
Fundamental activities in software engineering

Software Engineering 10



Four fundamental activities that are part of all software development processes

Specification, design and implementation, validation and evolution



Specification – defining what the software should do

**Design and implementation –
defining the software and data
organization and implementing the
system**



Validation – testing the system for bugs and to check it meets its requirements

Evolution – changing the system after it has gone into use



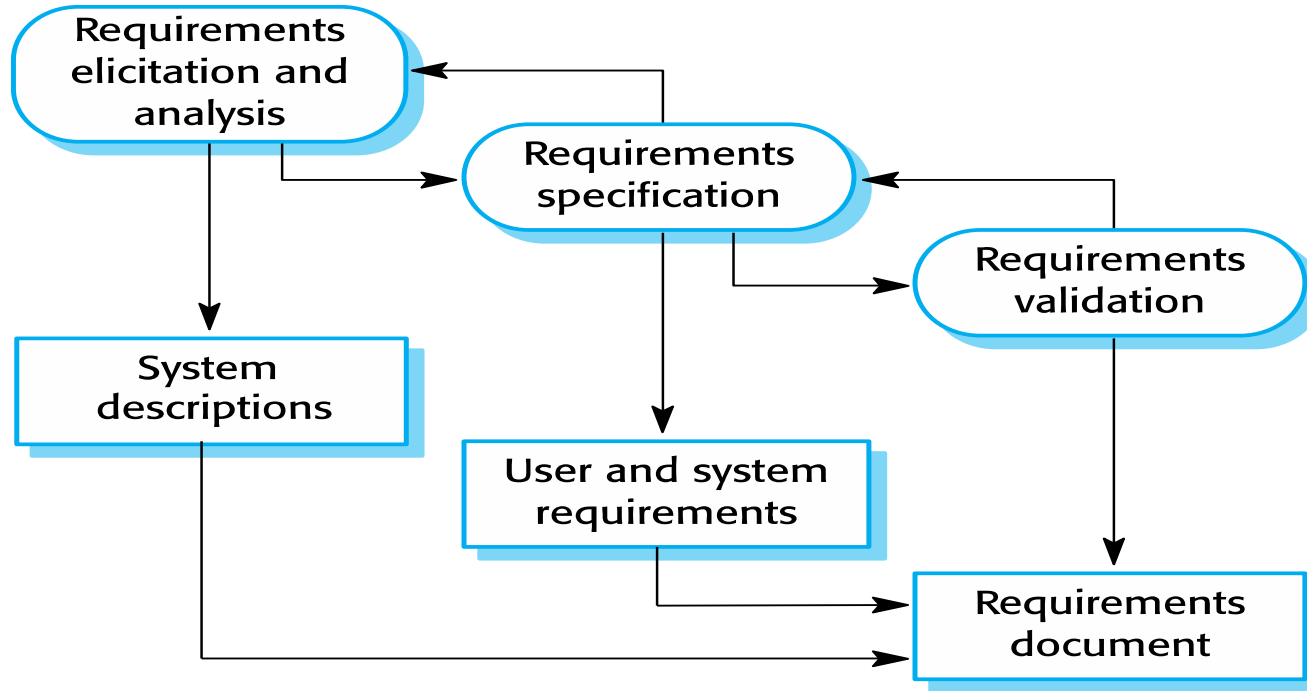
The four basic process activities of specification, development, validation and evolution are organized differently in different development processes.



For example, in the waterfall model, they are organized in sequence, whereas in incremental development they are interleaved.



