

MCS32-SOFTWARE PROJECT MANAGEMENT

UNIT I:

Project Management-Introduction to Project and Project management- problems with software projects - Project Management Knowledge Area and Framework- Stages of project - Feasibility study -cost-benefit analysis - Planning - project execution - project and product lifecycle - Project Stakeholders - All Parties of project - role of project manager - Exploration of Open Source Software tools for project management. Checkpoints And Processes of Project -Major Milestones- Minor Milestones- Periodic status assessments. Project Processes- Initiating Processes- Planning Processes- Control Processes- Executing Processes- Closing Processes- Process Groups- Process Interactions.

1.1.Project Definition

Project in general refers to a new endeavor with specific objective and varies so widely that it is very difficult to precisely define it. Some of the commonly quoted definitions are as follows. Project is a temporary endeavor undertaken to create a unique product or service or result. (AMERICAN National Standard ANSI/PMI99-001-2004) Project is a unique process, consist of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective confirming to specific requirements, including the constraints of time cost and resource.

Examples of project include Developing a watershed, Creating irrigation facility, Developing new variety of a crop, Developing new breed of an animal, Developing agroprocessing centre, Construction of farm building, sting of a concentrated feed plant etc. It may be noted that each of these projects differ in composition, type, scope, size and time.

Project Characteristics

Despite above diversities, projects share the following common characteristics.

Unique in nature.

Have definite objectives (goals) to achieve.

Requires set of resources.

Have a specific time frame for completion with a definite start and finish.

Involves risk and uncertainty.

Requires cross-functional teams and interdisciplinary approach.

Project Performance Dimensions

Three major dimensions that define the project performance are scope, time, and resource. These parameters are interrelated and interactive. The relationship generally represented as an equilateral triangle. The relationship is shown in figure :



It is evident that any change in any one of dimensions would affect the other. For example, if the scope is enlarged, project would require more time for completion and the cost would also go up.

If time is reduced the scope and cost would also be required to be reduced. Similarly any change in cost would be reflected in scope and time. Successful completion of the project would require accomplishment of specified goals within scheduled time and budget. In recent years a fourth dimension, stakeholder satisfaction, is added to the project. However, the other school of management argues that this dimension is an inherent part of the scope of the project that defines the specifications to which the project is required to be implemented.

Thus the performance of a project is measured by the degree to which these three parameters (scope, time and cost)

are achieved.

Mathematically

Performance = f(Scope, Cost, Time)

In management literature, this equilateral triangle is also referred as the “Quality triangle” of the project.

Project management

Project management is a distinct area of management that helps in handling projects. It has three key features to distinguish it from other forms of management and they include: a project manager, the project team and the project management system. The project management system comprises organization structure, information processing and decision making and the procedures that facilitate integration of horizontal and vertical elements of the project organization. The project management system focuses on integrated planning and control.

Benefits of Project Management Approach

The rationale for following project management approach is as follows:

Project management approach will help in handling complex, costly and risky assignments by providing interdisciplinary approach in handling the assignments. Example: R&D organizations.

Project management approaches help in handling assignments in a specified time frame with definite start and completion points .Example handling customer orders by Industries involved in production of capital goods.

Project management approaches provide task orientation to personnel in an Organization in handling assignments. Example: Organizations in IT sector handling software development assignments for clients.

1.2.Problems with software projects:

Chief reasons for software project failures:

Insufficient planning o Too “rosy” assumptions

Poor communication o Changes to the requirements

Changes in the context (funding, priorities)

Doing something without a clear customer base

Competition

Entrepreneurial nature of software

Cost overruns

Changing of requirements

Misunderstanding of requirements

Poor understanding of goals

Over-ambitious goals

Lack of clear specification

Poor planning/research

Lack of a reasonable & structured software/feature plan

No commercial market for end product

Complexity of software

The majority of software projects fail...

o not because of technical deficiencies or problems

o but because of underestimating the human aspects of development, including: ‡
the relationship with the customers ‡

regular and explicit communication between all stakeholders – managers, developers, testers, marketing, sales, customers

1.3. Project Management Knowledge Area and Framework:

Project management – Ability to meet project requirements by using various knowledge, skills, tools and techniques to accomplish project work.

Triple Constraint – Cost, Time and Scope: As well as Quality, Risk and Customer Satisfaction.

Management By Projects – Management of Projects and some ongoing operations, which can be redefined as projects using “Project Management”. An organization that adopts this approach defines its activities as projects in a way that is consistent with definition of project.

Project Integration Management – various elements of the project are properly coordinated.

Project Scope Management – includes all the work required, to complete the project successfully.

Project Time Management – ensure timely completion of the project.

Project Cost Management – completed within the approved budget.

Project Quality Management – project will satisfy the needs for which it was undertaken

Project Human Resource Management – to make the most effective use of the people involved with the project.

Project Communications Management – to ensure timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of project information.

Project Risk Management – identifying, analyzing, and responding to project risk.

Project Procurement Management – to acquire goods and services from outside the performing organization.

Areas of Expertise

PMBOK

Project Life cycle Definition

Five PM process groups

Nine Knowledge areas

2.Application area knowledge, standards and regulations. Application areas are usually defined in terms of

Functional Departments and supporting disciplines

Technical elements

Management specializations

Industry groups

Each application areas generally have a set of accepted standards and practices.

