Software Engineering

CSE 3102

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Objective of the Course

- Appreciate Software Engineering:
  - Build complex software systems in the context of frequent change
- Understand how to
  - produce a high quality software system within time
  - while dealing with complexity and change
- Acquire technical knowledge
- Acquire basic managerial knowledge

Course Contents

Topic	Lectures
Introduction	1, 2, 3, 4
Requirement Engineering	6, 7, 8, 9
System Design	10, 11, 12, 13
Object Design	14, 15, 16, 17
Implementation	18, 19
Testing	20, 21, 22, 23
Software Life Cycle	24, 25
Project Management	5
Book	Object Oriented Software Engineering, B Bruegge and Software Engineering: A Practitioner's Approach, 7/e by Roger S. Pressman

Course evaluation

Theory

Topic	Marks
Attendance	5
Quiz/Assignment	5
Mid Term	20
Final	70

Lab

Topic	Marks
Proposal	A/R
RAD	20
SDD	20
STD	20
Presentation	40

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 is Software?

Software Engineering is a collection of

- techniques,
- methodologies and
- tools

that help with the production of

a *high quality software* system

- with a given *budget*
- before a given *deadline*
- while accepting *changes*

What is Software Engineering

ISO/IEC/IEEE Systems and Software Engineering Vocabulary (SEVOCAB) defines **software engineering** as

"the application of a systematic, disciplined, quantifiable approach to the development, operation, and maintenance of software;

that is, **the application of engineering to software**"

What is the connection between software engineering and computer science?

Computer science focuses on theory and fundamentals (e.g. , programming languages, data structures, algorithms, operating systems, databases, etc.).

Software engineering is concerned with the practicalities of developing and delivering useful software.

What are the fundamental software engineering activities?

Specification – Requirements, architecture.

Development – Design, implementation/coding.

Verification & validation – Reviews and testing.

Evolution – Maintenance and growth.

What are the costs of software engineering?

Roughly

- 60% are development costs,
- 40% are testing costs.

For custom software, evolution costs often exceed development costs.

What are the key challenges facing software engineering?

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

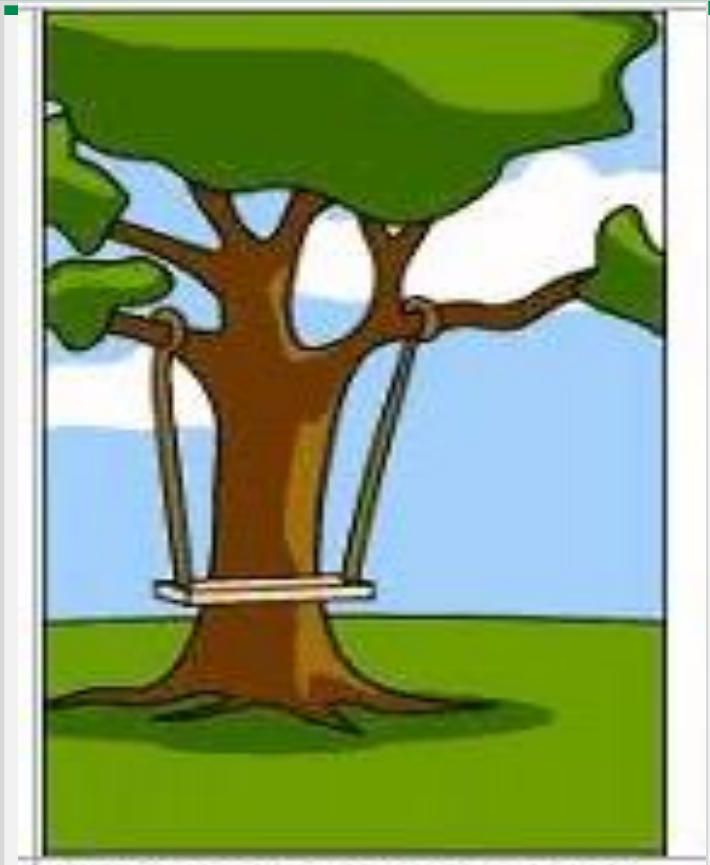
Why software Fail?

