

Software Quality & Testing

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inspired by the ISTQB foundation syllabus 2011



Software Quality

External quality : the stakeholder point of view

Internal quality : the development team point of view



External Quality

Functional

Validity w.r.t. the user requirements

Robustness when encountering
unexpected behaviors



External Quality

Non-functional (usually easier to check)

Performance: scalability, Throughput

Usability: easy to understand, fast to use

Reutilisability Portability Interoperability



Internal Quality

Verifiability: Is the software easily testable

Maintainability: adding a new feature or fixing a bug does not require huge preparation



How to ensure quality?

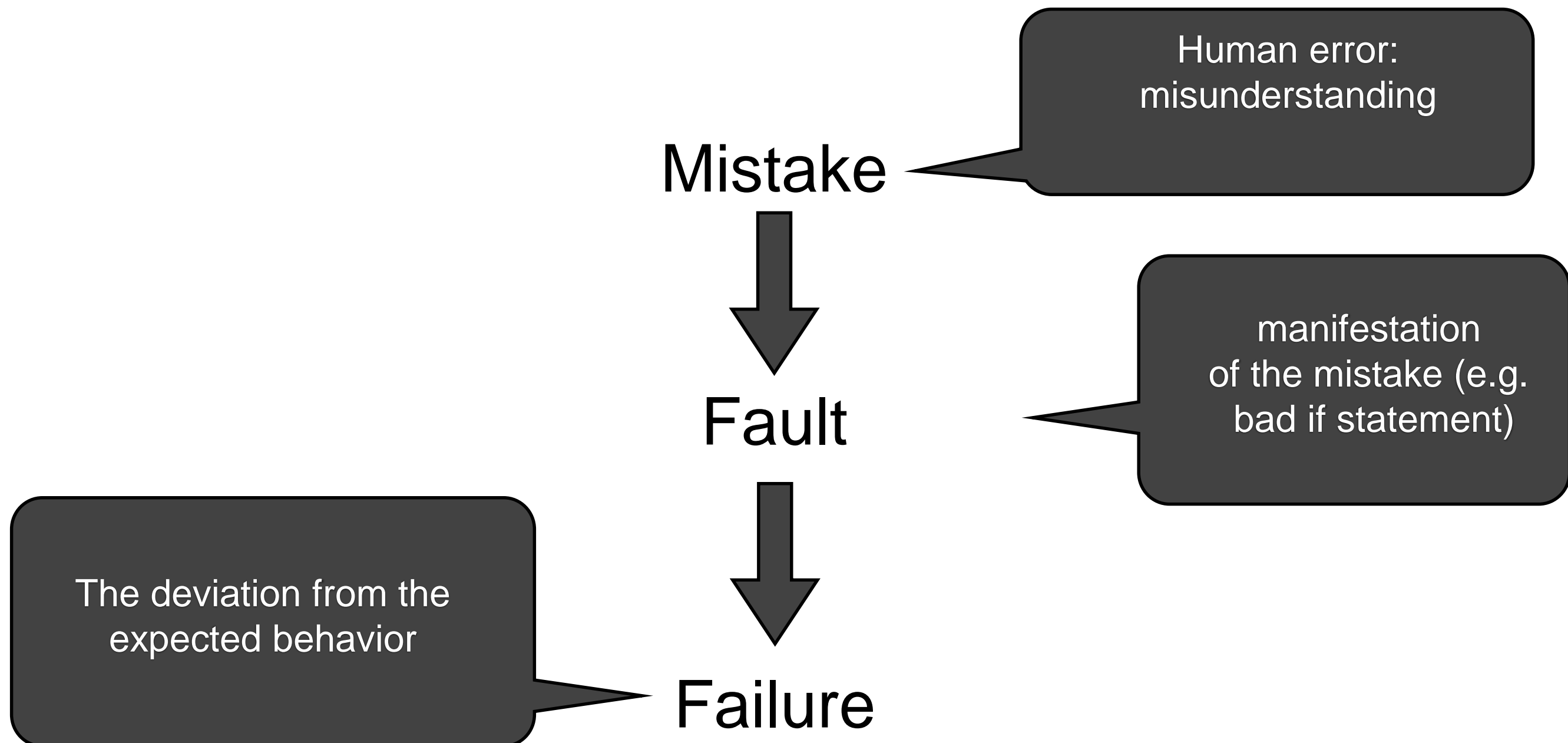
Test

Model Checking

Code Review/Audit

By Following known good practices/patterns

What do we chase?