Understanding Project environment

Cultural and social

2.International and political

3.Physical environment

General management knowledge and skills

Planning

2.Organizing

3.Staffing

4.Executing

5.Control the operations. It also includes

6.supporting disciplines

Interpersonal Skills

Effective communication

2.Influencing the organization

3.Leadership

4.Motivation

5.Negotiation & conflict resolution

6.Problem solving

Standard – is a “document approved by a recognized body, that provides, for common and repeated use, rules, guidelines, or characteristics for products, processes or services with which **compliance is not mandatory.**” Standards start out as guidelines and later with widespread adaptation becomes accepted as if they were regulations.

Regulation – is a “document, which lays down product, process or service characteristics, including the applicable administrative provisions, with which **compliance is mandatory.**”

PROJECT MANAGEMENT CONTEXT

Program – Group of related Projects managed in a coordinated way to obtain benefits and control not available from managing them individually.

Portfolio – Collection of Projects, Programs and other work grouped together to facilitate effective management to meet strategic objectives. Projects or program in portfolio may be related or be independent.

PMO – Project Management Office, Project office, Program Office – Centralize and Coordinate the management of project, oversee or administer project, program or both.

OPM3 – PMI’s organizational maturity model.

Expeditor – Staff Assistant and Communication coordinator. No Power to make decisions (Matrix)

Coordinator – Some authority, power and reports to higher-level manager. (Matrix)

Progressive Elaboration – Progressively means “proceeding in steps; continuing steadily by increments,” while *elaborated* means “worked out with care and detail; developed thoroughly”

1.4.Stages of project:

Any project, from a new business venture to property construction, is carried out in phases. The number of phases in a project will vary according to the project's type and the manager's techniques, and may range from four to six steps. These steps can be grouped into four phases which consist of initiation and planning, execution, monitoring and control, and closing.

Initiation and Planning

This phase is often broken into two: one for initiation and one for planning. The former entails budget outlines, the timeline needed for project delivery, as well as the overall goal of the project. The phase is essentially about laying out the project's mission. In sum, it is a formalization of the project's core idea. The planning phase delves into a little more detail. Managers will consider what specific steps and tasks

needed for project delivery. Each step and task will have its own estimated costs and timeline. Although these estimations don't need to be entirely accurate, it gives project managers a general idea about the project's feasibility and delivery time.

Execution

The execution phase is the real start of the project's implementation. Strict budget management comes into play here, as the project has left the planning phase and is now in full swing. Managers will want to be consistently updated on the project's progress as they must have full knowledge of how the project is coming off the ground. For this reason, project managers will constantly communicate with their employees, receiving not only updates but also problems that the project encounters. Project managers are also constantly in touch with their clients at this stage, as during the execution phase investors are most concerned about the project's development.

Project Monitoring and Control

This third stage often overlaps with the second stage. Specifically, project monitoring and control involves managers making sure that task deadlines are met and costs are within the allocated budgets. Most projects will encounter problems along the way, and such problems are rectified at this stage. The manager will also ensure that the project's original plan is adhered to.

Project Closing

No matter how many phases there are in a project, the closing stage is always the last. The phase involves two elements. The first of these is making a report that details how the project ran over the previous three phases. The report will analyze the project's initial goals compared to its current state and identify any problems encountered along the way and what steps were taken to address these problems. The second element of this phase is the project review, which is the project team meeting where team members can put in their own input regarding the project's implementation.

1.5.Feasibility Study

When the client approaches the organization for getting the desired product developed, it comes up with rough idea about what all functions the software must perform and which all features are expected from the software.

Referencing to this information, the analysts does a detailed study about whether the desired system and its functionality are feasible to develop.

This feasibility study is focused towards goal of the organization. This study analyzes whether the software product can be practically materialized in terms of implementation, contribution of project to organization, cost constraints and as per values and objectives of the organization. It explores technical aspects of the project and product such as usability, maintainability, productivity and integration ability.

The output of this phase should be a feasibility study report that should contain adequate comments and recommendations for management about whether or not the project should be undertaken.

Feasibility Study forms the backbone of Project Formulation and presents a balanced picture incorporating all aspects of possible concern. The study investigates practicalities, ways of achieving objectives, strategy options, methodology, and predict likely outcome, risk and the consequences of each course of action. It becomes the foundation on which project definition and rationale will be based so that the quality is reflected in subsequent project activity. A well conducted study provides a sound base for decisions, clarifications of objectives, logical planning, minimal risk, and a successful cost effective project. Assessing feasibility of a proposal requires understanding of the STEEP factors. These are as under Social, Technological, Ecological, Economic, and Political.

A feasibility study is not an end in itself but only a means to arrive at an investment decision. The preparation of a feasibility study report is often made difficulty by the number of alternatives (regarding the choice of technology, plant capacity, location, financing etc.) and assumptions on which the decisions are made.

The project feasibility studies focus on

Economic and Market Analysis

Technical Analysis

Market Analysis

Financial Analysis

Economic Benefits

Project Risk and Uncertainty

Management Aspects

Economic and Market Analysis

In the recent years the market analysis has undergone a paradigm shift. The demand forecast and projection of demand supply gap for products / services can no longer be based on extrapolation of past

trends using statistical tools and techniques. One has to look at multiple parameters that influence the market. Demand projections are to be made keeping in view all possible developments. Review of the projects executed over the years suggests that many projects have failed not because of technological and financial problems but mainly because of the fact that the projects ignored customer requirements and market forces.

In market analysis a number of factors need to be considered covering – product specifications, pricing, channels of distribution, trade practices, threat of substitutes, domestic and international competition, opportunities for exports etc. It should aim at providing analysis of future market scenario so that the decision on project investment can be taken in an objective manner keeping in view the market risk and uncertainty.

