Integrating quality activities in the project life cycle

Learning Objectives

- Describe the various software development models and discuss the differences between them.
- Explain the considerations affecting intensity of applying quality assurance activities.
- Explain the different aspects of verification, validation and qualification associated with quality assurances activities.
- Describe the model for the SQA plan's defect-removal effectiveness and cost.
- Explain possible uses for the model.

Classic and other software development methodologies

- Four models of the software development process are discussed in this section :
  - □ The Software Development Life Cycle (SDLC) model
  - □ The prototyping model
  - □ The spiral model
  - □ The object-oriented model

The SDLC Model

Figure 7.1: The waterfall model
Source: After Boehm (1981) and Royce (1970) (© 1970 IEEE)
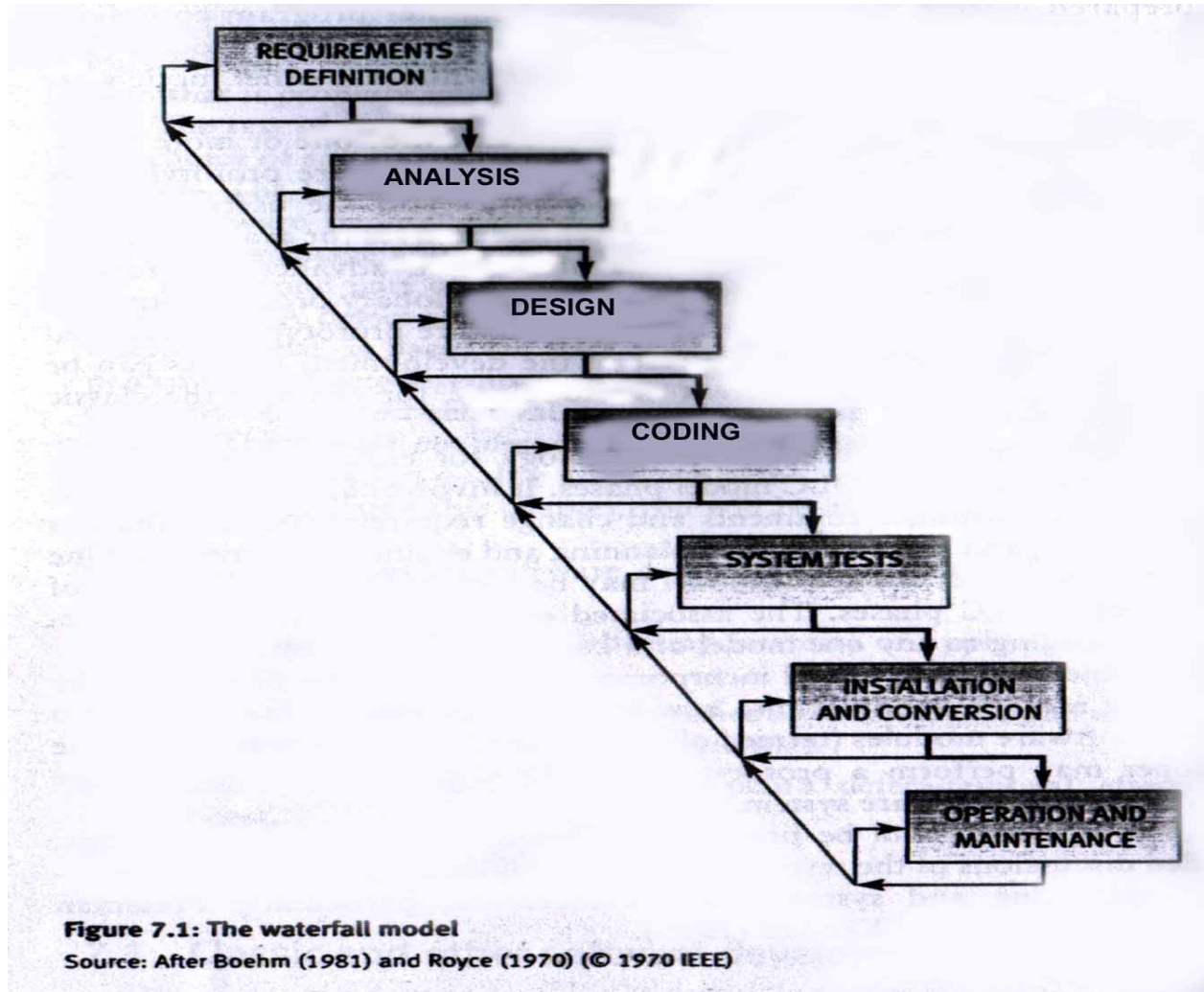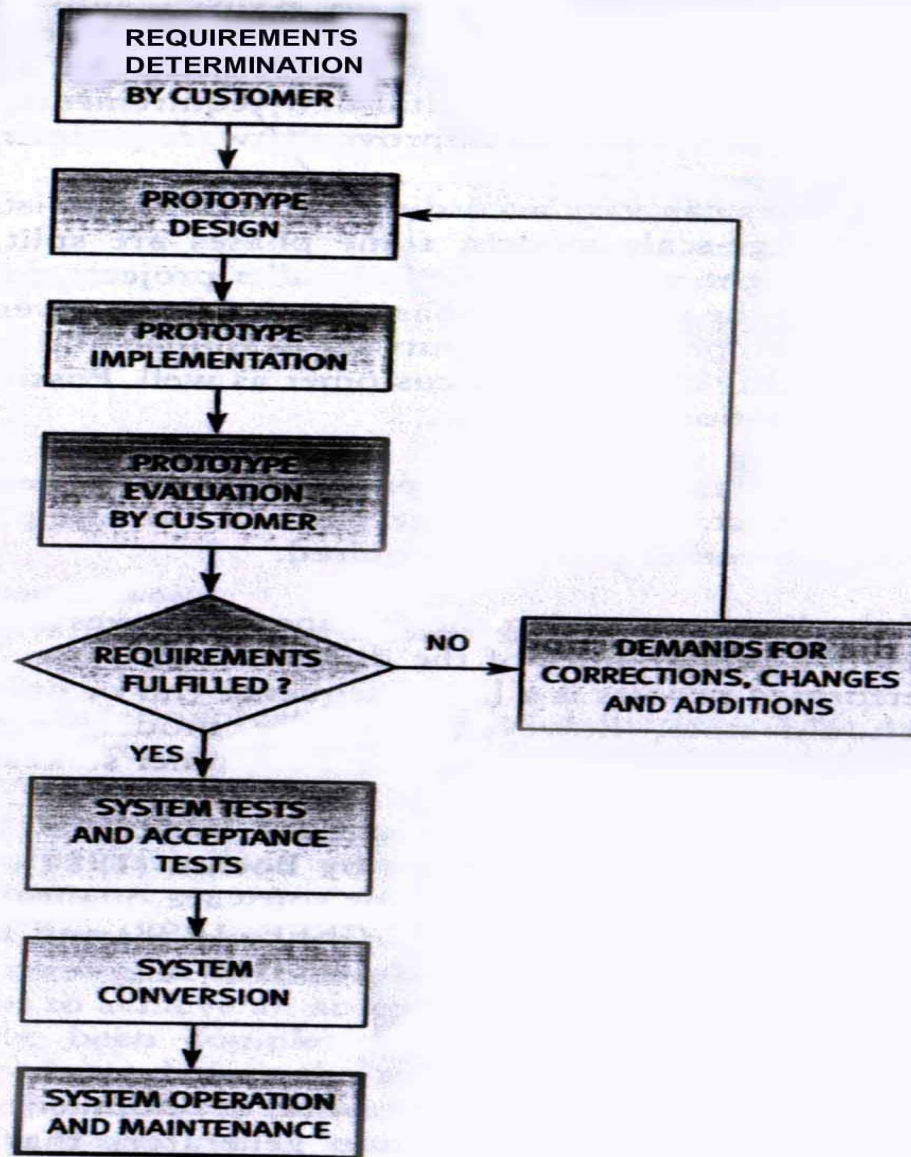
The prototyping models