V&V

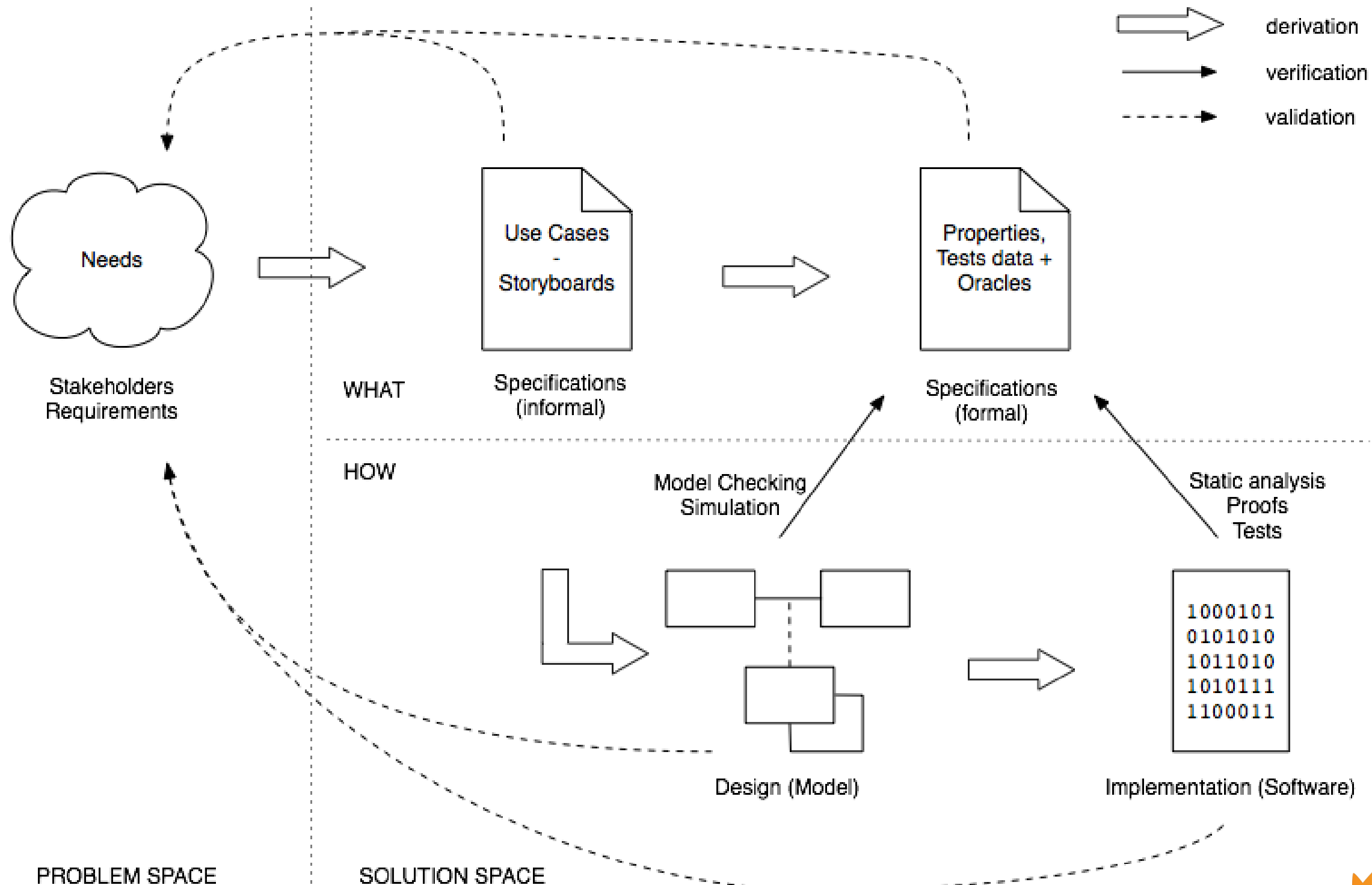
Assessing that the produced software respects the specification is not the same thing as checking that it satisfies user needs.

Validation : Did we built the right software (w.r.t. the user needs)

