Software Project Management
Lecture-1

By: Usama Musharaf

Contents of Lecture-1

- Introduction to Software Project Management
- Four Dimensions of Project
- Activities in Software Project Management
- Project Planing
- PM’s Nine Knowledge Areas

What Is Project?

A project is an activity with specific goals which takes place over a finite period of time.

Examples:

- Developing a new product or service.
- Effecting a change in structure, staffing, or style of an organization.
- Designing a new transportation vehicle.
- Developing or acquiring a new or modified information system.
- Constructing a building or facility.
- Building a water system for a community in a developing country.
- Running a campaign for political office.
- Implementing a new business procedure or process.

What Is Management?

Basically, the management involves the following activities:

- **Planning**- deciding what is to be done
- **Organizing**- making arrangements
- **Staffing**- selecting the right people for the job
- **Directing**- giving instructions
- **Monitoring**- checking on progress
- **Controlling**- taking action to remedy hold-ups
- **Innovating**- coming up with new solutions
- **Representing**- liaising with users, etc.

What Is Project Management?

- Project Management is the art of maximizing the probability that a project delivers its goals on Time, to Budget and at the required Quality.

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

Goals of Project Management

- **Project management** is the discipline of defining and achieving a **set of goals** while optimizing the use of allocated resources (time, money, people, space, etc).

This includes

Planning,

Scheduling

Maintaining

the progress of the activities that comprise the project.

Characteristics of Project

- Temporary
- Unique, Product or Service
- Aims/Tasks/Purpose
- Limited Time Scale

Why Project Fails?

- Management problems were more frequently dominant cause than technical problems

- Schedule overruns were more common (89%) than cost overruns (62%)

KPGM’s Survey in UK

What makes a Software Project success?

- User involvement – 20 points
- Executive Support – 15 points
- Clear Business Objectives – 15 points
- Experienced Project Manager – 15 points
- Small milestones – 10 points
- Firm basic requirements – 5 points
- Competent staff – 5 points
- Proper planning – 5 points
- Ownership – 5 points
- Others – 5 points

Chaos ten – Standish Group Report

Software Project Management

“Organizations that attempt to put software engineering discipline in place before putting project management discipline in place are domed to fail”

Software Engineering Institute

Four Project Dimensions (Four P’s)

Four Project Dimensions (Four P’s)

Four P's have a substantial influence on software project management- ***people***, ***product***, ***process***, and ***project***.

Software project management is an umbrella activity within software engineering.

It begins before any technical activity is initiated and continues throughout the definition, development, and support of computer software.

Four Project Dimensions (Four P’s)

People:

People must be organized into effective teams, motivated to do high-quality software work, and coordinated to achieve effective communication

Product:

The product requirements must be communicated from customer to developer, partitioned (decomposed) into their constituent parts, and positioned for work by the software team.

Four Project Dimensions (Four P’s)

Process:

The process must be adapted to the people and the problem. A common process framework is selected, an appropriate software engineering paradigm is applied, and a set of work tasks is chosen to get the job done.

Project:

The project must be organized in a manner that enables the software team to succeed.

(Four P’s)- People

1- Senior managers who define the business issues that often have significant influence on the project.

2- Project (technical) managers who must plan, motivate, organize, and control the practitioners who do software work.

3- Practitioners who deliver the technical skills that are necessary to engineer a product or application.

(Four P’s)- People

4- Customers who specify the requirements for the software to be engineered and other stakeholders who have a peripheral interest in the outcome.

5- End Users who interact with the software once it is released for production use.

(Four P’s)- Process

Software development is a social learning process. The process is a dialogue in which the knowledge that must become the software is brought together and embodied in the software. The process provides interaction between users and designers: between users and evolving tools, and between designers and evolving tools [technology] It is an iterative process in which the evolving tool itself serves as the medium for communication, with each new round of the dialogue eliciting more useful knowledge from the people involved.

Howard Baetjer. Jr, comments on the software process

(Four P’s)- 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 create a timely, high-quality result, The road map that you follow is called a ‘software process’

(Four P’s)- Product and Technology

The **80:20**, rule was originated by **Vilfredo Pareto**, an Italian economist who studies the distribution of wealth in a variety of countries around 1900.

He discovered a common phenomenon: about 80% of the wealth in most countries was controlled by a consistent minority -- about 20% of the people.