Technical Analysis

Technical analysis is based on the description of the product and specifications and also the requirements of quality standards. The analysis encompasses available alternative technologies, selection of the most appropriate technology in terms of optimum combination of project components, implications of the acquisition of technology, and contractual aspects of licensing. Special attention is given to technical dimensions such as in project selection. The technology chosen should also keep in view the requirements of raw materials and other inputs in terms of quality and should ensure that the cost of production would be competitive. In brief the technical analysis included the following aspects.

Technology

- Availability

- Alternatives

- Latest / state-of-art

- Other implications

Plant capacity

- Market demand

- Technological parameters

Inputs

- Raw materials

- Components

- Power

- Water

- Fuel

Others

Availability skilled man power

\Location Logistics

Environmental consideration – pollution,
etc., Requirement buildings/ foundation

Other relevant details

Environmental Impact Studies:

All most all projects have some impact on environment. Current concern of environmental quality requires the environmental clearance for all projects. Therefore environ impact analysis needs to be undertaken before commencement of feasibility study.

Objectives of Environmental Impact Studies:

To identify and describe the environmental resources/values (ER/Vs) or the environmental attributes (EA) which will be affected by the project (in a quantified manner as far as possible).

To describe, measure and assess the environmental effects that the proposed project will have on the ER/Vs.

To describe the alternatives to the proposed project which could accomplish the same results but with a different set of environmental effects .

The environmental impact studies would facilitate providing necessary remedial measures in terms of the equipments and facilities to be provided in the project to comply with the environmental regulation specifications.

Financial Analysis

The Financial Analysis, examines the viability of the project from financial or commercial considerations and indicates the return on the investments. Some of the commonly used techniques for financial analysis are as follows.

Pay-back period.

Return on Investment (ROI)

Net Present Value (NPV)

Profitability Index(PI)/Benefit Cost Ratio

Internal Rate of Return (IRR)

Economic Benefits:

Apart from the financial benefits (in terms of Return on Investment) the economic benefits of the project are also analyzed in the feasibility study. The economic benefits include employment generation, economic development of the area where the project is located, foreign exchange savings in case of import substitutes or earning of foreign exchange in case of export oriented projects and others.

Risk and Uncertainty

Risk and Uncertainty are associated with every project. Risk is related to occurrence of adverse consequences and is quantifiable. It is analysed through probability of occurrences. Where as uncertainty refers to inherently unpredictable dimensions and is assessed through sensitivity analysis. It is therefore necessary to analyse these dimensions during formulation and appraisal phase of the programme.

Factors attributing to risk and uncertainties of a project are grouped under the following;

Technical –relates to project scope, change in technology, quality and quantity of inputs, activity times, estimation errors etc.

Economical- pertains to market, cost, competitive environment, change in policy, exchange rate etc.

Socio-political- includes dimensions such as labour, stakeholders etc.

Environmental – factors could be level of pollution, environmental degradation etc.

Management Aspects:

Management aspects are becoming very important in project feasibility studies. The management aspects cover the background of promoters, management philosophy, the organization set up and staffing for project implementation phase as well as operational phase, the aspects of decentralization and delegation, systems and procedures, the method of execution and finally the accountability

1.6. Cost–Benefit analysis (CBA)

cost–benefit analysis (CBA), sometimes called **benefit costs analysis (BCA)**, is a systematic approach to estimate the strengths and weaknesses of alternatives (for example in transactions, activities, functional business requirements or projects investments); it is used to determine options that provide the best approach to achieve benefits while preserving savings. The CBA is also defined as a systematic process for calculating and comparing benefits and costs of a decision, policy (with particular regard to government policy) or (in general) project

Broadly, CBA has two main purposes:

To determine if an investment/decision is sound (justification/feasibility) – verifying whether its benefits outweigh the costs, and by how much;

To provide a basis for comparing projects – which involves comparing the total expected cost of each option against its total expected benefits.^[3]

CBA is related to (but distinct from) [cost-effectiveness](#) analysis. In CBA, benefits and costs are expressed in monetary terms, and are adjusted for the [time value of money](#), so that all flows of benefits and flows of project costs over time (which tend to occur at different points in time) are expressed on a common basis in terms of their [net present value](#).

Closely related, but slightly different, formal techniques include [cost-effectiveness](#) analysis, [cost-utility analysis](#), [risk-benefit analysis](#), [economic impact analysis](#), fiscal impact analysis, and [social return on investment](#) (SROI) analysis.

1.7.Planning:

Planning Phase In this phase the project structure is planned based on project appraisal and approvals. Detailed plans for activity, finance, and resources are developed and integrated to the quality parameters. In the process major tasks need to be performed in this phase are

Identification of activities and their sequencing

Time frame for execution

Estimation and budgeting

Staffing

A Detailed Project Report (DPR) specifying various aspects of the project is finalized to facilitate execution in this phase.

1.7.1.Execution Phase

This phase of the project witnesses the concentrated activity where the plans are put into operation. Each activity is monitored, controlled and coordinated to achieve project objectives. Important activities in this phase are

- Communicating with stakeholders

Reviewing progress

Monitoring cost and time

Controlling quality

Managing changes

1.7.2. Project and product life cycle:

Two major concepts in project management are Project Life Cycle and Product Life Cycle.

