ĐẠI HỌC BÁCH KHOA HÀ NỘI
HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

Nhóm chuyên môn Nhập môn Công nghệ phần mềm

NHẬP MÔN CÔNG NGHỆ PHẦN MỀM

Concepts in Software Engineering

CONTENTS

GOALS

By completing this session, learners are able to:

1. Gain an understanding of the definitions of software engineering
2. Master the knowledge about the components of software engineering and the phases in software engineering

CONTENTS

1. DEFINITION

Công nghệ phần mềm – Software Engineering

- **Bauer [1969]**

*"Software Engineering is the **establishment** and **use** of **sound engineering principles** in order to obtain **economically** software that is **reliable** and works **efficiently** on real machines."*

- **Ghezzi [1991]**

*"Software engineering is **a field of computer science** that involves building **large** and **complex software systems** by **one or more groups of engineers**."*

1. DEFINITION

- **IEEE [1993]**

  "Software engineering is:

  *(1) the application of a systematic, disciplined, and quantifiable approach to the **development**, **operation**, and **maintenance** of software;*

  (2) study the approaches used in (1)"

- **Pressman [1995]**

  *"Software engineering is a discipline that integrates **processes**, **methods**, and **tools** for developing computer software."*

1. DEFINITION

- **Sommerville [1995]**

*“Software engineering is a field related to the **theories**, **methods**, and **tools** used for software development.”*

- **K. Kawamura [1995]**

*"Software engineering is an academic field concerned with **techniques** and **technological methodologies** (theories and techniques implemented based on certain principles) throughout the entire software development process, aiming to improve both the **quality** and **productivity** of software production."*

1. DEFINITION

Software engineering is a **scientific field** concerned with the **methodologies**, **techniques**, and **tools** integrated into the software **production** and **operation** process to create software with the **desired quality**.

1. DEFINITION

- Objectives of Software Engineering
  - Improve software **productivity** and **quality**.
  - Managing software production **plans** effectively
  - **Reduce the cost** of software development
  - Satisfy customer **requirements** and **needs**
  - Enhance software engineering **processes** and **practices**
  - **Effectively and systematically support** the activities of software engineers.

CONTENTS

2. COMPONENTS OF SOFTWARE ENGINEERING

- Layered architecture
  - **Process**
  - **Method**
  - **Tools**

- Focus on quality of software

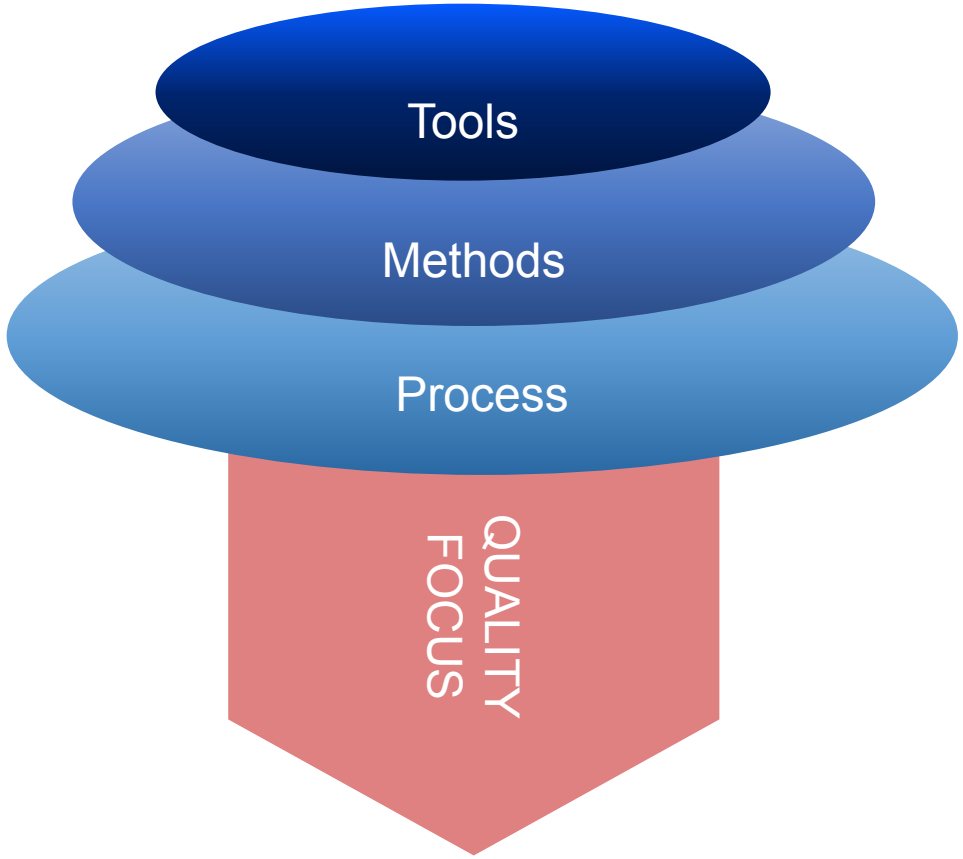


Figure 2.1. Components of software engineering

2. COMPONENTS OF SOFTWARE ENGINEERING

2.1. Process

- *Integrate* the layers
- *Foundation* for software engineering
- *Ensure the timeline* of software development
- *Establish a foundation* for controlling and managing software projects
- Establish the context for the applied technical methods
- Production of software
- Set milestones
- Quality assurance
- Management of changes

