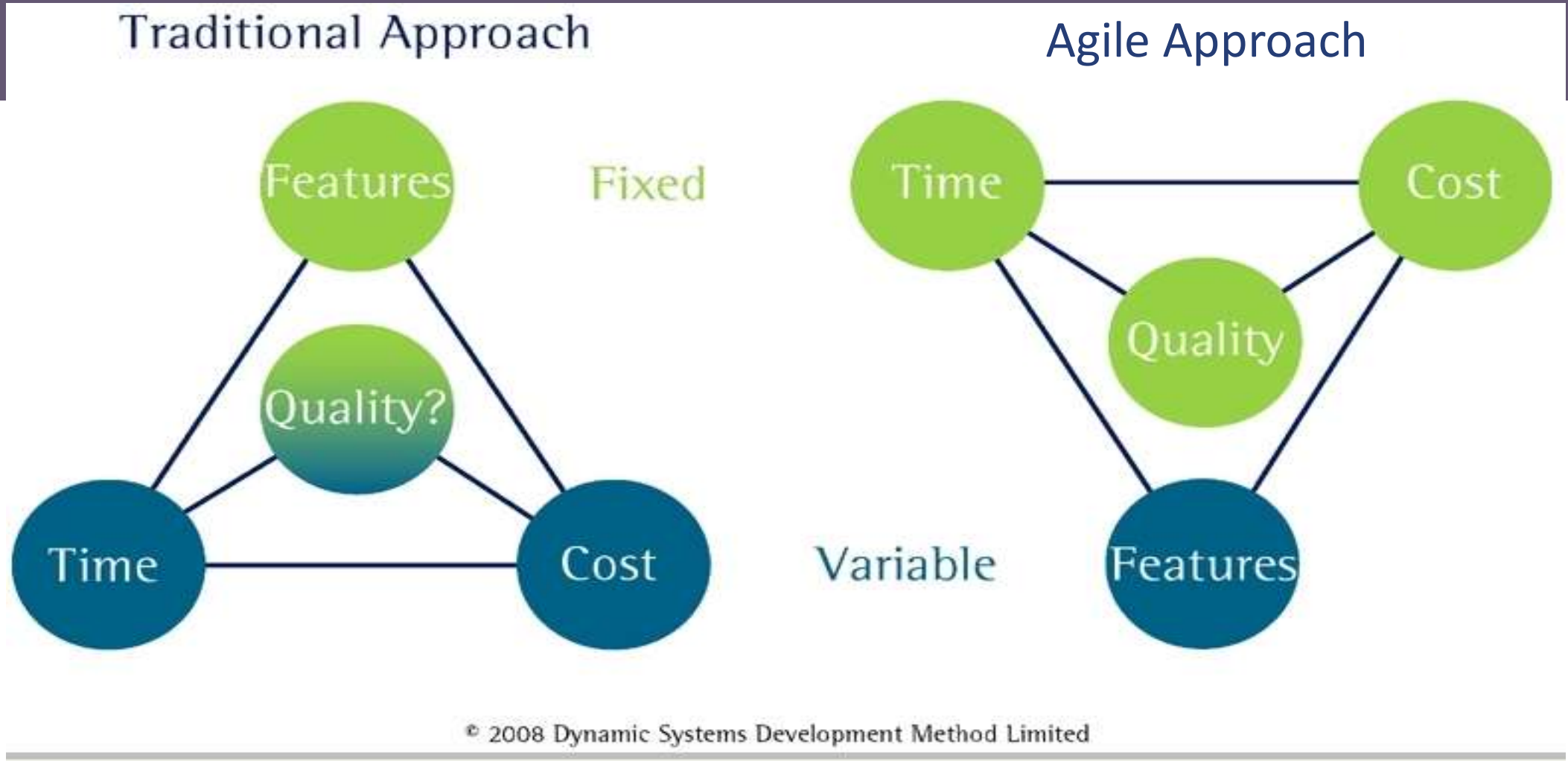
Refers to the application of knowledge, skills, tools and techniques to achieve specific **targets** within specified **budget** and **time** constraints.

1. Planning – what is to be done
2. Organizing – making arrangements
3. Directing – giving instructions
4. Monitoring – checking on progress
5. Controlling – taking actions to remedy hold-ups
6. Innovating – coming up with new solutions
7. Representing – liaising with users

A Set of PM Activities

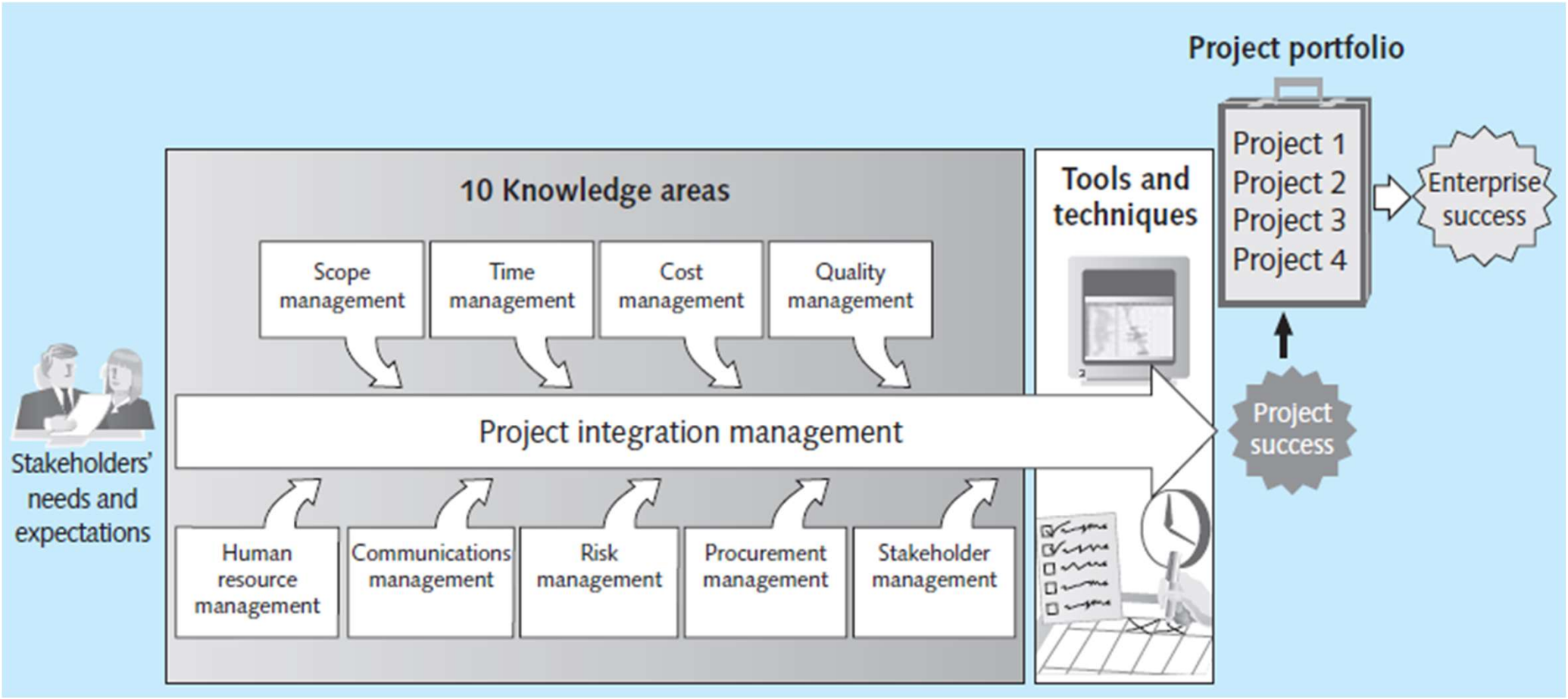
- Identifying project requirements
- Addressing the various needs, concerns, and expectations of stakeholders
- Establishing and maintaining active communication with stakeholders
- Managing resources
- Balancing the competing project constraints

