COMP90041

Programming and Software Development

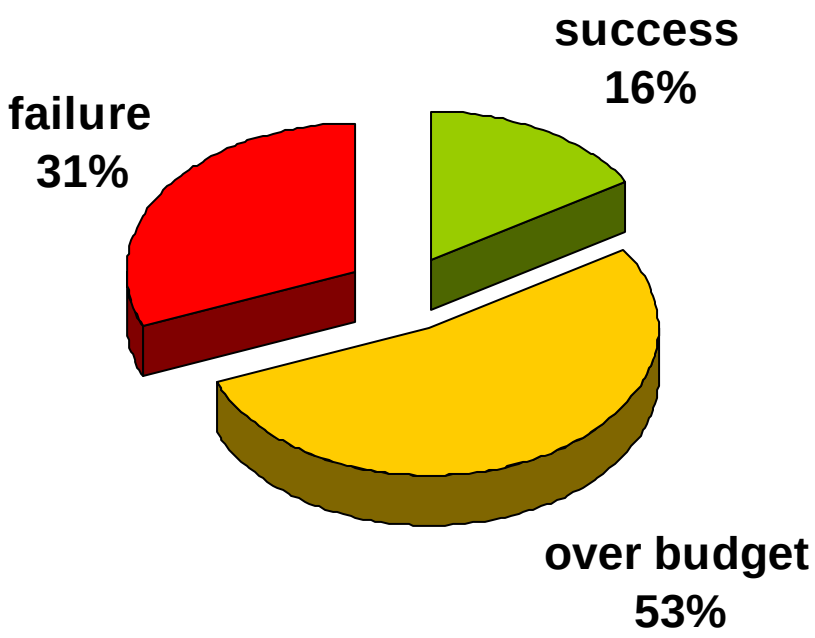
Introduction to Software Engineering

The Airbus A380 Super-Jumbo!

- Project started: Dec. 2000
- Budget: €8.8B -> €11B
- Delivery: 2006 -> 2008+
- Company's value: 26% drop
- Problems:
  1. Wiring (500km)
  2. Incompatible versions of CATIA
  3. High degree of customization
  4. Configuration Management and Change Control

Software Industry is in crisis!

- Over $80B US is wasted each year by failed software projects in the US alone!



Software Industry is in crisis!

- Who Killed the Virtual Case File?
  - $170M US
  - 700 000 lines of code

Major Software Failure Factors

1. Unrealistic or unarticulated project goals.
2. Inaccurate estimation of needed resources.
3. Badly defined *system requirements*.
4. Poor reporting of project Status.
5. Unmanaged risks
6. Poor Communication
7. Use of immature technology
8. Inability to handle complexity
9. Sloppy development practices
10. Poor project management
11. Stakeholder politics

What do we need?

- A systematic approach to Software development!
- That is Software Engineering (SE).