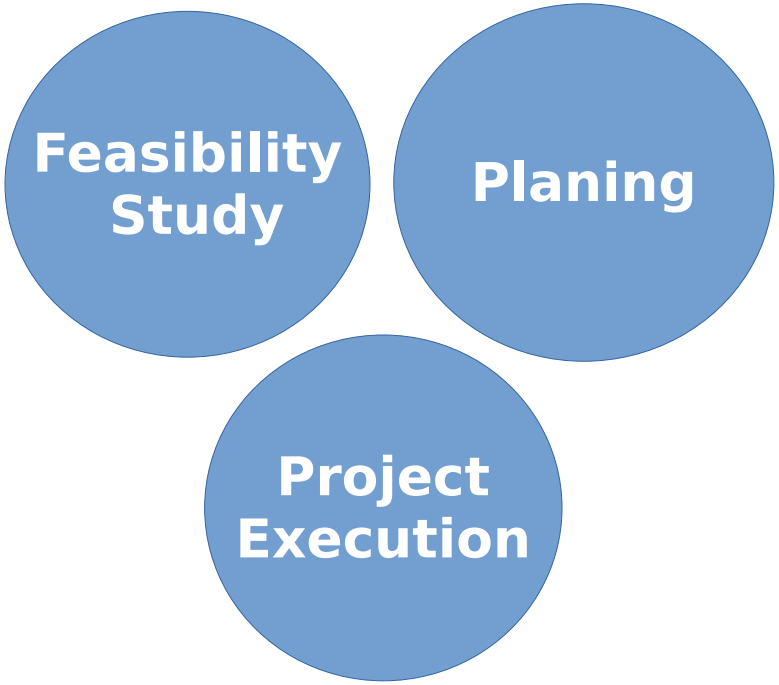
Pareto called this a "predictable imbalance." His observation eventually became known as either the "**80:20 rule**" or "**Pareto's Principle**."

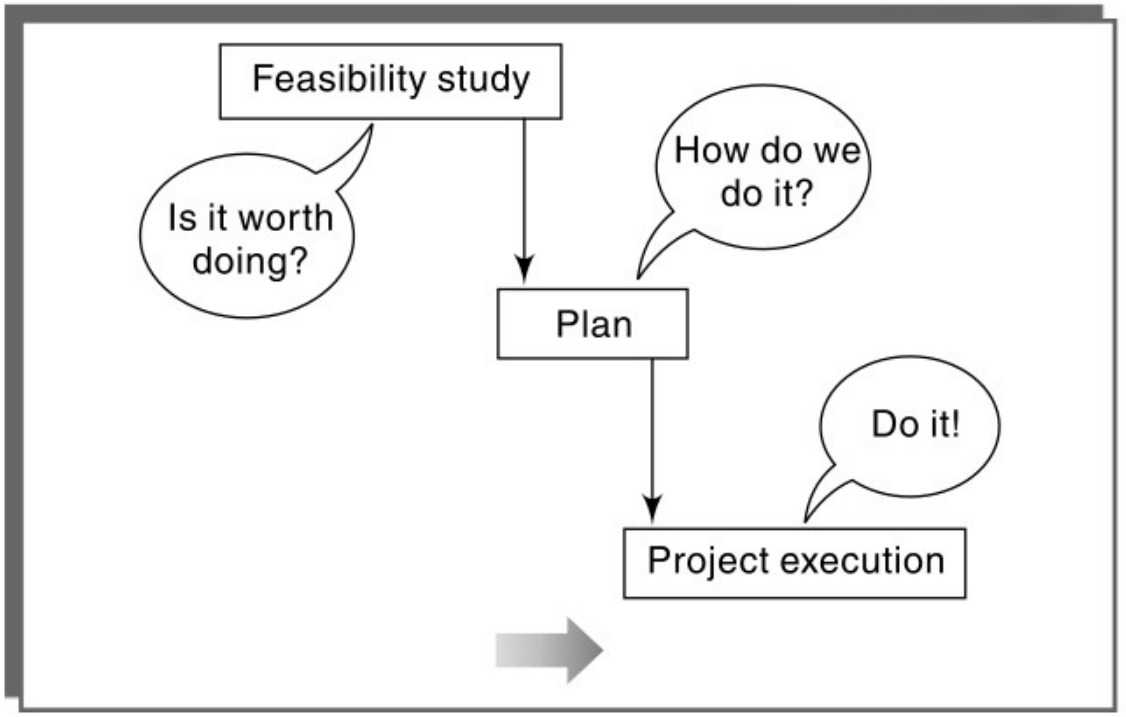
(Four P’s)- Product and Technology

There is an inherent imbalance between cause and effect, effort and reward, inputs and outputs, etc; and that imbalance tends to the ratio of 80:20. So, if we know which 20% of our work produces 80% of our income, we can do more of it and our income will increase proportionately!