Project Constraints



- Major constraints: scope, cost, time, quality, resources and risks

Project Management Framework

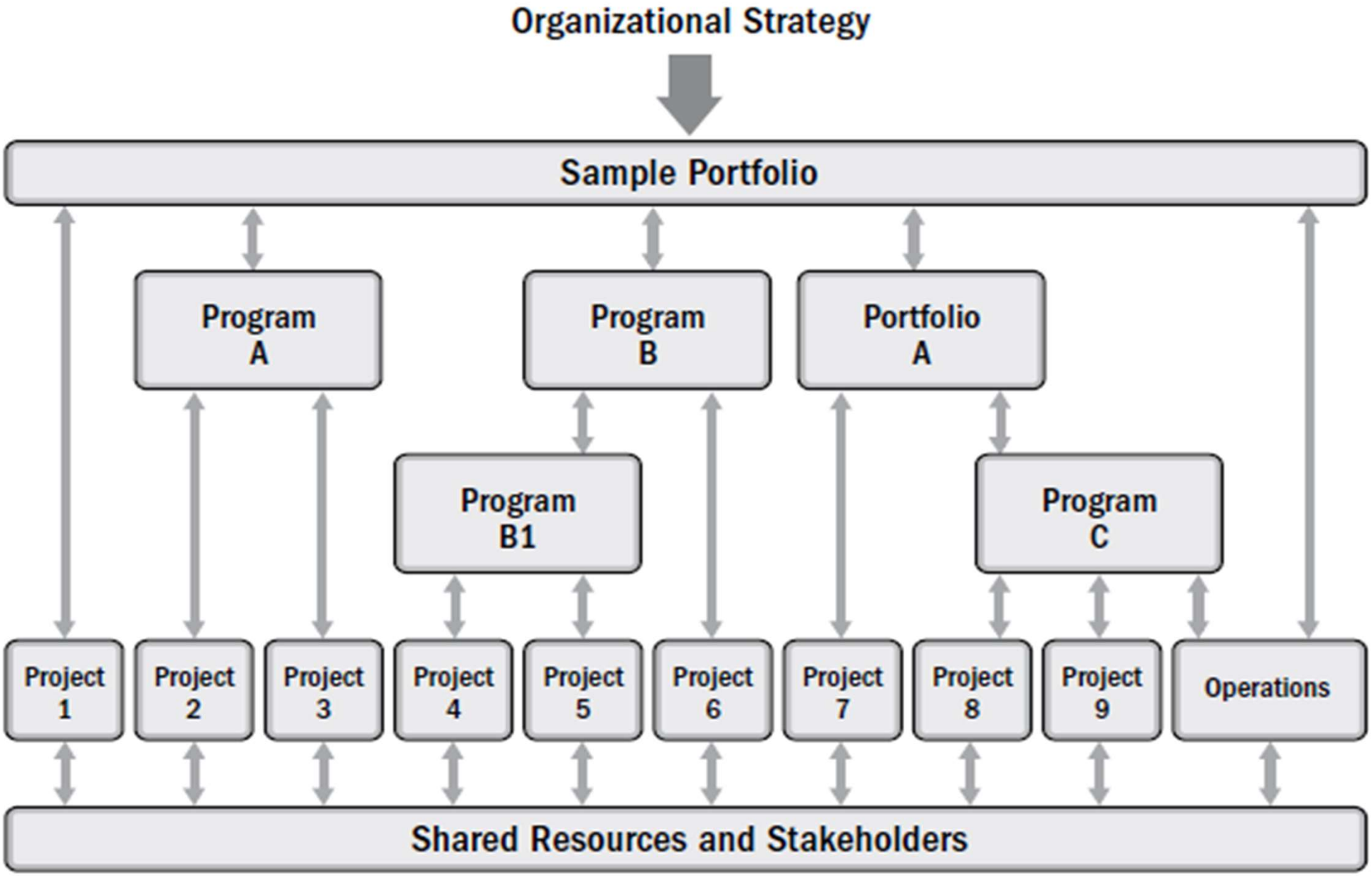


Importance of Project Management

Relationship Among Portfolios, Programs, and Projects

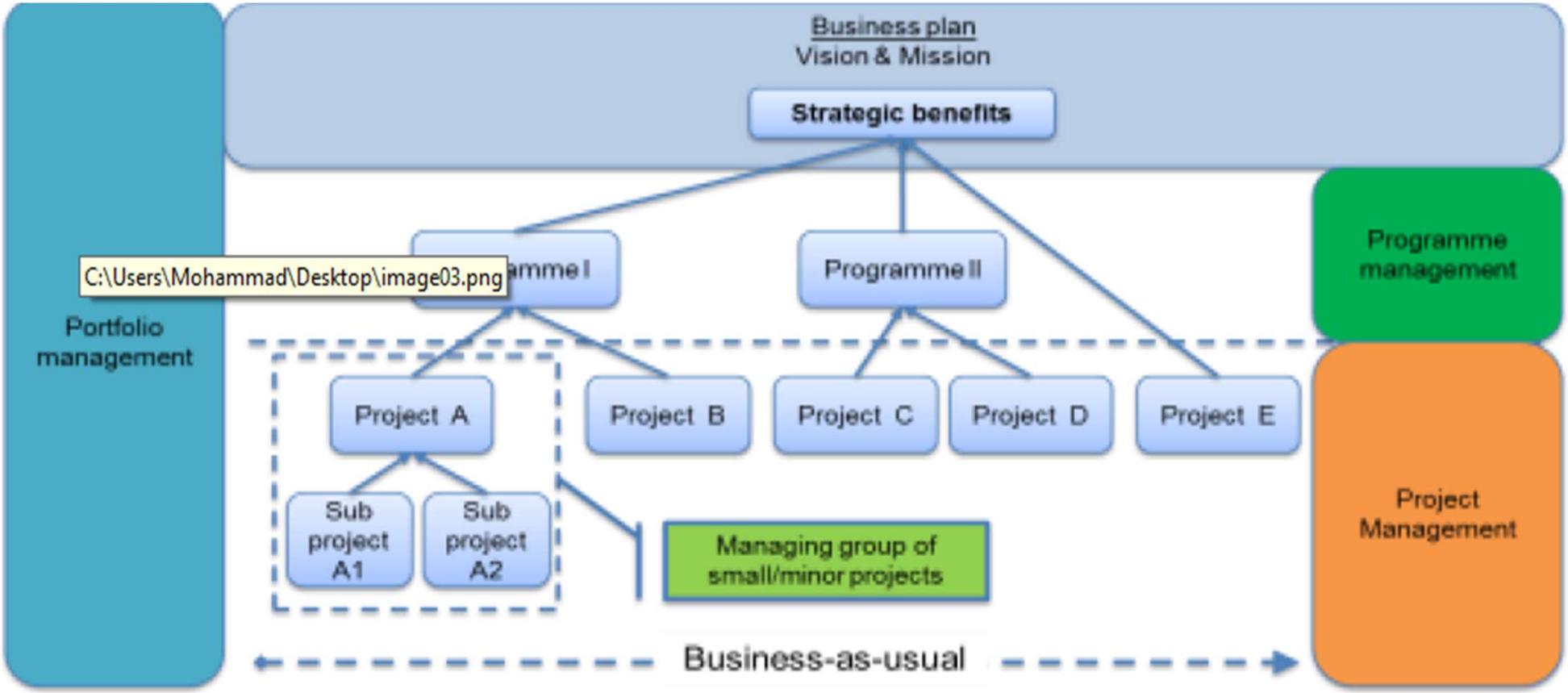
- **Portfolio:** Projects, programs, subsidiary portfolios, and operations managed in a coordinated manner to achieve strategic objectives.
- **Program:** Related projects, subsidiary programs, and program activities managed in a coordinated manner to obtain benefits not available from managing them individually.
- A project may be managed in three separate scenarios:
  - as a stand-alone project (outside a portfolio or program);
  - within a program; or
  - within a portfolio.
- Project management has interactions with portfolio and program management when a project is within a portfolio or program.

Relationship Among Portfolio, Programs, and Projects



Program/Project Mgt. vs Portfolio Mgt.

