

Project Management Notes – Semester III [Session 1 to 10] IBS, Mumbai

INTRODUCTION TO PROJECT MANAGEMENT

Projects are important elements of change and innovations in organizations. Whether the goal is to putting together sky-rappers, implementing AI solutions, or plan for commonwealth games, the means to achieve the desired outcome is through project management. The application of modern project management skills and techniques is not only limited to the private sector but also in the government initiated projects (commercial, non-profit), and the community service related projects. Projects in construction industry, IT industry, solar industry, pharmaceutical industry, space station, corporate reallocation, mergers, company audits, expressways, highways, new product development, system implementation, etc. all require good project management practice to complete projects. However, having good project management skills does not completely eliminate problems, risks, or surprises. The value of good project management is to have standard processes in place to deal with all contingencies.

PROJECT:

Project Management Institute defines project as a temporary endeavor undertaken to create a unique product, service, or result.

Characteristics of Projects

1. Project involves a single, definable purpose and well-defined end-items, deliverables.
2. Every project is unique.
3. Projects are temporary activities. It has a defined life span with a start date and an end date.
4. Projects cut across organizational and functional lines because it requires skills and talents from multiple functions, professions, and organizations.

Examples of project:

1. Setting up a sales kiosk for a professional accounting meeting
2. Developing a supply-chain information system
3. Writing a new piano piece
4. Designing an iPod that is approximately, interfaces with PC, and stores 10,000 songs
5. RFID projects for GE and Wal-Mart

PROJECT MANAGEMENT:

Project management is the application of knowledge, skills, tools, and techniques applied to project activities in order to meet the project requirements. Project management is a process of planning, putting up the plan into action, and measuring progress and success.

The project management methodology provides the means for (1) identification of tasks, (2) identification of resource requirements and costs, (3) establishing priorities, (4) planning and updating schedules, (5) monitoring and controlling end-item quality and performance, and (6) measuring project performance.

What a Project Is Not: A routine, repetitive, high-certainty activities (ex. prefabricated housing, supply flights, and fabrication of same components) are performed by the organizations that do the same thing over and over, with little change in operations other than rescheduling. Projects differ greatly from repetitive efforts is the reason both must be managed differently.

PROGRAM

A program is a group of related projects designed to accomplish a common goal over an extended period of time.

Program management is the process of managing a group of ongoing, interdependent, related projects in a coordinated way to achieve strategic objectives.

4

PORTFOLIO

Portfolio is a collection of projects, programs, subsidiary-portfolios, and/or operations managed as a group to achieve strategic business objectives. The projects and programs of the portfolio not necessarily are interdependent or directly related.

Portfolio Management is a Centralized management of one or more portfolios to achieve strategic objectives. It also confirms portfolios are consistent with and within aligned with organizational strategies.

PROJECT MANAGEMENT OFFICE (PMO)

Project management offices have been around since the 1800s, though their function has evolved over time. A Guide to the Project Management Body of Knowledge (PMBOK® Guide) defines

Project Management Office (PMO) as —a management structure that standardizes the project related governance processes and facilitates the sharing of resources, methodologies, tools, and techniques.

A primary function of a PMO is to support project managers in a variety of ways which may include, but are not limited to:

- Managing shared resources across all projects administered by the PMO; - Identifying and developing project management methodology, best practices, and standards;
- Coaching, mentoring, training, and oversight;
- Monitoring compliance with project management standards, policies, procedures, and templates by means of project audits;
- Developing and managing project policies, procedures, templates, and other shared documentation

There are three different PMO structure types:

- **Supportive:** Supportive PMOs provide a consultative role
- **Controlling :** Controlling PMOs provide support and require compliance through various means
- **Directive:** Directive PMOs take control by managing one or more projects

PROJECT MANAGEMENT IN DIFFERENT ENVIRONMENTS

1. Commercial/For Profit Project Management
2. Government/Nonprofit Project Management
3. Military Project Management

Many organizations exist in multiple project environments (such as government/ military and commercial) and utilize a variety of management forms—project, program, matrix, task force, and committee.

THE PROJECT MANAGEMENT SYSTEMS, METHODOLOGIES & SYSTEMS DEVELOPMENT CYCLE

A project is a system of people, equipment, materials, and facilities organized and managed to achieve a goal. Most of the developed philosophy and practice of what it takes to organize and execute a project comes from a perspective called the —systems approach and at the same time,

work done on projects is mostly for the purpose of creating systems.