Activities Covered by Software Project Management

Activities Covered by Software Project Management





Contents List for a Project Plan

Contents List for a Project Plan

- 1. Introduction
- 2. Background
- 3. Project Objectives
- 4. Constraints
- 5. Methods
- 6. Project Products
- 7. Activities to be carried out
- 8. Resources to be used
- 9. Risks to the project
- 10. Management of the project, including
    - Organizational responsibilities
    - Management of quality
    - Configuration Management

Project Objectives

1- Define Project Scope

Objective:

Clearly outline what is included in the project and what is not.

Example:

For a project developing a mobile banking app, the scope might include features like account management, transaction history, and fund transfers, while excluding advanced analytics and third-party integrations.

Project Objectives

2- Set Clear Deliverables

Objective:

Identify the tangible outputs or products that will be delivered at various stages of the project.

Example:

Deliverables could include a requirements document, a working prototype, the final software application, and user documentation.

Project Objectives

3. Establish Timelines and Milestones

Objective:

Define the project schedule, including key milestones to track progress.

Example:

Milestones might include the completion of the design phase, the start of user acceptance testing, and the final release date.

Project Objectives

4. Allocate Resources

Objective:

Identify and assign the necessary resources, including team members, budget, tools, and equipment.

Example:

Assigning a team of five developers, two QA engineers, and a project manager, with a budget of $200,000 for a 6-month project.

Project Objectives

5. Risk Management

Objective:

Identify potential risks and develop strategies to mitigate them.

Example:

A risk could be the potential delay in obtaining third-party API access, with a mitigation plan that includes developing a backup solution using alternative APIs.

Project Objectives

6. Quality Assurance

Objective:

Define the quality standards and testing protocols to ensure the software meets the required specifications.

Example:

Implementing automated testing with coverage targets, and conducting regular code reviews and performance testing.

Project Objectives

7. Communication Plan

Objective:

Establish a communication strategy to ensure all stakeholders are informed and engaged throughout the project.

Example:

Weekly status meetings, monthly progress reports, and a dedicated project collaboration platform like Jira or Slack

Project Objectives

8. Budget Management

Objective:

Plan and monitor the project's financial resources to ensure it stays within the allocated budget.

Example:

Allocating $50,000 for development, $20,000 for testing, and $30,000 for contingency.

Project Objectives

9. Client and Stakeholder Expectations

Objective:

Ensure that the client and other stakeholders have a clear understanding of what will be delivered, including any limitations.

Example:

Setting expectations that the first version of the software will focus on core features, with additional features planned for future updates.

Project Objectives

10. Define Success Criteria

Objective:

Establish the criteria by which the project's success will be measured.

Example:

Success criteria could include completing the project on time and within budget, meeting all functional requirements, and achieving a user satisfaction score of 90% or higher in post-launch surveys.

Project Sub-Objectives

Measures of Effectiveness

Measures of Effectiveness (MoE) in software project management are metrics used to evaluate how well a software project is achieving its objectives and meeting stakeholder expectations.

These measures help determine whether the project is on track, whether it meets quality standards, and whether it delivers the expected value.

MoE Examples

Schedule Adherence

Tracks whether the project is being completed on time according to the planned schedule.

Metric Examples:

Percentage of milestones met on time.

Number of days ahead or behind schedule.

MoE Examples

Budget Adherence

Measures how well the project is staying within its allocated budget.

Metric Examples:

Percentage of budget spent vs. planned budget.

Cost variance (difference between planned and actual costs).

MoE Examples

Quality of Deliverables

Assesses the quality of the software deliverables against predefined standards.

Metric Examples:

Number of defects found during testing.

Defect density (defects per lines of code or function points).

Percentage of test cases passed.