- Program and project management focus on doing programs and projects the “right” way, and Portfolio management focuses on doing the “right” programs or projects at the right time.



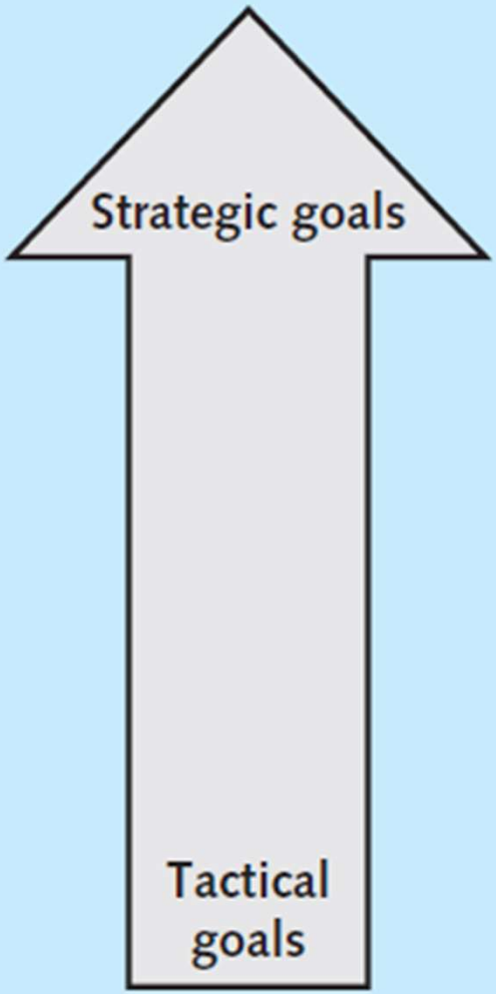
Relationship Among Portfolios, …contd.

- A portfolio refers to projects, programs, sub-portfolios, and operations managed as a group to achieve strategic objectives.
- Project may or may not be part of a program, but a program will always have projects.
- Projects within a program are related through the common outcome or collective capability.
- The projects or programs of the portfolio may not necessarily be interdependent or directly related.

Management of Portfolios, Programs and Projects

- Portfolio management aligns portfolios with organizational strategies by selecting the right programs or projects, prioritizing the work, and providing the needed resources.
- Program management harmonizes its program components and controls interdependencies in order to realize specified benefits.
- Project management enables the achievement of organizational goals and objectives

