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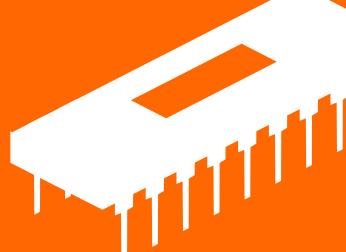
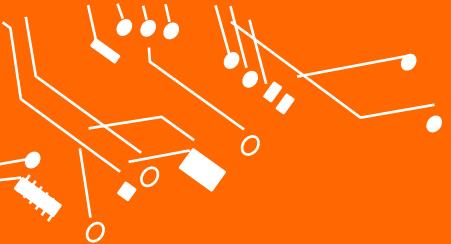
Software Engineering

Chapter 1 :

Introduction to Software Engineering

ຝສ.ດຣ.ວຽກຄະນາ ກິມປານ

ภาควิชาวิทยาการคอมพิวเตอร์ สาขาวิชานักวิเคราะห์และตัดสินใจทางธุรกิจ



Notations

You may have seen these following words in this course:

- SE : Software Engineering
- SEng : Software Engineer
- SW : Software
- HW : Hardware
- SP : Software Project

Introduction to Software Engineering

Software Engineering : Preview and History

- In the middle to late 1960; truly large SW. system were attempted commercially.
- In 1968, in the NATO meeting "Software Engineering" was proposed to solve software crisis.
- In 1975, the term of SE is clearly defined from International Conference on Software Engineering (ICSE).

(Ian)

What is Software?

Hardware : A computers or the electronic equipments that you can see and touch

Software is ... ???

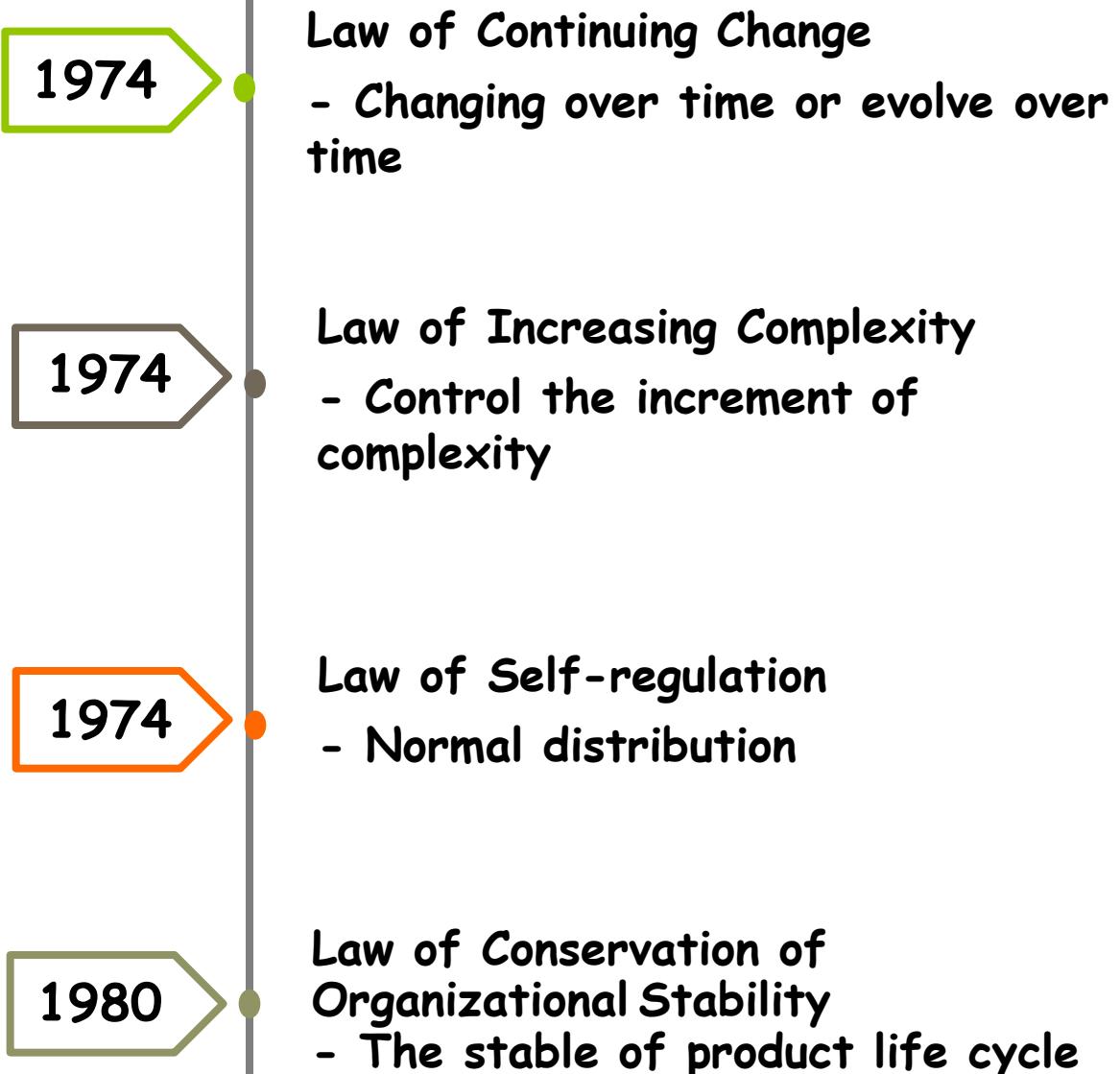
- Any program that is installed in Hardware to make it run.
- Software products can be developed for a particular customer.
- Software products can also be Generic (MS-Office) or Custom.

Engineering

- Engineering is ...
 - The application of scientific principles and methods to the construction of useful structures & machines
- Examples
 - Mechanical engineering
 - Computer engineering
 - Civil engineering
 - Chemical engineering
 - Electrical engineering
 - Nuclear engineering
 - Aeronautical engineering

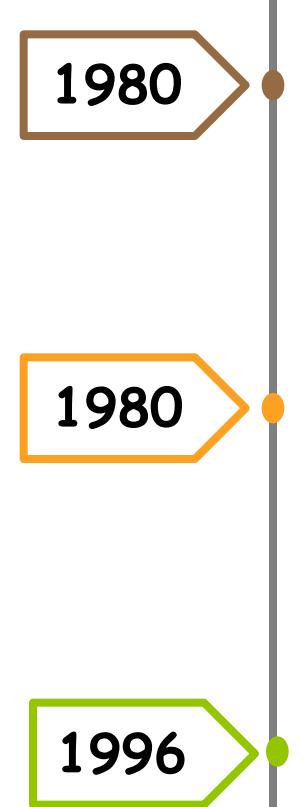
Theory for Software Evolution

(ทฤษฎีการวิวัฒนาการของซอฟต์แวร์)



Theory for Software Evolution

(ทฤษฎีการวิวัฒนาการของซอฟต์แวร์) (2)



Law of Conservation of Familiarity

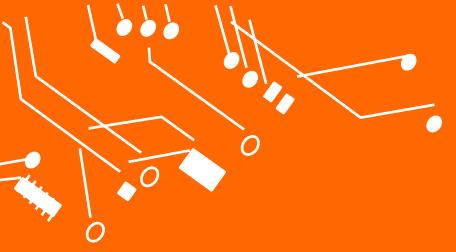
- Keep the familiar of the use of SW that work with. The growth of SW should be normal.

Law of Continuing Growth

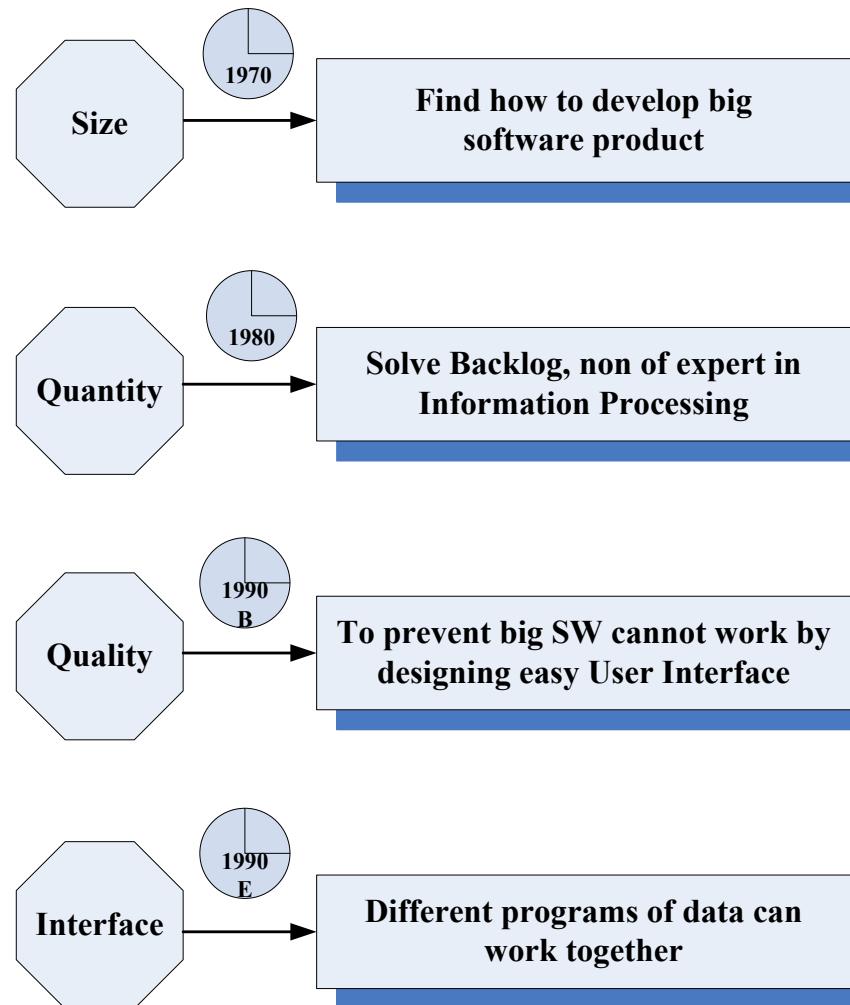
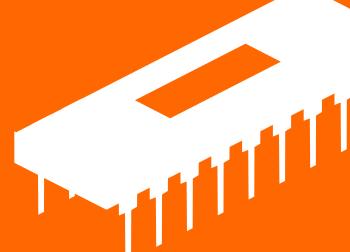
- Functions or details of SW should increasing gradually to keep the satisfaction .

Law of Declining Quality

- The quality of the system will not decrease, if we take a good maintenance within the environment and Feedback System Law
- The levels or loops of the SW evolution will lead to the better improvement.