MoE Examples

Team Productivity and Performance

Measures how effectively the project team is working and their output quality.

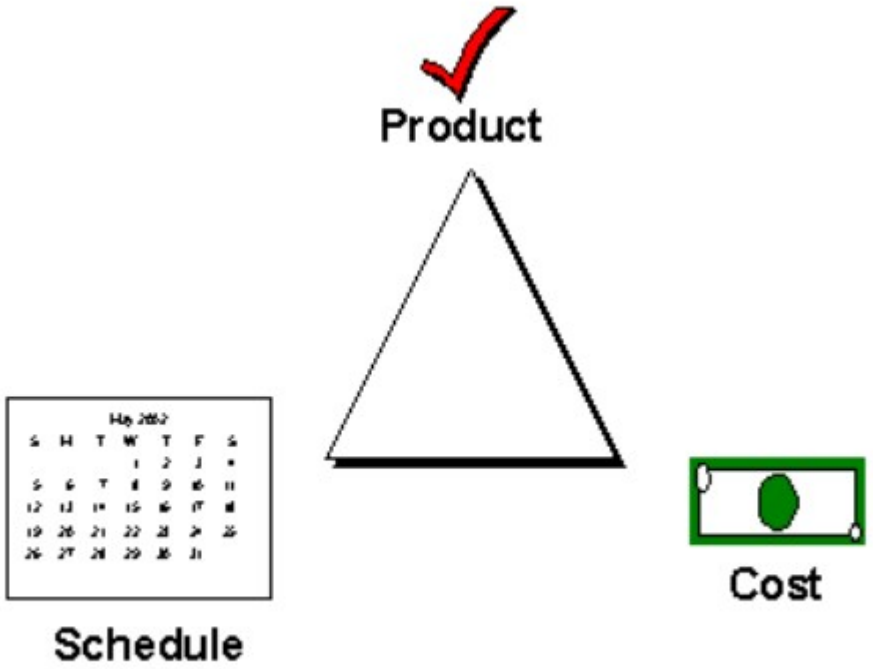
Metric Examples:

Velocity (in Agile projects, e.g., story points completed per sprint).

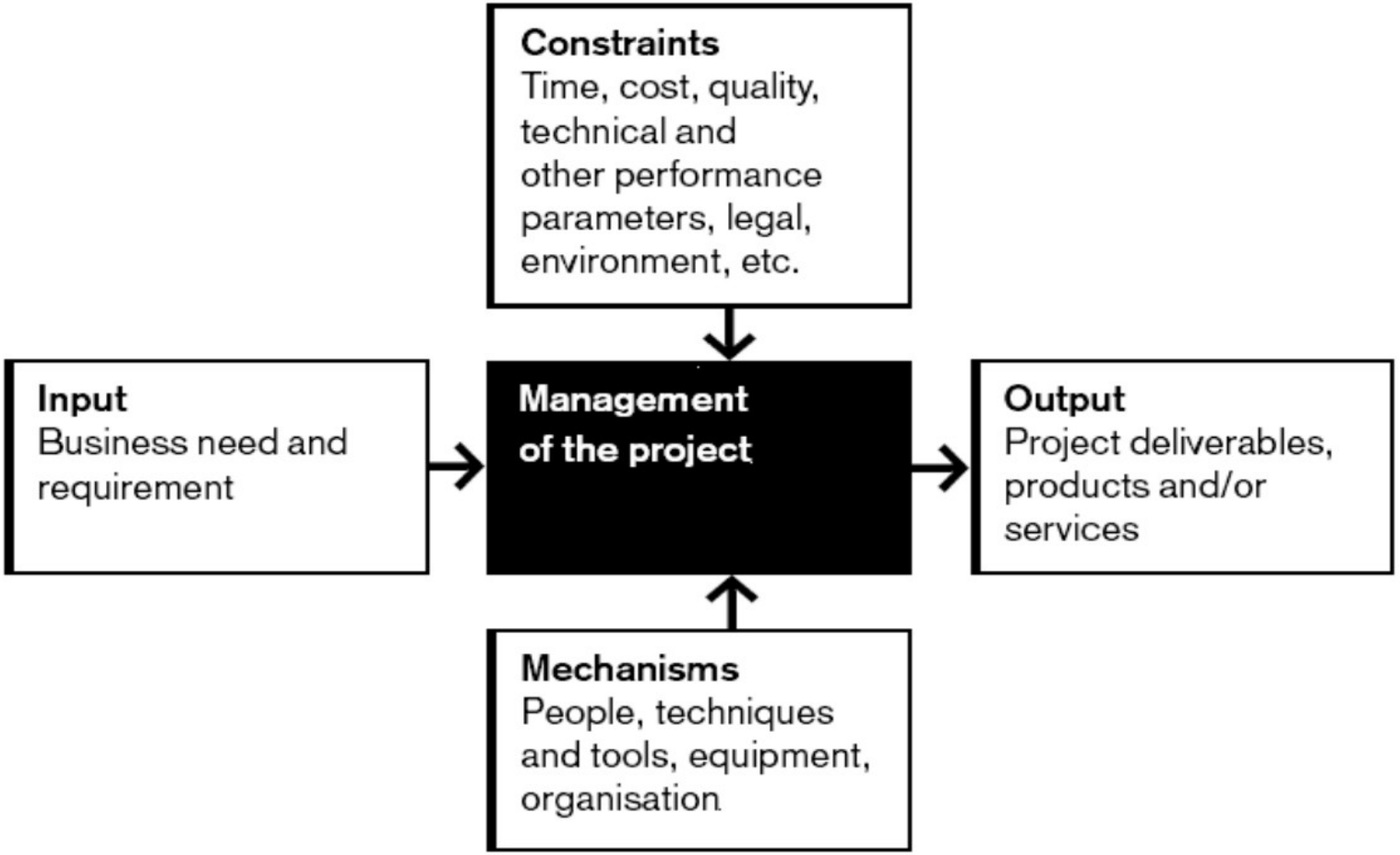
Number of tasks completed per team member.

