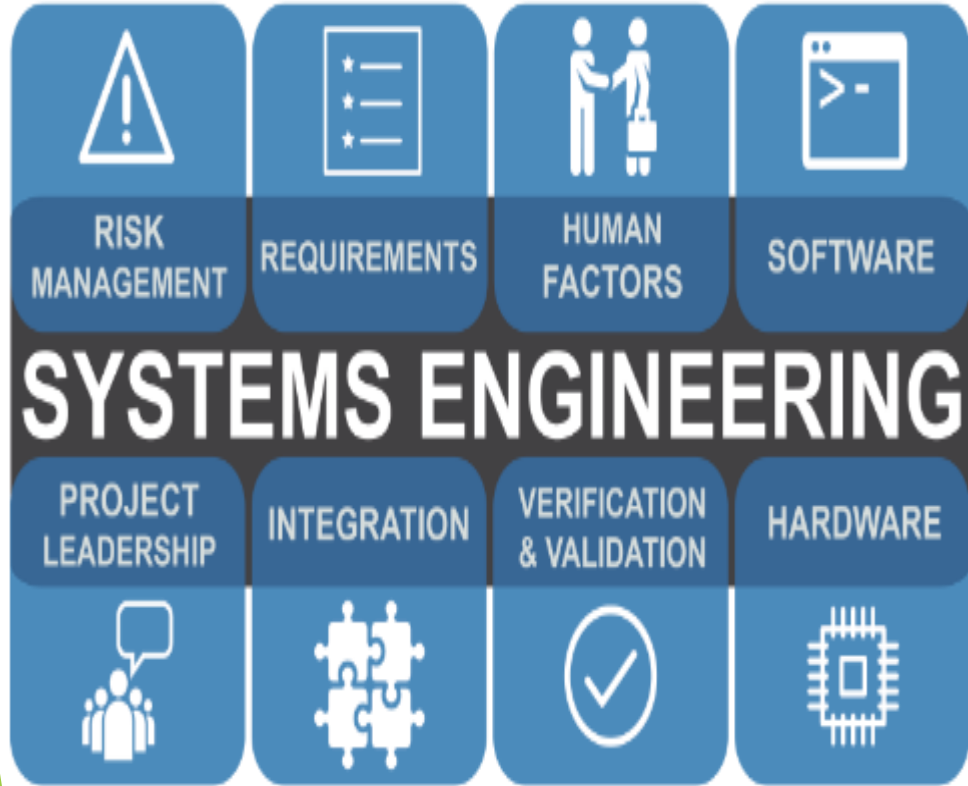


Introduction to Software Engineering

Lecture # 2







V/S



SE as Layered Technology

- ▶ Divided into 4 layers:-
- ▶ **1. A quality Process :-**
 - ▶ Any engineering approach must rest on an quality.
 - ▶ The "Bed Rock" that supports software Engineering is Quality Focus.
- ▶ **2. Process :-**
 - ▶ Foundation for SE is the Process Layer
 - ▶ It forms the base for management control of software project.
- ▶ **3. Methods :-**
 - ▶ SE methods provide the "Technical Questions" for building Software.
 - ▶ Methods contain a broad array of tasks that include communication requirement analysis, design modeling, program construction testing and support.
- ▶ **4. Tools :-**
 - ▶ SE tools provide automated or semi-automated support for the "Process" and the "Methods".
 - ▶ Tools are integrated so that information created by one tool can be used by another.



Software Process Activities

Software Specification

Software Development

Software Validation

Software Evolution



Generic View of Software Engineering

- ▶ What is the problem to be solved?
- ▶ What characteristics of the software are used to solve the problem?
- ▶ How will the software be realized?
- ▶ How will the software be constructed?
- ▶ What approach will be used to uncover the errors that were made in the design and construction of the software?
- ▶ How will the software be supported over the long term, when changes are requested by the user?



Generic Phases of Software Engineering

Definition Phase

- System or Information Engineering
- Software Project Planning
- Requirement Analysis

Development Phase

- Software Design
- Code Generation
- Software Testing

Support Phase

- Correction
- Adaptation
- Enhancement
- Prevention



Software Engineering Diversity

- ▶ There are many different types of software system and there is no universal set of software techniques that is applicable to all of these.
- ▶ The software engineering methods and tools used depend on the type of application being developed, the requirements of the customer and the background of the development team.