Software Crisis



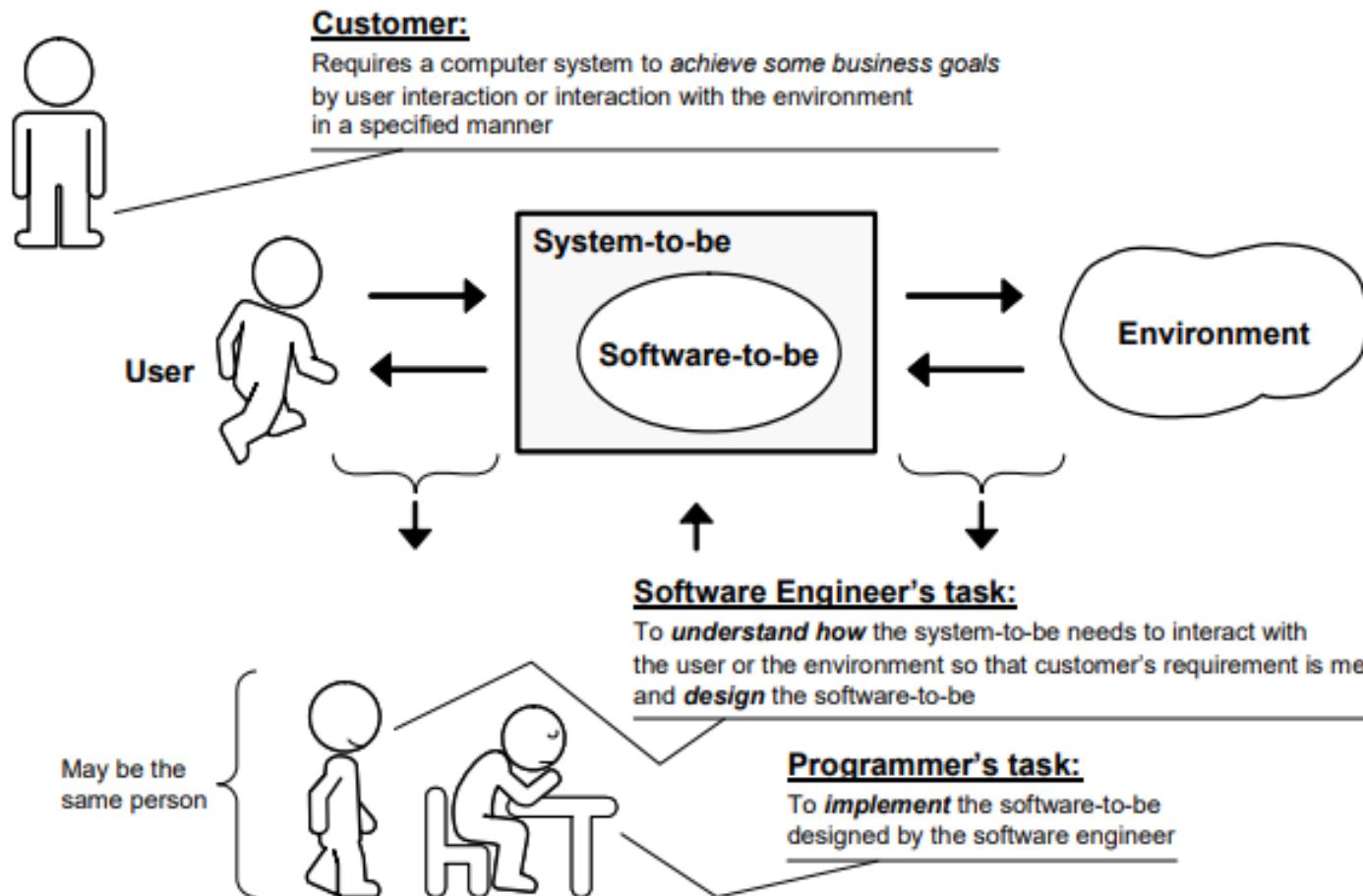
What is Software Engineering?

- Software Engineering (SE) is a computer science's field deals with **the building of so large or so complex software systems** by teams of engineers.
- Software engineering is an engineering discipline that is **concerned with all aspects of software production**.
- Software engineers should have ability to adopt a systematic and organised approach to their work.
- Software engineers should be able to **use appropriate tools and techniques depending on the problem** to be solved within the resources available.

What is Software Engineering? (2)

- Software engineering is the creative activity of understanding the business problem, coming up with an idea for solution, and designing the “blueprints” of the solution. Programming is the craft of implementing the given blueprints.

Roles of Software Engineering?



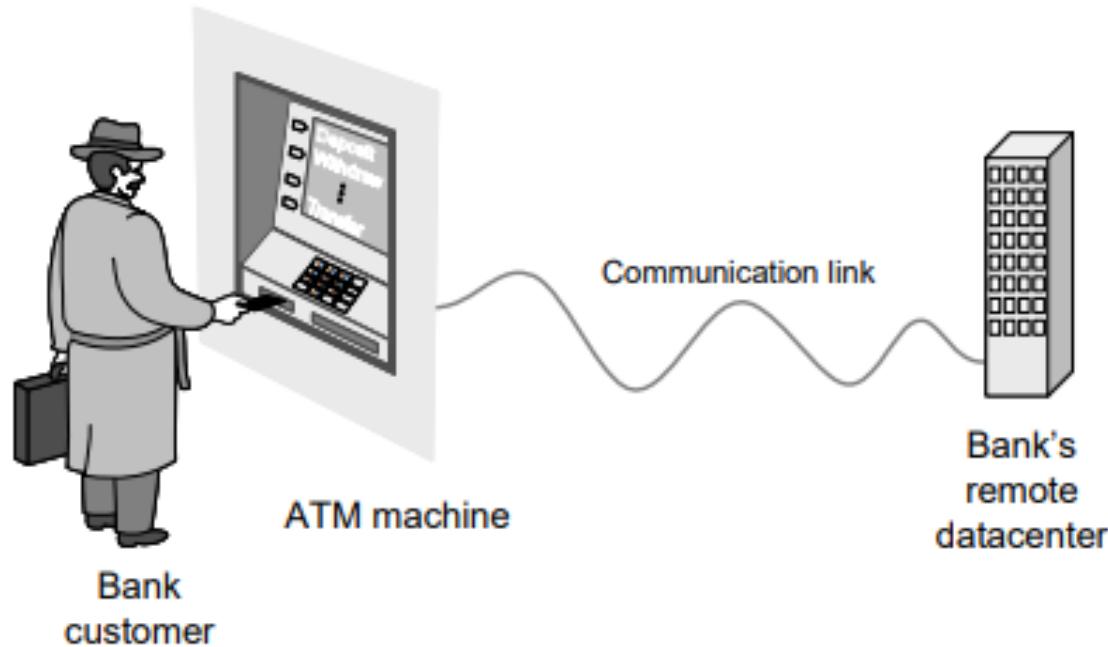
What does a Software Engineer Do?