Project Mgt Vs Portfolio Mgt



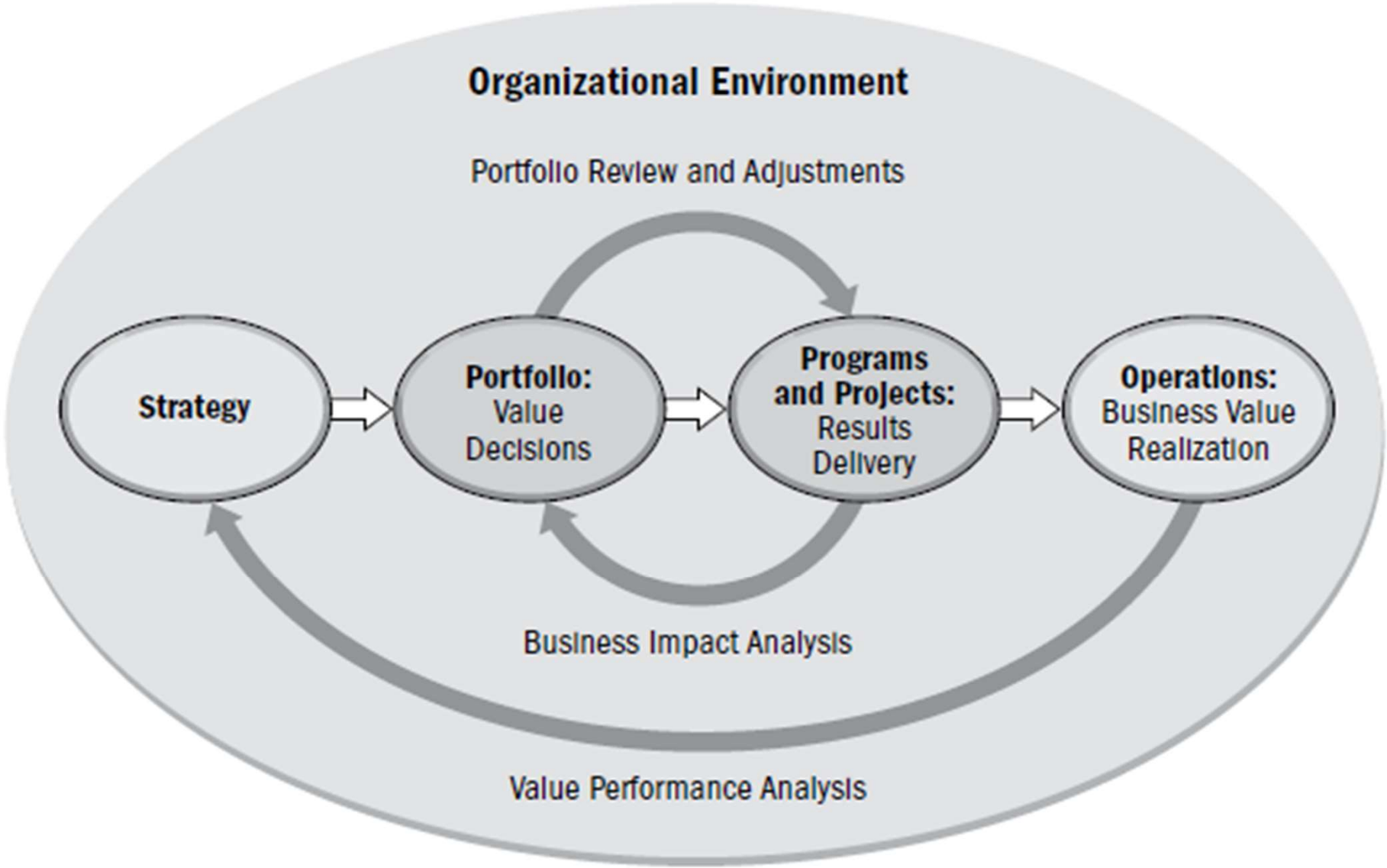
Project portfolio management

- Are we working on the right projects?
- Are we investing in the right areas?
- Do we have the right resources to be competitive?

Project management

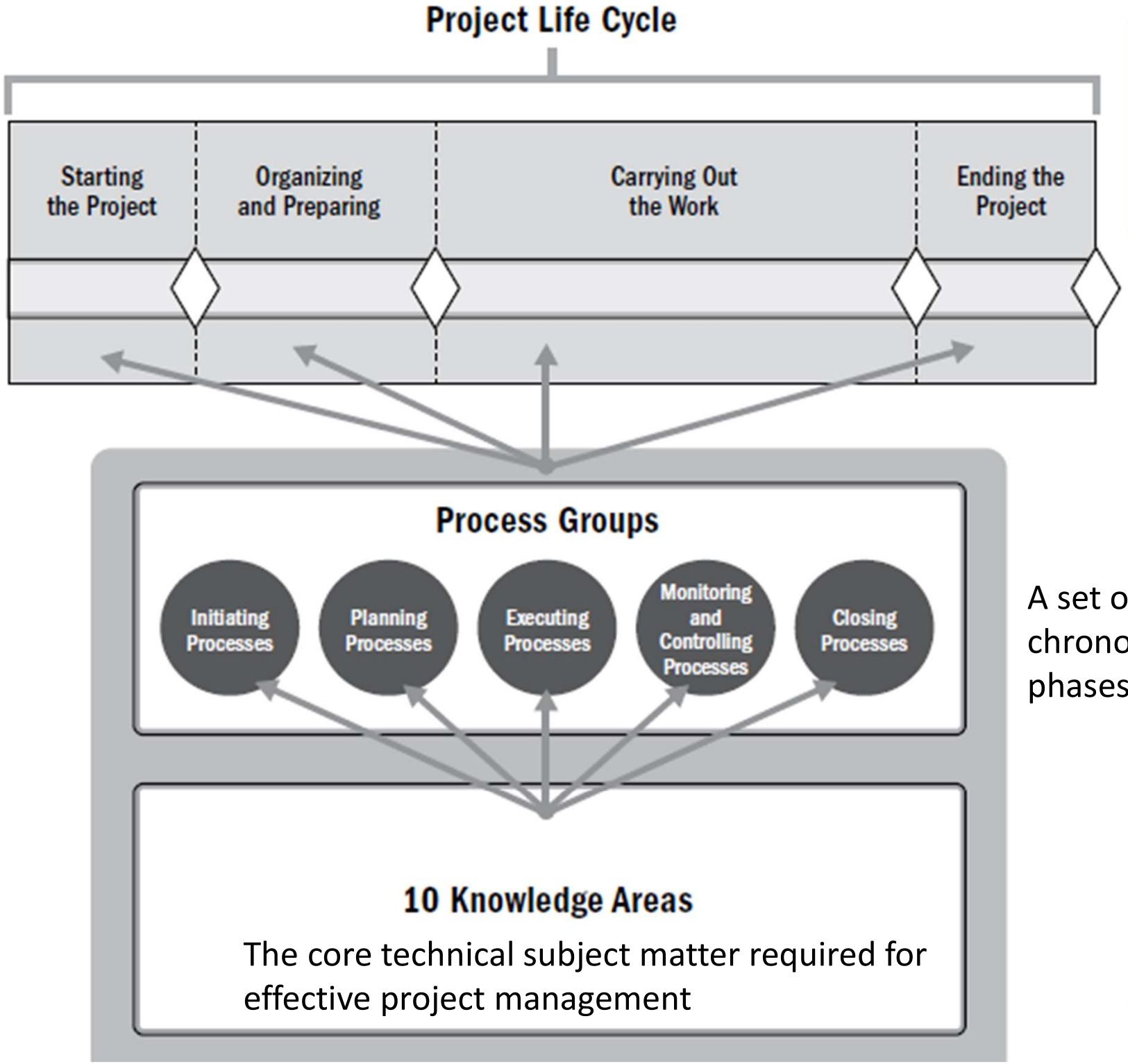
- Are we carrying out projects well?
- Are projects on time and on budget?
- Do project stakeholders know what they should be doing?

Organizational Project Management



Project Life Cycle

PM is accomplished through the application and integration of these five major processes.