- Lack of commitment – management and user
- Misunderstanding requirements
- End user expectations
- Scope change, new technology
- Expertise
- Requirements froze/change
- Etc.

An Example

How the customer explained it

An Example



How the project leader understood it

Poor Communication

An Example

How the analyst designed it

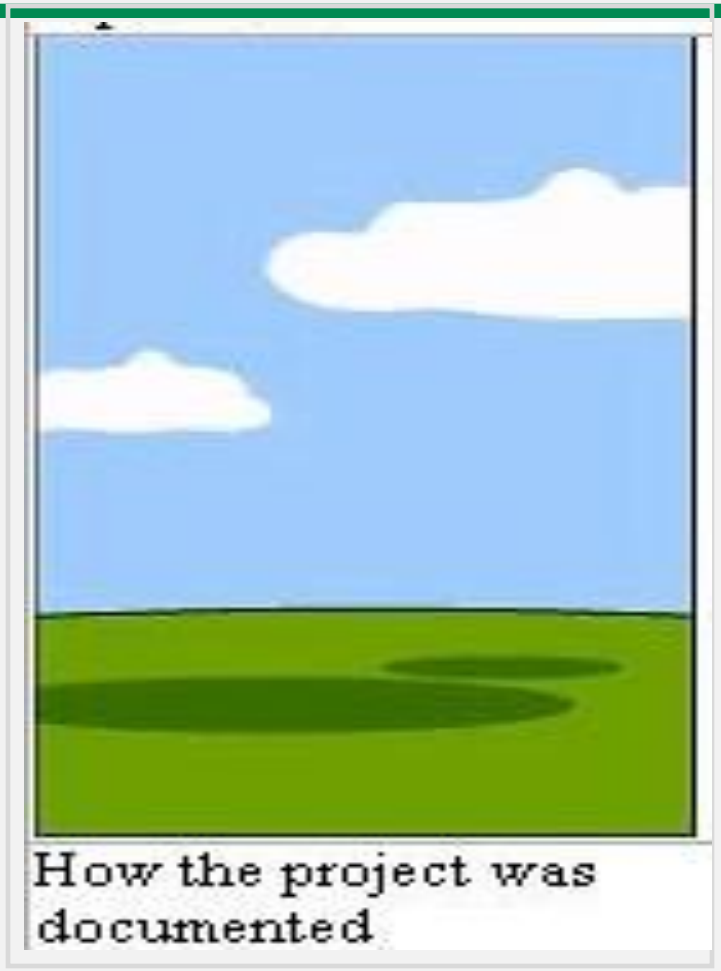
Poor Planning and Modeling

An Example

How the programmer wrote it

Poor construction

An Example



Poor documentation

An Example

Failure to deploy

What are the properties of good software?

Good software should deliver the required functionality to the user and should be efficient, maintainable, dependable and usable.

What are the key challenges facing software engineering?

Efficiency

Software should not make wasteful use of system resources such as memory and processor cycles.

Efficiency therefore includes responsiveness, processing time, memory utilization, etc.

What are the key challenges facing software engineering?

Maintainability

Maintainability as the capability of the software product to be modified.

Modifications may include corrections, improvements, or adaptation of the software to changes in environment as well as changes in requirements and functional specifications.

What are the key challenges facing software engineering?

Dependability

Software dependability includes a range of characteristics including reliability, availability, security and safety.

Dependable software should not cause physical or economic damage in the event of system failure.

Malicious users should not be able to access or damage the system.

What are the key challenges facing software engineering?

Usability

Software must be acceptable to the type of users for which it is designed.

It must be understandable, usable and compatible with other systems that they use..

What are the expected outcomes?

The study and application of systematic processes, methods and techniques for software design, implementation and testing.

Learn how to:

Specify requirements for a large scale software system.