Figure 7.2: The prototyping model

Prototyping versus SDLC-advantages and disadvantages

- Mainly for small to medium-sized projects
- **Advantages prototyping:**
  - ☐ Shorter development process
  - ☐ Substantial savings of development resources (man-days)
  - ☐ Better fit to customer requirements and reduced risk of project failure
  - ☐ Easier and faster user comprehension of the new system
- **Disadvantages prototyping:**
  - ☐ Diminished flexibility and adaptability to changes and additions
  - ☐ Reduced preparation for unexpected instances of failure
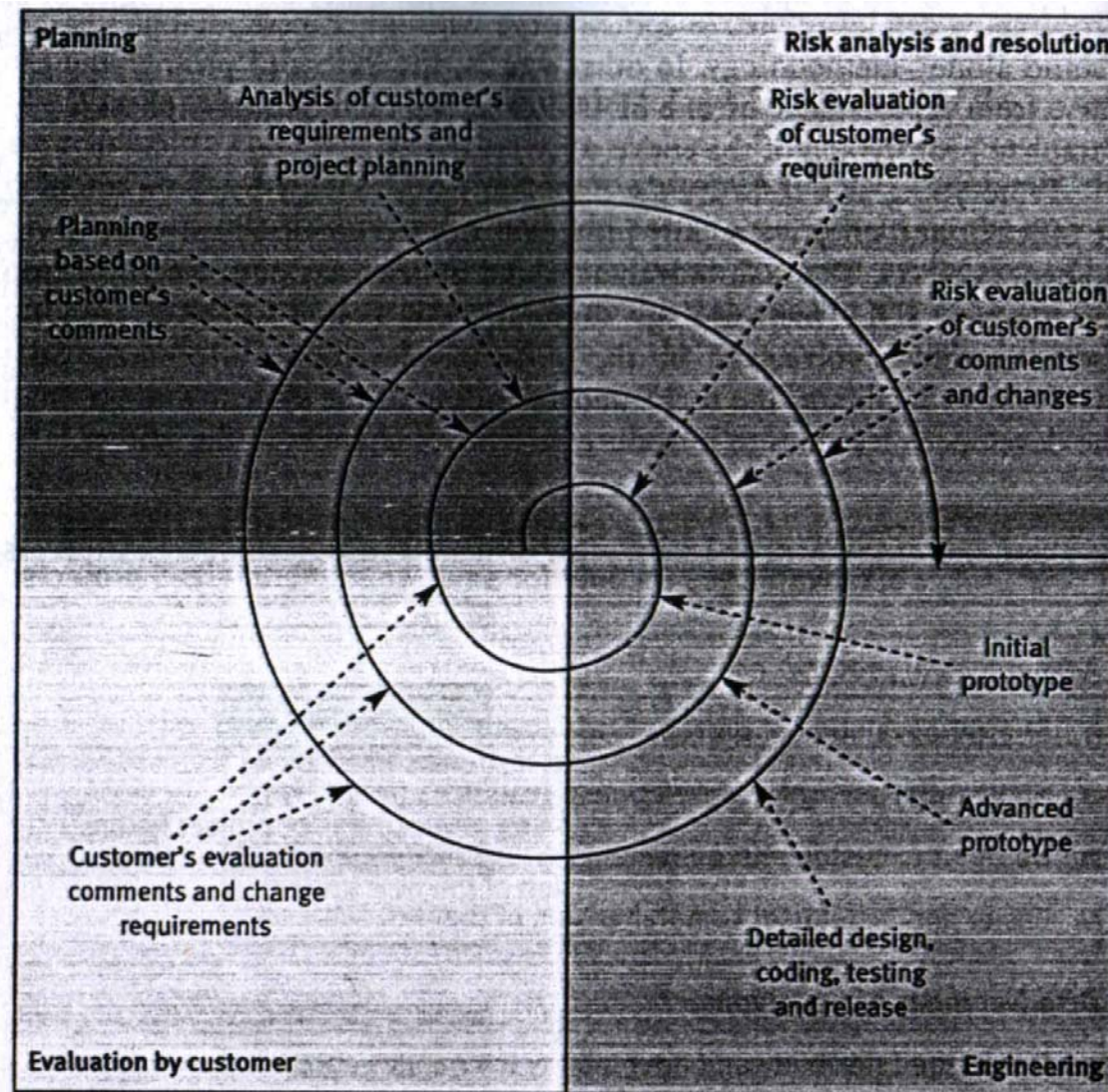
The Spiral Model

