Software Project Management

Week – 1

Outline

- Introduction to project management
  - Introduction to software crisis for motivation.
  - Basic software project management concepts.
- Software Lifecycle processes and models
  - Waterfall model
  - Spiral model
  - Incremental delivery model
  - Agile Methods and basics of SCRUM.
- Project Management Methods and tools
  - Methods
  - Tools

Outline

- Software Estimation
  - Software Size
  - Software estimation methods
- Project planning and control
  - Project Planning
  - Project Control
  - Earned value analysis.
  - Change management.
  - Project Plan

Outline

- Risk Management
  - Introduction.
  - Planning
  - Identification
  - Prioritization
  - Treatment and monitoring
- Requirements Management
  - Introduction
  - Requirements Development and evaluation architecture

Outline

- Software Architectures
  - Introduction
  - Documenting architecture
- Software Quality Assurance and reviews
  - Management/technical reviews.
  - Walkthroughs
  - Inspections
- Software configuration management
  - Introduction
  - SCM activities and planning

Outline

- Software test management
  - Introduction.
  - Verification and validation process
  - Test phases types and management issues

Assessment

- Assignments (5 in number)
  - 20 Marks
- Quizzes
  - 10 Marks
- Mid Term
  - 20 Marks
- Final Exam
  - 50 Marks

Assignment

- Project Charter
- Project Plan
- Work Breakdown Structure
- Schedule bar chart and network analysis
- Project Estimate

Today

- Course basics, administrative items
- Introductions
- Fundamentals
- Classic Mistakes

Textbooks

- Required texts
  - "Rapid Development", Steve McConnell
  - "Information Technology Project Management", Kathy Schwalbe
- These provide two very different viewpoints
  - In-the-trenches vs. PMI textbook perspective
- Recommended reading
  - "Quality Software Project Management", D. Shafer
  - "Software Project Survival Guide", Steve McConnell
  - "Peopleware", T. DeMarco and T. Lister

Project Management Skills

- Leadership
- Communications
- Problem Solving
- Negotiating
- Influencing the Organization
- Mentoring
- Process and technical expertise

Introduction

- **What is a Project?**
- **What is Project Management?**
- **Areas of Expertise**
- **Project Management Context**

What is a Project?

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

From *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – 3rd Edition

Definitions

- **Task**
  - A generic term for work that is not included in the work breakdown structure, but potentially could be a further decomposition of work by the individuals responsible for that work. Also, the lowest level of effort on a project
- **Activity**
  - **An element of work performed during the course of a project. An activity normally has an expected duration, en expected cost, and an expected resource requirement. Activities can be subdivided into tasks**
- **Phase**
  - **A group of activities/tasks, producing a significant deliverable work product**
- **Project**
  - **A unique, goal-oriented, time-bound, and constrained undertaking**
- **Program**
  - **Related projects to achieve an organization goal (Website, CMS, …)**
- **Portfolio**
  - **Unrelated projects (ABC Consulting: BU, CCPA, 1122, ….)**

Definitions

- **Program**
  - A large collection of related projects
- **System**
  - **An organized element acting as a whole**

What is a Project (Contd.)

- All Project definitions have few things common
  - Objective
  - Start and end points (dates etc)
  - Uniqueness
  - Constraints

Project Characteristics

- **Temporary**
  - **Opportunity or market window**
  - **Team seldom outlives the project**
- **Unique products, services and results**
  - **A product or artifact that is produced, is quantifiable, and can be either an end item in itself or a component item**
  - **A capability to perform a service, such as business functions supporting production or distribution**
  - **A result, such as outcomes or documents.**
- **Progressive elaboration**
  - **Developing in steps, and**
  - **Continuing by increments.**
- **Other Attributes**
  - **Unique purpose**
  - **Require resources, often from various areas**
  - **Should have a primary sponsor and/or customer**
  - **Involve uncertainty**

From *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – 3rd Edition

Project and Operations

- **Shared Characteristics**
  - **Performed by people**
  - **Constrained by limited resources**
  - **Planned, executed, and controlled.**
- **Projects**
  - **Temporary and Unique**
  - **Attain objective and then terminate**
  - **concludes when its specific objectives have been attained**
- **Operations**
  - **Ongoing and repetitive**
  - **Sustain the business**
  - **Adopt a new set of objectives and the work continues.**

From *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – 3rd Edition

Project and Strategic Planning

Projects are often implemented as a means of achieving an organization's strategic plan.

- **Strategic Considerations**
  - **A market demand**
  - **An organizational need**
  - **A customer request**
  - **A technological advance**
  - **A legal requirement**

From *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – 3rd Edition

What is Project Management?

Application of knowledge, skills, tools, and techniques to project activities to meet the project requirements.