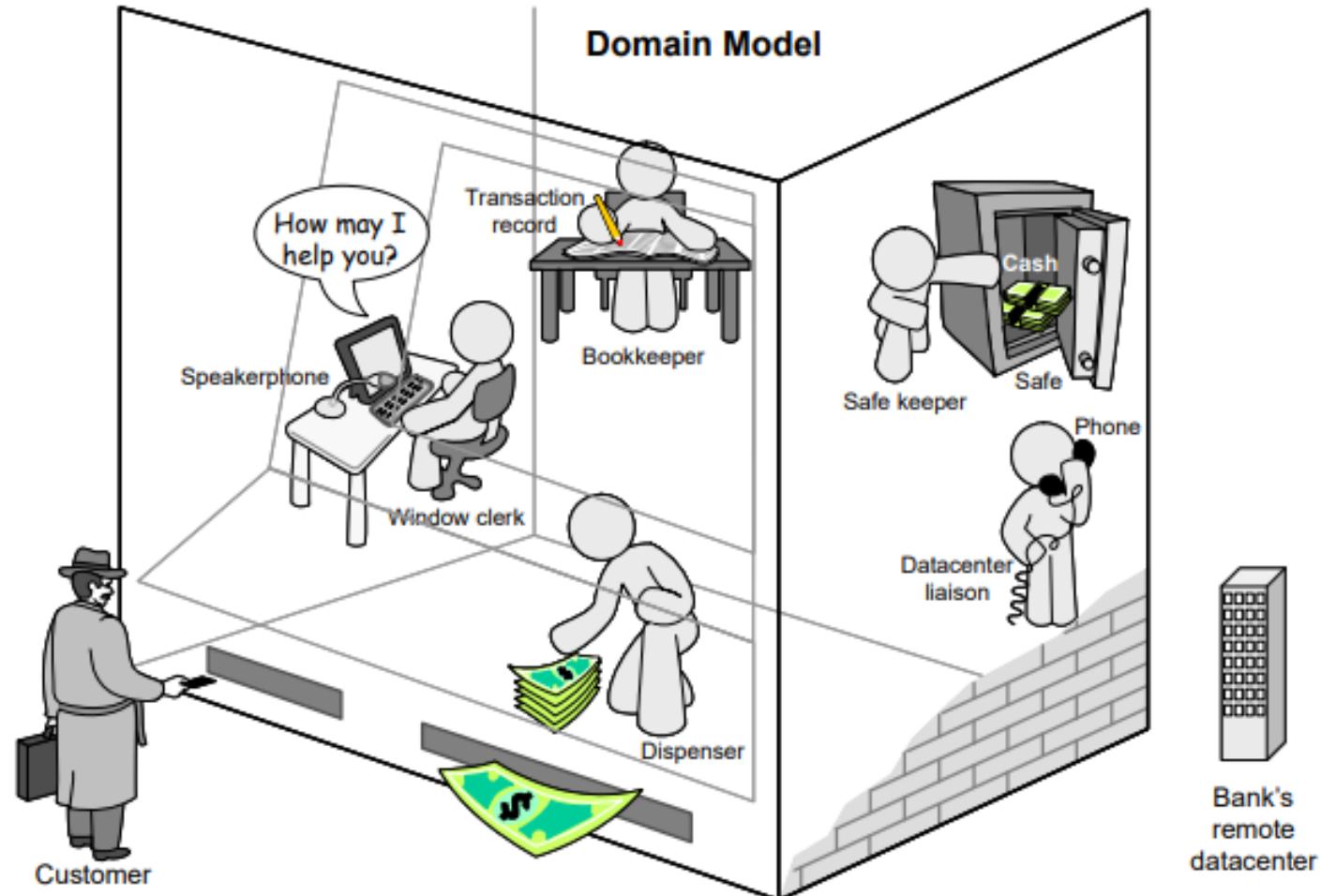


Software engineers should

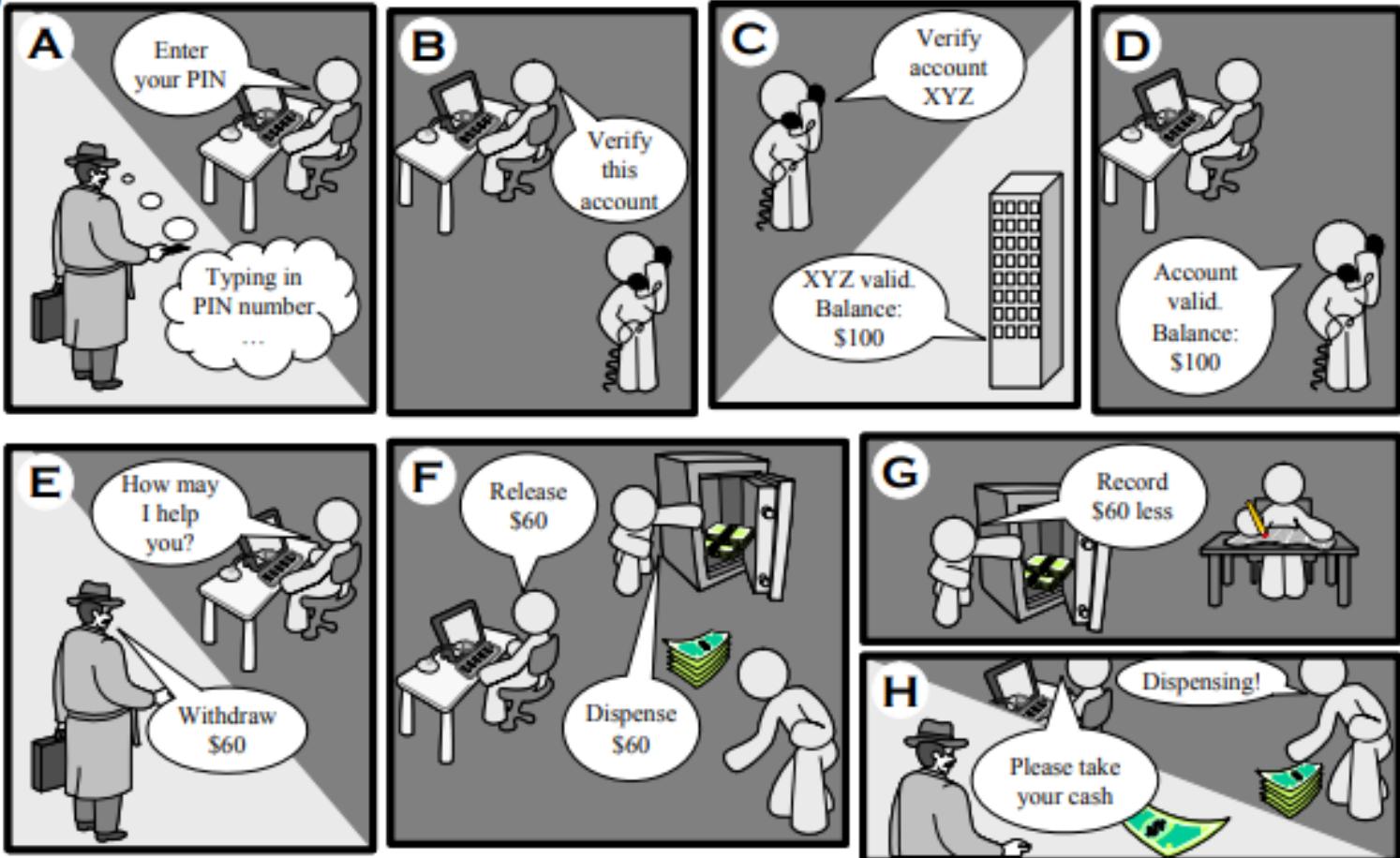
- Adopt a systematic and organised approach to all aspects of software development.
- Use appropriate tools and techniques depending on
 - the problem to be solved,
 - the development constraints and
 - the resources available
- Understand and communicate processes for improved software development within their organization
- Be effective team members and/or leaders.
- Can be very technical or more managerial depending on organizational need.

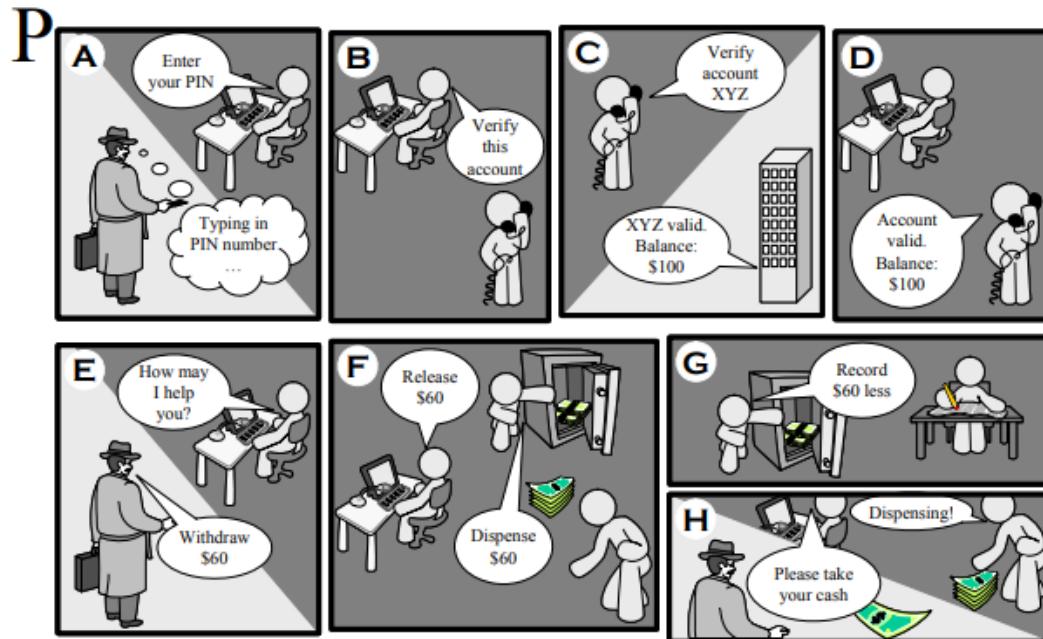
Example: developing software for an Automatic Teller Machine (ATM)





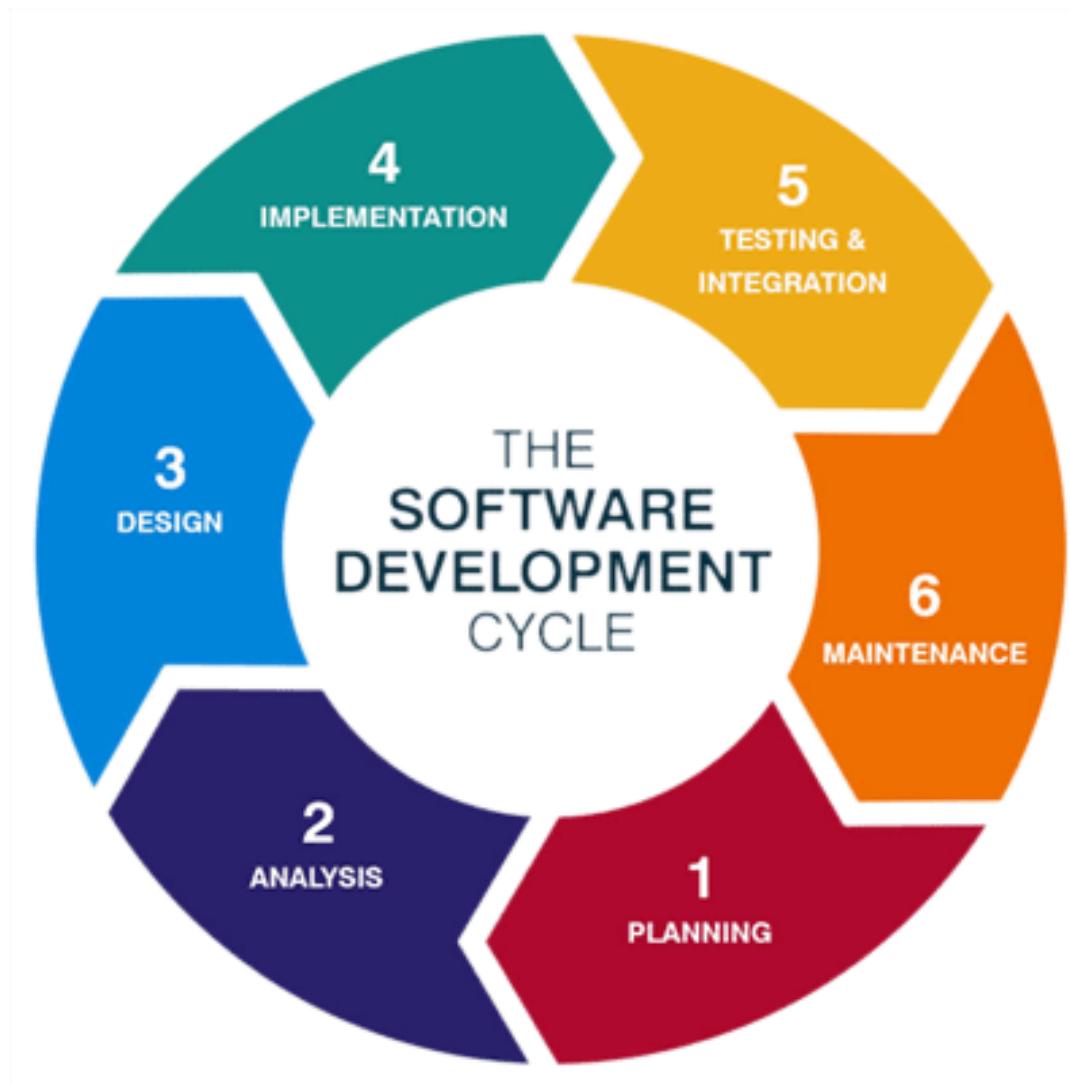
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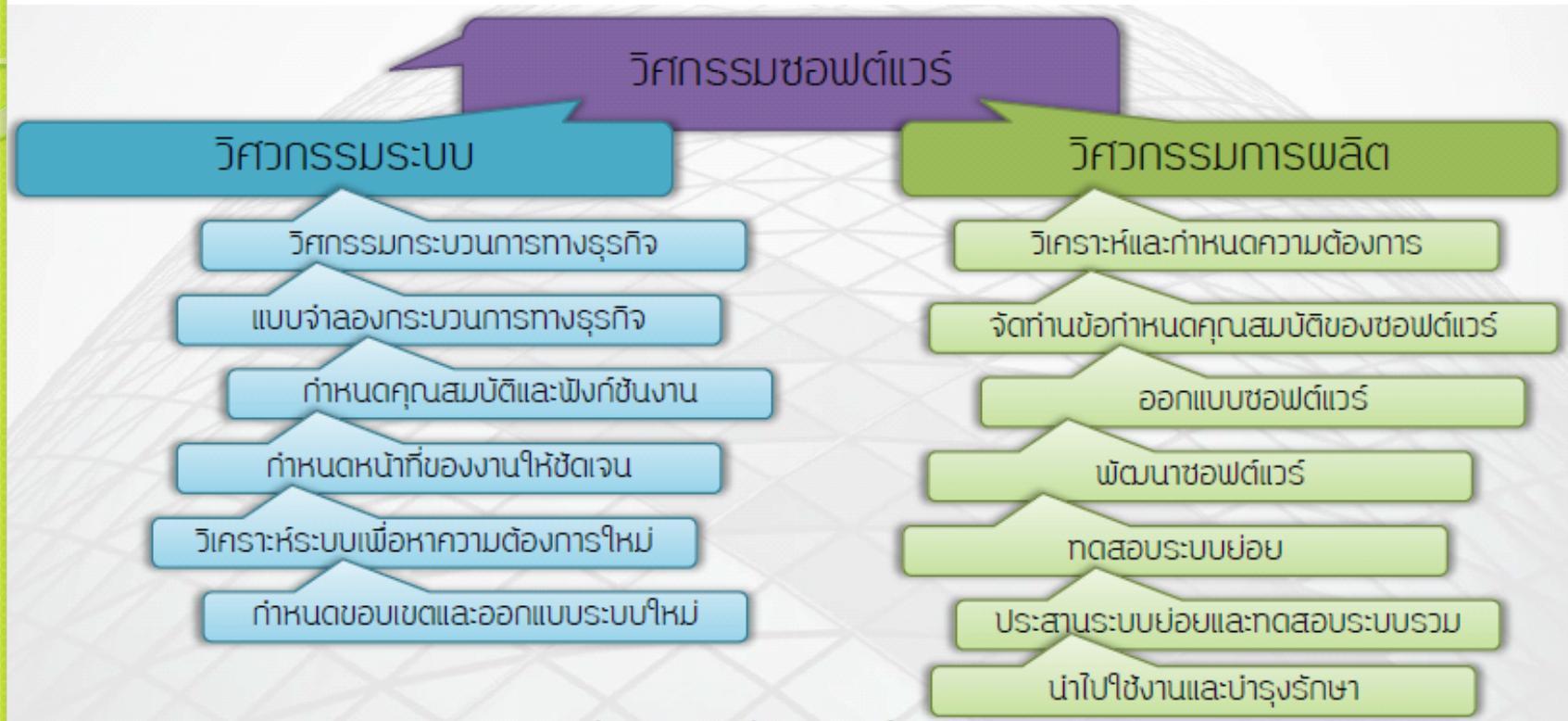


