

كلية الحاسبات والذكاء الاصطناعي
Faculty of Computers & Artificial Intelligence



Software Engineering 1

Overview

Dr. Sayed AbdelGaber

Professor

Faculty of Computers and Artificial Intelligence

Helwan University

Software Engineering

Software engineering is a discipline that aim to produce fault-free software, delivered on time, within budget and satisfies the user's needs. Furthermore, the software must be easy to modify when the user's need change.

OR

Software engineering is an engineering discipline that is concerned with all aspects of software production.

Course Objectives

- **Apply the appropriate software analysis and design methodologies to the process of developing large software systems.**
- **Design and produce working models of software programs using UML.**
- **Use CASE tools: to implement the phases of a development methodology, to test design completeness and correctness, and to produce all required documentation.**

Topics Covered

- **Course overview**
- **Software development life cycle**
- **Software Process Models**
- **Software Modeling**
 - ✓ Use-case modelling (actors, use cases, use case diagram)
 - ✓ Behaviour modelling (sequence diagram)
 - ✓ Activity modelling (activity diagram)
 - ✓ State change modelling (state chart diagram)
- **Software Architecture**
- **Introduction to Design Patterns for Software Development**
- **Software Testing**

Grade Structure

Task	Grade
Midterm	20
Project Presentation	10
Project Documentation	10
Final Exam	60
Total	100

كلية الحاسب والذكاء الاصطناعي
Faculty of Computers & Artificial Intelligence

References

1. *Ian Sommerville. “Software Engineering”, Addison-Wesley; 9th Edition, 2010.*
2. *Bernd Bruegge, Allen H. Dutoit “Object-Oriented Software Engineering: Using UML, Patterns and Java”, Prentice Hall; 2nd edition, 2003.*

كلية الحاسبات والدكاء الاصطناعي
Faculty of Computers & Artificial Intelligence

What does a Software Engineer do?

Studies the **Problems** and **Requirements** of an organization to determine how people, methods, and computer technology can best accomplish improvements for the business

كلية الحاسبات والذكاء الاصطناعي

Faculty of Computers & Artificial Intelligence

Role of Software Engineer

- **Facilitate communication between all groups with a stake in the project.**
- **Elicit requirements from as many sources as possible**
- **Document requirements in an accurate and consistent manner, ensuring as many good properties as possible.**
- **Manage future revisions of requirements (version control) to meet evolving needs of system.**

Stakeholders

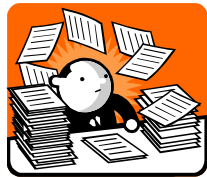
Who has an interest in the final system and therefore, an influence on requirements?

Managers (could be clients)

Clients (pays for System)



Regulators



Day-to-Day users

Technical support



Software Engineer



Developer (Systems analyst, requirements engineer, systems engineer, system designer, programmer, test engineer)