SYSTEMS APPROACH FRAMEWORK

The systems approach formally acknowledges that the behavior of any one system element may influence other elements in the system and no single element can function effectively without the help of others. This recognition of interdependence and cause–effect among elements is what most distinguishes the approach to systems.

This approach is a methodology for solving problems and managing systems which deals with the:

1. Objectives and the performance criteria of the whole system;
2. Environment and constraints of the system;
3. Resources of the system;
4. Elements of the system, their functions, attributes, and performance measures;
5. Interaction among the elements;
6. Management of the system.

PROJECT LIFE CYCLE AND SYSTEMS LIFE CYCLE

A project life cycle is the series of phases that a project passes through from its start to its completion. It provides the basic framework for managing the project. This framework applies regardless of the specific project work involved. The phases may be sequential, iterative or overlapping. All projects can be mapped to the generic life cycle.

Project life cycle is independent of product life cycle, which may be produced by a project. A product life cycle is the series of phases that represent the evolution of a product, from concept through delivery, growth, maturity, and to retirement.

The development of a system also follows a series of phases. It includes phase of conception, definition, design and development, fabrication and testing, installation or launch, production, operation and maintenance, and, finally, enhancement, replacement, or cancellation.

SYSTEMS DEVELOPMENT CYCLE

The life cycle of a system can be segmented into a logical series of phases and stages, each representing a group of tasks or activities that typically happen in that phase, regardless of

the particular system. One of the way of dividing the life cycle into four phases, called the systems development cycle:

1. Conception phase (Phase A)
2. Definition phase (Phase B)
3. Execution phase (Phase C)
4. Operation phase (Phase D)

PROJECT FEASIBILITY

Feasibility is the process of investigating a need, problem, and solutions in sufficient detail to assess if a solution is economically viable and worth developing. The feasibility entails a more protracted, rigorous study that requires consideration of alternating solutions (system concepts) as well as the benefits and viability of each factor. Even though the customer does feasibility analysis, in some cases where the study requires special expertise, the third party consultants are hired to do it. Deciding to build a new airport, power plant, highway, or tunnel are examples where feasibility studies are lengthy, expensive projects, and are done by a third party. Multiple dimensions of project feasibility study are analyzed throughout different stages of project in varying degrees of detail, both separately and in relation to others.

The importance of a feasibility study is based on organizational desire to —get it right before committing resources, time, or budget. A feasibility study might uncover new ideas that could completely change a project’s scope. It’s best to make these determinations in advance, rather than to jump in and to learn that the project won’t work. Conducting a feasibility study is always beneficial to the project as it gives client and other stakeholders a clear picture of the proposed project.

A well design feasibility analysis of a project cover six important study areas: (1) technical, including manpower and technological requirements; (2) administrative/managerial, including external linkages and internal organization; (3) economic justification, such as the costs and benefits; (4) financial for funding needs and sources; (5) social/political, including demographic data and social needs; and (6) environmental, including present baseline data and the impact of those data

- 1) Technical Feasibility - The technical feasibility refers to the ability of the process to take advantage of the current state of art technology in pursuing further improvement

- 2) Managerial Feasibility - The managerial feasibility involves the capability of the infrastructure of a process to achieve and sustain process improvement
- 3) Economic Feasibility - The economic feasibility analyzes the feasibility of the proposed project to generate economic benefits
- 4) Financial Feasibility - The financial feasibility attempts to assess the capability of the project organization to raise the appropriate funds needed to implement the proposed project
- 5) Political Feasibility - The political feasibility deals with the initial acceptance of the project and sustenance of the project in the long-run by the prevailing political system
- 6) Environmental Feasibility - The environmental feasibility is very much important. If the commissioning of the project results with any kind of pollution, it will be visible to the public, administrators and politicians.

If the feasibility study indicates that the project concept is viable and the concept cannot be executed internally, it is given to outside contractors. In the later case, the customer usually solicits ideas and bids from multiple contractors and chooses the best. Each competing contractor must then perform its own feasibility study to assess the merits of the project, and its capability for developing a winning proposal and obtaining a contract. Whether the project is done internally or externally, a feasibility study is used to justify the idea and obtain financial and other forms of support.