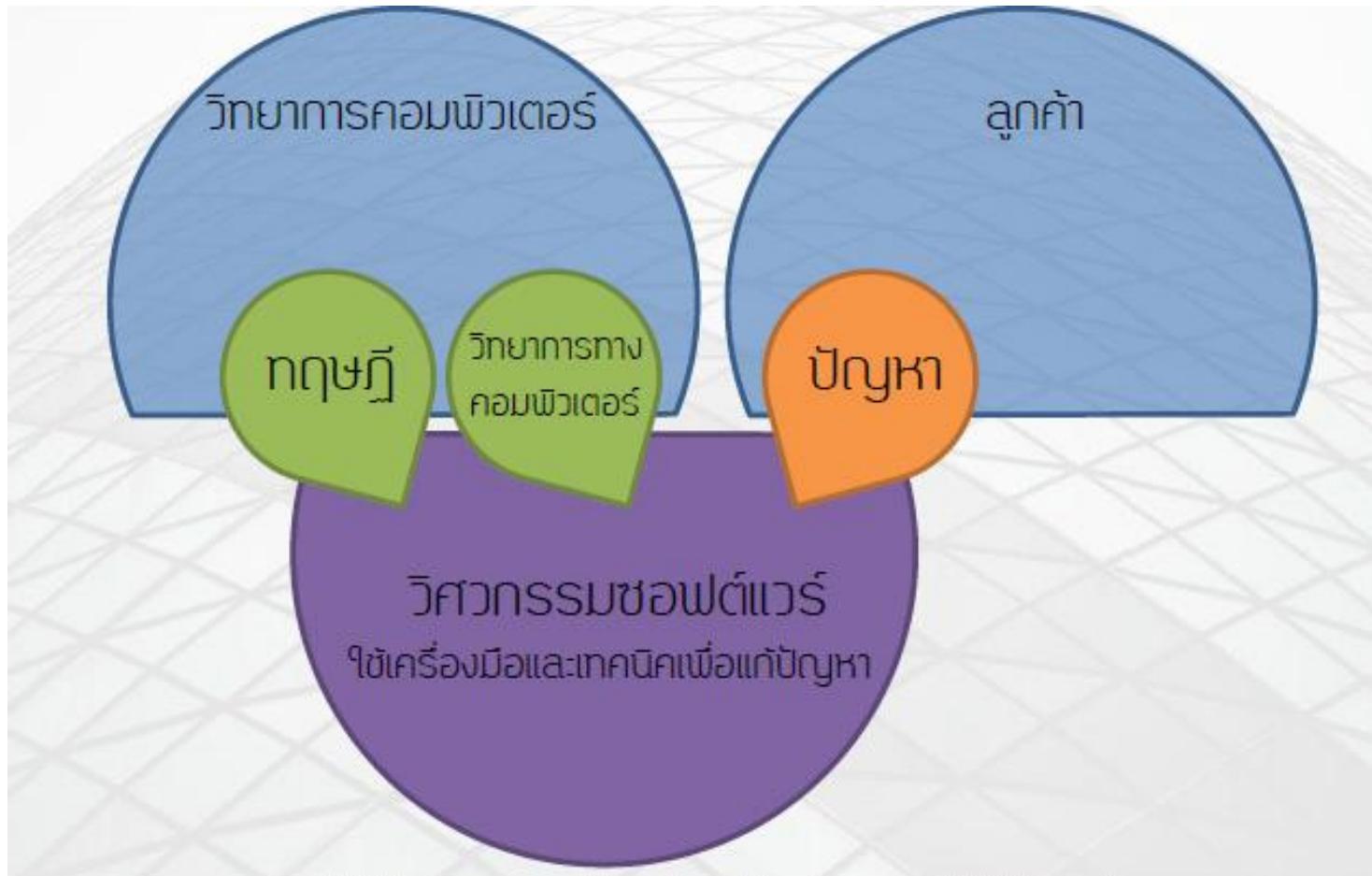


To understand a **complex thing**, one needs to develop ideas about **relationships among the parts inside**. By **dividing a complicated job into simpler tasks** and describing how they interact, we simplify the problem and make it easier to understand and solve. This is why **imagination is critical for software engineering (as it is for any other problem-solving activity!)**.

SDLC







Home Works

- 1. What is the difference between software engineering and computer science?*

- 2. What is the difference between software engineering and system engineering?*

Software Types (Software Products)

1. System Software :

- Program written to service other programs. For example, operating system component, drivers, compilers, editors, file management, and etc.
- System software involved with heavy usage by multiple users, scheduling, resource sharing, process management, etc.

2. Application Software :

- Programs that solve specific problems or for business system.
- Includes 3 components.
 - 1. Data gathering which collect information from external environment.
 - 2. Analysis which transforms information as required.
 - 3. Control/Output which responses to the external environment, monitoring other components with real-time response.

Software Types (2)

3. Engineering and Scientific Software :

- Software which have been characterized by "numbering crunching" algorithms.
- For example, the software for Astronomy or Volcanology.
- Also there are software involve with Computer-aided design, system simulation or real-time system software.

4. Embedded Software :

- Used for intelligent products in industrial market.
- Can perform only limited specific functions. For example,
keypad for microwave, digital function in cars; fuel control, etc.

Software Types (3)

5. Product-line Software :

- Software for the markets, or mass market such as Word Processor, Spread Sheet, Business financial applications or Database system.

6. Web-based Software :

- or WebApps, the web pages retrieved by incorporative software with executable instructions such as HTML, CGI, Java.

7. Artificial Intelligence Software :

- AI software makes use of non-numerical algorithms for solving complex problems which include Expert systems, Knowledge-based system, image or voice in pattern recognition, artificial neural network, etc.

Software Types (4)

8. Mobile Application :

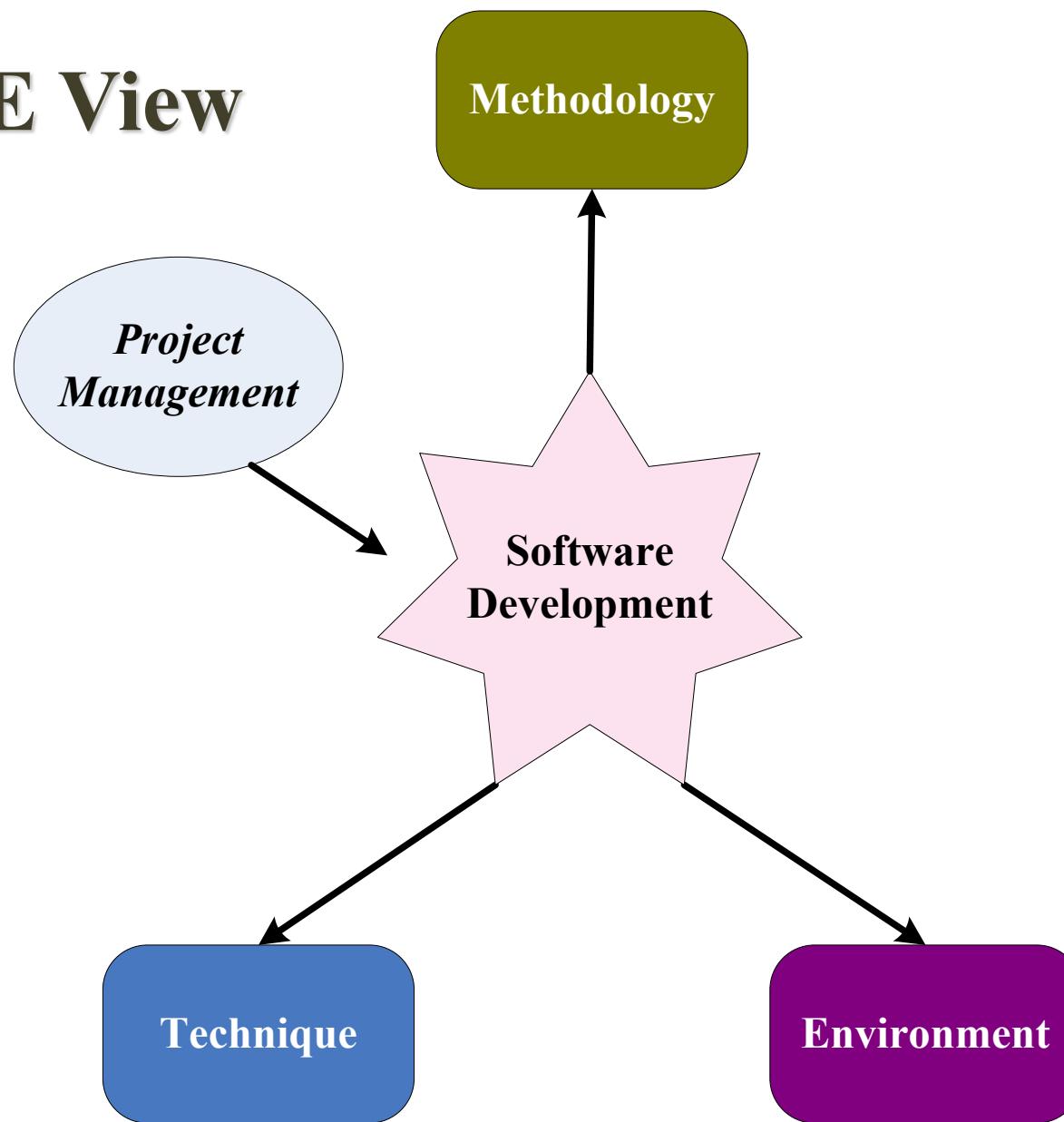
- Software application developed specifically for use on small, wireless computing devices, such as smartphones and tablets, rather than desktop or laptop computers.
- Mobile apps are sometimes categorized according to whether they are web-based or native apps, which are created specifically for a given platform.
- A third category, hybrid apps, combines elements of both native and Web apps.

Software Types (5)

8. Mobile Application Software :

- A type of application software designed to run on a mobile device, such as a smartphone or tablet computer.
- Mobile applications frequently serve to provide users with similar services to those accessed on PCs.

SE View



SE View (2)

Methodology

To indicate the software development methods such as, Water Fall Model, Spiral Model, Structured Model or Object-Oriented Model.