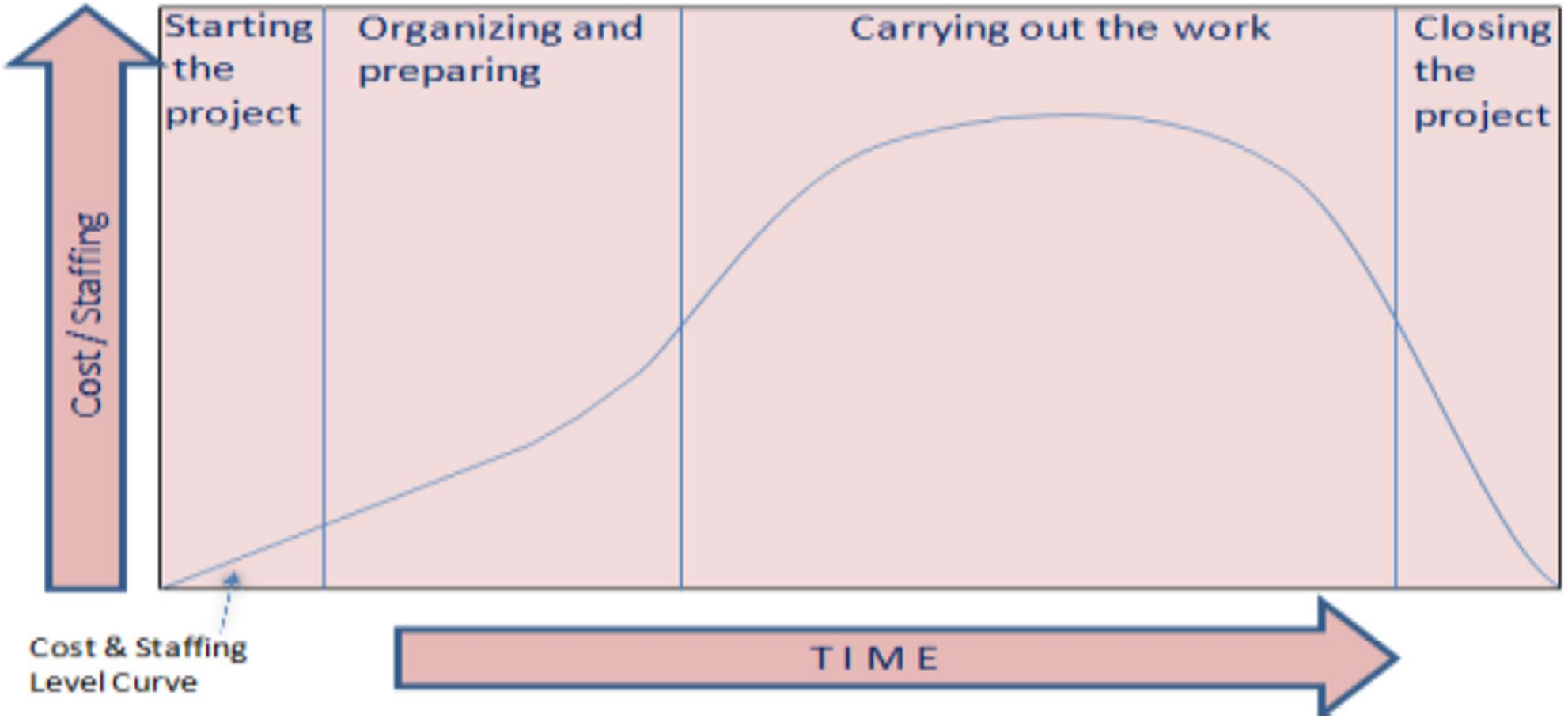


A set of chronological phases

10 Knowledge Areas

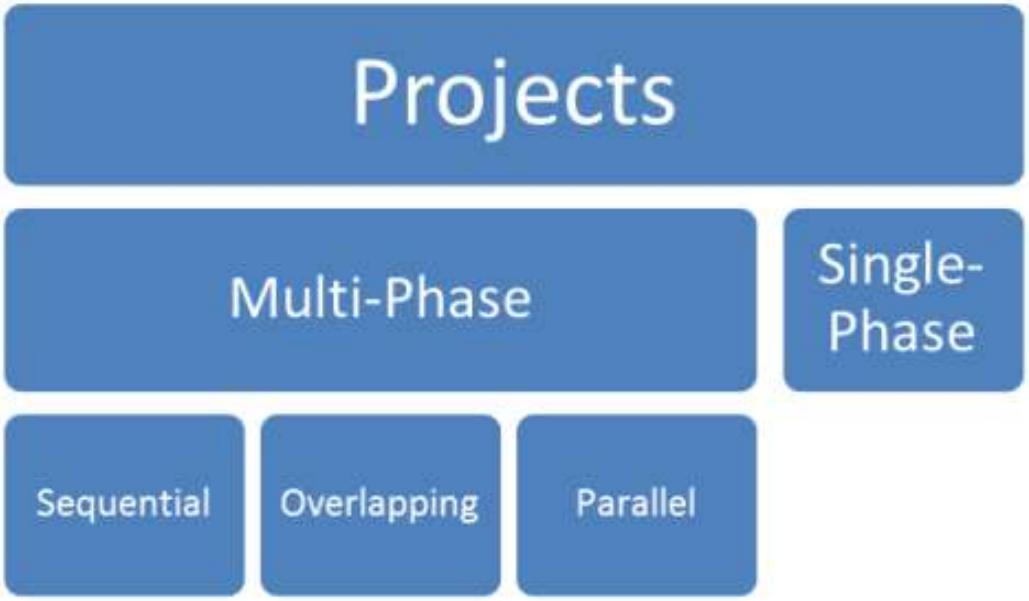
1. Project Integration Management
2. Project Scope Management
3. Project Time Management
4. Project Cost Management
5. Project Quality Management
6. Project Human Resource Management
7. Project Communications Management
8. Project Risk Management
9. Project Procurement Management
10. Project Stakeholder Management

Cost and Staffing Level Curve



Project Phase

- A project phase is a collection of logically related project activities that culminates in the completion of one or more deliverables. The phases in a life cycle can be described by a variety of attributes.



Project Phase Attributes

- Name (e.g., Phase A, Phase 2, Proposal phase)
- Number (e.g., three phases in the project)
- Duration (e.g., 1 week, 1 month, 1 quarter)
- Resource requirements (e.g., people, buildings, devices,…)
- Entrance criteria for a project to move into a phase (e.g., specified approvals documented, specified documents completed), and
- Exit criteria for a project to complete a phase (e.g., documented approvals, completed documents, completed deliverables).

Phase Gate

- Also known as phase review, stage gate, kill point, and phase entrance or phase exit
- Held at the end of a phase
- Where performance and progress are compared to project and business documents
- Decides to;
  - Continue to the next phase,
  - Continue to the next phase with modification,
  - End the project,
  - Remain in the phase, or
  - Repeat the phase or elements of it.

Software Project Mgt Methods

1. **Traditional/Waterfall method-** best when scope, budget and time factors are known
2. **Incremental method (Kanban)** - a method that focuses on continuous improvement and helps you find the weak spots of your workflow (Backlog> To do> Ongoing> Done)
3. **Iterative method (Scrum)** - a prescriptive framework employs an iterative, incremental approach to optimize predictability and control risk
4. **Hybrid method (Scrumban)** - a combination of both, that actually put the Kanban practices on top of Scrum and makes it easy for Scrum teams to focus on continuous improvement

Scrum or Kanban, Which is the best?