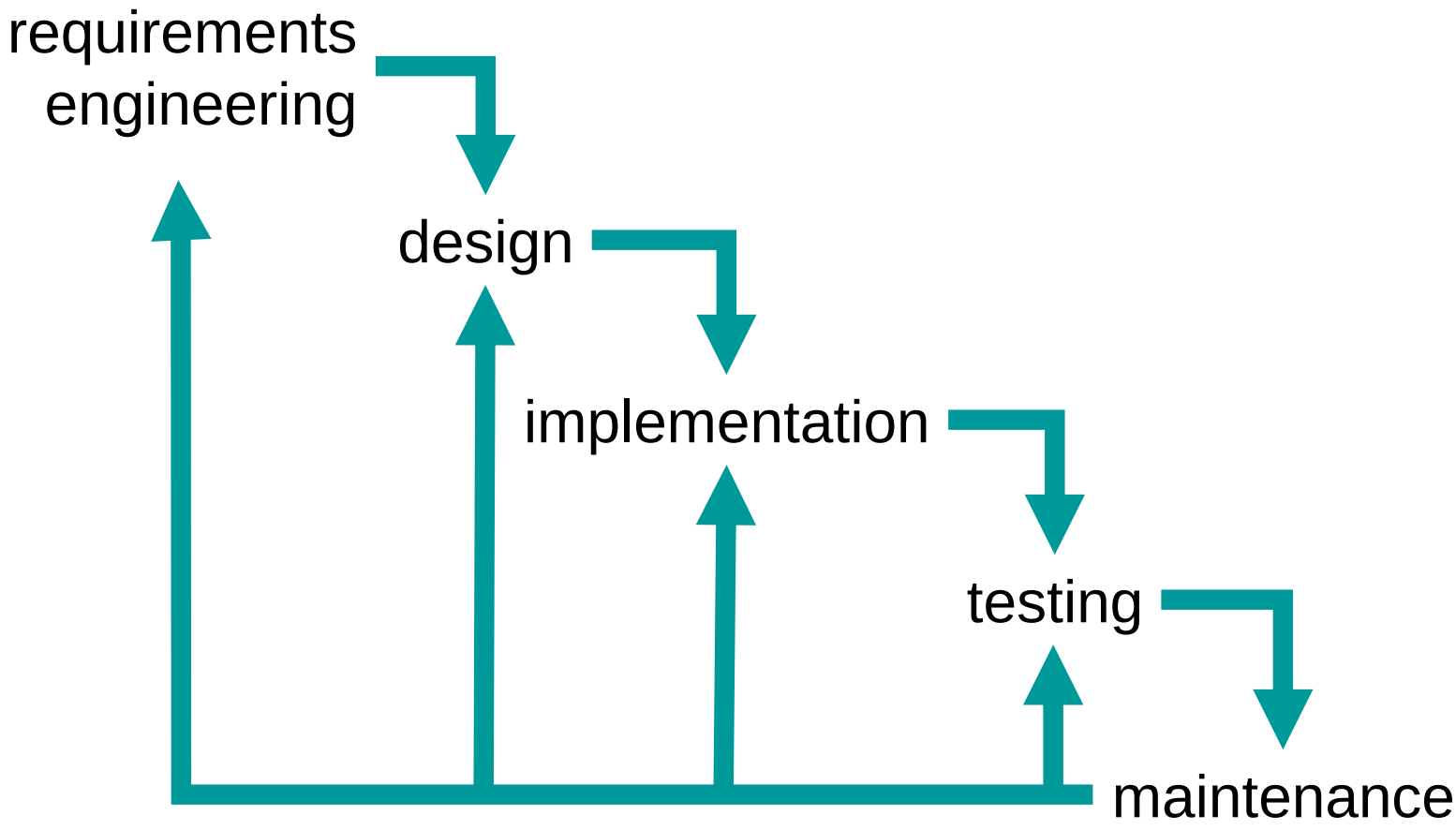
What is a software process?

- A set of activities whose goal is development or evolution of a software system.
- Generic activities in all software processes are:
  - Requirements Specification: **what the system should do and its development constraints.**
  - Design: **set of decisions on how the software system is going to meet its specification.**
  - Implementation: **actual production of the software system**
  - Validation: **making sure that the implemented software is meeting its specification.**
  - Evolution: **changing the software in response to changing demands.**

