Software Project Management

Course Objective

- To learn the techniques required to plan, organize, monitor and control software development projects

Learning aspects in SPM ...

- Managing people, process and problems during a software project
- Relating software metrics with software projects
- Estimating effort, cost and project duration
- Risk assessment techniques
- Project scheduling
- Project quality management
- Change management during software development and after delivery to customer

Books

- Text Book:
  - Software Engineering: A Practitioner's Approach 6/e or 7/e – by Roger Pressman

- Reference Material:
  - A Guide to The Project Management Body of Knowledge – PMI Standards Committee (William R. Duncan)
  - Software Engineering Project Management – Edited by Richard H. Thayer (Original Contributions by numerous authors)
  - Other relevant resources may be included

Course Contents

- Topics from Roger Pressman's Book
  - Chapter 21 - Project Management
  - Chapter 22 - Metrics for Process and Projects
  - Chapter 23 - Estimation
  - Chapter 24 - Project Scheduling
  - Chapter 25 - Risk Management
  - Chapter 26 - Quality Management (selected topics)
  - Chapter 27 - Change Management
- From reference material – contents in lecture slides and in the form of handouts

LECTURE #1

The beginning…

Lecture Outline

- Introduction
  - Basic concepts
- Project Management & Software Project Management
- Project Management Skills
- PMBOK

Introduction

Software Project Management

What is Software?

- Software can be considered a product of engineering just like an airplane, automobile, television, or an other object that requires a high degree of skill to turn a raw material into a usable product.

- But software is developed or engineered, not manufactured!

What is Software? (Contd.)

- Software can be of different types:
  - System software
  - Application software
  - Engg./Scientific software
  - Embedded software
  - Product-line software
  - Web-applications
  - Artificial Intelligence software
  - etc.

What is a Project ?

- PMI* definition
    - It is a temporary endeavor (having specific start and completion dates) undertaken to create a unique product or service

* Project Management Institute

What is a Project ? (Elaboration)

- **Temporary**
  - It means that every project has a definite *beginning* and definite *end*
    - End is reached when project's objectives have been achieved OR it is clear that objective will not be met. The project is terminated in such a situation
  - The term temporary does not apply to a project's product or service (which is a lasting result)
- **Unique**
  - It means that the product or service is different in some distinguishing way from all similar products or services

What is a Project ? (Contd.)

- Projects may involve a single person or thousands
- Projects may be completed in hours, several months or years
- Examples of projects
  - Developing a new product or service
  - Designing a new vehicle
  - Constructing a building
  - Running a campaign for political office
  - Implementing a new business procedure or process
  - And so on …

What is Management?

- It is a set of activities and tasks undertaken by one or more persons for the purpose of planning & controlling the activities of others in order to achieve an objective or complete an activity that could not be achieved by others acting independently.

Koontz, H., C. O'Donnell and H. Weihirch, Management, 7th ed., McGraw-Hill, New York,N. Y., 1980

What is Management? (Contd.)

- Components of Management:
  - Planning
  - Organizing
  - Staffing
  - Directing (Leading)
  - Controlling

What is Management? (Contd.)

- **Planning**
  - Pre-determining course of action to achieve the objectives
- **Organizing**
  - Establishing relationship among work units and granting responsibility and authority to obtain the objectives
- **Staffing**
  - Selecting and training people
- **Directing (Leading)**
  - Creating an atmosphere that will assist & motivate people to achieve the desired end results
- **Controlling**
 - Establishing, measuring, and evaluating performance of activities towards planned objectives

What is Project Management ?

- It is the discipline of planning, organizing, and managing resources to bring about the successful completion of specific project goals and objectives

Project Management (Contd.)

- Following are related to Project Management
  - **Professional Organizations**
    - Project Management Institute (PMI) (pmi.org)
    - Software Engineering Institute (SEI)
    - IEEE Software Engineering Group
  - **Certifications** (offered by PMI)
    - PMP (Project Management Professional)
    - CAPM (Certified Associate in Project Management)
  - **PMBOK** – Project Management Body of Knowledge, published by PMI
  - **Tools**
    - MS Project
    - Primavera Project Manager