- Product scope is almost clear
- Good clarity on tasks to be done
- Suitable for typical SDLC projects with fairly defined domin process

- Very Frequent changes in scope
- Not clear on the tasks to be done
- Suitable for experimental projects

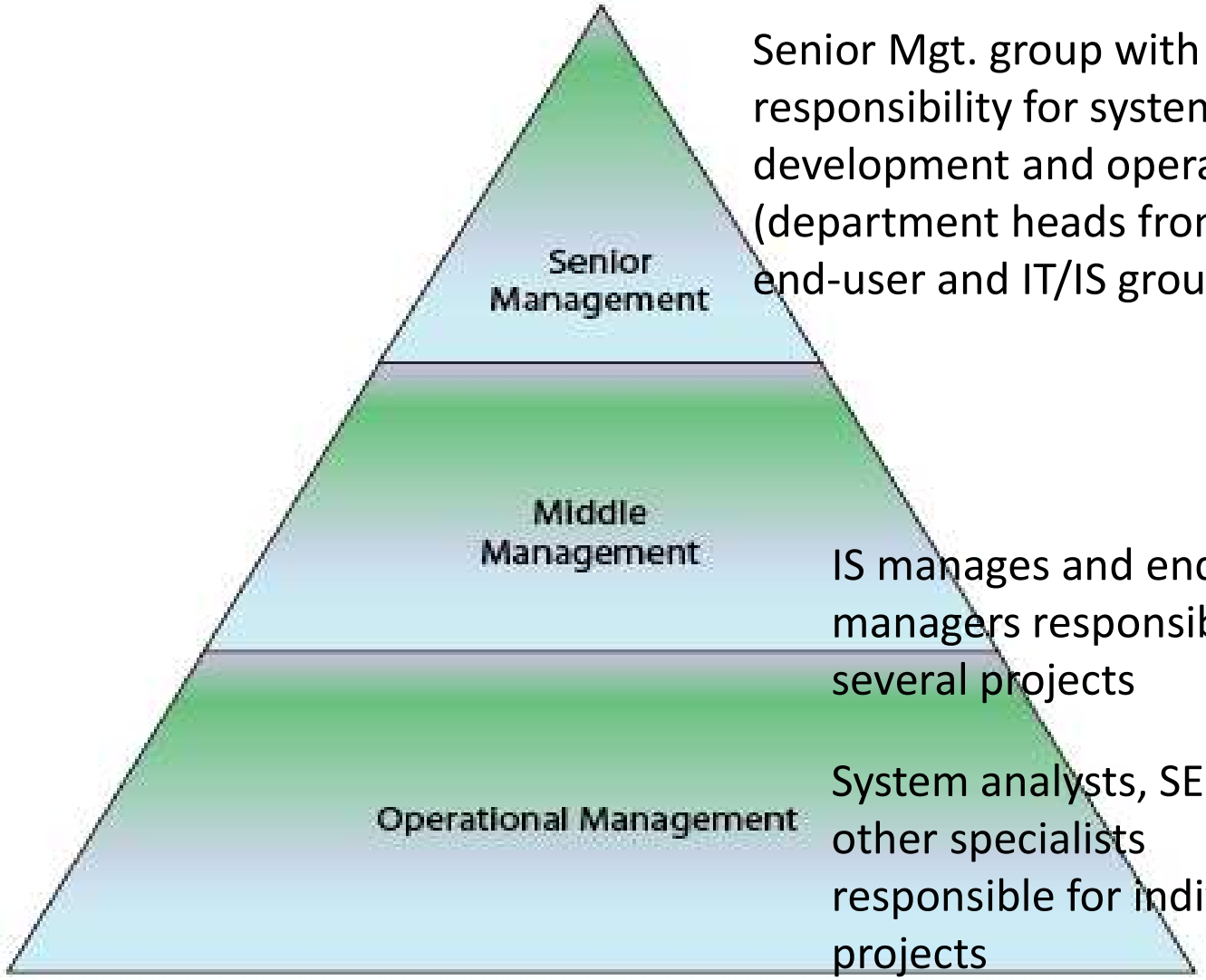
What is Scrumban?

Exercise 5: Select the correct option

What is the difference between Waterfall method and Agile method in S/W project management?

A. Waterfall is preplanned and so are Agile projects.
B. Scope is fixed on Agile projects but not on Waterfall projects.
C. Agile plans are just in time, and Waterfall projects are preplanned.
D. They both are project management frameworks.

Management Structure for Projects in a large organization



Senior Mgt. group with responsibility for system development and operation (department heads from end-user and IT/IS groups)

