



جامعة المستقبل
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قسم الانظمة الطبية الذكية كلية العلوم

المحاضرة الثانية

Software engineering

المادة : Software engineering

المرحلة : الثالثة

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Software process: Is a structured set of activities required to develop a software system whose goal is the production or evolution of the software system.

There are generic activities in all software processes:

1. **Specification:** the process of establishing what services are required and identifying the constraints (e.g. cost and time) on the operation of the system and its development.
2. **Development** (design and implementation): the process of converting the system specification into an executable system.

Software design: design a software structure that realizes the specification.

What design methods?

Is a systematic approach of software design that is usually documented as a set of graphical models:

- Data- flow model.
- Entity- relation- attribute model.
- Structural model.
- Object models.

Implementation: translate the designed software structure into an executable program.

- This activity contains the programming and debugging process which translating a design into a program and removing errors from that program.
- Programming is a personal activity; there is no "best" generic programming process.
- Programmers carry out some program testing to discover faults in the program and remove these faults in the debugging process; as shown in Figure 2.1.

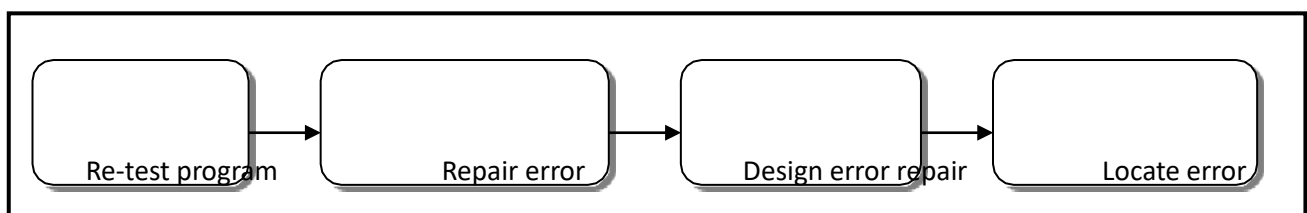


Figure (2.1): The debugging process.

3. **Validation:** checking that the software is what the customer wants.

Validation is intended to show that a system conforms to its specification and meets the requirements of the customer. Involves **checking, review processes**, and **system testing**.

- **System testing** involves executing the system with test cases that are derived from the specification of the real data to be processed by the system. System testing process contains several stages as shown in Figure 2.2, they are :

1- **Unit testing:** individual components are tested.

2- **Module testing:** collections of related components are tested.

3- **Sub-system testing:** modules are integrated into sub-systems and tested.

4- **System testing:** integrated system as a whole is tested.

5- **Acceptance testing:** final test with real data for customer/client acceptance.