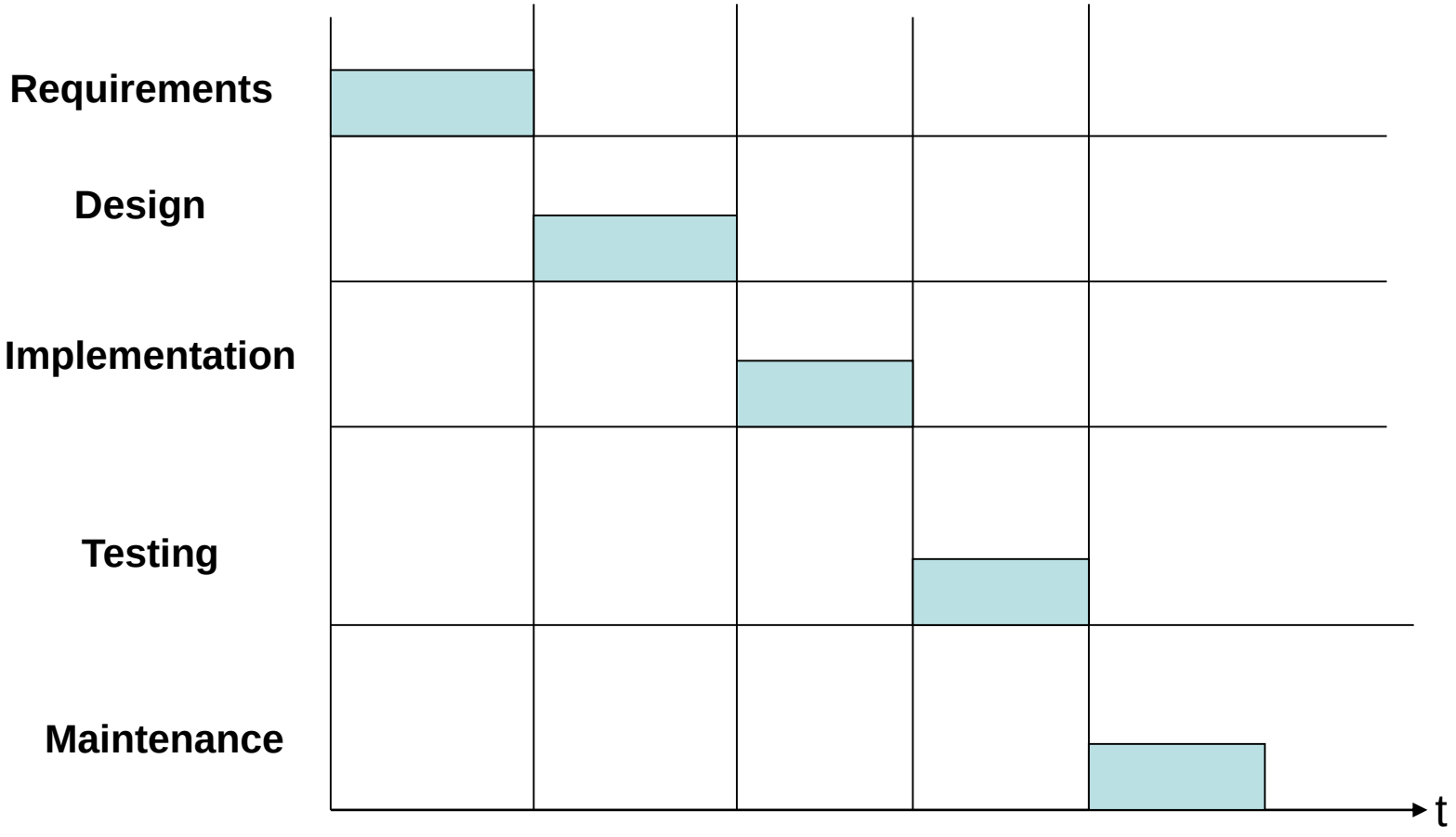
What is a software process model?

- An abstract representation of a software process from a specific *perspective*.
  - The Waterfall model
    - Separate and distinct phases of specification, design and development.

The Waterfall Model



The Waterfall Model



The Waterfall model (cont'd)

- Applicability
  - When the requirements are well-understood and changes will be fairly limited during the design process.
  - It is mostly used for large systems engineering projects where a system is developed at several sites.
- Problems
  - Each phase has to be completed before moving onto the next phase.
  - Difficult to respond to changing customer requirements.

Other software process models

- Evolutionary development
  - Specification, development and validation are interleaved.
- Component-based software engineering
  - The system is assembled from existing components.
- Incremental development
  - The system is designed and implemented in increments.