IS manages and end-user managers responsible for several projects

System analysts, SEs and other specialists responsible for individual projects

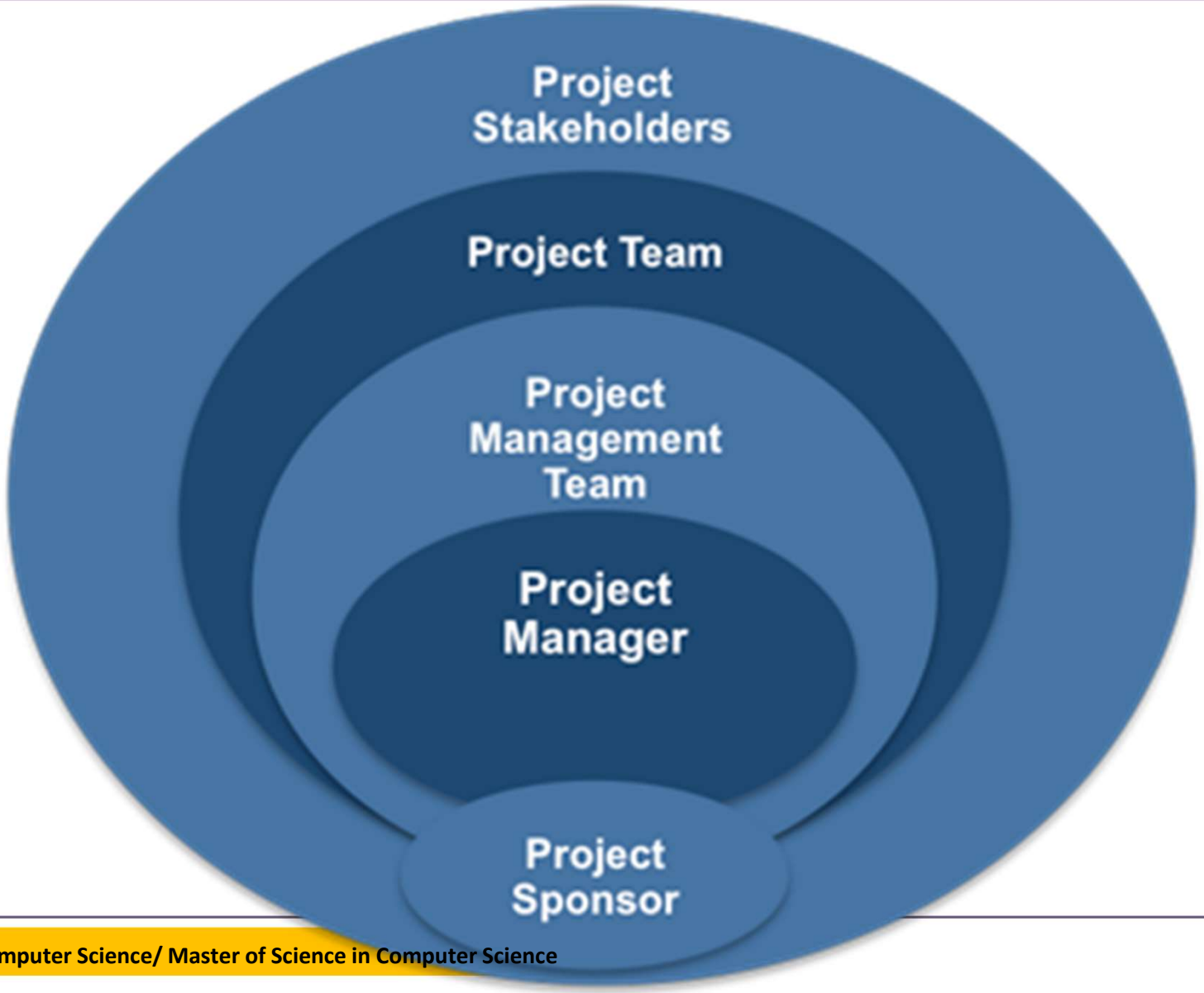
Corporate strategic planning group

IS steering committee

Project Management

Project Team

Roles in Project Management



Project Stakeholders

- **Internal to the project team**
  - Be under the direct control of the project leader
- **External to the project team but within the same organization**
  - Users of the system who can do system testing
- **External to the project team and the organization**
  - Users of the system – customers or contractors

Contract Management and Technical Project Management

- Project Manager in Client Organization
  - Contract Supervision
- Project Manager in Software Supplier Org.
  - Technical Management

Plans, Methods and Methodologies

- Method- Relates to a type of activity
- Plan – Takes the method
- Methodology- Group of methods or techniques
- Planning involves;
  - Selecting a suitable method
  - Convert methods to real activities
  - Define the start and end date of each activity
  - Define who will carry it out
  - Identify what tools and materials will be used

Exercise:

i. Define what project management is.
ii. Identify the roles in Project management
iii. Describe the major Activities of a project
iv. Describe the Project Life Cycle

Project Manager

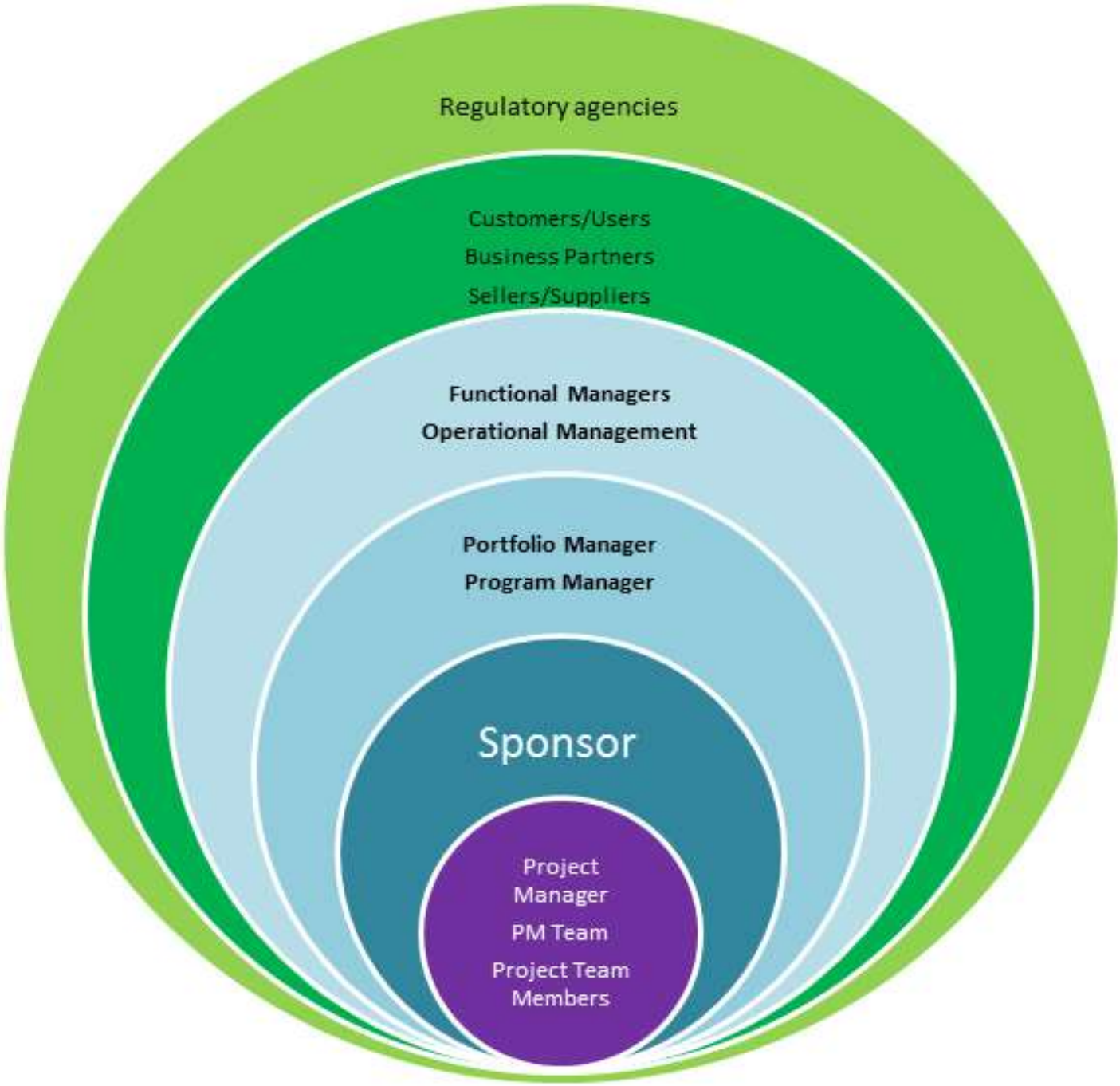
1. Describe the role of a project manager.