REQUEST FOR PROPOSAL

The RFP (or request for bid, request for quotation, invitation to bid, or similar term) is notification that a customer is interested in hiring a contractor. The dual purpose of the RFP is to outline the user's idea (problem, need, etc.) and to solicit suggestions (proposals) for solutions. RFPs are sent to contractors on the user's bidders list. The RFP must be clear, concise, and complete: when it is, the customer can expect contractors to respond with a clear, concise, and complete proposal.

PROJECT CONTRACTING

Contract is an agreement between two parties wherein one party (the contractor) promises to perform a service, and the other party (the client) promises to do something in return, typically make payment for the service. The two fundamental kinds of contracts are **fixed price and cost-plus contracts**.

Fixed Price contract

In FP contract or lump sum contract, the price is agreed upon and remains fixed as long as there are no changes to the scope or provisions of the agreement. However, FP contract is more difficult and more costly to prepare. Types of Fixed price contract include Firm-fixed price (FFP); Fixed price– incentive fee (FPIF); Fixed price economic price adjustments (FPEPA)

Cost-plus contract:

In cost plus, the contractor is reimbursed for all or some of the expenses incurred during the performance of the contract, and as a result, the final price is unknown until the project is completed. In this type of contract also, several variations exist including some with built-in incentives for the contractor to meet cost, time, or performance targets – Cost plus fixed fee (CPFF); Cost plus incentive fee (CPIF); Cost plus award fee (CPAF).

Time and Materials Contract

A time and materials (TM) contract is a simple form of agreement that reimburses the contractor for labor costs and materials as incurred. It provides for payment of direct labor hours at an hourly rate that includes direct labor costs, indirect costs, and profit.

PROJECT MANAGEMENT TODAY—AN INTEGRATIVE APPROACH

Integration of Projects with Organizational Strategy

Projects are undertaken for implementing strategy. The strategic alignment of projects becomes critical in effective use of organization resources. Project selection criteria need to ensure that each project undertaken is prioritized and contributes to strategic goals.

Strategic Management provides the focus of the future direction for the firm. Activities of the Strategic Management Process includes

1. Review and define the organizational mission.
2. Set long-range goals and objectives.
3. Analyze and formulate strategies to reach objectives.
4. Implement strategies through projects

Integration of projects through Portfolio management

Project portfolio management provides a set of integrative criteria and processes for evaluating and selecting projects that support higher-level strategies and objectives. The portfolio management domain encompasses project oversight at the organization level. This oversees the alignment of organizational strategy with programs, as well as their interdependencies. A project management office, which acts as a bridge between senior management and project managers, also oversees the project portfolio.

The major functions of portfolio management are to oversee project selection, monitor aggregate resource levels and skills, balance projects in the portfolio in order to represent a risk level appropriate to the organization and also, to create a total organization perspective that goes beyond silo thinking.

Effective Project Portfolio Management System

A project portfolio system can go long way to reduce, or even eliminate the impact of challenges that may exist if projects are not linked to strategy. These challenges could fall on any of the category mentioned below:

1. Implementation Gap- Lack of understanding and consensus on strategy among top management and middle-level (functional) managers who independently implement the strategy.
2. Organization Politics - Project selection is based on the persuasiveness and power of people advocating the projects.
3. Resource Conflicts and Multitasking - The multi-project environment creates interdependency relationships of shared resources which results in the starting, stopping, and restarting projects.

The design of a project portfolio system should also classify projects based on the urgency and risk associated with it.

CLASSIFICATION OF PROJECTS

The project can be classified on several bases; on the size of the project, risk involved in the project: ownership of the project, economic life of the project and many more factors. Many organizations find they have three different kinds of projects in their portfolio:

1. **Compliance projects**
2. **Operational projects**
3. **Strategic projects**

20

Compliance projects are typically those needed to meet regulatory conditions required to operate in a region; hence, they are called —must do projects. Emergency projects, such as rebuilding a soybean factory destroyed by fire, meet the must do criterion. Compliance and emergency projects usually have penalties if they are not implemented.

Operational projects are those that are needed to support current operations. These projects are designed to improve efficiency of delivery systems, reduce product costs, and improve performance. Total quality management (TQM) projects are examples of operational projects.