Application types

- ▶ Stand-alone applications :
 - ▶ These are application systems that run on a local computer, such as a PC. They include all necessary functionality and do not need to be connected to a network.
- ▶ Interactive transaction-based applications:
 - ▶ Applications that execute on a remote computer and are accessed by users from their own PCs or terminals. These include web applications such as e-commerce applications.



Application types

- ▶ Embedded control systems:
 - ▶ These are software control systems that control and manage hardware devices. Numerically, there are probably more embedded systems than any other type of system.
- ▶ Batch processing systems :
 - ▶ These are business systems that are designed to process data in large batches. They process large numbers of individual inputs to create corresponding outputs.
- ▶ Entertainment systems :
 - ▶ These are systems that are primarily for personal use and which are intended to entertain the user



Application types

► Artificial Intelligence Systems:

- These systems make use of non numerical algorithms to solve complex problems that are not compliant to computation or straight forward analysis.

► Business systems:

- Business information processing is largest single software application area. Software systems in this category restructure existing data in a way that facilitates business operations and decision making.



Application types

- ▶ Systems for modeling and simulation:
 - ▶ These are systems that are developed by scientists and engineers to model physical processes or situations, which include many, separate, interacting objects
- ▶ Data collection systems:
 - ▶ These are systems that collect data from their environment using a set of sensors and send that data to other systems for processing
- ▶ Systems of systems:
 - ▶ These are systems that are composed of a number of other software systems



Software Engineering Fundamental Principles

- ▶ Some fundamental principles apply to all types of software system, irrespective of the development techniques used:
 - ▶ Systems should be developed using a managed and understood development process. Of course, different processes are used for different types of software.
 - ▶ Dependability and performance are important for all types of system
 - ▶ Understanding and managing the software specification and requirements (what the software should do) are important
 - ▶ Where appropriate, you should reuse software that has already been developed rather than write new software.



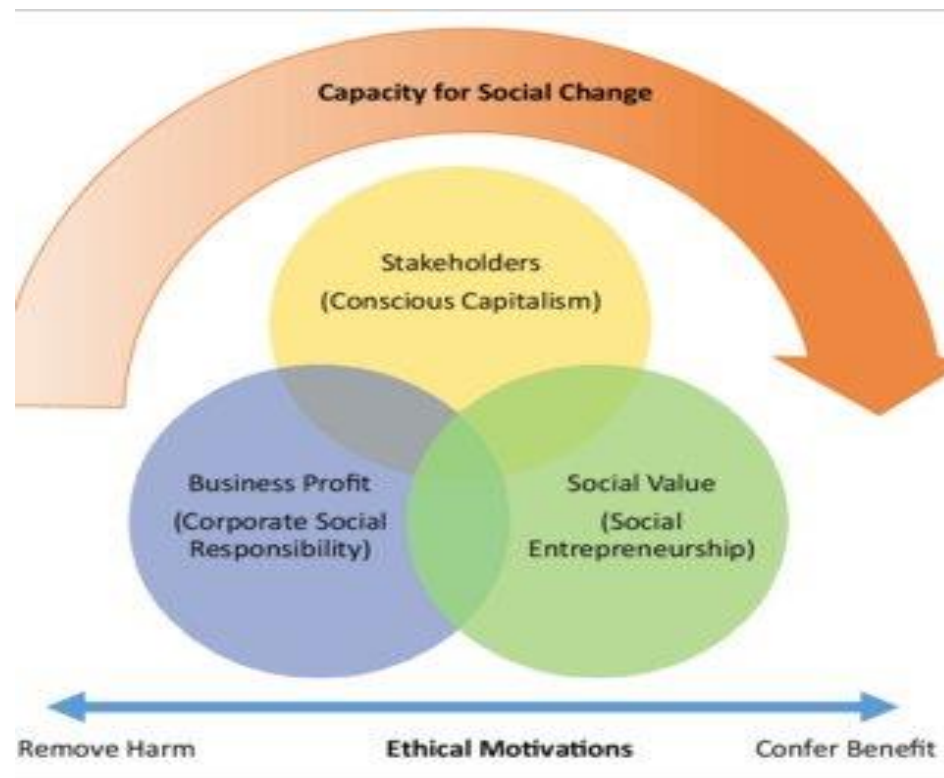
General issues that affect different software types

► Heterogeneity:



General issues that affect most software

► Business and social change



General issues that affect most software

► Security and Trust



Software engineering and the web

- ▶ The Web is now a platform for running application and organizations are increasingly developing web-based systems rather than local systems
- ▶ Web services allow application functionality to be accessed over the web
- ▶ Cloud computing is an approach to the provision of computer services where applications run remotely on the 'cloud' .