Project Life cycle:

Project Life Cycle is the entire cycle that encompasses a project. It means the different phases that take place within a project. There are typically five different processes that take place in a project, namely:

Initiation

Planning

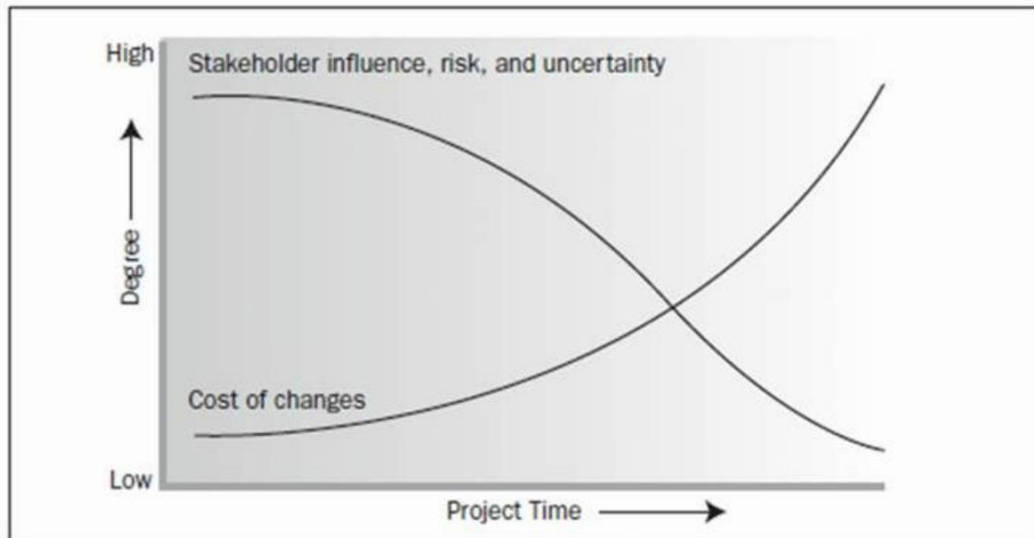
Executing

Monitoring and Control

Closing



Project Lifecycle



Initiation, planning, executing, monitoring and controlling and closing are also the five basic processes of project management. Every project has these five phases in existence. Initiation, planning, executing and closing takes place once throughout the process, however monitoring and control needs to be done even [after closing of the project](#) towards smooth and fluent project delivery. Also monitoring and control is a part of every process at different levels.

Product-Life-Cycle

Product Life Cycle defines the different stages that enrapture the growth of a product. A product typically goes through the below mentioned stages.

Market Introduction

Market Growth

Market Maturity

Decline and Saturation Stage

At each stage of a product life cycle, marketing strategies along with revenue and profit generation might keep changing. Every product moves through a life cycle right from project initiation stage through developing a product till it reaches the end of the life cycle. Every

product in different stages of product life cycle goes through each phases of project life cycle. This is the basic difference between project life cycle and product life cycle

What are the main stages of the product life cycle?

The main stages of the product life cycle are:

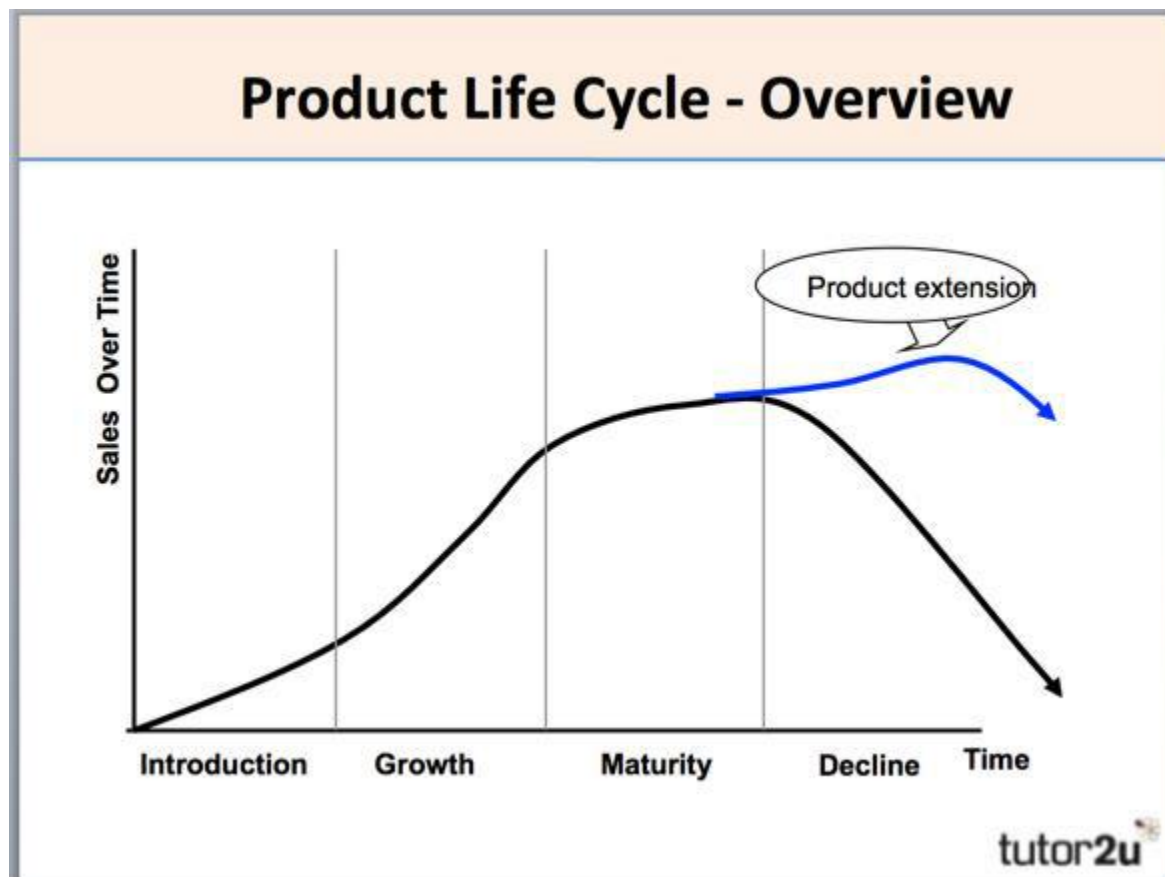
Introduction – researching, developing and then launching the product

