Introduction to Software Engineering

Lecture # 2

Lecture by Engr. Sidra

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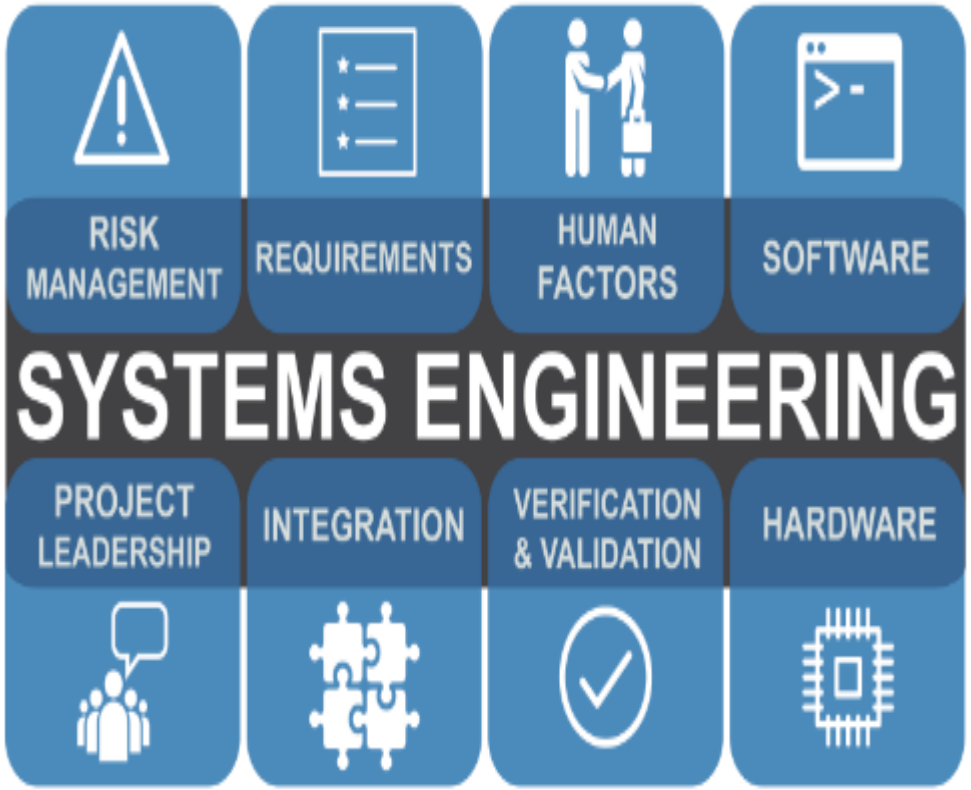
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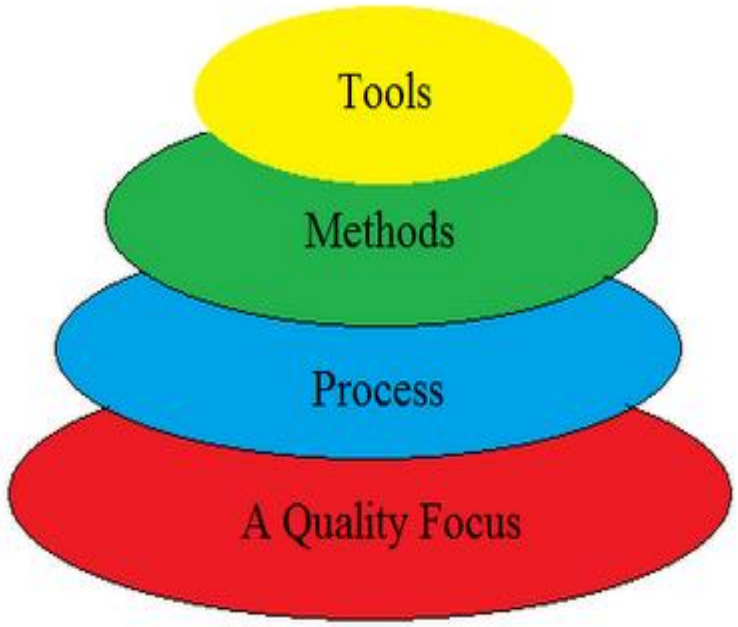
SE as Layered Technology

- 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 usre?

Generic Phases of Software Engineering

Definition Phase	Development Phase	Support Phase
• System or Information Engineering • Software Project Planning • Requirement Analysis	• Software Design • Code Generation • Software Testing	• 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

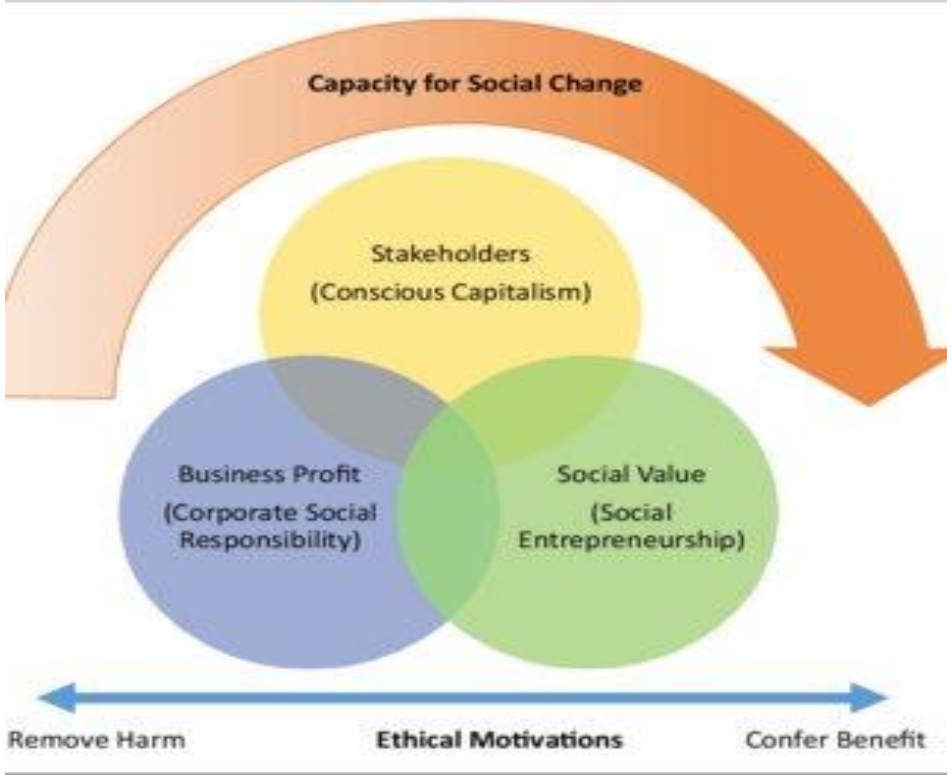
- Some fundamental principles apply to all types of software system, irrespective of the development techniques used:
  - Systems should be developed using a managed and understood development process. Of course, different processes are used for different types of software.
  - Dependability and performance 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’ .