Software Project Management

Management

Project
Management

Software
Project
Management
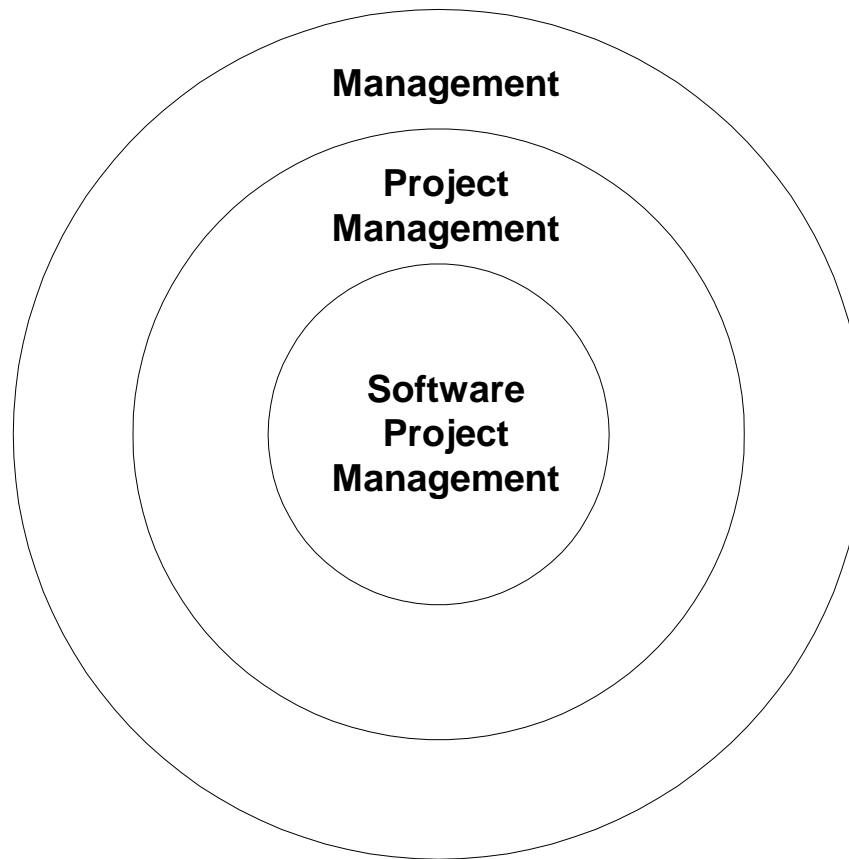
Software Project Management

- A sub-discipline of project management in which software projects are planned, monitored and controlled

Software Project Management (Contd.)

- Software development is a complex undertaking particularly when it involves many people working over a relatively long time.

- Hence software development projects need to be managed.

- Everyone involved "manages" to some extent, but the scope of management activities varies for every person.

Managerial Skills

- Robert L. Katz identified three kinds of skills for administrators*. The fourth may be added to it.
  - ○ Technical skills
  - ○ Human skills
  - ○ Conceptual skills
  - ○ Design skills

*in "Skills of an Effective Administration" 1955, and "Retrospective Commentary", 1974, both printed in Harvard Business Review

Managerial Skills (Contd.)

- Technical skills
  - Knowledge of & proficiency in activities involving methods, processes & procedures.
  - Working with tools & specific techniques.
- Human skills
  - Ability to work with people.
  - Cooperative effort, team work.
  - Creating a conducive environment for people/ workers.

Managerial Skills (Contd.)

- **Conceptual skills**
  - Ability to see the "big picture".
  - Ability to recognize significant elements in a situation & to understand the relationship among them.
- **Design skills**
  - Ability to solve problems that will eventually benefit the enterprise.
  - The skill to design effective & practical solutions to problems rather than becoming "problem watcher" only.
  - Important for upper level managers.