Growth – when sales are increasing at their fastest rate

Maturity – sales are near their highest, but the rate of growth is slowing down, e.g. new competitors in market or saturation

Decline – final stage of the cycle, when sales begin to fall

This can be illustrated by looking at the sales during the time period of the product.



Extending the Product Life Cycle

What can businesses do to extend the product life cycle?

Extension strategies extend the life of the product before it goes into decline. Again businesses use marketing techniques to improve sales. Examples of the techniques are:

Advertising – try to gain a new audience or remind the current audience

Price reduction – more attractive to customers

Adding value – add new features to the current product, e.g. improving the specifications on a smartphone

Explore new markets – selling the product into new geographical areas or creating a version targeted at different segments

New packaging – brightening up old packaging or subtle changes

1.8. Project Stakeholders:

Project stakeholders in general can be single individuals or entire organizations who are affected by the execution or outcome of a project. Doesn't matter whether the project affects them negatively or positively. If they're affected, they're a stakeholder.

Project stakeholders are entities that have an interest in a given project. These stakeholders may be inside or outside an [organization](#) which:

[sponsor](#) a project, or

have an interest or a gain upon a successful completion of a project;

may have a positive or negative influence in the project completion.

The following are examples of project stakeholders:

Project leader

[Senior management](#)

[Project team](#) members

Project customer

[Resource](#) Managers

Line Managers

Product user group

Project testers

Any group impacted by the project as it progresses

Any group impacted by the project when it is completed

Subcontractors to the project

Consultants to the project

1.9.All parties of projects:

The typical parties are:

Employer or client. The party procuring the works being either the owner of the real property or a developer.

Contractor. The party engaged by the employer/client to carry out the works. ...

Sub-contractors. ...

Architect/engineer. ...

Project manager. ...

Technical manager. ...

Financing bank. ...

Project fund manager.

1.10.Role of project manager:

A project manager is a person who is responsible for making decisions, both large and small. The project manager should make sure they control risk and minimise uncertainty. Every decision the project manager makes must directly benefit their project.

Project managers use project management software, such as Microsoft Project, to organise their tasks and workforce. These software packages allow project managers to produce reports and charts in a few minutes, compared with the several hours it can take if they do it by hand.

Roles and Responsibilities

The role of the project manager encompasses many activities including:

Planning and Defining Scope

Activity Planning and Sequencing

Resource Planning

Developing Schedules

Time Estimating

Cost Estimating

Developing a Budget

Documentation

Creating Charts and Schedules

Risk Analysis

Managing Risks and Issues

Monitoring and Reporting Progress

Team Leadership

Strategic Influencing

Business Partnering

Working with Vendors

Scalability, Interoperability and Portability Analysis

Controlling Quality

Benefits Realisation

Finally, senior management must give a project manager support and authority if he or she is going to be successful.

1.11.Exploration of Open Source Software tools for project management:

List of 10 Best Project Management Software Tools

Wrike. Our review team is very impressed with Wrike based on its key features and support elements. ...

Asana. Asana is a recommended task and project management app for teams that wish to communicate and collaborate efficiently and effectively. ...

Monday.com. ...

Smartsheet. ...

JIRA. ...

Clarizen. ...

Trello. ...

Zoho Projects.

1.12.Check points and processes of project:

Checkpoints of the process :

It is always important to have visible milestones in the life cycle where various stakeholders meet, face to face, to discuss progress and plans. The purpose of these events is not only to demonstrate how well a project is performing but also to achieve the following:

Synchronize stakeholder expectations and achieve concurrence on three evolving perspectives: the requirements, the design, and the plan

Synchronize related artifacts into a consistent and balanced state

Identify the important risks, issues, and out-of-tolerance conditions

Key Points

Three sequences of project checkpoints are used to synchronize stakeholder expectations throughout the life cycle: major milestones, minor milestones, and status assessments.

The most important major milestone is usually the event that transitions the project from the elaboration phase into the construction phase.

The format and content of minor milestones are highly dependent on the project and the organizational culture.

Periodic status assessments are crucial for focusing continuous attention on the evolving health of the project and its dynamic priorities.

Perform a global assessment for the whole life cycle, not just the current situation of an individual perspective or intermediate product

Milestones must have well-defined expectations and provide tangible results. This does not preclude the renegotiation of the milestone's objectives once the project has gained further understanding of the trade-offs among the requirements, the design, and the plan.

Three types of joint management reviews are conducted throughout the process:

1. Major milestones. These system wide events are held at the end of each development phase. They provide visibility to system wide issues, synchronize the management and engineering perspectives, and verify that the aims of the phase have been achieved.

Minor milestones. These iteration-focused events are conducted to review the content of an iteration in detail and to authorize continued work.

