

Introduction I

Course Topics

- Introduction
- Software Process Models
- Requirements Engineering
- Modeling
- Programming Languages
- Software Construction Techniques
- Testing
- Refactoring
- Project Management
- Ethical Issues

Lecture Objectives

- ✓ What is Software?
 - Importance of Software
- ✓ What is Software Engineering?
 - Software engineering importance
 - Develop a broad understanding of the software engineering domain
- ✓ SWE and CS



What is software?

- Not just the computer programs themselves but also all associated documentation and configuration data, such as
 - Requirements
 - Design models
 - User manuals
- Software products may be developed for a particular customer or may be developed for a general market
 - Generic
 - Custom
 - Cooperative Solutions



Software Types

- Generic - developed to be sold to a range of different customers, e.g., PC software such as Word or Excel
 - The organization that develops the software controls the software specification.
- Custom - developed for a single customer according to their specification, e.g., system to support a particular business process
 - The specification is controlled by the organization that is buying the software.
- Cooperative Solutions
 - Starting with generic system and customizing it to the needs of a particular customer. For example, Enterprise Resource Planning (ERP) systems, such as the SAP system

Student Activity




- What makes software so important?
 - A software product impacts our life

- Behind the Scene Impact
 - Think of non-computer related business where software has a significant role

General Observations



- Software is used by virtually everyone in society either directly or indirectly
 - The economies of the world depend on software
- 

What is Software Engineering?

Software Engineering History



- The first usage of term "software engineering" was
 - Seminal NATO conference in **1968** by Professor F.L. Bauer
 - First conference on software engineering

- First Bachelor in Software Engineering
 - In **1987**, Imperial College London introduced the first three-year software engineering Bachelor's degree in the UK and the world.

 - In **1996**, the Rochester Institute of Technology established the first software engineering bachelor's degree program in the United States.



*“The application of a **systematic, disciplined, quantifiable** approach to the **development, operation, and maintenance** of software”*

IEEE Standard Glossary of Software Engineering Terminology



*“Software engineering is an **engineering discipline** that is concerned with **all aspects of software production** from the early stages of system specification through to maintaining the system after it has gone into use.”*

Sommerville, Software engineering

What is Software Engineering

~~Computer Science and Software Engineering
= Programming
!!~~

What is Software Engineering




Problem

Client has some
requirements!!
The system must do

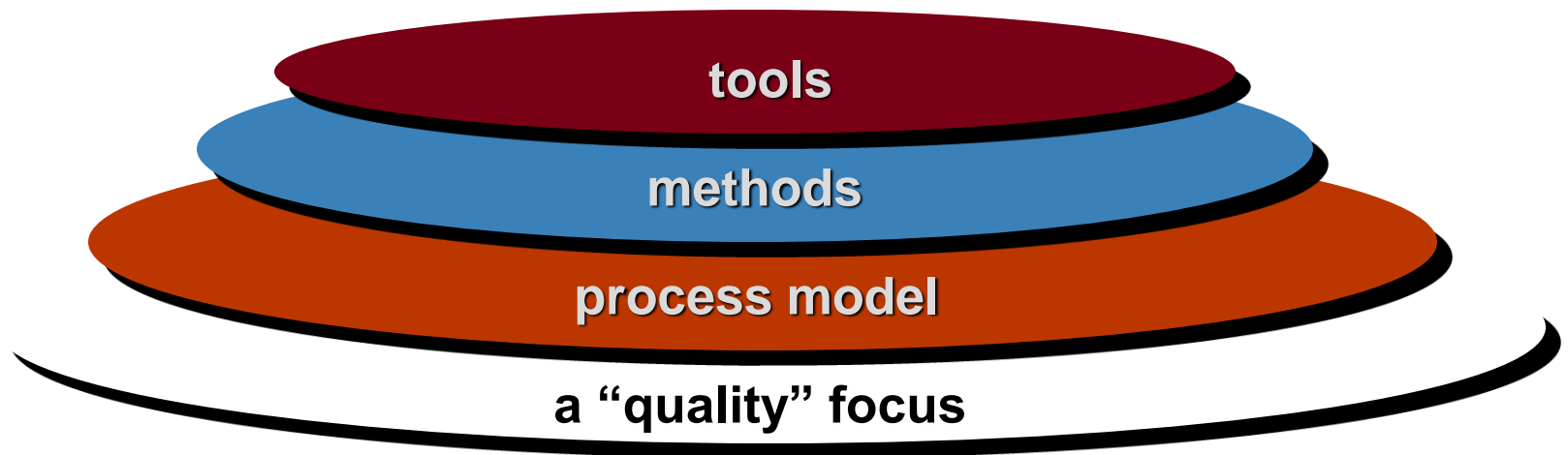
and some constraints!!
Money, time, security, etc