2. COMPONENTS OF SOFTWARE ENGINEERING

2.2. Methods

- Provide **techniques** for building software
- Operations:
  - communication,
  - requirements analysis,
  - design modelling,
  - building software,
  - testing, maintenance and support.
- Based on fundamental **principles**
  - Includes modeling activities

2. COMPONENTS OF SOFTWARE ENGINEERING

2.3. Tools

- Automated or semi-automated tools supporting processes and methods
- Toward quality improvement
  - Foundation for software engineering
  - Any technical approach must be based on a commitment to quality
  - Continuously promote process improvement

CONTENTS

3. PHASES IN SOFTWARE ENGINEERING

3.1. Definition phase

- **What**
  - What information is being processed,
  - Desired functionality and performance,
  - Expected behavior of the system,
  - Interfaces that need to be established,
  - Constraints for system design,
  - And the criteria that need to be assessed.

 The main requirements of the system and software.

3. PHASES IN SOFTWARE ENGINEERING

3.2. Development phase

- **How**
  - How data is structured,
  - How functions are implemented within the software architecture,
  - How procedures are implemented in detail,
  - How to define the characteristics of the interface,
  - How to transition from design to programming,
  - And how testing is performed.

3. PHASES IN SOFTWARE ENGINEERING

3.3. Support phase

- Adapt to **change**
  - Bug fixing, code upgrading,
  - Adapt to the change of requirements ,
  - Changes driven by customer requirements change.
- 4 types of change:
  - Correction,
  - Adaptation,
  - Enhancement,
  - Prevention.

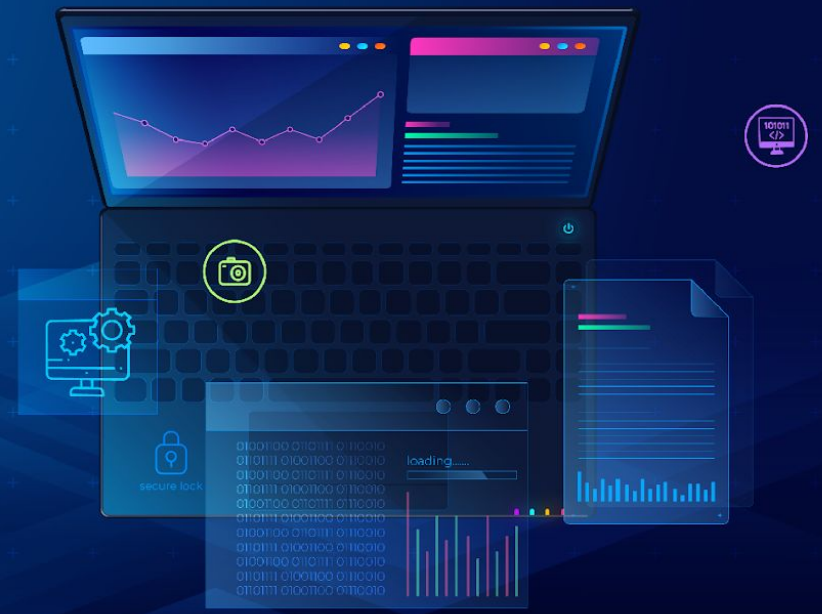
SUMMARY AND OUTLOOK

1. The lesson has provided learners with **concepts** of software engineering, along with knowledge of its **components** and the **phases** involved in the software engineering process.
2. Following this lesson, we will explore the **role** and **importance** of software engineering in software development.

NHẬP MÔN CÔNG NGHỆ PHẦN MỀM

Các khái niệm trong Công nghệ phần mềm

Biên soạn:
TS. Trịnh Thành Trung
Trình bày:
TS. Trịnh Thành Trung



NHẬP MÔN CÔNG NGHỆ PHẦN MỀM

Bài học tiếp theo:

Các vấn đề trong Công nghệ phần mềm

Tài liệu tham khảo:

[1] R. Pressman, Software Engineering: A Practitioner's Approach. 8th Ed., McGraw-Hill, 2016.

[2] I. Sommerville, Software Engineering. 10th Ed., AddisonWesley, 2017.

[3] Pankaj Jalote, An Integrated Approach to Software Engineering, 3rd Ed., Springer.

[4] Shari Lawrence Pleeger, Joanne M.Atlee, Software Engineering theory and practice. 4th Ed., Pearson, 2009

KẾ HOẠCH GIẢNG DẠY

Tuần	Chương	Video
1	Khái niệm và các đặc trưng của phần mềm	C1.1-Software
1	Các khái niệm trong công nghệ phần mềm	C1.2-SoftwareEngineering
1	Vai trò của công nghệ phần mềm	C1.3-SERoles