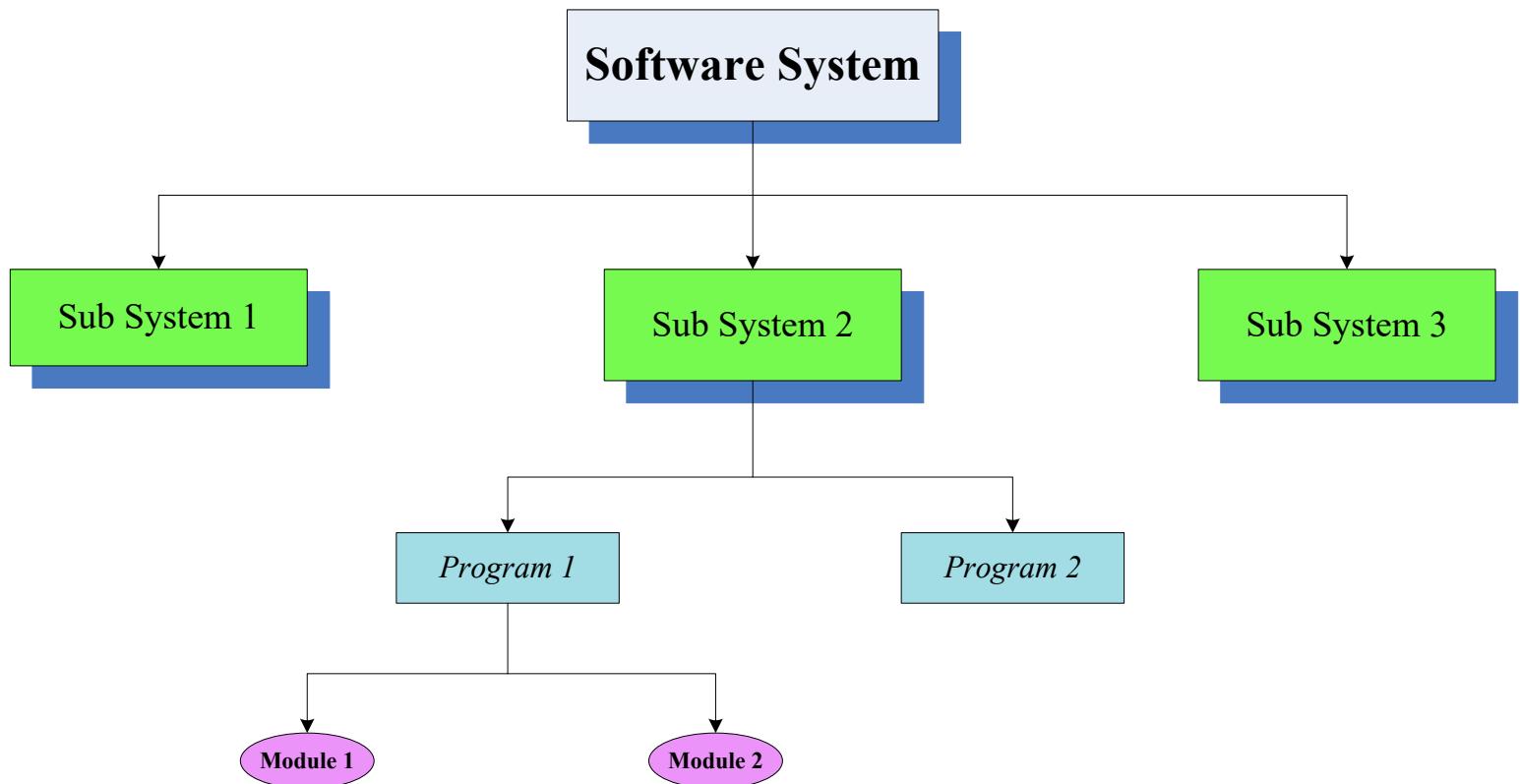
Technique

There are Planning and Design/Development Techniques such as, Object-Oriented, Algorithms, Programming Language or CASE Tool.

Environment

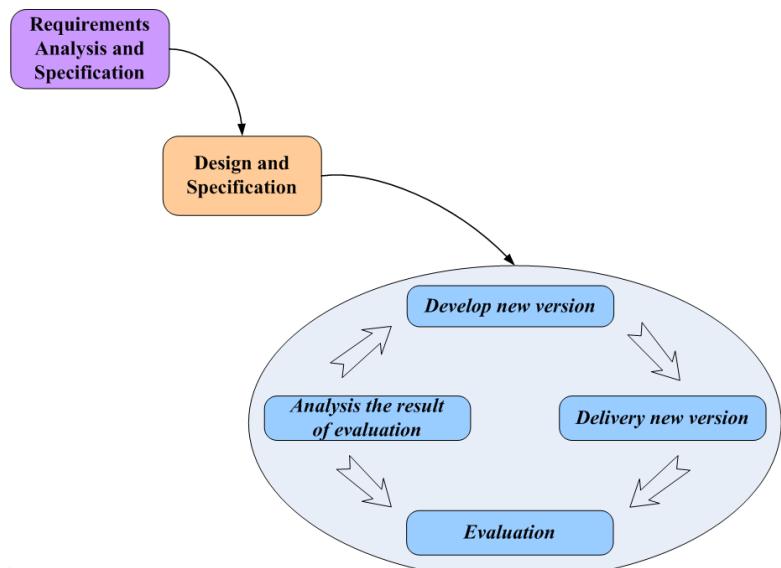
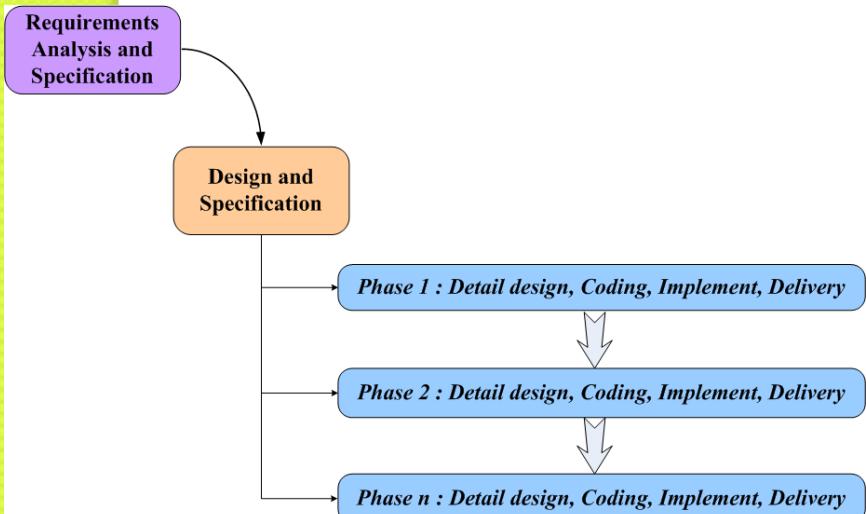
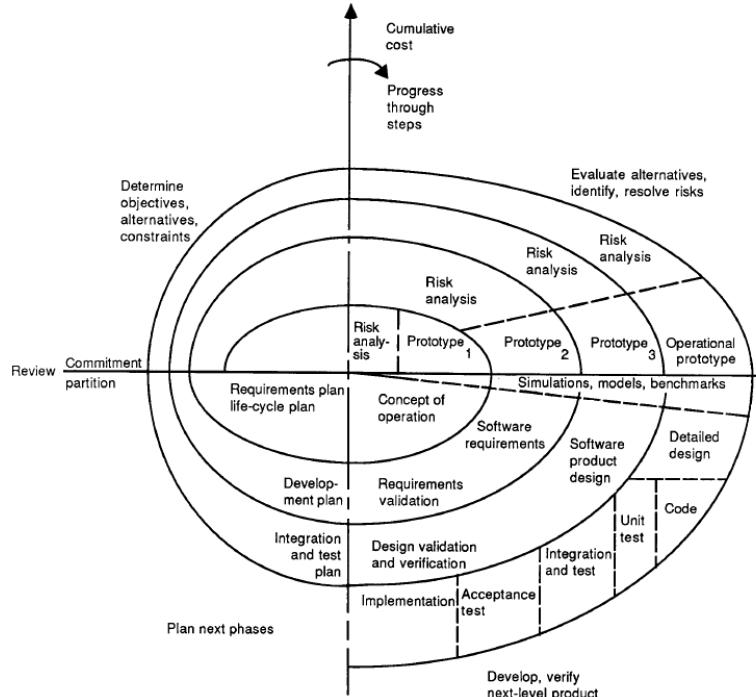
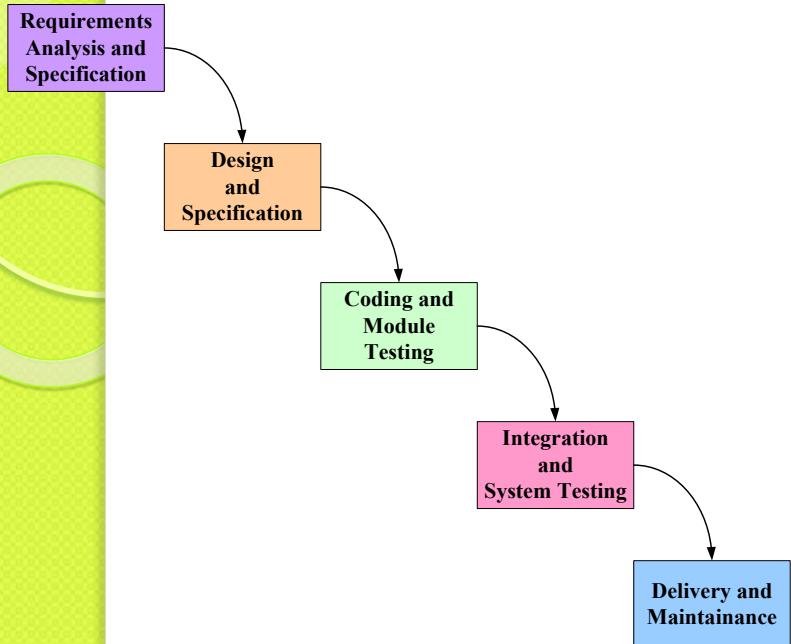
Tools for development such as, PC, OS, Internet or Client-Servers.

How do you solve a huge problem?



Software Life Cycle (Software Model)

- Waterfall model
- Spiral model
- Prototyping model
- Incremental Distribution model
- Evolutionary Distribution model



What is Software Process?

- The activities for the development or evolution of software.
- Goal of SW process is to produce SW with high quality, reliable, predictable, efficient.
- There are many different models to capture the SW process which we called "Software Life Cycle".
- Life Cycle must be expected and controlled to achieve the desired qualities of the products.

Software Process Activities

1. **Specification** : What the system should do to meet the requirements.
2. **Development** : The production of SW system.
3. **Validation** : To check SW with user' s requirements.
4. **Evolution** : Change the SW from the demands.

Software Engineering Costs

- Developing costs = 60%
- Testing costs = 40%
- SW cost will vary depending on the type of the system that we will develop and the requirements of the system.
- The cost also depends on the model used to develop.

Home Works

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If You Want to Build Software!