Skills Vs. Management Levels in Organizational Hierarchy
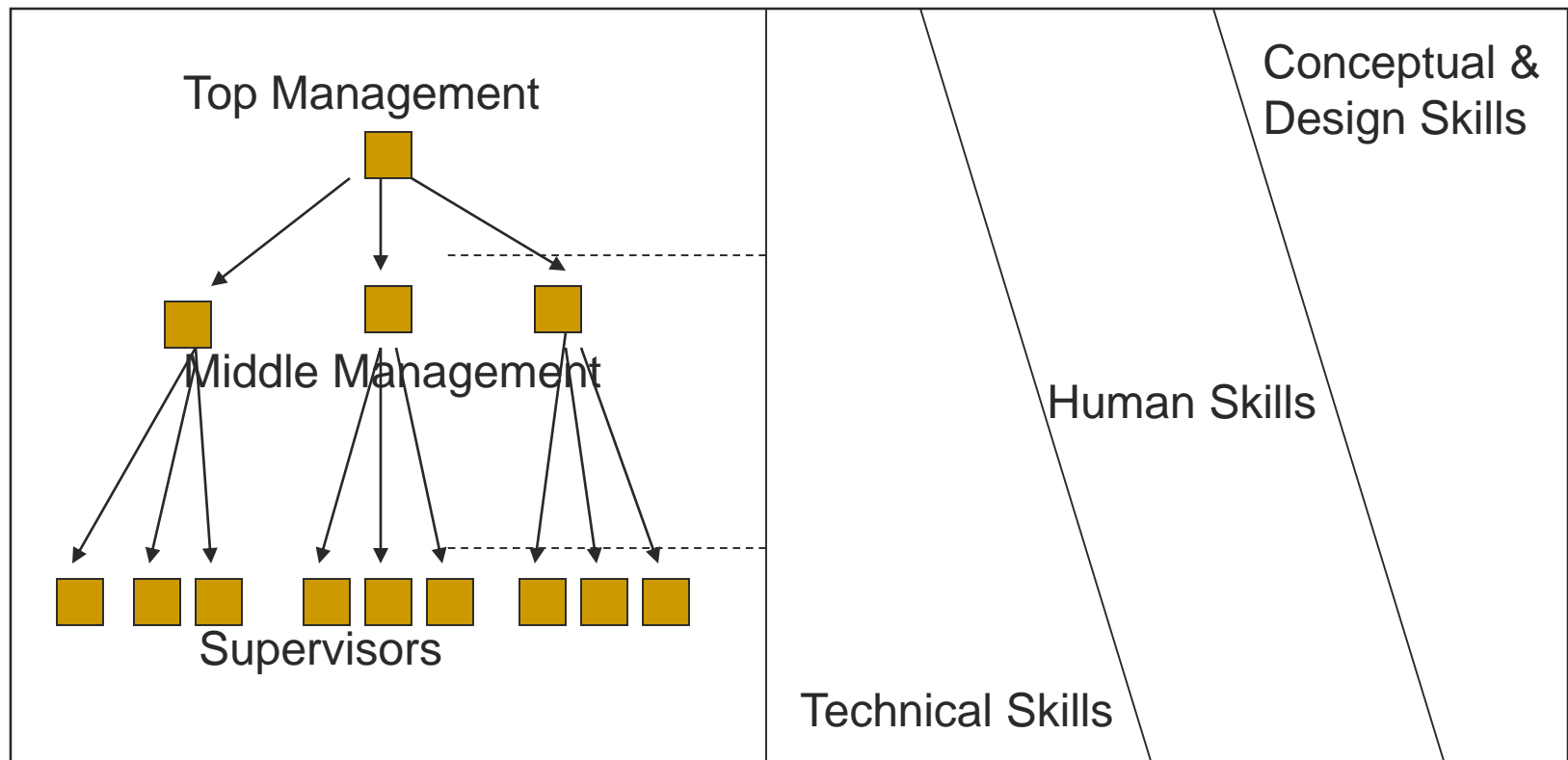
Project Management Skills

- Project Management Skills (in simple words)
  - Leadership
  - Communications
  - Problem Solving
  - Negotiating
  - Influencing the Organization
  - Mentoring
  - Process and technical expertise

PMBOK

- The Project Management Body of Knowledge (PMBOK) is a collection of processes and knowledge areas generally accepted as best practice within the project management discipline.

- Generally accepted means that it is applicable to most of the projects most of the time.

- It is an internationally recognized standard (IEEE Std 1490-2003).

PMBOK (Contd.)

- PMBOK recognizes 5 basic process groups and 9 knowledge areas typical of almost all projects.

- The five basic process groups are:
  - Initiating
  - Planning
  - Executing
  - Monitoring and Controlling
  - Closing

PMBOK (Contd.)

- The nine suggested Knowledge Areas are:
  - Project **Integration** Management
  - Project **Scope** Management
  - Project **Time** Management
  - Project **Cost** Management
  - Project **Quality** Management
  - Project **Human Resource** Management
  - Project **Communications** Management
  - Project **Risk** Management
  - Project **Procurement** Management

References

- Today's lecture has been taken from:
  - Software Engineering: A Practitioner's Approach – Roger Pressman
  - Software Engineering Project Management – Richard H. Thayer
  - PMBOK-2000.pdf

End of the Lecture!