Accomplished through the use of processes such as ***Initiating, planning, executing, controlling, and closing***.

From *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)* – 3rd Edition

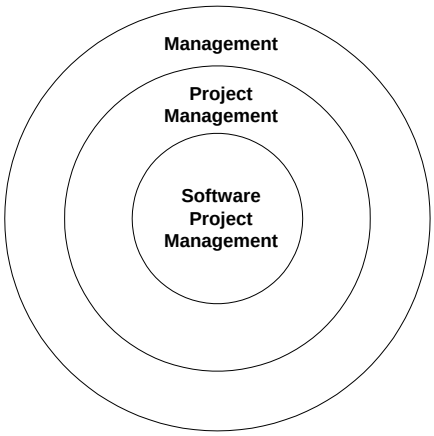
Managing a Project includes:

- Identifying requirements
- Establishing clear and achievable objectives
- Balancing the competing demands for quality, scope, time and cost
- **Adapting** the specifications, plans, and approach to the different concerns
- expectations of the various stakeholders.

Why Project Management?

- Disciplined project management provides:
  - Focal point for effective communications, coordination and control
  - A plan to assess progress
  - Emphasis on time and cost performance
- Project management provides the framework for methods, processes, monitoring and change control.

Software Project Management



What is a Program

- A program is
  - The necessary first level elements of a system (in context of system theory); a time-phased subsystem; and, borrowing from NASA, a relative series of undertakings that continue over a period of time (normally years), and that are designed to accomplish a broad technical or scientific goal in the long range plan.
  - A program is a large Endeavour, encompassing a broad goal which can be composed of a number of projects e.g. US space program

What is a Program

- A program is
  - A group of related projects managed in a coordinated way and usually includes an element of on-going activity
  - Therefore
    - A Program is
      - Large
      - Lengthy
      - General

Project vs. Program Management

- What's a 'program'?
- Mostly differences of scale
- Often a number of related projects
- Longer than projects
- Definitions vary
- Ex: Program Manager for MS Word
- What is a 'Portfolio'

Project Dimensions

- People
- Process
- Product
- Technology

Project Lifecycle

Project Lifecycle

- All projects are divided into phases
- All phases together are known as the Project Life Cycle
- Each phase is marked by completion of Deliverables
- Identify the primary software project phases

Project Lifecycle

- Project managers or the organization can **divide projects into phases** to provide better management control with appropriate links to the ongoing operations of the performing organization.
- Collectively, these phases are known as the **project life cycle**. Many organizations identify a specific set of life cycles for use on all of their projects.

Characteristics of Project Lifecycle

- The project life cycle **defines the phases** that connect the beginning of a project to its end.
- The phases of a project life cycle are **not** the same as the **Project Management Process Groups**.
- The transition from one phase to another within a project's life cycle generally involves some form of **technical transfer or handoff**.
- Deliverables from one phase are usually reviewed for completeness and accuracy and **approved before work starts on the next phase**.
- This practice of overlapping phases, normally done in sequence, is an example of the application of the schedule compression technique called **fast tracking**.

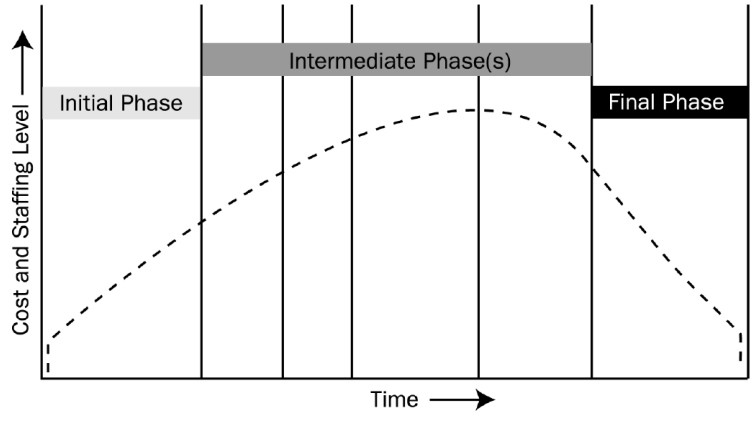
Project Lifecycle includes…

- What technical work to do in each phase
- When the deliverables are to be generated in each phase and how each deliverable is reviewed, verified, and validated
- Who is involved in each phase
- How to control and approve each phase.

Common characteristics of different project lifecycles

- Phases are **generally sequential** and are usually defined by some form of technical information transfer or technical component handoff.
- **Cost and staffing levels** are low at the start, peak during the intermediate phases, and drop rapidly as the project draws to a conclusion.
- The **level of uncertainty** is highest and risk of failing to achieve the objectives is greatest at the start of the project. The certainty of completion generally gets progressively better as the project continues.
- The **ability of the stakeholders to influence** the final characteristics of the project's product and the final cost of the project is highest at the start, and gets progressively lower as the project continues.
- The **cost of changes** and correcting errors generally increases as the project continues.