Trade-off Triangle

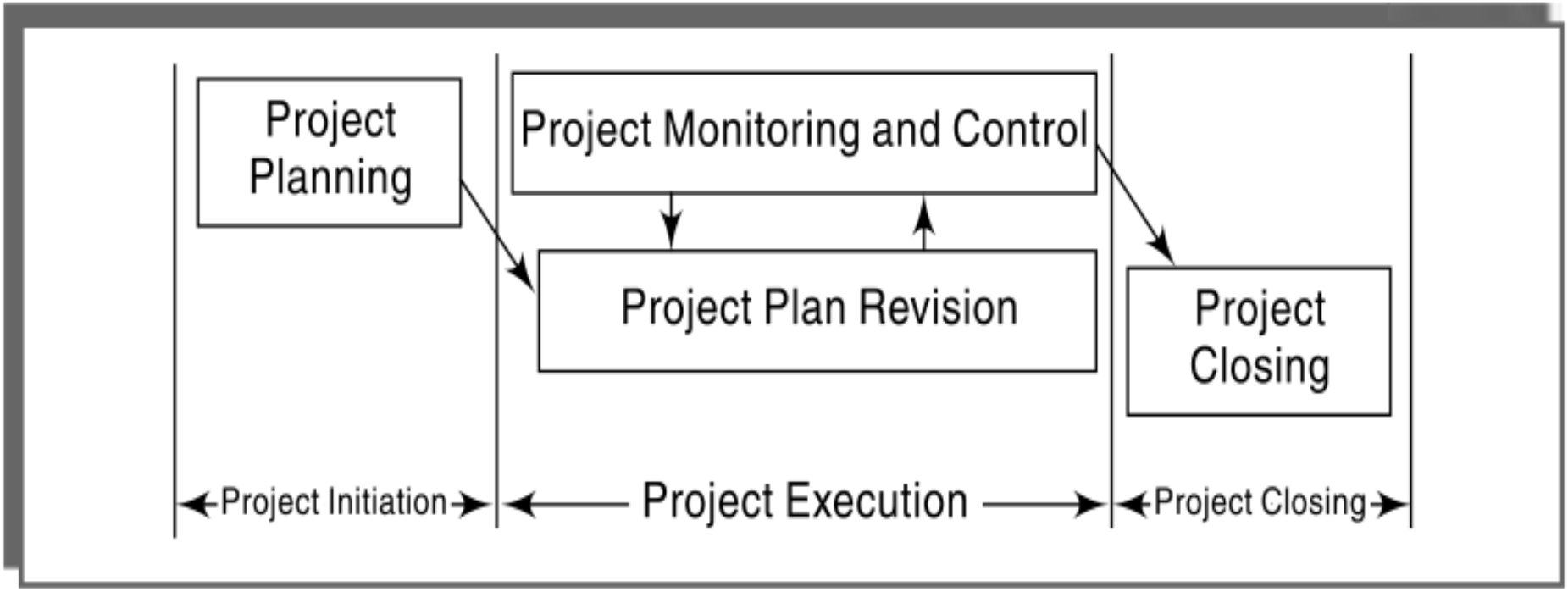
Fast, Cheap, Good. Choose two.