Group of designers, developers,
validators
Assign tasks!!! Track progress!!




Software Engineering

- The *objective* of Software Engineering is to produce *high-quality* software products with a *finite amount of resources* and to a *predicted schedule*.



Software Engineering sub-disciplines




- Software Requirements
 - Software Design
 - Software Development Process
 - Software Testing
 - Software Project Management
 - Software Quality
 - Etc.
- 

Computer Science Vs. Software Engineering



CS vs SWE



- Computer science is concerned with the theories and methods that underlie computers and software systems,
 - Whereas software engineering is concerned with the practical problems of producing software.
- 

Software Engineer As a Profession



- **legal requirements** to assume or use the job title “Software Engineer”

- In Canada
 - Professional Engineer (P.Eng) designation
 - Information Systems Professional (I.S.P.) designation

- In Saudi Arabia
 - Saudi Council of Engineers

* ما المقصود بعضوية مهندس :

هي عضوية اعتماد مهني لمن يحمل شهادة بكالوريوس (أو ما يعادلها) في أحد التخصصات الهندسية المعتمدة .

ويمكن اختيار مدة العضوية (سنة - سنتين - ثلاث سنوات) و قيمتها مقسمة على مرحلتين (500 ريال لمرة واحدة فقط رسوم دراسة ملف + 250 ريال رسوم عضوية عن كل سنة مع إمكانية تحديد عدد السنوات من سنة إلى ثلاث سنوات) .

* أمثلة على التخصصات الهندسية المباشرة :

Website
<https://www.saudieng.sa/>

1. هندسة مدنية
2. هندسة كهربائية
3. هندسة ميكانيكية
4. هندسة كيميائية
5. هندسة معمارية
6. هندسة النفط
7. هندسة صناعية
8. هندسة طبية
9. هندسة الإلكترونيات
10. هندسة الاتصالات
11. هندسة الميكاترونكس
12. هندسة نظم
13. هندسة برمجيات
14. هندسة الحاسب الآلي

Frequently asked questions about Software

Question	Answer
What is software?	Computer programs and associated documentation. Software products may be developed for a particular customer or may be developed for a general market.
What are the attributes of good software?	Good software should deliver the required functionality and performance to the user and should be maintainable, dependable, and usable.
What is software engineering?	Software engineering is an engineering discipline that is concerned with all aspects of software production.
What are the fundamental software engineering activities?	Software specification, software development, software validation, and software evolution.
What is the difference between software engineering and computer science?	Computer science focuses on theory and fundamentals; software engineering is concerned with the practicalities of developing and delivering useful software.

Frequently asked questions about Software

What are the key challenges facing software engineering?

Coping with increasing diversity, demands for reduced delivery times, and developing trustworthy software.

What are the costs of software engineering?

Roughly 60% of software costs are development costs; 40% are testing costs. For custom software, evolution costs often exceed development costs.

What are the best software engineering techniques and methods?


While all software projects have to be professionally managed and developed, different techniques are appropriate for different types of system. For example, games should always be developed using a series of prototypes whereas safety critical control systems require a complete and analyzable specification to be developed. You can't, therefore, say that one method is better than another.

What differences has the Web made to software engineering?

The Web has led to the availability of software services and the possibility of developing highly distributed service-based systems. Web-based systems development has led to important advances in programming languages and software reuse.

Key Points



- Software engineering is an engineering discipline that is concerned with all aspects of software production
 - Software production consist of developed programs and associated documentation.
 - Software Types:
 - Generic, Custom and Cooperative Solutions
- 

Read

Chapter 1