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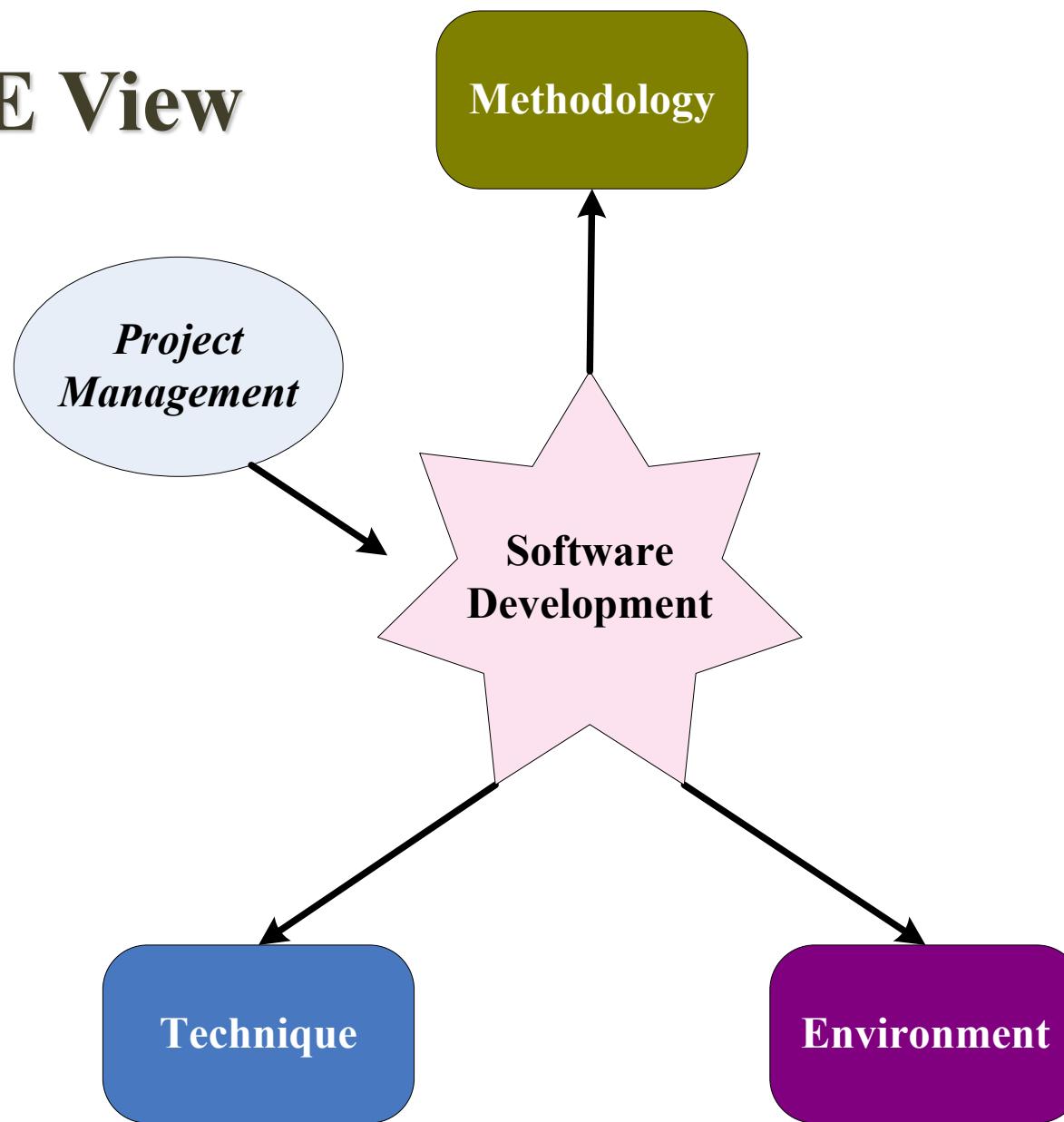
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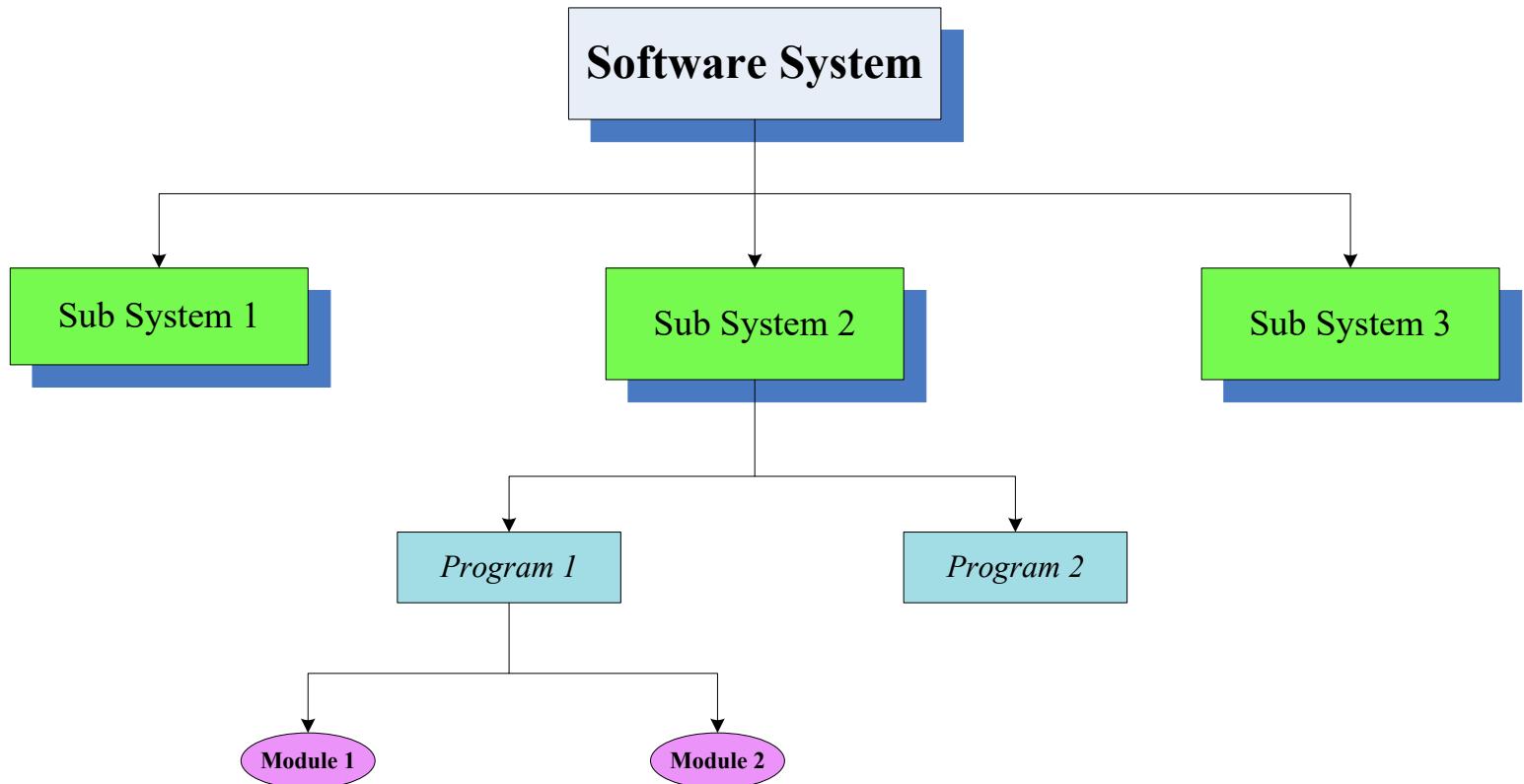
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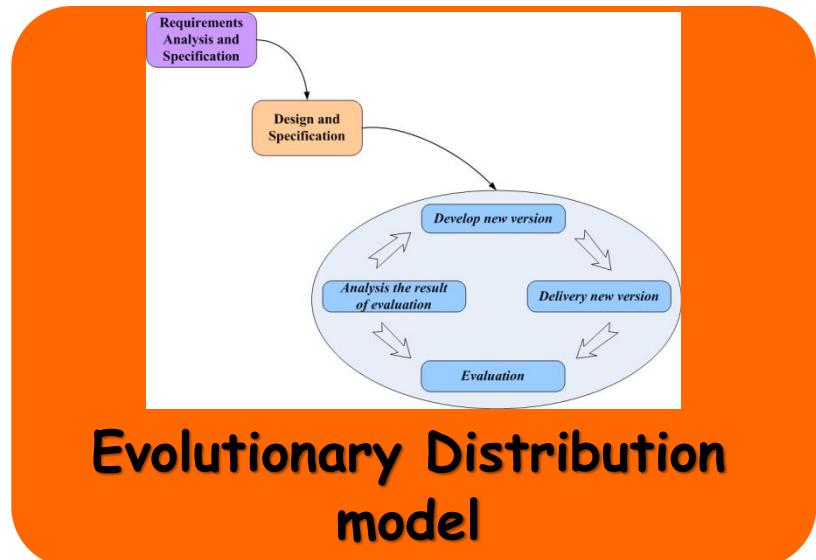
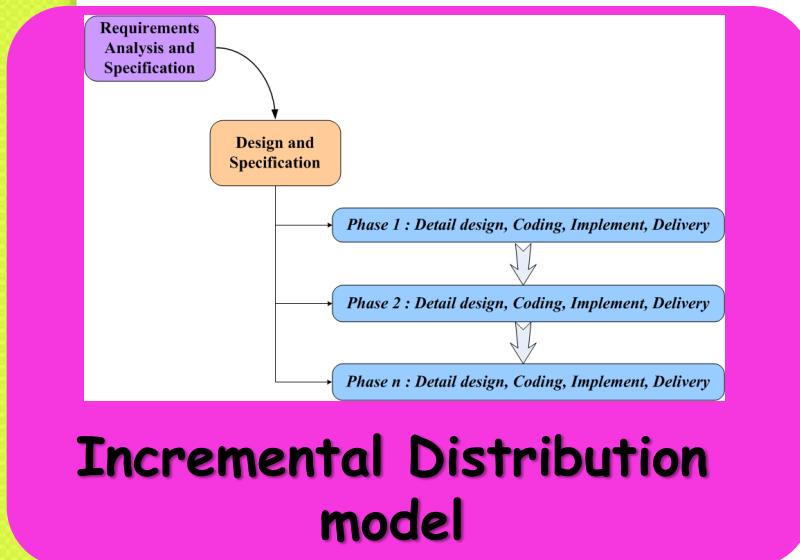
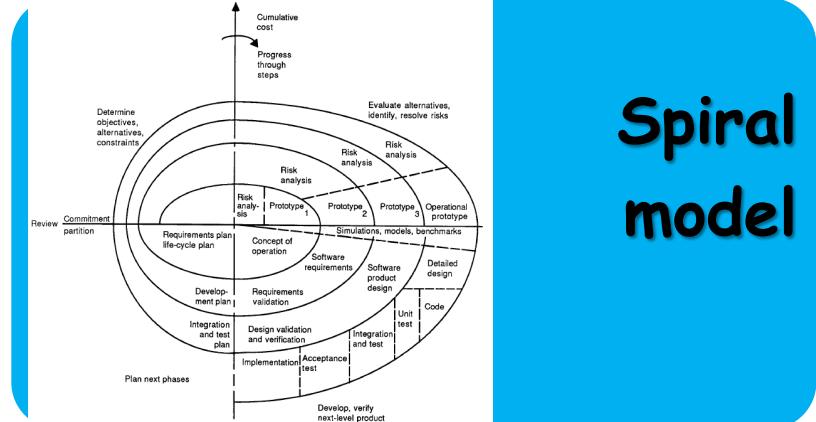
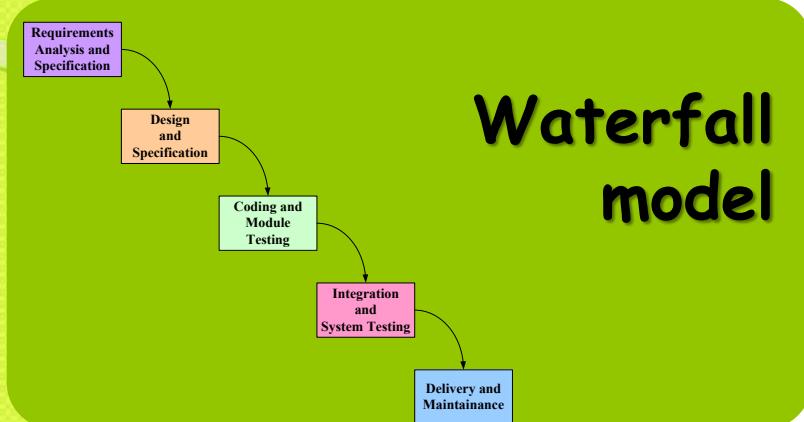
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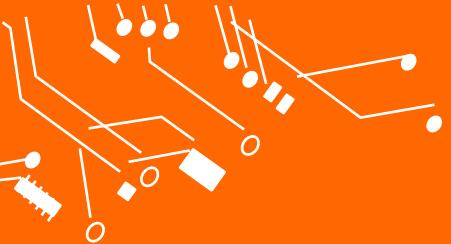


Software Life Cycle (Software Model)