Strategic projects are those that directly support the organization's long-run mission. They frequently are directed toward increasing revenue or market share. Examples of strategic projects are new products, research, and development.

PROJECT SELECTION CRITERIA

Although there are many criteria for selecting projects, selection criteria are typically identified as financial and nonfinancial.

Financial models:

1. Payback
2. Net present value (NPV)

Non-Financial Models

1. Checklists
2. Multi-Weighted Scoring Models

FINANCIAL CRITERIA

The Payback Model: Measures the time the project will take to recover the project investment or how long it takes to reach breakeven. It emphasizes cash flows, a key factor in business. Shorter payback period is desirable.

The Net Present Value (NPV) model: Net present value (NPV) is the difference between the present value of cash inflows and the present value of cash outflows over a period of time.

NONFINANCIAL CRITERIA

Checklist: This approach basically uses a list of questions to review potential projects and to determine their acceptance or rejection

Multi weighted scoring criteria: This approach uses several weighted selection criteria to evaluate project proposals. It includes both qualitative and quantitative criteria. Each selection criterion is assigned a weight and scores based on its importance to the project being evaluated. The weights and scores are multiplied to get a total weighted score for the project. Projects with higher weighted scores are considered better.

PROJECT PLANNING FUNDAMENTALS

Planning is concerned with deciding in advance what, when, how, and who will take the necessary actions to accomplish established objectives. It involves creating a set of plans to help guide your team through the implementation, monitoring and controlling and closure phases of the project. The plans created during this phase will help to manage time, cost, quality, changes, risk, and related issues. It also serves as a guideline for team and external suppliers to ensure the timely completion of project on time, within budget, and within schedule.

The purpose of the project planning phase is to:

1. Establish business requirements
2. Establish cost, schedule, list of deliverables, and delivery dates
3. Establish resources plans
4. Obtain management approval and proceed to the next phase

The five generic steps to provide a structured approach for collecting the project information necessary for developing a detailed project scope / work breakdown structure.

1. Defining project scope - Project scope is a definition of the end result or mission of the project for the client/customer in specific, tangible, and measurable terms. To ensure that all the required inputs are covered and scope definition is complete, projects may use a checklist.

The **sample project scope checklist** is as follows:

- a. Project objective - overall objective to meet your customer's need(s)
- b. Deliverables – major deliverables or the expected outputs over the life of the project
- c. Milestones - significant event in a project
- d. Technical requirements - to ensure proper performance
- e. Limits and exclusions - Failure to do so can lead to false expectations and to expending resources and time on the wrong problem.
- f. Reviews with customer – understanding and agreement of expectations

Different industries and companies have checklists and templates to fit their needs

2. Establishing project priorities - Project management needs to recognize and define the priorities of the project related to triple constraints [cost (budget), time (schedule), and scope (performance)]. One of the primary roles of a project manager is to manage the trade-offs between time, cost, and performance.

One of the ways to achieve tradeoff is by implementing a priority matrix for the project as it helps to identify which criterion is to be constrained, which should be enhanced, and which can be accepted.

Constrain: The original parameter is fixed. The project must meet the completion date, specifications and scope of the project, or budget.

Enhance: Given the scope of the project, which criterion should be optimized? In the case of time and cost, this usually means taking advantage of opportunities to either reduce costs or shorten the schedule. Conversely, with regard to performance, enhancing means adding value to the project.

Accept: For which criterion is it tolerable not to meet the original parameters? When trade-offs have to be made, is it permissible for the schedule to slip, to reduce the scope and performance of the project, or to go over budget?

However, these priorities may change during the period tenure.