Status assessments. These periodic events provide management with frequent and regular insight into the progress being made.

Each of the four phases-inception, elaboration, construction, and transition consists of one or more iterations and concludes with a major milestone when a planned technical capability is produced in demonstrable form. An iteration represents a cycle of activities for which there is a well-defined intermediate result—a minor milestone—captured with two artifacts: a release specification (the evaluation criteria and plan) and a release description (the results). Major milestones at the end of each phase use formal, stakeholder-approved evaluation criteria and release descriptions; minor milestones use informal, development-team-controlled versions of these artifacts.

1.13. Project Processes:

The process of project management is an integrative one—an action (or failure to take action) in one area will usually affect other areas. For example, a scope change will almost always affect cost and schedule estimates, but it may also have an impact on other factors as diverse as team morale and product quality. These interactions often require trade-offs among project objectives— performance in one area may be enhanced only by sacrificing performance in another. Successful project management requires actively managing these interactions.

BASIC PROJECT MANAGEMENT PROCESSES

Most management models identify three basic management processes that serve to organize the ongoing activity of the enterprise:

Planning—devising a workable scheme to accomplish an objective

Executing—carrying out the plan

Controlling—measuring progress and taking corrective action when necessary

These processes occur at all levels of the enterprise, in many different forms, and under many different names. For example, planning is a constant, not a onetime event.

. A senior manager may develop a strategic plan that looks out 5-10 years, or a crisis response plan that addresses 5-10 days.

. A line manager may develop an organization plan and execute it with the aid of an annual staffing plan.

. Major corrective action may require a plan of its own.

Although there are many variations on this basic model, all view management as an ongoing activity with neither a clear beginning nor an expected end (except as an event to be avoided). Projects, however, are temporary; they have both an identifiable starting point and an emphasis on timely future termination. Projects thus include two additional basic management processes:

Initiating—setting overall project direction and defining project objectives

Closing—formalizing acceptance of the product of the project and bringing the project itself to an end

These additional processes also occur at all levels of the project, in many different forms, and under many different names. For example, the initiating process may be called feasibility analysis while the closing process may be called turnover or start-up.

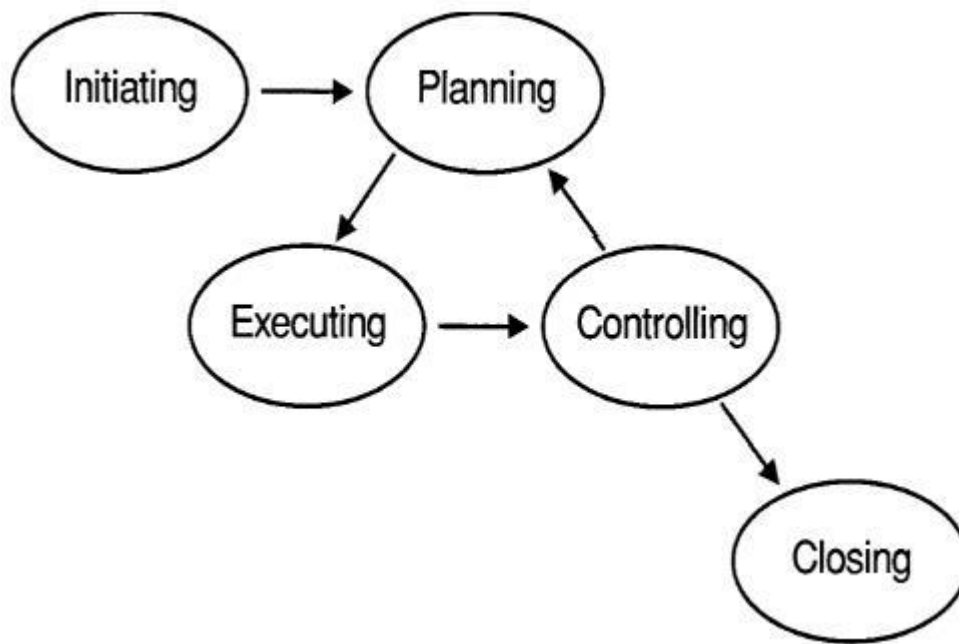


Figure :Basic Project Management Processes

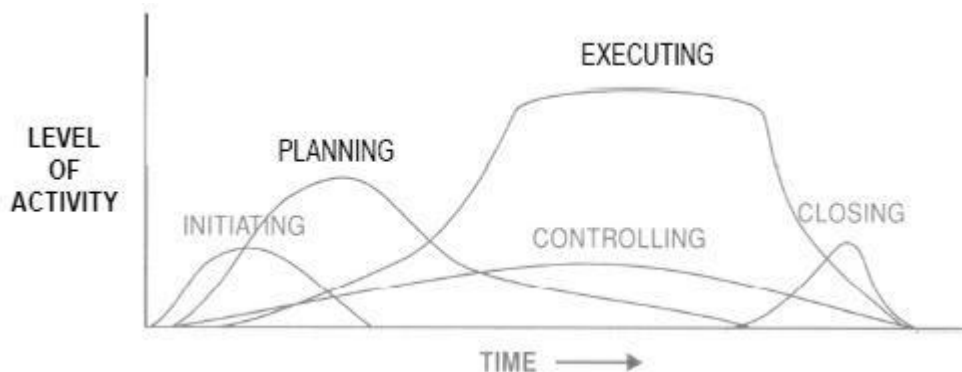


Figure : Basic Project Management Processes Over Time

Initiating Processes:

This basic process includes only one detail process:

Concept development—describing the product of the project, documenting initial project objectives, and assigning a project manager.

