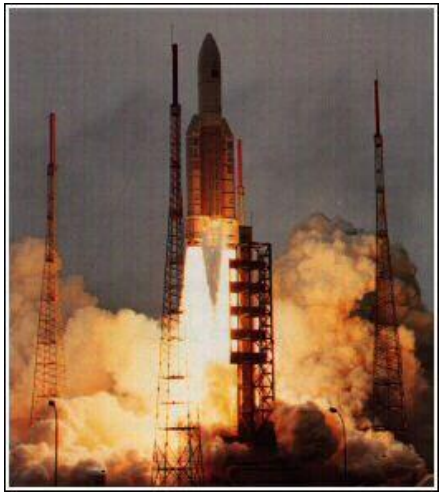
Software Inspection

Acknowledgement

- These slides are adapted from Nina D. Fogelström, Blekinge Institute of Tech. Sweden

Software Defects

On 4 June 1996, the maiden flight of the Ariane 5 launcher ended in a failure.



The failure of the Ariane 501 was caused by the complete loss of guidance and attitude information 37 seconds after start of the main engine ignition sequence (30 seconds after lift-off).
This loss of information was due to ***specification*** and ***design errors*** in the software of the inertial reference system.

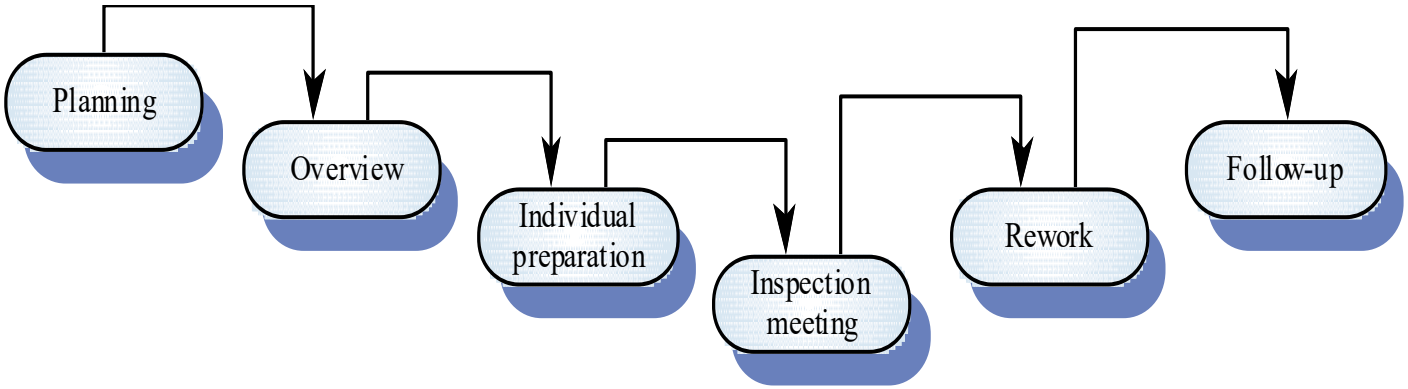
The exception was due to a floating-point error: a conversion from a 64-bit integer to a 16-bit signed integer…

There was no explicit exception handler to catch the exception, so it followed the usual fate of uncaught exceptions and crashed the entire software, hence the on-board computers, hence the mission.

Inspection Objectives

- To find problems at the earliest possible point in the software development process
- Ensure that necessary rework will be done
- Verify that any rework done meets the predefined criteria

Inspection Process Fagan



- System overview presented to inspection team
- Documents are distributed to inspection team in advance
- Inspection takes place and discovered errors are noted
- Modifications are made to repair discovered errors
- Re-inspection may or may not be required

Checklist for Requirements Inspection

Clearness	Is the requirement ambiguous? Is the requirement measurable?
Uniqueness	Is it possible to find duplicate requirements?
Numbering	Does the requirement have a number?

Checklist for Code Inspections

Data Flows	Are all program variables initialized? Have all constants been named?
Control Flows	For a conditional statement is the condition correct? Is each loop certain to terminate?
Interface Flows	Are the parameters in the right order? Do function calls have the correct number of parameters?

Cost-benefit analysis

- What do inspections cost?
  - About 10-15% of the development budget (Not included the start-up costs) - Tom Gilb
- Example of costs:
  Planning; Training; Inspecting; Analysis Other?

- What are the benefits?
- 42% of all defects result from lack of traceability from code to design…
- 50-90% of the defects are caught by the inspections.

Reading Reference

- Books:
- Steven. R. Rakitin, “Software Verification and Validation For Practitioners and Managers”, Chapters 5,6.
- I. Sommerville, “Software Engineering”, Excerpt: Verification & Validation, Addison-Wesley, 7-th addition, pp. 521-527.
- Articles:
- A. Aurum, H. Petersson and C. Wohlin, “State-of-the-Art: Software Inspections after 25 Years”, Software Testing Verification and Reliability, 2001.
- H. Petersson and T. Thelin, ”A Survey of Capture-Recapture in Software Inspections”, Proc. First Swedish Conf. on Software Engineering Research and Practice, October 2001.
- S. Biffl, “Using Inspection Data for Defect Estimation”, IEEE Software, November/ December 2000, pp. 36-43.