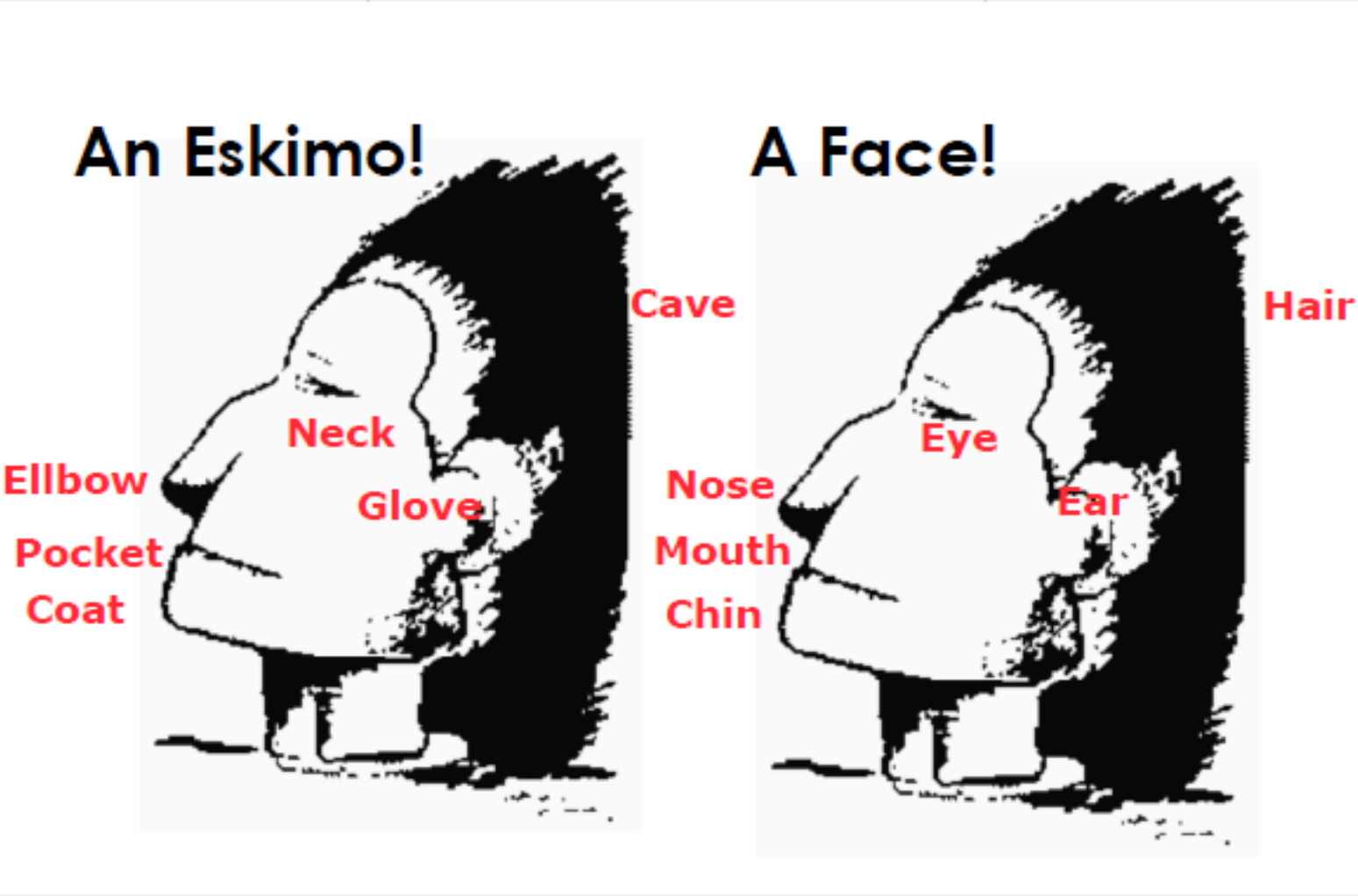
Specify the architecture of the system based on the requirements specification.

Design and implement the subsystems of the system's architecture.

Test the system in a principled way that guarantees the quality of the result.

Organize the delivery of the system and the user's training.

How to Deliver?



Extreme Programming?

Thank You