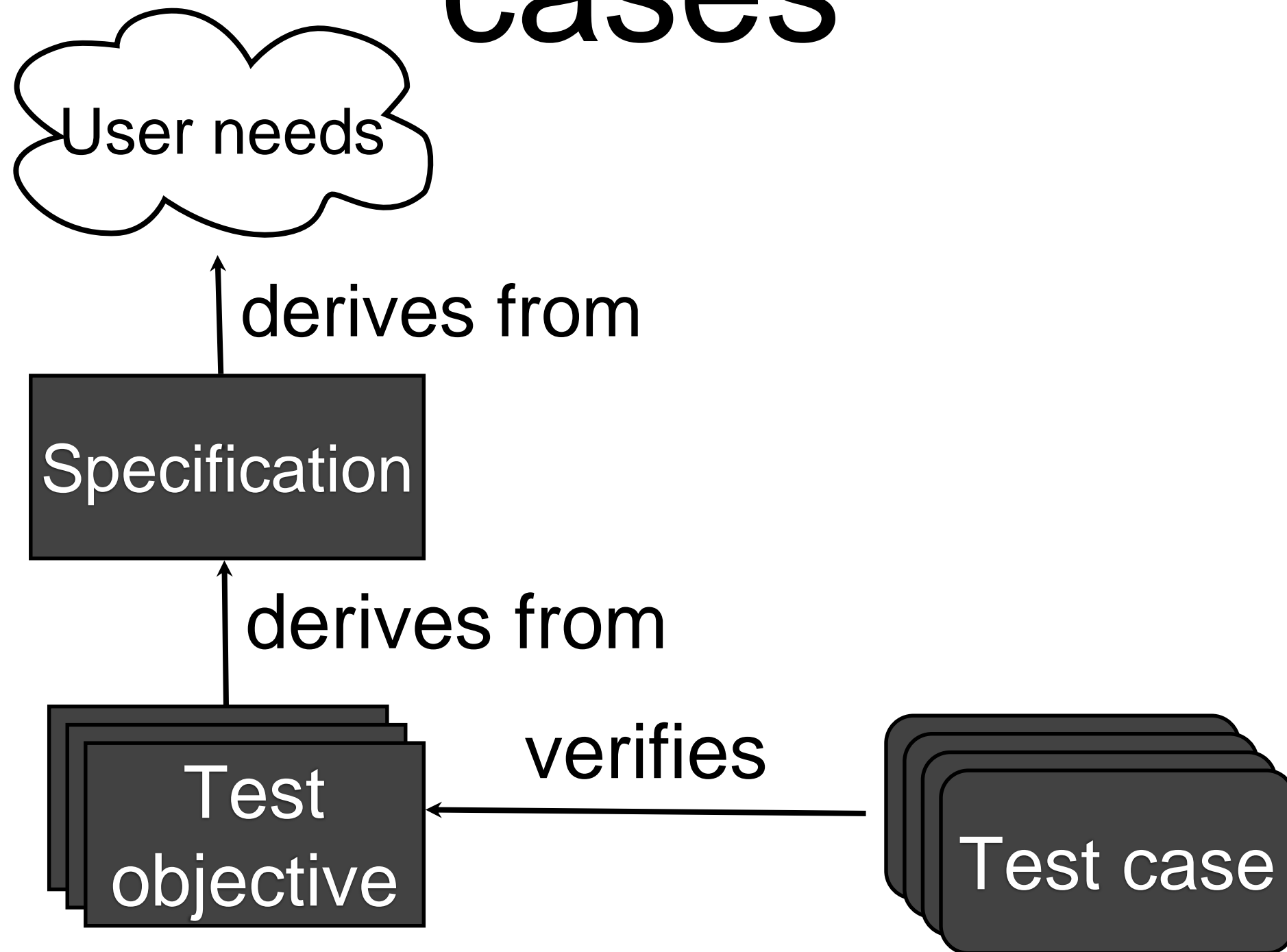
Verification : Did we built the software right(w.r.t. the specification)



Validation & Verification



Test conditions & Test cases



Testing : Vocabulary

from IEEE STD 829-2008

Test objective : what to test (functionality, NFR)

Test Case : verifies a test objective and consists in a set of input values, pre-conditions, expected result and post-conditions



Testing : Vocabulary

from IEEE STD 829-2008

Test Procedure : procedure to setup, execute, and evaluate the result of a sequence of test cases

Test plan : description of the scope, approach, resources and schedule of the test activities.



What is testing

Testing consists in the following activities:

1. Tests planning and control
2. Test analysis and design
3. Test implementation and execution
4. Evaluate exit criteria and reporting
5. Test closure activities



Test planning and control

1. Definition of the test objectives
2. High-level scheduling
3. Control and reporting of deviations

Test analysis and design

- Transform general test conditions into real test cases:
 - Put the test architecture in place
 - Designing high-level test cases

Test implementation and execution

- Prioritizing Test cases implementation
- Creating test procedure
- Creating a test harness (environment)
- Check bi-directional traceability



Test implementation and execution

- Executing the test procedure
- Logging outcome
- Compare actual and expected results
- Report failure and trace back the reason
- Repeat the execution to check that the fault has been fixed.



Evaluate exit criteria & reporting

- Collect the data produced by the test executions and present them to the stakeholders so that they can make an informed decision.
- Evaluate the confidence in the software quality

Test closures activities

- Improve test infrastructure and guidelines based on the experience
- Clean up the test infrastructure for the next run



How much testing is enough?

- Risks
- What is at stake (human life, granny's pictures, billions of \$\$)
- Testing should provide enough information and confidence to the stakeholder such that they can decide whether to go live.

7 principles in tests

(1)

from ISTQB syllabus 2011

Testing proves the presence of defects.

Testing DOES NOT PROVE the absence of defects (see principle 2).



7 principles in tests

(2)

from ISTQB syllabus 2011

Exhaustive testing (testing all combination of inputs and outputs) is not feasible for non-trivial case.

7 principles in tests

(3)

from ISTQB syllabus 2011

The sooner the tests, the better it is

7 principles in tests

(4)

from ISTQB syllabus 2011

Investigate the defect density.

Testing should focus on the
modules with a high
expected/measured defect density

7 principles in tests

(5)

from ISTQB syllabus 2011

Tests do not age well. In other terms, tests should be reviewed regularly to assess their validity



7 principles in tests

(6)

from ISTQB syllabus 2011

Testing is not done similarly in safety-critical application and in e-commerce web sites. Remember to assess the risks and what is at stake.



7 principles in tests

(7)

from ISTQB syllabus 2011

No defect does not mean that the system is up for prime time. It means that it fulfills (some of) the specification but not necessarily the user requirements.