Planning Processes:

Planning is of major importance on a project—you are doing something unique and you only get one chance to get it right. As a result, there are relatively more detail processes in this section. However, the

number of processes does not mean that project management is primarily planning—the amount of planning should always be commensurate with the scope of the project.

The relationships among the project planning processes are shown in Figure 3.3 (note that this chart is an explosion of the ellipse labeled “planning” in Figure 3.1). These processes are subject to frequent iterations prior to completing the plan. For example, if the initial completion date is too late, project scope may need to be reduced or costs increased.

Some detail planning processes have clear dependencies that require them to be performed in sequence. For example, tasks must be defined before they can be scheduled or costed. The dependent planning processes include:

Scope definition—developing a written scope statement that includes the project justification, the major deliverables, and the project objectives

Project definition—decomposing the major deliverables into more granular deliverables to provide better control (the top levels of the Work Breakdown Structure)

Task definition—identifying the tasks that will be performed in order to produce the project's deliverables (the lower levels of the WBS)

Task sequencing—identifying dependencies among tasks

Duration estimating—estimating the probable duration of individually scheduleable tasks and activities

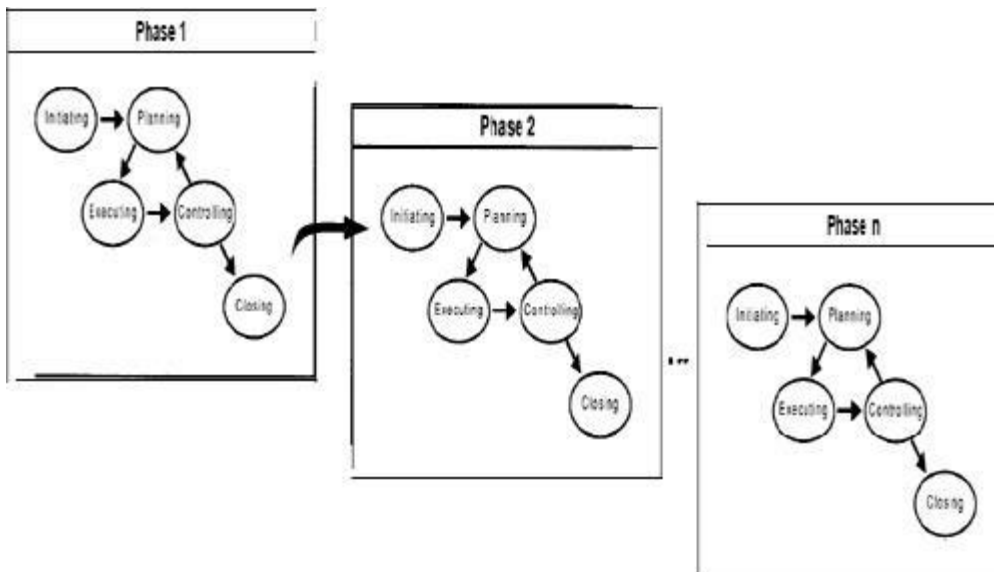
Schedule development—determining and documenting specific dates for tasks

Cost estimating—developing initial estimates of the overall project cost

Cost budgeting—developing detail estimates of the cost of individual tasks

Plan integration—creating and documenting a coherent project plan from the outputs of the other planning processes

Fig:Basic Project Management Processes and the Project Life Cycle



Interactions among other planning processes are more dependent on the nature of the project. For example, on some projects, there may be little or no identifiable risk until after most of the planning has been done and the team recognizes that the cost and schedule targets are extremely aggressive and involve considerable risk. These facilitating processes are performed sporadically throughout the course of project planning. They include:

Quality planning—determining how to ensure that the project quality objectives will be met

Role and responsibility definition—determining the broad outlines of project responsibilities

Organization planning—deciding how the project will be organized, establishing reporting relationships

Project staffing—deciding who will fill what positions and assume which roles and responsibilities over time

Communications planning—determining who needs what information, when they will need it, and how it will be given to them

Risk identification—determining which risks are likely to affect the project

Risk assessment—quantifying and evaluating the probability of risk occurrence and risk impact

Solution development—defining deflection and mitigation steps for downside risk and enhancement steps for opportunities

Procurement planning—deciding what items will be obtained under contract and how such contracts will be defined and awarded

Solicitation—identifying possible sources for contractual services and obtaining responses from them

Procurement—negotiating and contracting for outside products and services

Executing Processes:

This basic process includes the following detail processes:

Plan execution—carrying out the project plan by performing the tasks identified therein and managing the various technical and organizational interfaces

Contract administration—managing the contractual aspects of the procured products and services

Controlling Processes:

Project progress must be measured regularly to identify variances from the plan as well as to determine when the project is finished. Variances are fed into the control processes in the various knowledge areas. To the extent that significant variances are observed (e.g., those that jeopardize the project objectives), adjustments to the plan are made by repeating the appropriate project planning processes. For example, a missed task finish date may require adjustments to the current staffing plan, reliance on overtime, or trade-offs between budget and schedule objectives.