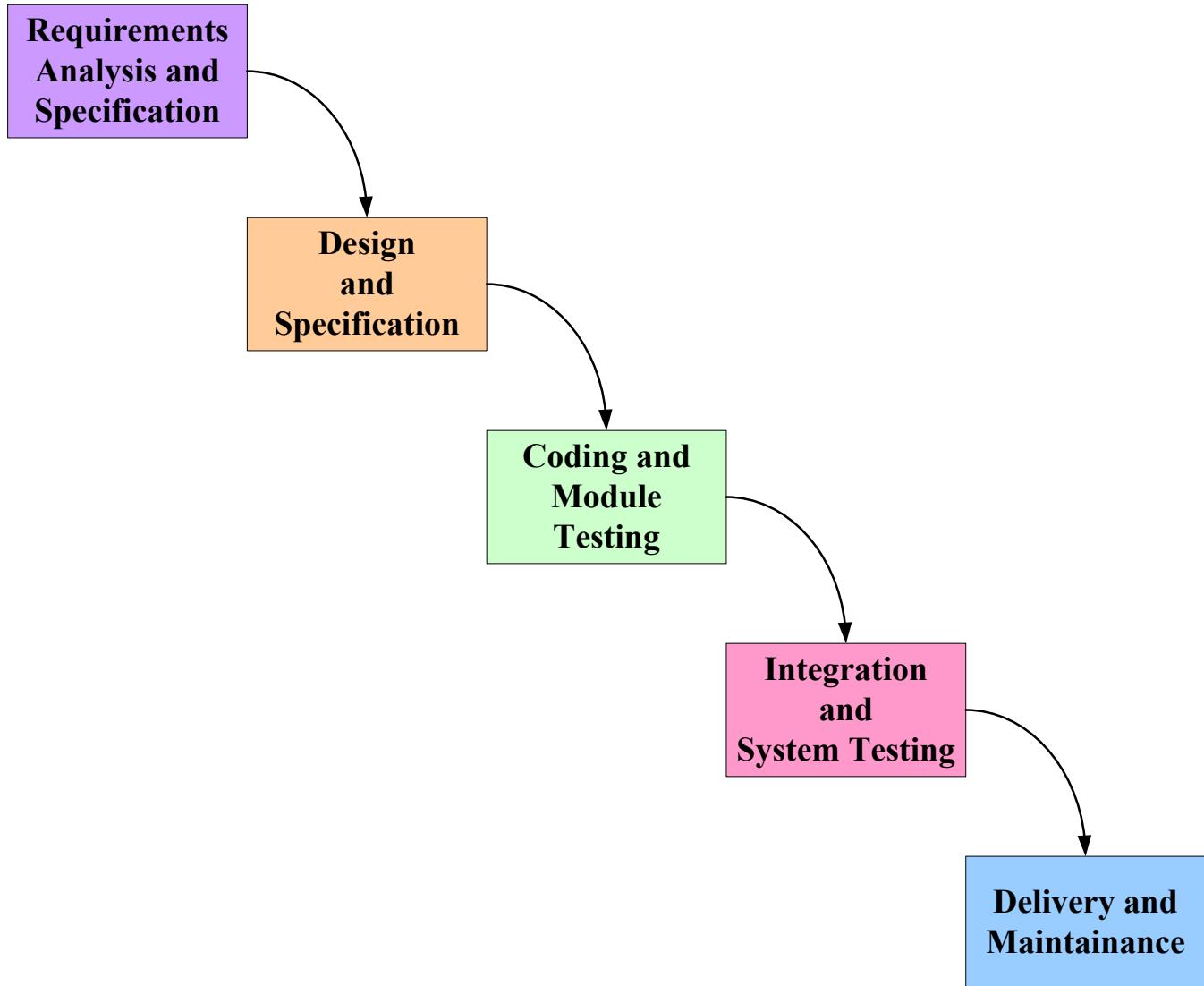
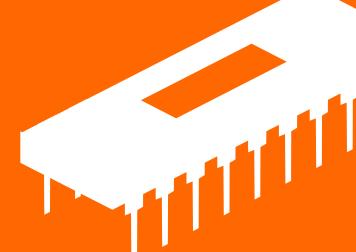
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Software Life Cycle (Software Model) (2)