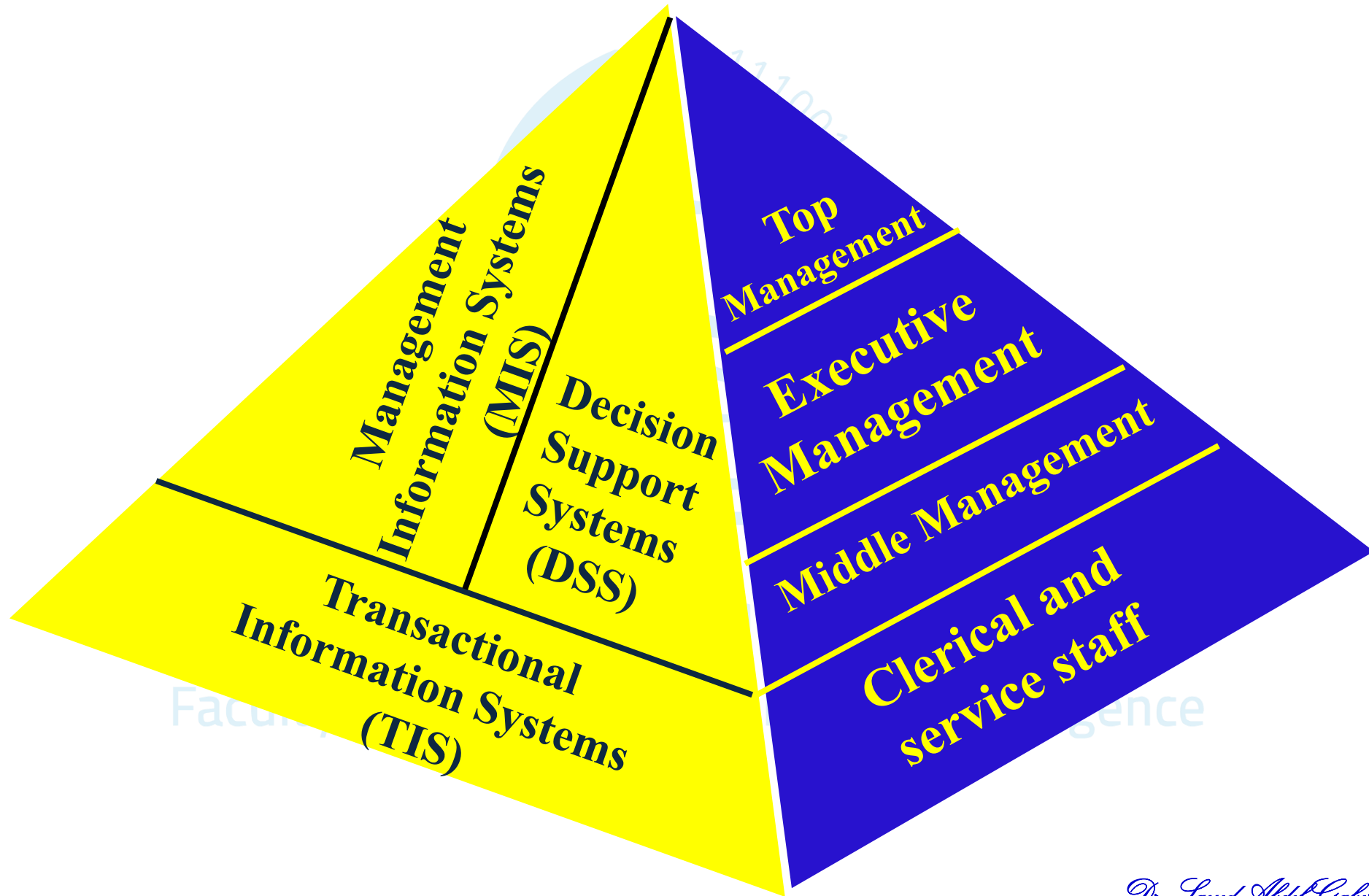
Characteristics of Good SE

- **Impertinence:**
question everything, assume nothing
- **Impartiality:**
find the best solution to the business problem
- **Relax constraints:**
assume anything is possible and eliminate the infeasible
- **Attention to detail:**
be precise, comprehensive, consistent
- **Re-framing:**
be creative, 'think outside the square'

Organization Management Levels



The Relation Between Systems and Management levels



Models, Techniques and Tools

➤ Models:

A representation of some important aspect of the real world

Models used in system development include representations of inputs, outputs, processes, data, objects, object interactions, locations, networks, and devices etc.

- Graphical
- Mathematical
- Physical

➤ Techniques

a collection of guidelines that help the analyst complete a system development activity or task

- Data modeling techniques
- Software testing techniques

➤ Tools

Supportive software that helps create models or other components required in the project

- Computer-aided system engineering (CASE) tools
- Integrated development environment (IDE)

Essential Elements for Successful Software Development

- **The Software is for the End-User**
- **Establish Phases and Tasks**
- **Problem-Solving Skills**
- **Software Development is Not a Sequential Process**
- **Software are Capital Investments**
- **Don't Be Afraid to Cancel**
- **Documentation is a Product of All Phases**

What Counts as a Project Failure?

- **Complete failure implies no deliverable output.**
- **Other types of failure include:**
 - **Cost overruns**
 - **Software quality problems**
 - **Missed deadlines**
 - **Unsatisfied stakeholders:**
 - **Operational failure**



كلية الحاسب والذكاء الاصطناعي
Faculty of Computer Science and Artificial Intelligence

Questions