4. Creating work breakdown structure –

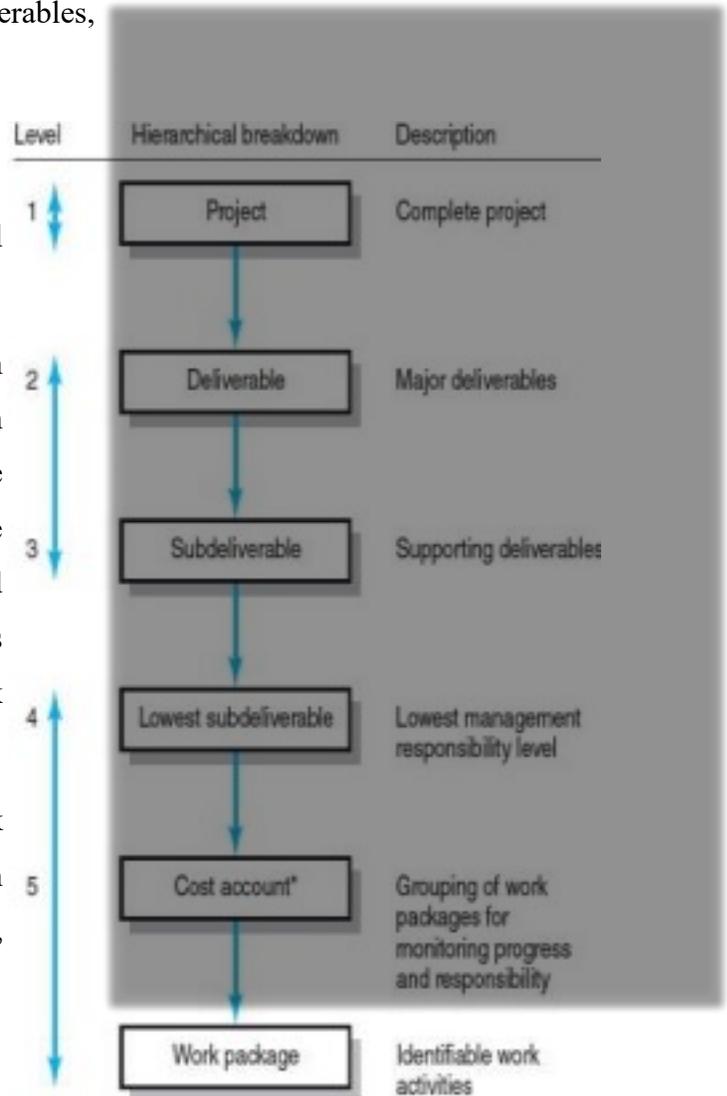
The workbreakdown structure represents the hierarical decomposition of the products and work elements involved in the project. It defines the relationship of the final deliverable (the project) to its subdeliverables, and in turn, their relationships to work packages

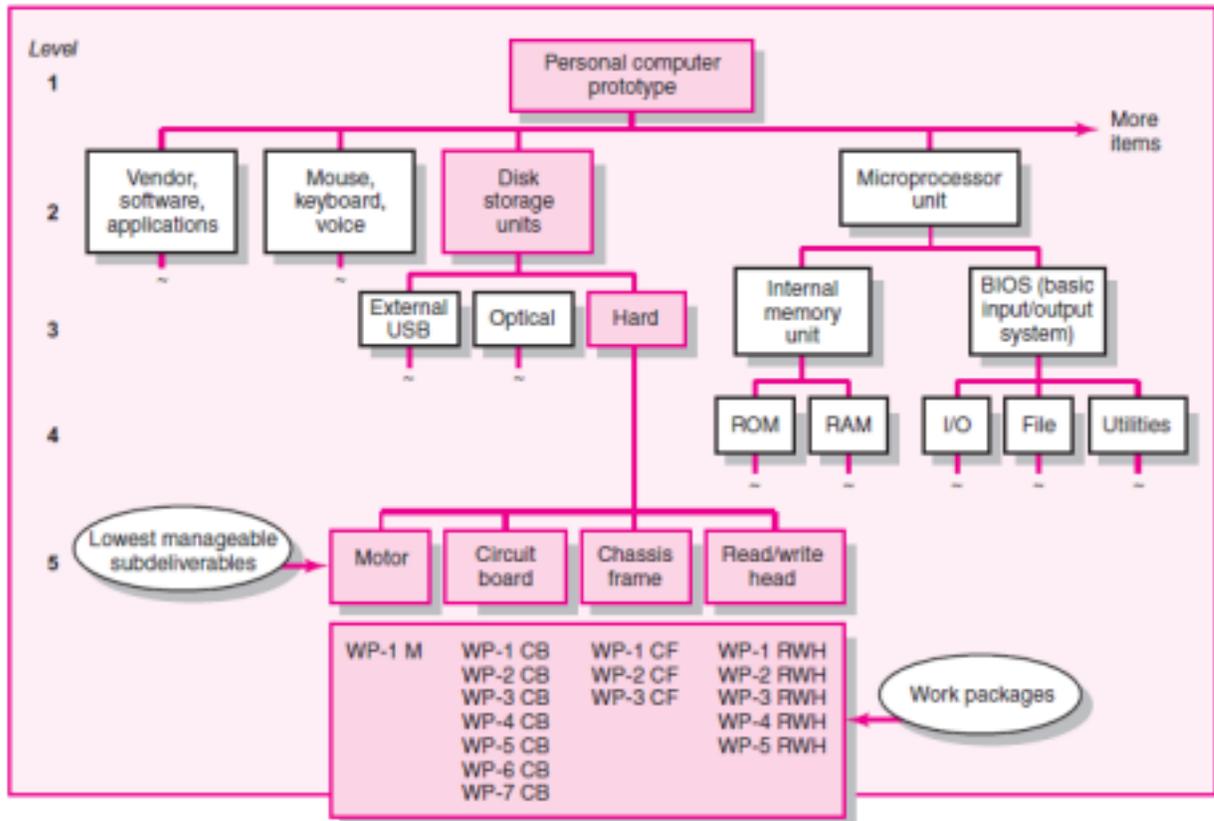
The WBS begins with the project as the final deliverable. Major project work