The requirements engineering process



**Design a software architecture and
identify the major system
components**

Refine to add detail if required



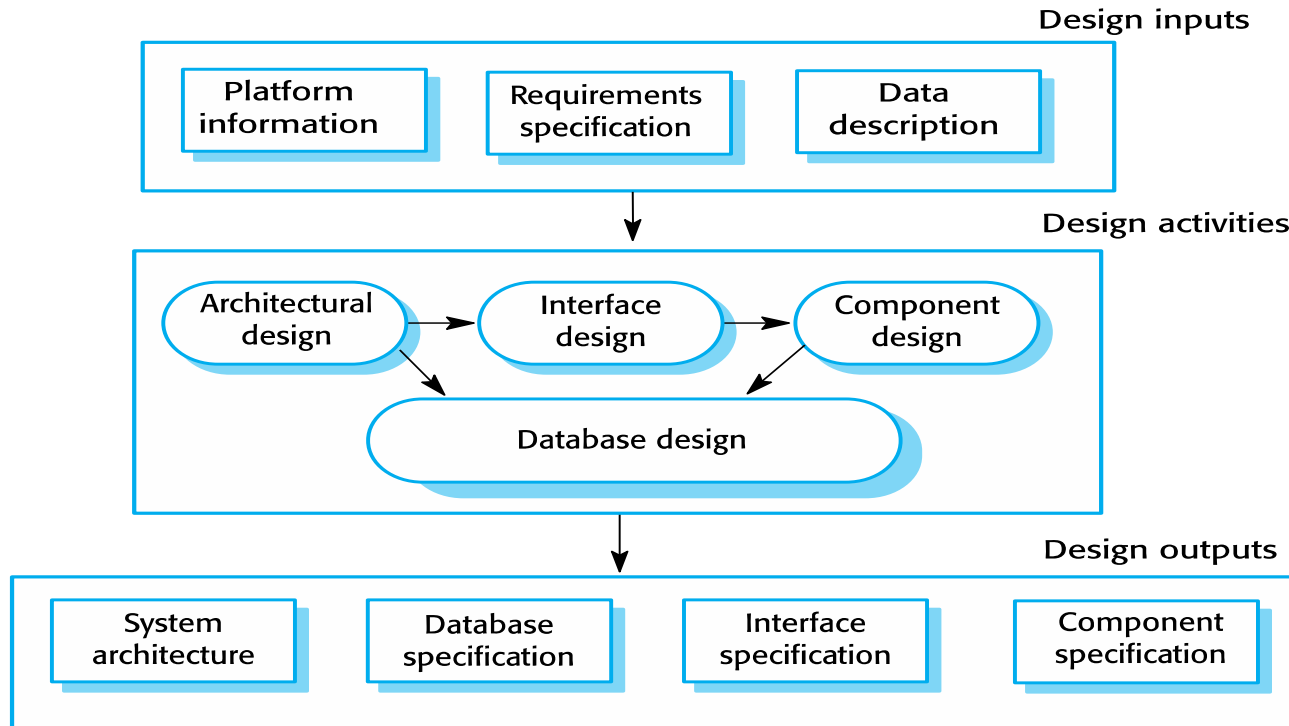
Implementation involves adding detail to the design and programming the system



Design and implementation are closely related and are normally inter-leaved activities.



A general model of the design process



The software is implemented either by developing a program or programs or by configuring an application system.



Programming is an individual activity with no standard process. Different people program in different ways



Debugging is the activity of using testing to reveal program faults and then correcting these faults.



Test-first development integrates testing/programming and debugging



Verification and validation (V & V) is intended to show that a system meets its stated requirements (verification) and also meets the real needs of the system customer (validation).



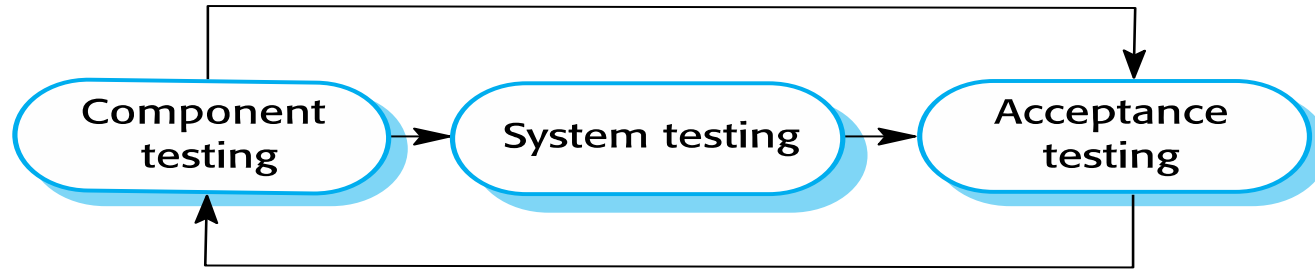
System testing involves executing the system with test cases that are derived from the specification of the real data to be processed by the system.