Progress measurement and reporting—collecting and disseminating progress information

Scope change management—documenting and controlling changes to project scope

Quality control—measuring project deliverables and activities to assess whether quality objectives are being met

Quality improvement—evaluating project performance on a regular basis to determine how to improve project quality

Time/schedule control—controlling and responding to schedule changes

Cost control—controlling and responding to cost changes

Risk control—responding to changes in risk over the course of the project

Closing Processes:

This basic process includes the following detail processes:

Scope verification—ensuring that the project deliverables have been completed satisfactorily

Contract close-out—resolution of any outstanding administrative matters and archiving of contract documentation

Project closure—gathering and disseminating information to formalize project completion

Process Groups:

Successful [project management](#) requires a precise set of skills, knowledge, flexibility, and creative problem-solving. Seasoned project managers know that along with years of experience comes a greater understanding of the complex interrelationships between all parts of a project from set-up to completion.

A Guide to the Project Management Body of Knowledge (PMBOK® Guide) provides a best-practice approach to tackling project management challenges across the industry at all professional levels. The integrative approach of five essential process groups, also referred to as the traditional approach to project management, yields positive results for project leaders who take the time to understand how the five different process groups overlap and support success throughout all phases of the project.

Leading effective projects requires not only strong general leadership skills, but also a methodological and responsive set of core processes and abilities. Success on one project can be duplicated in subsequent projects and may lead to more contacts and additional opportunities. While no two projects will be identical, mastering a standard set of industry-wide processes can leverage more effective project management strategies and can yield to increased professional advancement.

The five PMBOK® process groups outline the necessary competencies that must be achieved in order to secure the most effective use of project resources. These five essential areas or process groups are:

Initiating Process Group

The [initiating process group](#) involves the processes, activities, and skills needed to effectively define the beginning of a project. Setting all permits, authorizations, and initial work orders in place to secure an effective and logical progression of initial project activities sets the stage for subsequent success throughout all project phases. Setting clear phases for work to be completed, initializing teams, and having the budget in place before work begins are vital for a strong start to any project across industry.

Planning Process Group

The [Planning Process Group](#) sets forth the processes needed to define the scope of the project, set strategic plans in place to maximize workflow, and begin to assemble priority lists and plan team needs. This process

group also addresses a more narrow clarification of all project goals and expectations and puts in place the project infrastructure necessary to achieve those goals according to the timeline and budgetary constraints.

Executing Process Group

The [executing process group](#) involves managing teams effectively while orchestrating timeline expectations and reaching benchmark goals. Project managers utilizing this set of skills will demonstrate a high degree of organization and communication skills while addressing team concerns or other complex situations associated with getting the work done on time and within budget.

Monitoring and Control Process Group

Processing change orders, addressing on-going budget considerations, and mitigating unforeseen circumstances that may affect a team's ability to meet initial project expectations are all part of the core skills and competencies involved in the [Monitoring Process Group](#). Seasoned managers keep the momentum moving forward and guard the project against stalling by actively monitoring progress and using foresight and quick response to address project challenges.

Closing Process Group

Bringing a project to a successful close on time and within budget is no small feat. The [Closing Process Group](#) addresses the culmination of strong project management skills demonstrated throughout the other interrelated processes that guided the project. Following through to close all aspects of the process and submitting necessary paperwork on time is just as important as all other skills and processes. Good closure brings great reviews and can increase future word of mouth referrals.

For project managers committed to upholding the highest standards, the protocol contained within the PMBOK® Guide contains vital information for leading effective projects in any industry. For project managers looking to set themselves apart from other leaders in the field, developing advanced project management skills through ongoing professional development including increased competency with PMBOK® process groups can help leverage the competitive edge.

To the outside world, a smooth project may seem like a stroke of luck. To those that understand the intricacies of project management core competencies, the "luck" is a reproducible duo of knowledge and skills that can be applied over and over. Understanding project management as an interrelated set of dynamic skills and progressive knowledge can help professionals build a long and illustrious career. The

PMBOK® sets forth a detailed outline for project management success for those willing to invest the time into finessing these vital career skills.

1.14. PROCESS INTERACTIONS

A process is “a series of actions bringing about a result” while a result is a “concrete outcome” (American Heritage Dictionary). The major (but by no means the only) concrete outcomes of the five basic project management processes are as follows:

Initiating—a description of the product of the project, initial documentation of project objectives, and assignment of a project manager

Planning—a documented project plan and documented updates to the plan as the project progresses

Executing—verifiably completed project deliverables

Controlling—periodic measurements of progress vs. plan, corrective action when needed, and identification of when the project is done

Closing—documented acceptance of the results of the project

These outcomes provide a direct link between the processes—the output from one becomes an input to another as illustrated in Figure 3.1. Each project management process can then be described in terms of its:

Inputs—documents (e.g., a scope statement) or documentable items (e.g., task dependencies) that will be acted upon

Tools and techniques—mechanisms (e.g., earned value computations) applied to the inputs (e.g., task results) to create the outputs (e.g., a progress report)

Outputs—documents or documentable items that are the result of the process

In addition, these processes are not discrete, one-time events; they are iterative and repetitive and occur at varying levels of intensity throughout the project as illustrated in Figure 3.2.

Finally, each of the mechanisms is a process in its own right. For example, cost budgeting is a technique used to develop a project plan. It uses the Work Breakdown Structure (an output of task definition) and preliminary cost estimates (an output of cost estimating) and provides detail task budgets as an input to plan integration.

The process interactions described here reflect generally accepted project management practices. They do not reflect project-specific or application area-specific practices, nor do they include general management processes. For example:

Most projects will produce a written scope statement—scope statements are generally accepted.

Expediting is a process that occurs on many but not most projects—expediting is not a generally accepted practice.

The process of negotiating is not significantly different on a project—it is a general management process and is not included here.

Fig: Detail Planning Process Relationships