deliverables/systems are identified first; then the subdeliverables necessary to accomplish the larger deliverables are defined. The process is repeated until the subdeliverable detail is small enough to be manageable and where one person can be responsible. This subdeliverable is further divided into work packages.

The lowest level of the WBS is called a work package. Work packages are short duration tasks that have a definite start and stop point, consume resources, and represent cost.

Example





4. Integrating WBS with OBS - The WBS is used to link the organizational units responsible for performing the work. The organizational breakdown structure depicts how the firm has organized to discharge work responsibility. The purposes of the OBS are to provide a framework to summarize organization unit work performance, identify organization units responsible for work packages, and tie the organizational unit to cost control accounts

5. Coding the WBS for the information system - The codes are used to define levels and elements in the WBS, organization elements, work packages, and budget and cost information. The codes allow reports to be consolidated at any level in the structure.

RESPONSIBILITY MATRIX (RM)

RACI is one form of responsibility matrix. RACI stands for Responsible Accountable, Consulted and Informed. The RACI matrix has been adopted by many organizations to associate roles with project deliverables. RACI matrix is a responsibility assignment matrix (RAM), designed to assign tasks, activities, responsibilities, accountability, decision making, support to team members of a process/project, and clarify expectations on the level of their participation.

The value of the matrix is to help organize project team by clearly defining the responsibilities of the project team members. It is crucial for all project stakeholders to understand their roles and responsibilities. This is especially important when project teams are more complex and cross functional.

PROJECT COMMUNICATION PLAN

Communication is a key component in coordinating and tracking project schedules, issues, and action items. The plan maps out the flow of information to different stakeholders and becomes an integral part of the overall project plan. The purpose of a project communication plan is to express what, who, how, and when Information will be transmitted to project stakeholders so schedules, issues, and action items can be tracked.

PROJECT STAKEHOLDERS

According to the Project Management Institute (PMI), the term project stakeholder refers to, "an individual, group, or organization, who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project. Stakeholders have varying levels of responsibility and authority and can change over the project life cycle. Project stakeholders may have a positive or negative influence in the project completion. **Stakeholder analysis** is technique of systematically gathering and analyzing stakeholder information such as their positions, roles, and to determine whose interests should be taken into account throughout the project. It also deals with stakeholders interests, influence, attitude and expectations and relates them to the purpose of the project