Project Lifecycle Phases



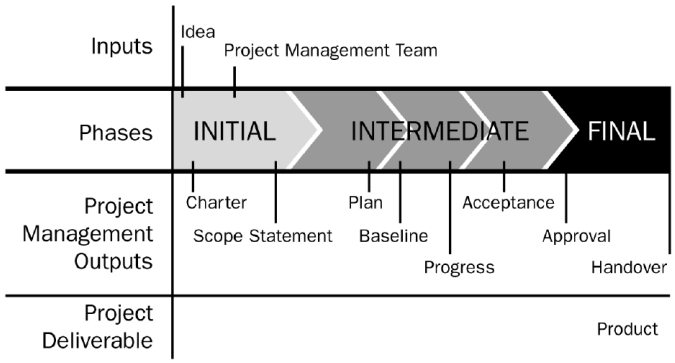
Characteristics of Project Phases

- The completion and approval of one or more deliverables characterizes a project phase.
- A deliverable is a measurable, verifiable work product.
- Some deliverables can correspond to the project management process, whereas others are the end products or components of the end products for which the project was conceived.
- The deliverables and the phases, are generally in sequential process designed to ensure proper control of the project.
- Phases can be further subdivided into subphases.
- Each subphase is aligned with one or more specific deliverables for monitoring and control.
- The majority of subphase deliverables are related to the primary phase deliverable.
- Phases typically take their names from these phase deliverables: requirements, design, build etc.

Characteristics of Project phases

- A project phase is concluded with a review of the work accomplished and the deliverables to determine acceptance.
- A management review is held to reach a decision to start the activities of the next phase without closing the current phase.
- Requirements for a module can be gathered and analyzed before the module is designed and constructed.
- A phase can be closed without the decision to initiate any other phases.
- Formal phase completion does not include authorizing the subsequent phase.
- Each phase is formally initiated to produce a phase-dependent output of the Initiating Process Group.
- A phase-end review can be held with the explicit goals of obtaining authorization to close the current phase and to initiate the subsequent one.
- Both authorizations can be gained at one review.
- Phase-end reviews are also called phase exits, phase gates, or kill points.

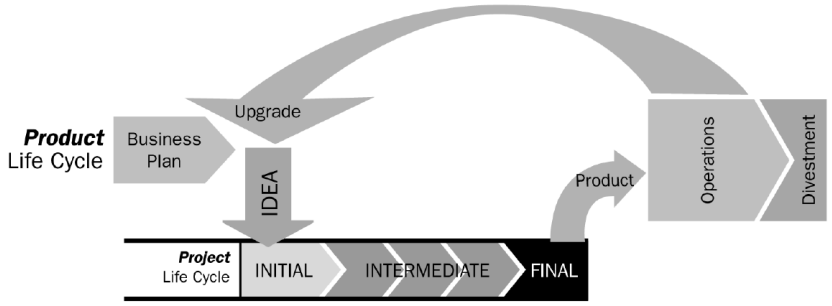
Sequence of Project phases



Project vs. Product Lifecycle

- The project life cycle starts with the business plan, through idea, to product, to ongoing operations and to product divestment.
- The project life cycle goes through a series of phases to create the product.
- Additional projects can include a performance upgrade to the product.
- In some application areas, such as new product development or software development, organizations consider the project life cycle as part of the product life cycle.

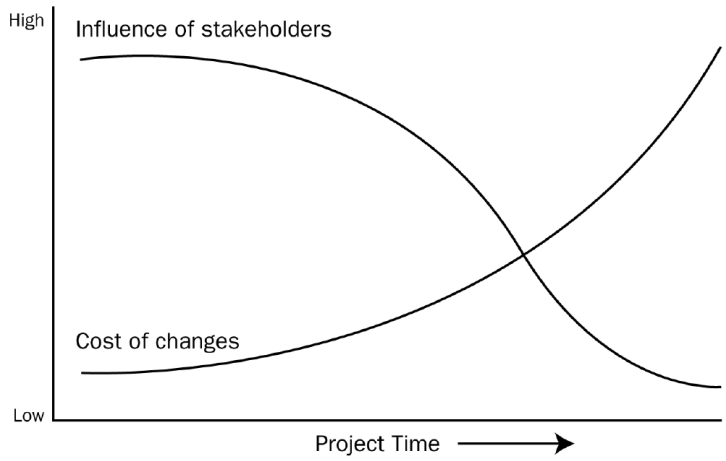
Relationship between Project and Product phases