2. Identify the essential skills of a project manager.

3. Is communication skill required? Explain your answer.

The Role of a Project Manager

Project Manager's Sphere of Influence



Role of a PM

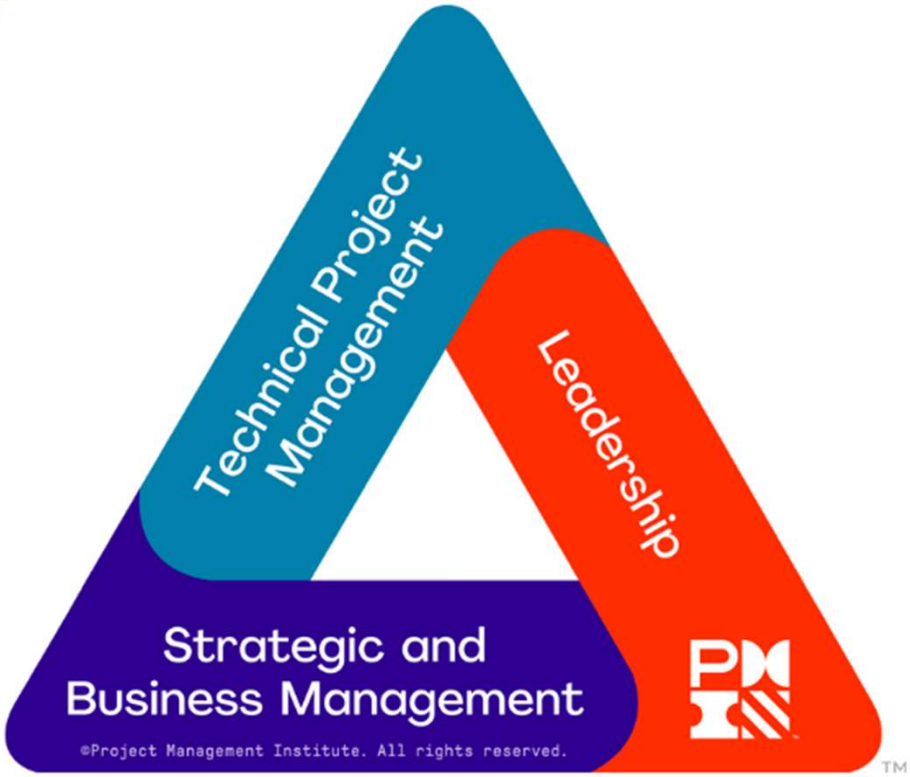
- Leads the project team to meet the project's objectives and stakeholders' expectations
- Works to balance the competing constraints on the project with the resources available
- Performs communication roles between the project sponsor, team members, and other stakeholders
  - Providing direction and presenting the vision of success for the project
  - Using soft skills to balance the conflicting and competing goals of the project stakeholders in order to achieve consensus.

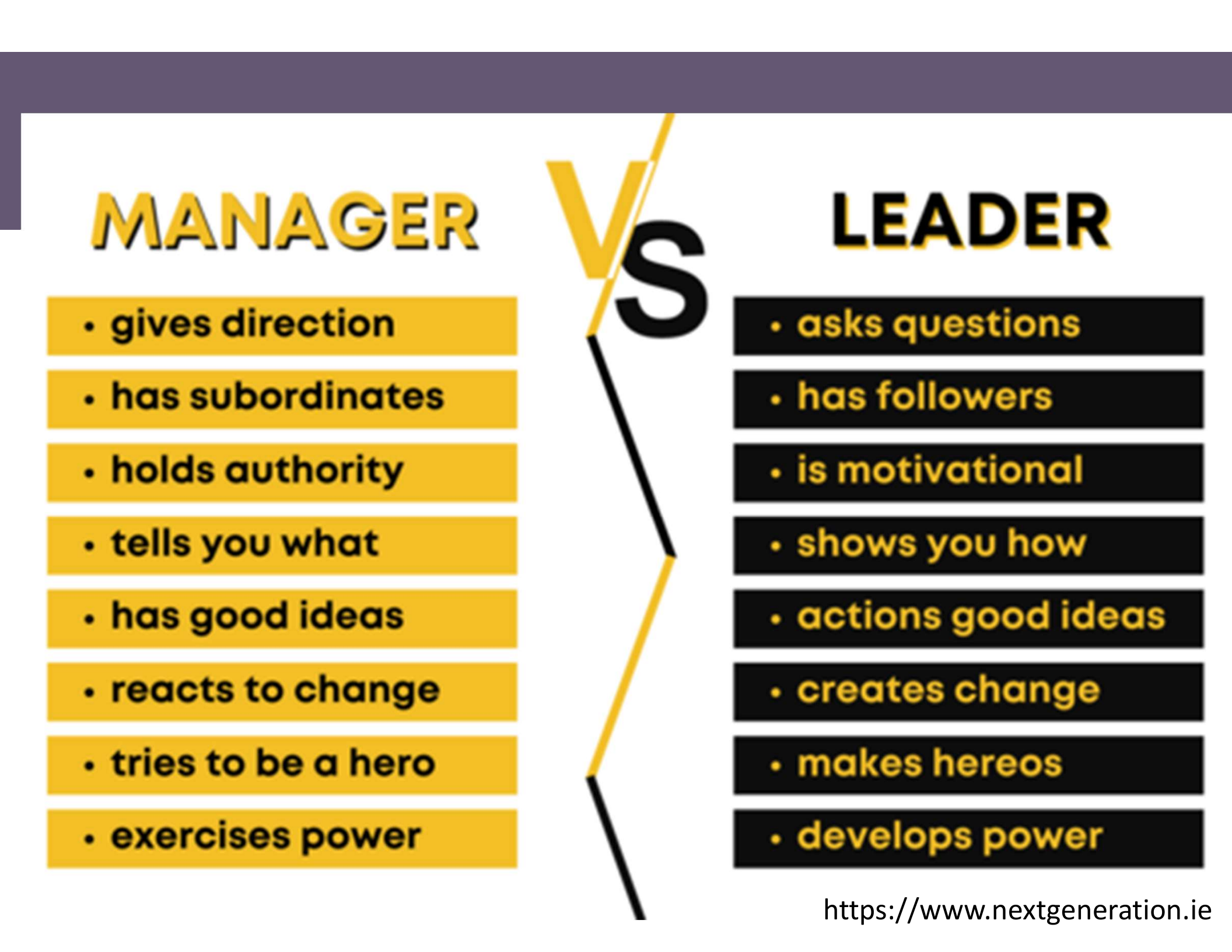
PM's Communication Skill requirement

- Demonstrate sufficient verbal, nonverbal and writing skills;
- Create maintain, and adhere to communications plans and schedules;
- Communicate predictably and consistently;
- Seek to understand the project stakeholders' communication needs;
- Make communications concise, clear, complete, simple, relevant, and tailored;
- Include important positive and negative news;
- Incorporate feedback channels;
- Develop formal and informal networks of relationships

Skills Needed by a Project Manager

- **Technical project management.** The knowledge, skills, and behaviours related to specific domains of project, program, and portfolio management. The technical aspects of performing one's role.
- **Leadership.** The knowledge, skills, and behaviours needed to guide, motivate, and direct a team, to help an organization achieve its business goals.
- **Strategic and business management.** The knowledge of and expertise in the industry and organization to enhance performance and better delivers business outcomes.




MANAGER
VS
LEADER
• gives direction
• has subordinates
• holds authority
• tells you what
• has good ideas
• reacts to change
• tries to be a hero
• exercises power
• asks questions
• has followers
• is motivational
• shows you how
• actions good ideas
• creates change
• makes hereos
• develops power
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Principles of PM

- Be diligent, respectful, and caring steward
- Focus on value
- Build quality into processes and deliverables
- Create a collaborative team environment
- Demonstrate leadership behaviours
- Navigate complexity
- Optimize risk responses
- Effectively engage with stakeholders
- Tailor based on context
- Embrace adaptability and resiliency
- Recognize, evaluate, and respond to system interactions
- Enable change to achieve the envisioned future state