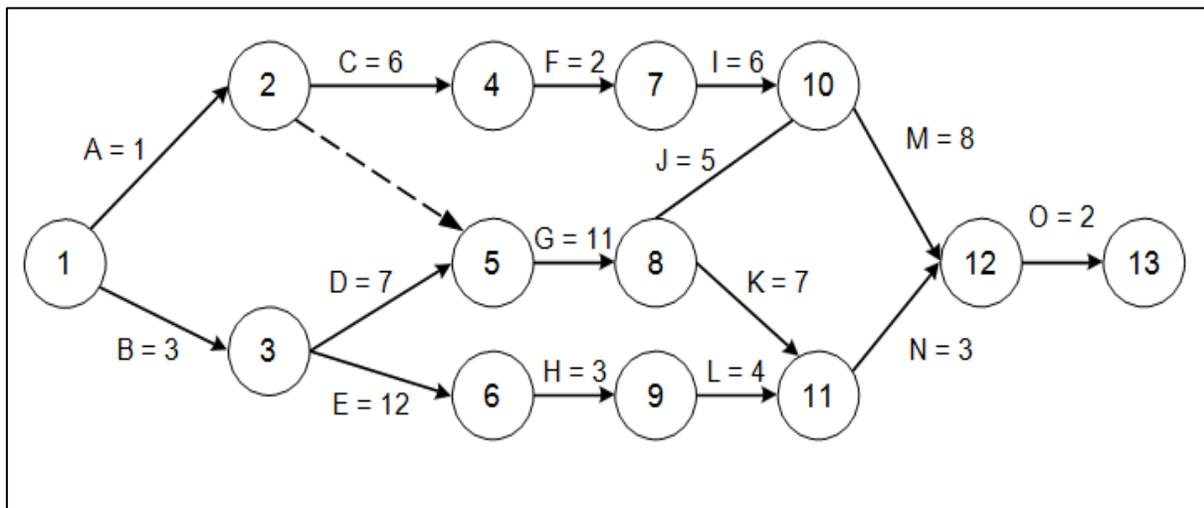
PROJECT ESTIMATING

The process of forecasting or approximating the time and cost of completing project deliverables is called as project estimating. Estimating is a critical factor to all the projects. Estimating is needed to support good decisions, schedule work, determine project timeline, develop case needs, develop time phased budget and to establish project baseline. There are several factors that influence project estimates: Planning horizon, Organisational culture, People in the project team, Stake holder attitude, Project structure and organisation, Constraints and many more.

Two types of network diagrams

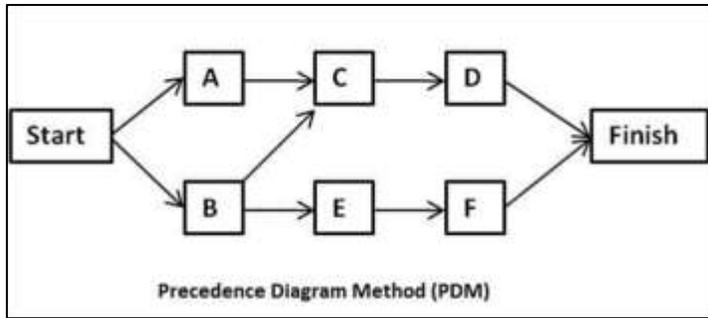
There are two main types of network diagrams in project management: the arrow diagramming method (ADM), and the precedence diagramming method (PDM)

In ADM / AOA: The arrow diagramming method uses arrows to represent activities associated with the project.



- The tail of the arrow represents the start of the activity and the head represents the finish.
- The length of the arrow typically denotes the duration of the activity.
- Each arrow connects two boxes, known as —nodes. The nodes are used to represent the start or end of an activity in a sequence. The starting node of an activity is sometimes called the —i-node, with the final node of a sequence sometimes called the —j-node.
- Requires dummy activity to resolve identity crisis. Dummy activity is a zero time activity, consumes no resources and is denoted by dash lines

In PDM Node Network / Activity on Node (AON) network: The precedence diagramming method uses nodes to represent activities associated with the project.



- Arrows that represent logical relationships (predecessor/and successor).
- Each activity will have its own activity node.
- Start any network with one node and end with one node.(project Start and project finish node).
- Node networks are easier to draw
- Do not require dummy activities to fix the activity identity problem

DEPENDENCY IN THE PROJECT NETWORK DIAGRAM

Dependencies are the relationships among tasks which connect and show the relationship between preceding task and succeeding task. It determines the order in which activities need to be performed.