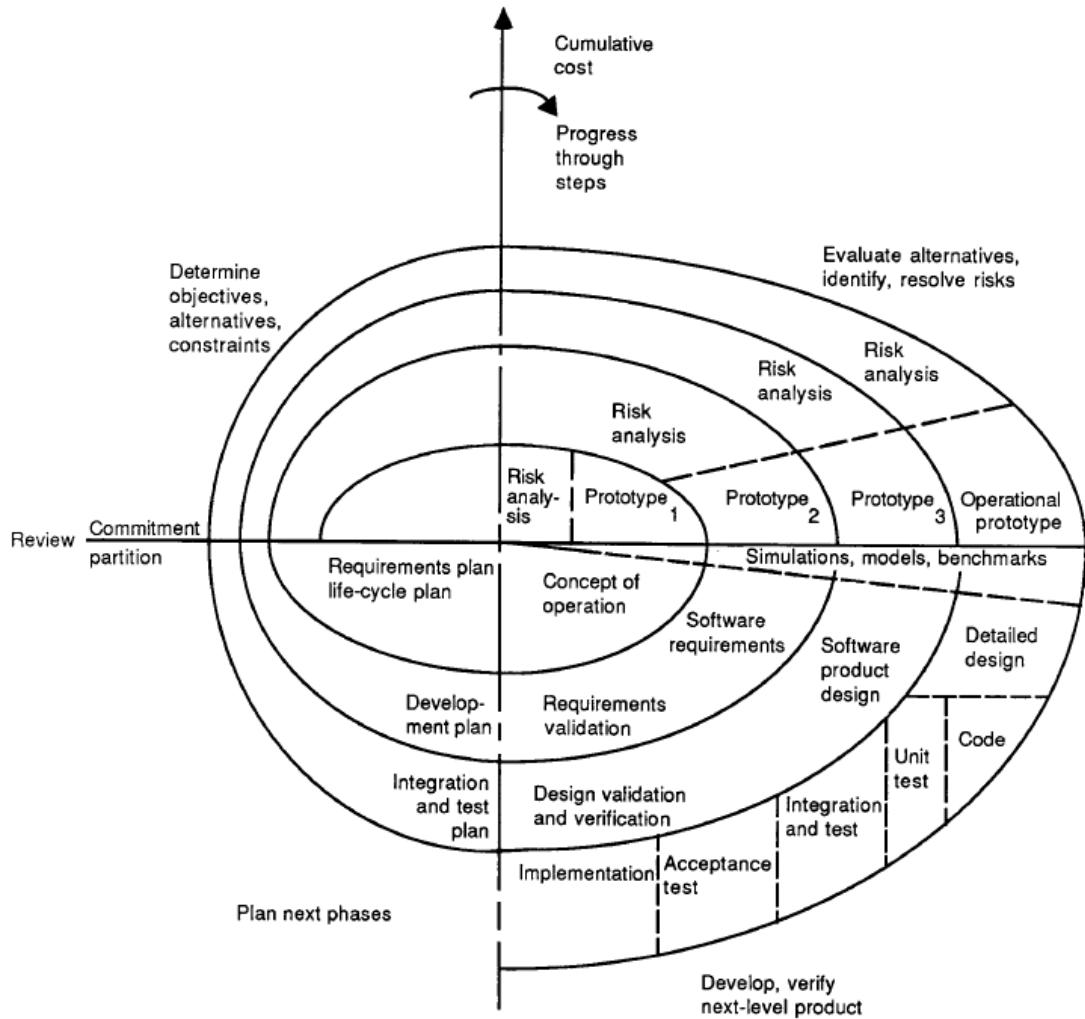




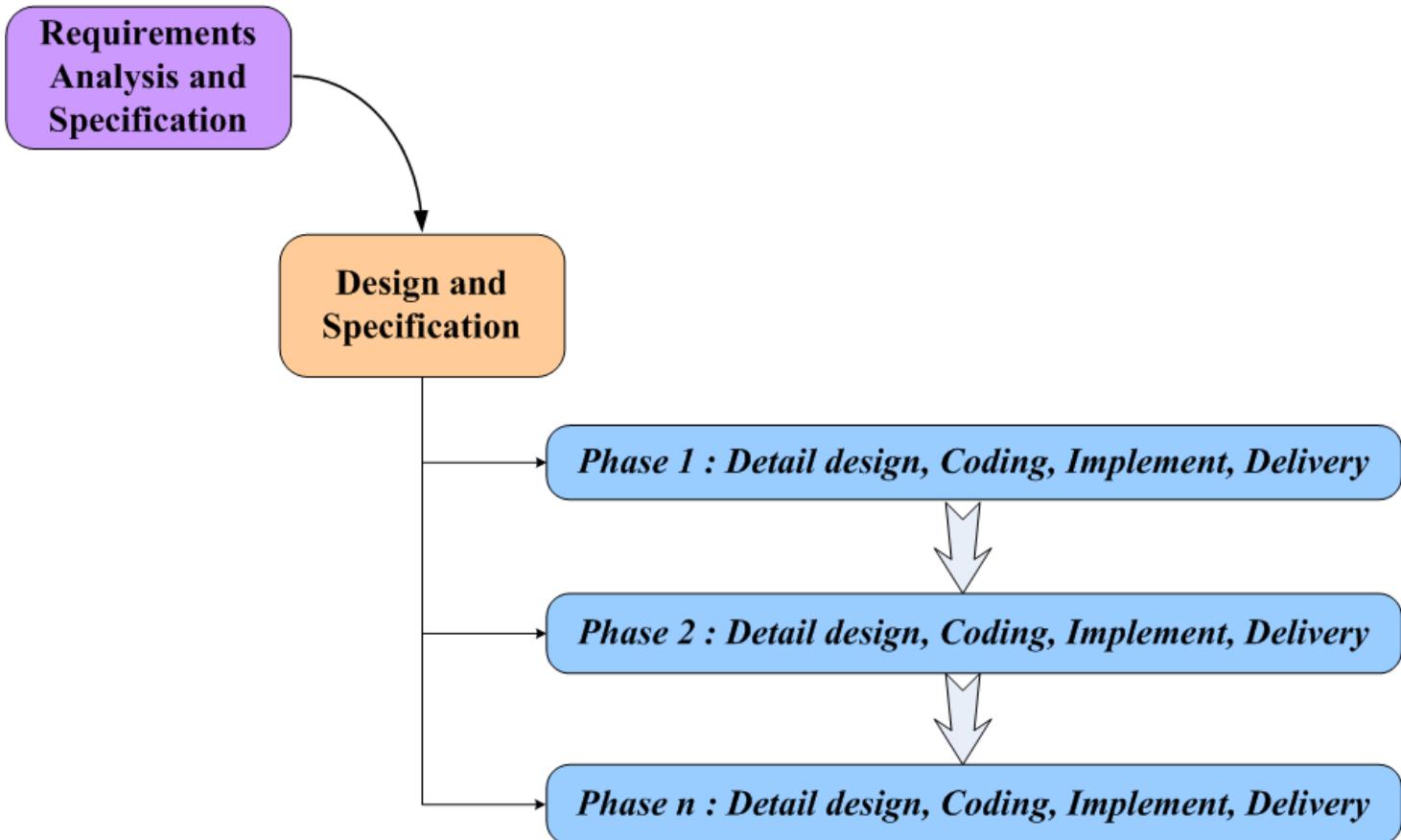
Waterfall Model



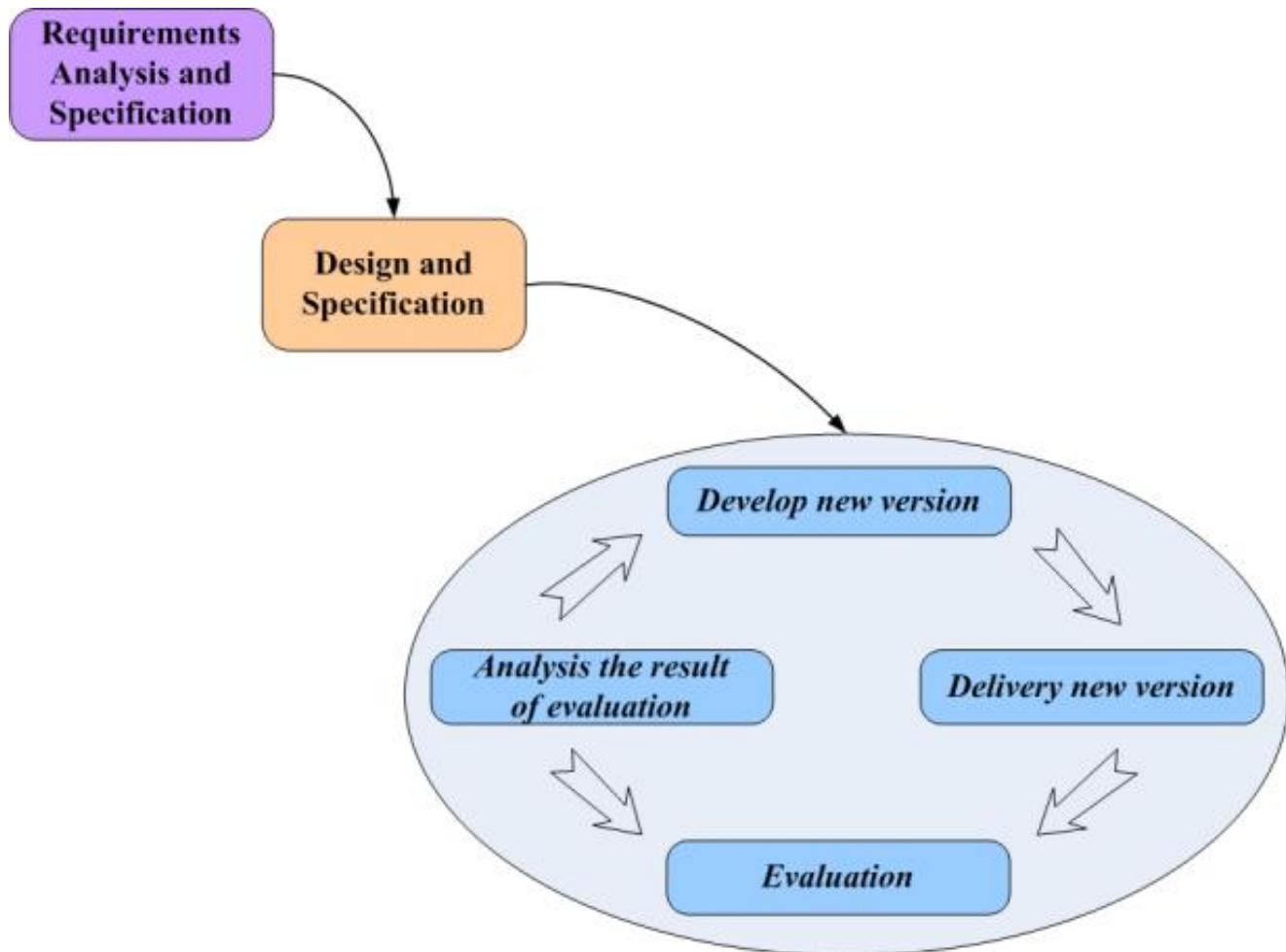
Spiral Model



Incremental Distribution Model



Evolutionary Distribution Model



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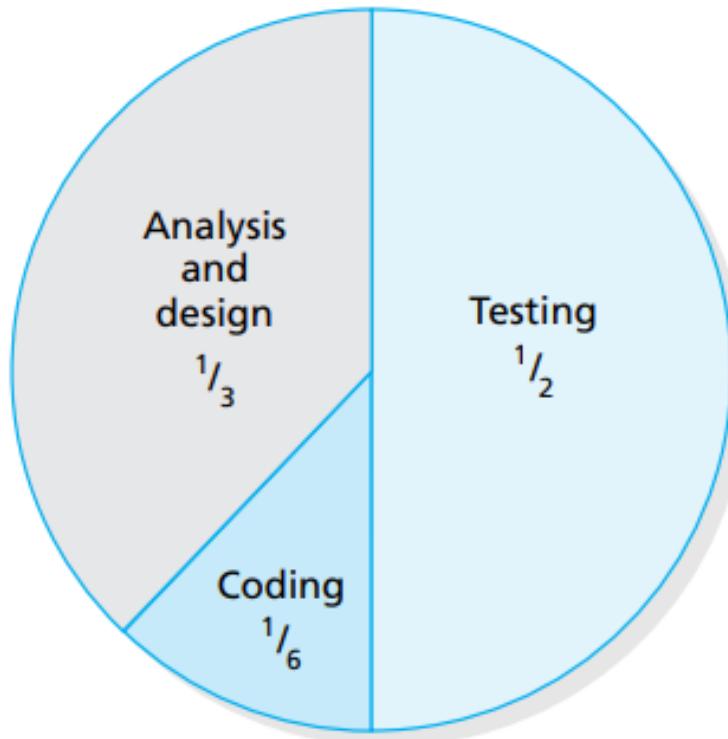
04 Evolution

Change the SW from the demands

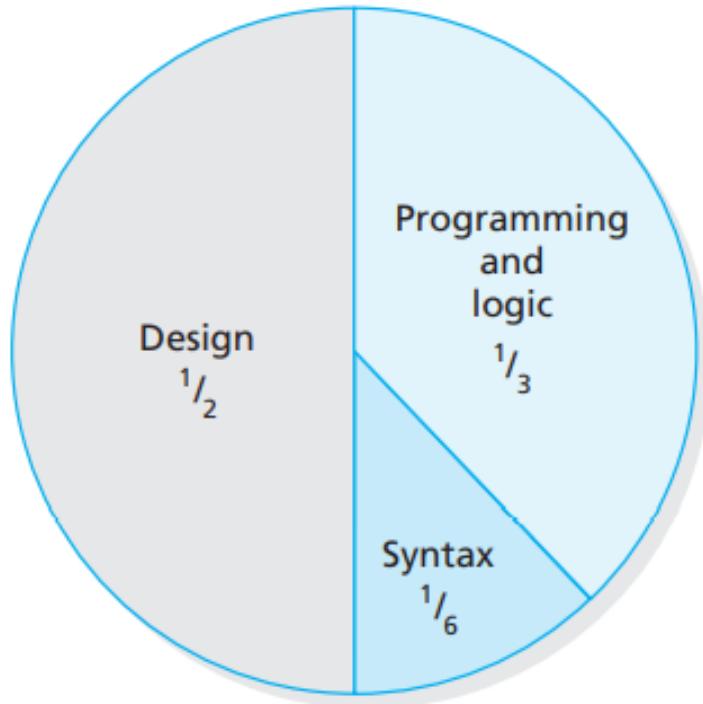
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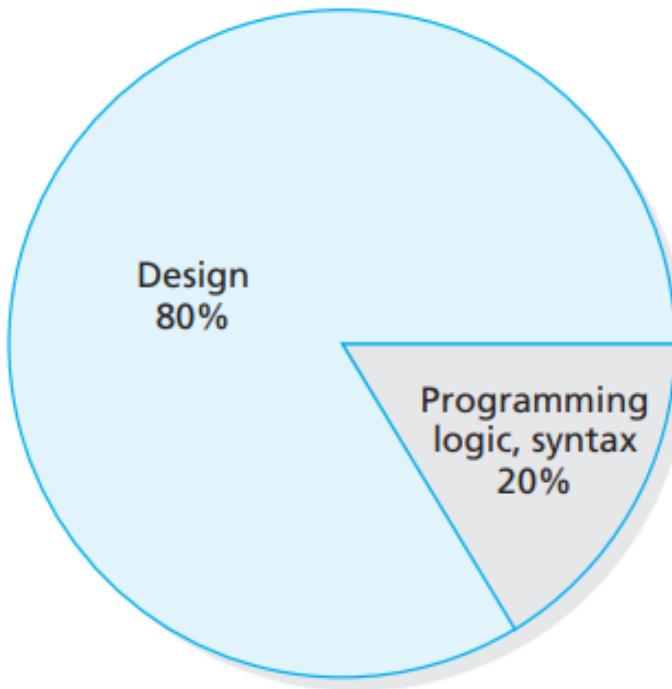
Relative Costs of the Stages of Software Development



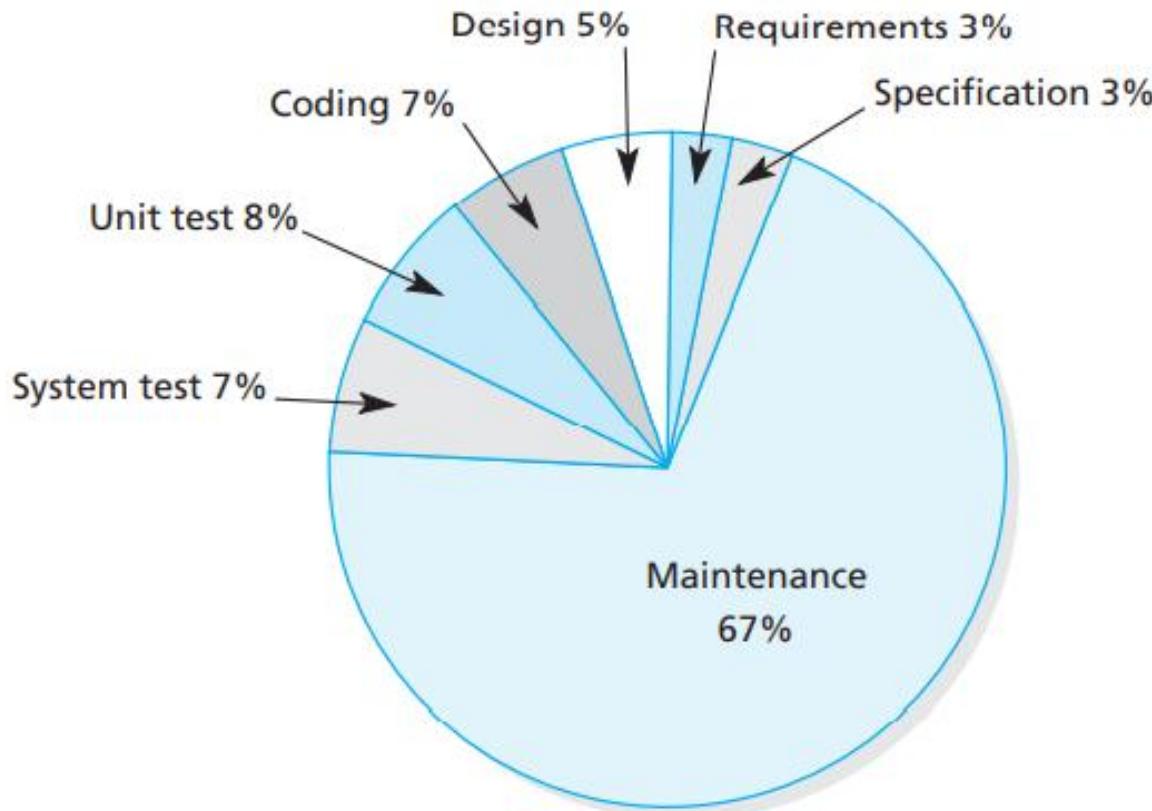
Relative Numbers of Errors Made During the Stages of Software Development



Relative Cost of Fixing Different Types of Fault



Relative Costs of the Stages of Software Development





END OF CHAPTER 1