Figure 7.3: The spiral model (Boehm, 1988)
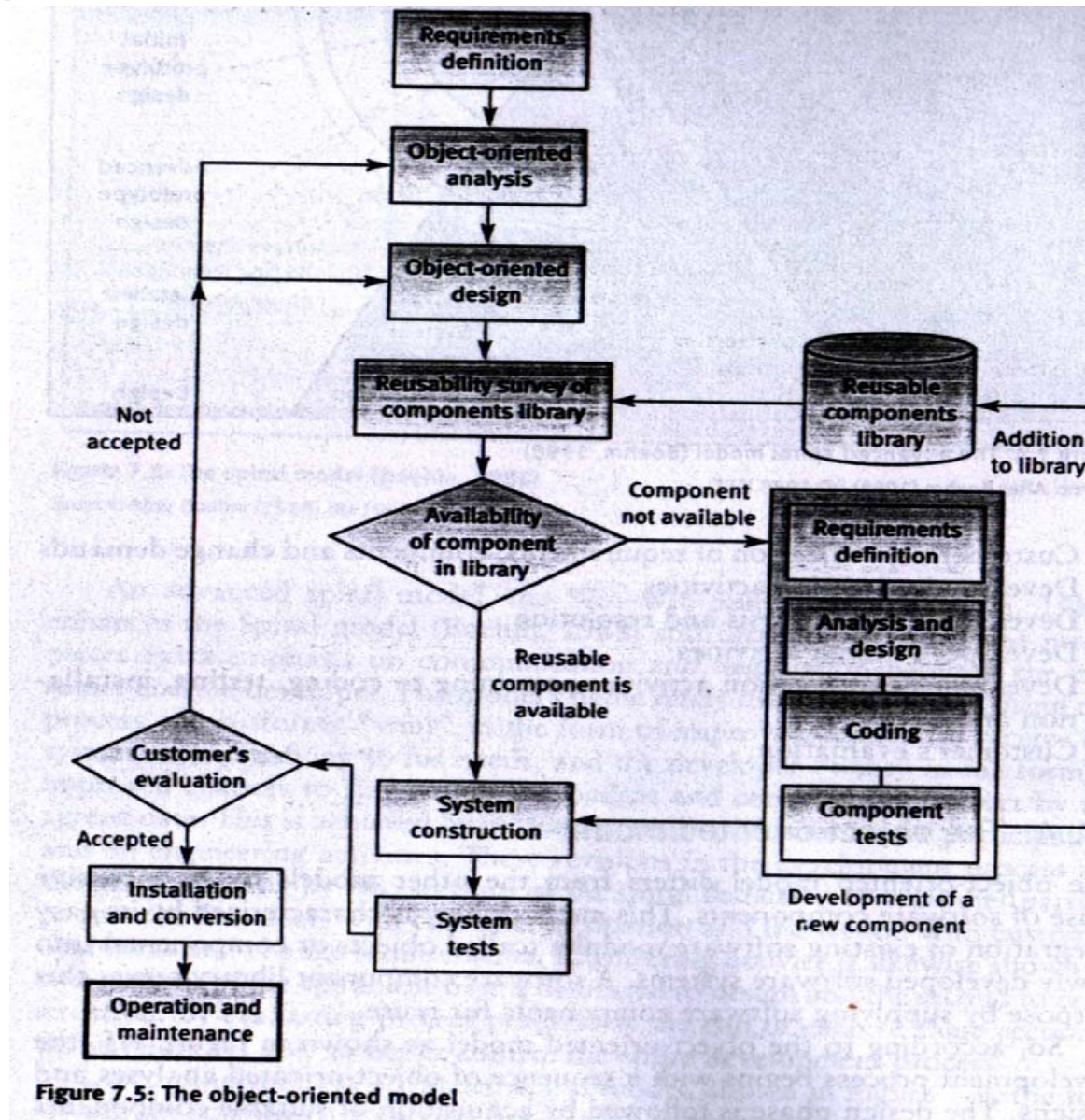Source: After Boehm (1988) (© 1988 IEEE)

The object-oriented model

Figure 7.5: The object-oriented model

Factors affecting the required intensity of quality assurance activities

- Project factors :
  - ☐ Magnitude of the projects
  - ☐ Technical complexity and difficulty
  - ☐ Extent of reusable software components
  - ☐ Severity of failure outcomes if the project fails
- Team factors :
  - ☐ Professional qualification of the team members
  - ☐ Team acquaintance with the projects and its experience in the area
  - ☐ Availability of staff members who can professionally support the team
  - ☐ Familiarity with the team members, in other words the percentage of new staff members in the team

Verification, validation and qualification

- **IEEE defines (1990) :**
  - "Verification – The process of evaluating a system or component to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase."
  - "Validation- The process of evaluating a system or component during or at the end of the development process to determine whether it satisfies specified requirements."
  - "Qualification – The process used to determine whether a system or component is suitable for operational use."

A model for SQA defect removal effectiveness and cost

■ The model deals with two quantitative aspects of an SQA plan consisting of several defect detection activities:

1. The plan's total effectiveness in removing projects defects.

2. The total costs of removal of project defects.

The Data

- The application of the model is based on three types of data:
  - Defect Origin Distribution
  - Defect removal effectiveness
  - Cost of defect removal

The Model

- The models is based on the following assumptions:
  - The development process is linear and sequential, following the waterfall model.
  - A number of "new" defect are introduces in each development phase.
  - Review and test software quality assurance activities serve filters, removing a percentage of the entering defects and letting the rest pass to the next development phase.
  - At each phase, the incoming defects are the sum of defects not removed by the former quality assurance activity together with the "new" defects introduced (created) in the current development phase.
  - The cost of defect removal is calculated for each quality assurance activity by multiplying the number of defects removed by relative cost of removing a defect.
  - The remaining defects, unfortunately passed to the customer, will be detected by him or her.

Summary

- Describe the various software development models and discuss the differences between them.

- Explain the consideration affecting application of quality assurance activities.

- Explain the different aspects of verification, validation and qualification for quality assurance activities.

- Describe the model for SQA defect removal effectiveness and cost.

- Explain possible uses for the model.

TUGAS III

Kembangkan materi testing sebagai salah satu kegiatan SQA untuk satu fase pengembangan SDLC :
- requirement
- design
- programming / coding
- instalasi
- acceptance
- maintenance

 satu fase dikerjakan oleh 3 orang, dan akan dipresentasikan dikuliah meliputi aspek :

* definisi
* keuntungan / kerugian
* pengetesan yang dilakukan
* proses pengetesan
* justifikasi SQA
* kesimpulan

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