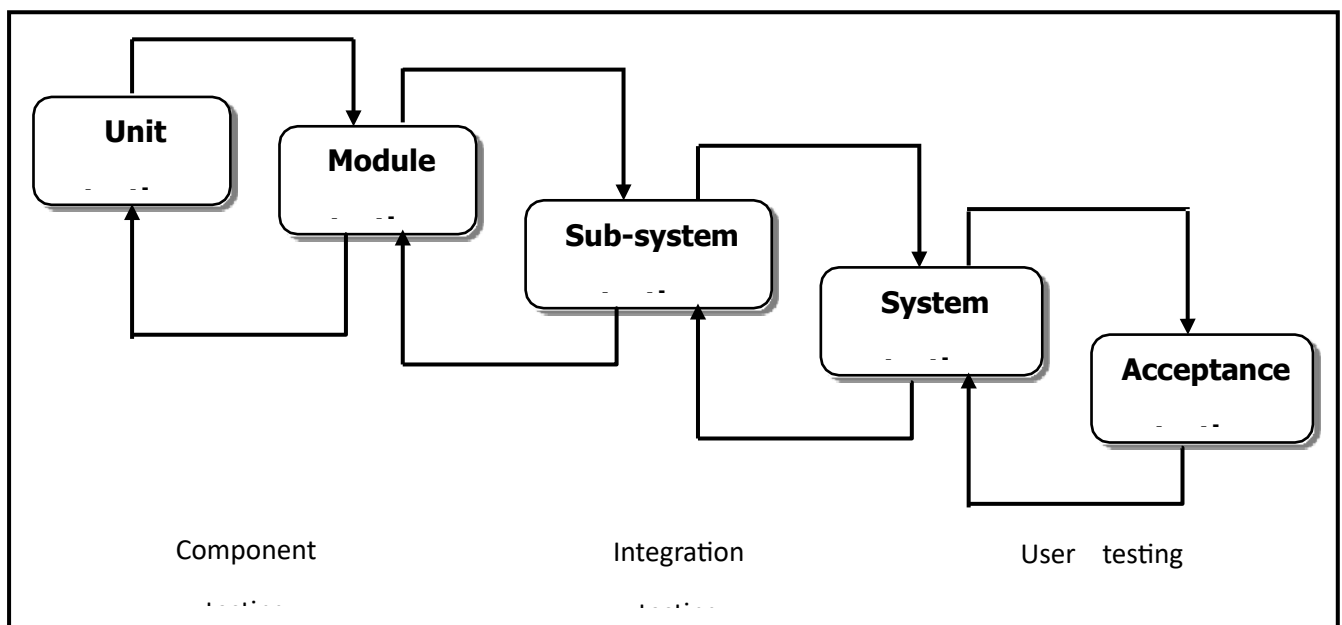


Figure (2.2): The testing process.

4. **Evolution:** changing the software in response to changing in demands. The software evolves to meet changing customer needs. Evolution is concerned with modifying the system after it is in use; as shown in Figure 2.3.

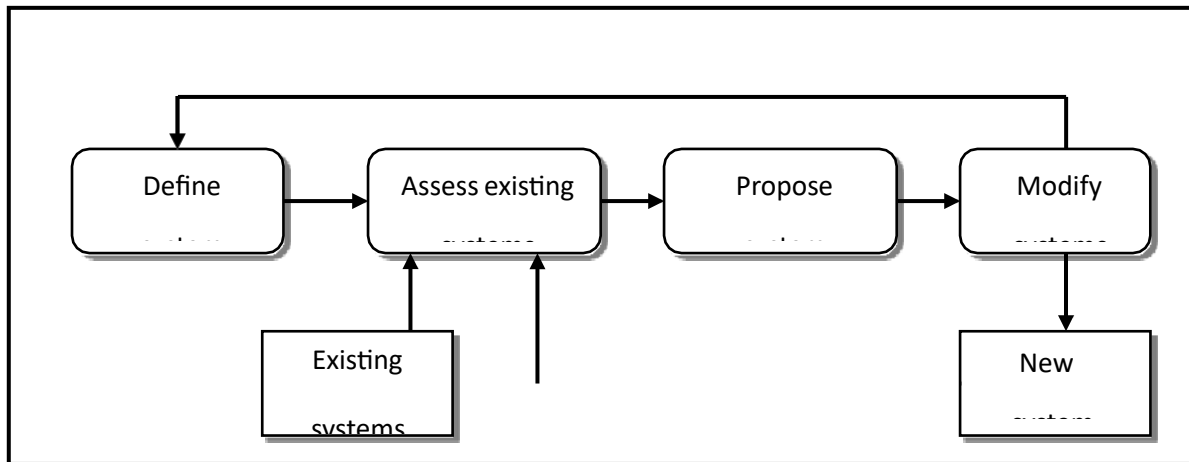


Figure (2.3): The system evolution.

Software Process

What is a Software process?

A **process** is a collection of activities, actions and tasks that are performed when some work product is to be created. It is *not a rigid prescription* for how to build computer software. Rather, it is an adaptable approach that enables the people doing the work to pick and choose the appropriate *set of work actions* and tasks.

Five Activities of a Generic Process framework as follows:

1. **Communication:** communicate with customer to understand objectives and gather requirements
 2. **Planning:** creates a “map” defines the work by describing the tasks, risks and resources, work products and work schedule.
 3. **Modeling:** Create a “sketch”, what it looks like architecturally, how the constituent parts fit together and other characteristics.
 4. **Construction:** code generation and the testing.
 5. **Deployment:** Delivered to the customer who evaluates the products and provides feedback based on the evaluation.
- These five framework activities can be used to all software development regardless of the application domain, size of the project, complexity of the efforts etc, though the details will be different in each case.
 - For many software projects, these framework activities are applied iteratively as a project progresses. Each iteration produces a software increment that provides a subset of overall software features and functionality.



- Costs vary depending on:
 - (1) the type of system being developed
 - (2) the requirements of system attributes such as performance and system reliability.
- Distribution of costs depends on the development model that is used.

What are software engineering methods?

- Structured approach to software development which includes: system models, notation, rules, design advice, and process guidance.
- **Module descriptions:** Graphical models that should be produced.
- **Rules:** Constraints applied to system models.
- **Recommendations:** Advice on good design practice.
- **Process guidance:** What activities to follow and how to do so.