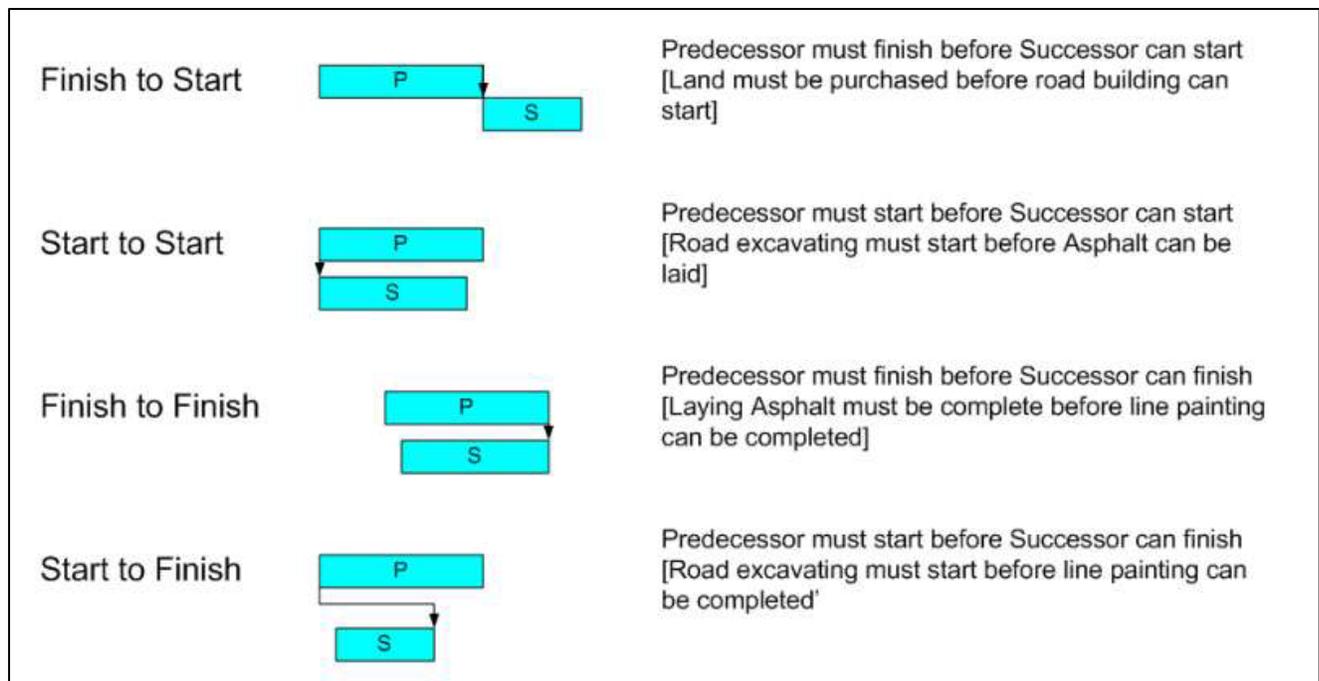
There are four (4) types of dependency relationships.

Finish to Start: The first task or predecessor must finish before Successor can start.

Start to Start: The 2nd task does not start until predecessor task starts.

Finish to Finish: The 1st task or predecessor must finish before Successor can finish. **Start to**

Finish: The first task must start before Successor can finish.



CRITICAL PATH METHOD

The critical path method calculates the longest path of planned activities of the project or the shortest time to complete the project. A network diagram visually conveys the critical path. This visibility into the critical path allows project managers to prioritize activities and take appropriate corrective actions to meet schedule deadlines.

NETWORK COMPUTATION PROCESS

Performing a few simple computations allows the project manager to complete a process known as the forward and backward pass. Completion of the forward and backward pass will answer the following questions:

Forward Pass—Earliest Times

1. How soon can the activity start? (early start—ES)
2. How soon can the activity finish? (early finish—EF)
3. How soon can the project be finished? (expected time—TE)

Backward Pass—Latest Times

1. How late can the activity start? (late start—LS)
2. How late can the activity finish? (late finish—LF)
3. Which activities represent the critical path (CP)? This is the longest path in the network which,

when delayed, will delay the project.

4. How long can the activity be delayed? (slack or float—SL)

Network Calculation

Forward pass calculation > left to right > $ES + DUR = EF$

Backward pass calculation > right to left > $LF - DUR = LS$

Float or Slack > $LF - EF$ or $LS - ES$

By looking at a network diagram, project managers can determine when they have float or slack, which is the amount of time that any given schedule activity can be delayed without causing a delay to the start date of subsequent activities (free float) or to the project completion date (total float). Knowing when a project has float allows a Project Manager to understand what tasks may slip and by how much before they have an impact on the project schedule.

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