Project Management Process



Principal Project Management Process

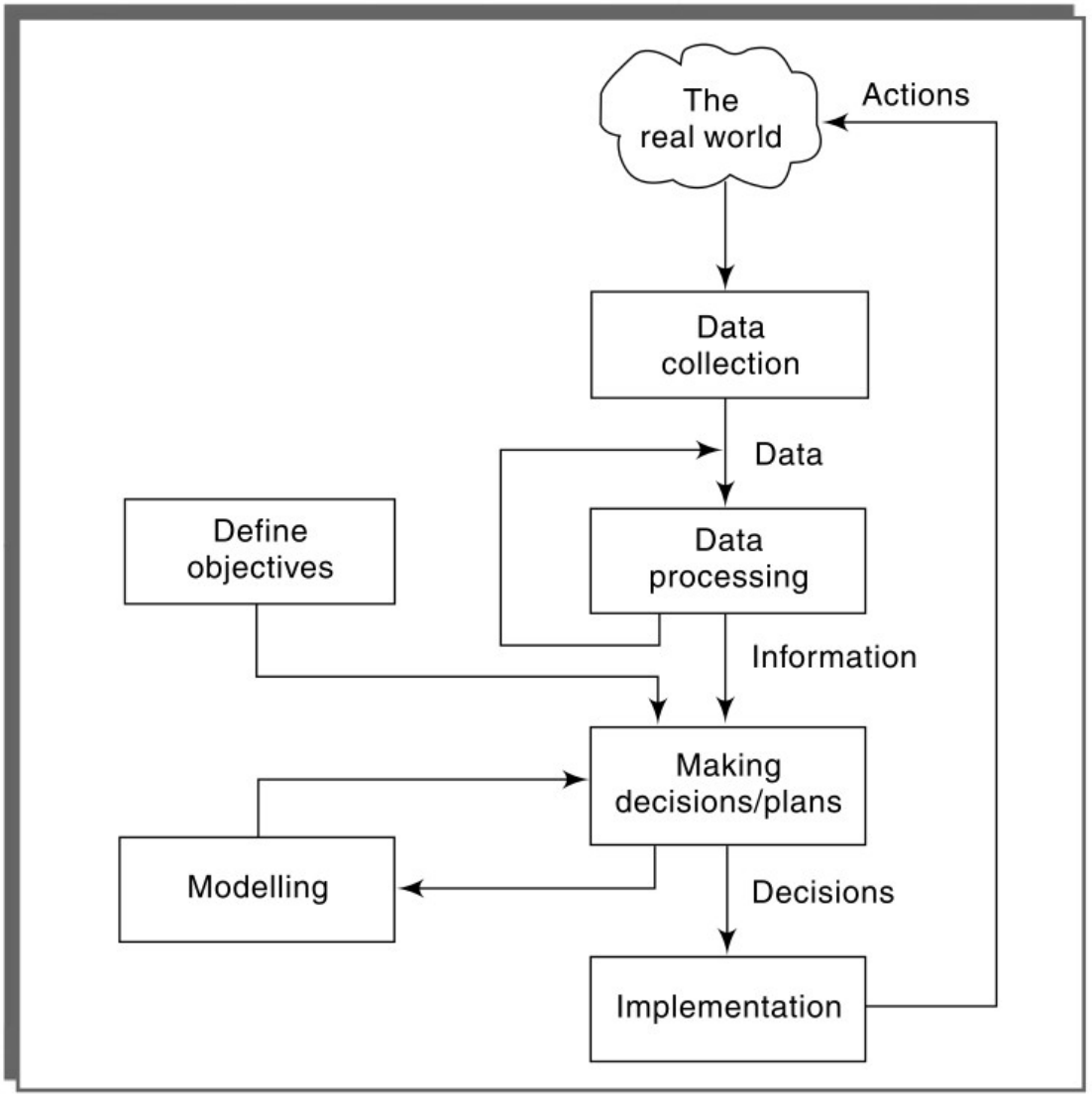


Management Control

Management Control

Management, in general, involves setting objectives for a system and then monitoring the performance of the system.