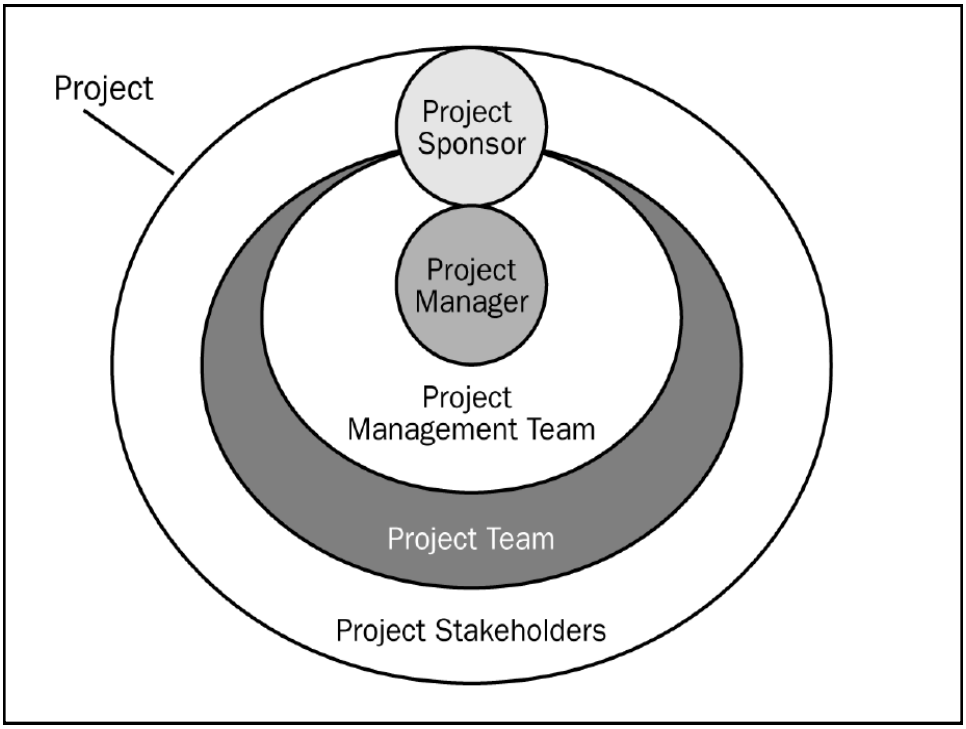


Stakeholders

- Project stakeholders are individuals and organizations that are actively involved in the project, or whose interests may be affected as a result of project execution or project completion.
- They may also exert influence over the project's objectives and outcomes.
- The project management team must identify the stakeholders, determine their requirements and expectations, and, to the extent possible, manage their influence in relation to the requirements to ensure a successful project.

Figure 2-2. Stakeholders' Influence Over Time



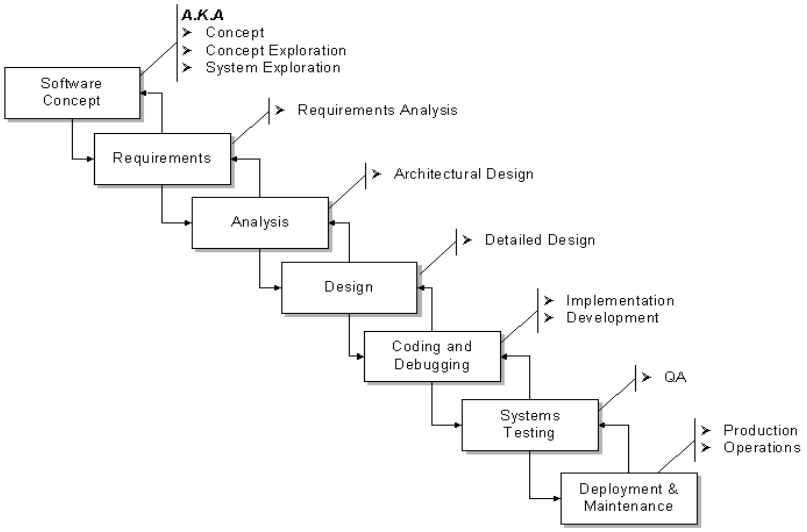


Stakeholders on Every Project

- **Project manager**
- **Customer/user**
- **Performing organization.** Support staff
- **Project team members**
- **Project management team**
- **Sponsor**
- **Influencers**
- **PMO.** If it exists
- Others. internal and external, owners and investors, sellers, suppliers and contractors, team members and their families, government agencies and media outlets, opponents & competitors, individual citizens, temporary or permanent lobbying organizations, and society-at-large

Project Phases and Activities Example

Seven Core Project Phases



Phases Variation