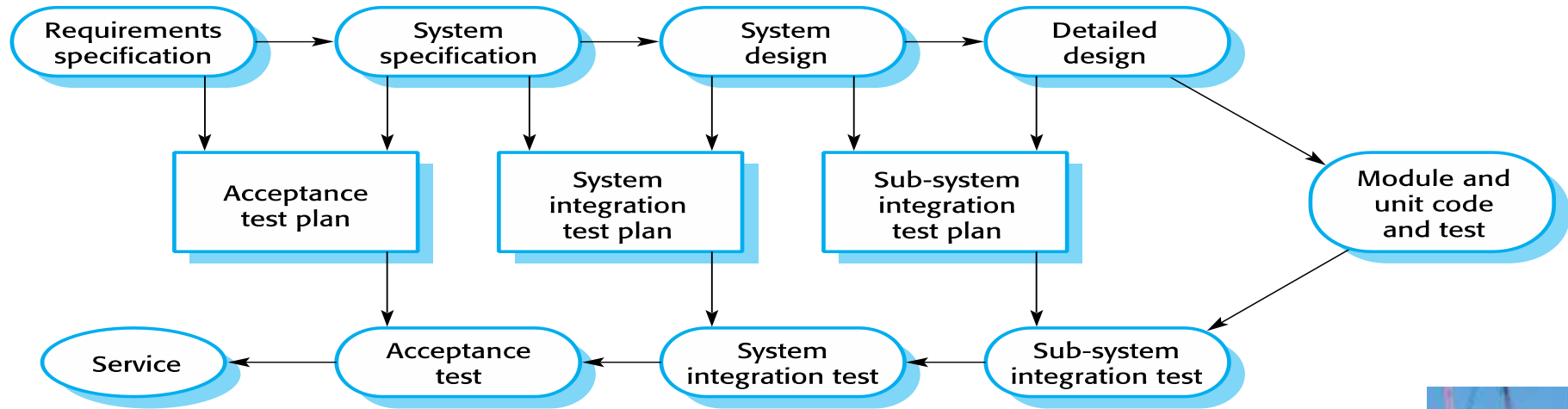
As well as system testing, system validation may involve other reviews and automated program checking procedures



Stages of testing



Testing phases in a plan-driven software process (V-model)



**Software is inherently flexible and
can change.**



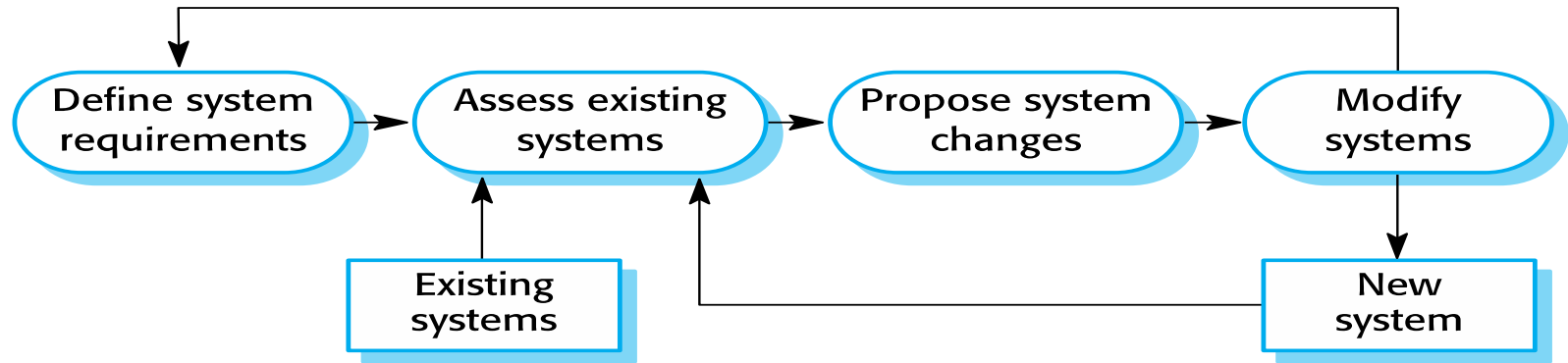
As requirements change through changing business circumstances, the software that supports the business must also evolve and change.



Although there has been a demarcation between development and evolution (maintenance) this is increasingly irrelevant as fewer and fewer systems are completely new



System evolution



The first part of my book on software engineering focuses on these fundamental activities of software engineering.