Project Control Cycle



PM’s Nine Knowledge Areas

Management Control

The Project Management Body of Knowledge (PMBOK) outlines nine key knowledge areas that are essential for effective project management.

These knowledge areas provide a framework for managing projects systematically and cover various aspects of project management, from scope and schedule to risk and procurement.

1- Project Integration Management

Ensures that the various elements of a project are properly coordinated. It involves making trade-offs between competing objectives and alternatives to meet or exceed stakeholder expectations.

One of the techniques used to both integrate the various processes and to measure the performance of the project as it moves from initiation through to completion is ***Earned Value Management (EVM)***.

- ***Earned value*** is the amount of work completed, measured according to the budgeted effort that the work was supposed to consume.
- It is also called the budgeted cost of work performed.
- As each task is completed, the number of person-months originally planned for that task is added to the earned value of the project.

2- Project Scope Management

Defines and controls what is included in the project and what is not, ensuring that the project includes all the work required to complete it successfully.

Key Processes:

- Planning scope management.
- Collecting requirements.
- Defining scope.
- Creating the Work Breakdown Structure (WBS).
- Validating scope.
- Controlling scope

3- Project Time Management

Project Time Management includes the processes required to ensure timely completion of the project. The followings are major processes in developing the project time schedule:

(a) Activity Definition—identifying the specific activities that must be performed to produce the various project deliverables.

(b) Activity Sequencing—identifying and documenting interactivity Dependencies.

(c) Activity Duration Estimating—estimating the number of work periods that will be needed to complete individual activities.

(d) Schedule Development—analyzing activity sequences, activity durations, and resource requirements to create the project schedule.

(e) Schedule Control—controlling changes to the project schedule.

4- Project Cost Management

Project Cost Management includes the processes required to ensure that the project is completed within the approved budget.

Key Processes:

- **Resource Planning**—determining what resources (people, equipment, materials) and what quantities of each should be used to perform project activities.
- **Cost Estimating**—developing an approximation (estimate) of the costs of the resources needed to complete project activities.
- **Cost Budgeting**—allocating the overall cost estimate to individual work activities.
- **Cost Control**—controlling changes to the project budget.

5- Project Quality Management

Ensures that the project meets the quality requirements specified by the stakeholders and that the project deliverables are fit for purpose.

Key Processes:

- Planning quality management.
- Performing quality assurance.
- Controlling quality.

6- Project Human Resource Management

Organizes, manages, and leads the project team. It involves processes to plan, acquire, develop, and manage the project team.

Key Processes:

- Planning human resource management.
- Acquiring the project team.
- Developing the project team.
- Managing the project team.

7- Project Communication Management

Ensures timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and the ultimate disposition of project information.

Key Processes:

Planning communications management.

Managing communications.

Controlling communications.

8- Project Risk Management

Project Risk management is the process of identifying, analyzing, and responding to project risk. It includes maximizing the probability and consequences of positive events and minimizing the probability and consequences of adverse events to project objectives.

Risk Management Planning—deciding how to approach and plan the risk management activities for a project.

Risk Identification—determining which risks might affect the project and documenting their characteristics.

Qualitative Risk Analysis—performing a qualitative analysis of risks and conditions to prioritize their effects on project objectives.

Quantitative Risk Analysis—measuring the probability and consequences of risks and estimating their implications for project objectives.

Risk Response Planning—developing procedures and techniques to enhance opportunities and reduce threats to the project's objectives.

Risk Monitoring and Control—monitoring residual risks, identifying new risks, executing risk reduction plans, and evaluating their effectiveness throughout the project life cycle.

9- Project Procurement Management

Project Procurement Management includes the processes required to acquire goods and services, to attain project scope, from outside the performing organization.

Key Processes:

Planning procurement management.

Conducting procurements.

Controlling procurements.

Closing procurements.

Q & A

What is project success and failure according to you?