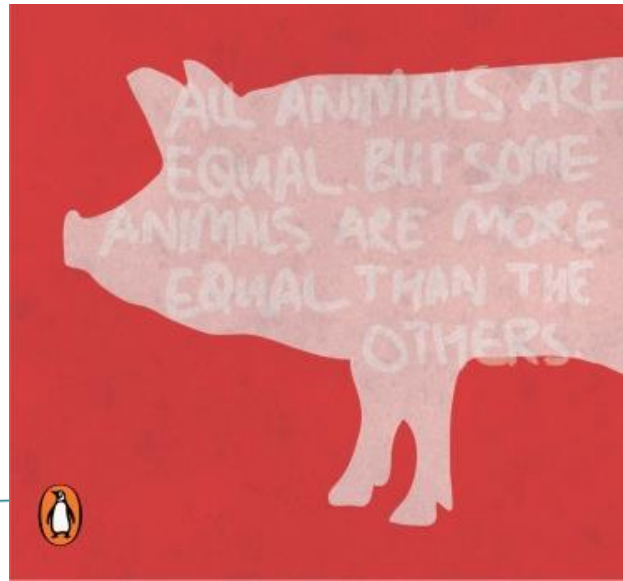
Model-Based Testing

Test Selection

Test Selection

All test cases are equal, but some

test cases are more equal than others



Test Selection

(Infinitely) many sound test cases can be generated,

but : no time and resources to execute them all

exhaustive testing not possible in practice

- *Which tests are the best ones ?* *How many tests ?*

Problem of Test Selection

- = select subset of exhaustive test suite,

  to achieve confidence in quality of tested product

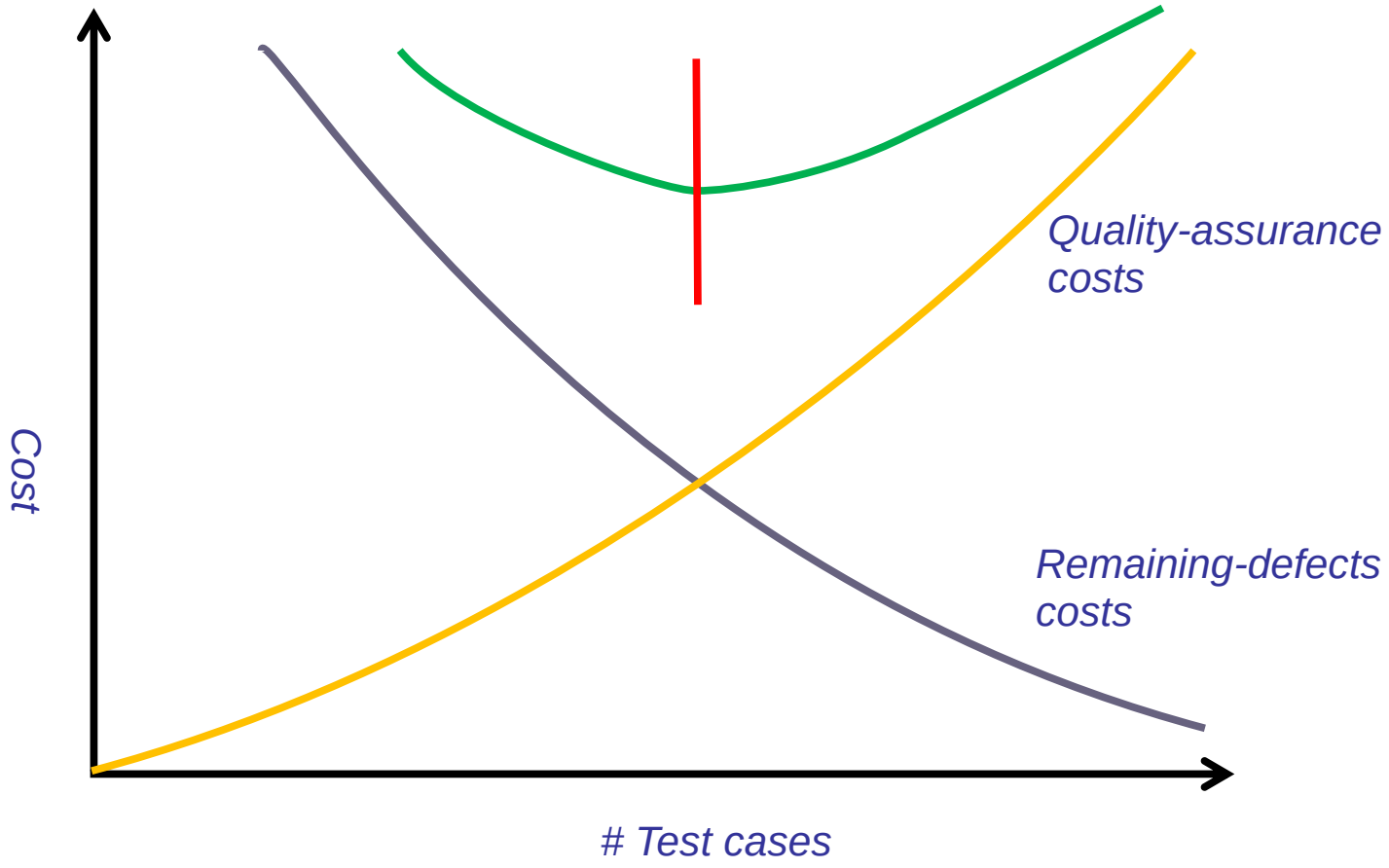
  – select best test cases capable of detecting failures

  – measure to what extent testing was exhaustive **: coverage**

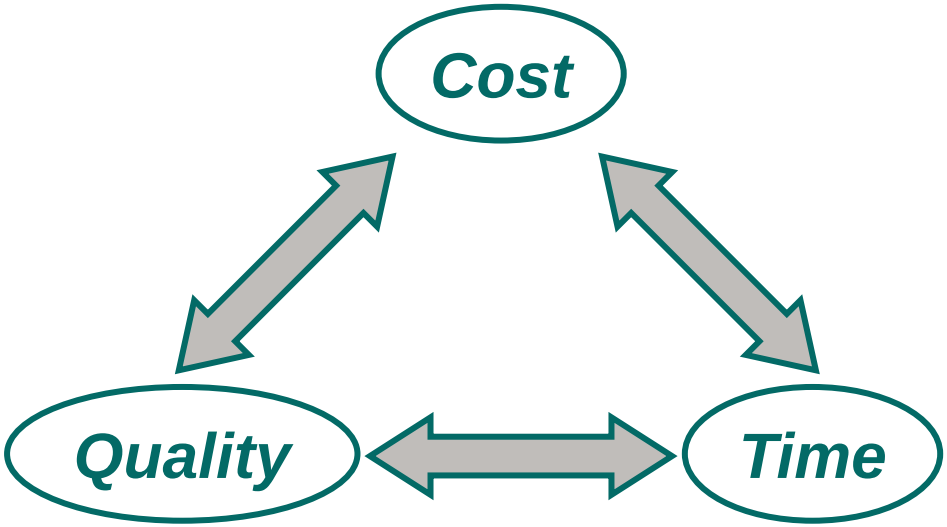
- Optimization problem

  best possible testing ↔ *within cost/time constraints*

Testing and Quality



Is Quality on Time and Cheap?



Tension between:

- On Time ⇔ Right Quality ⇔ Cost

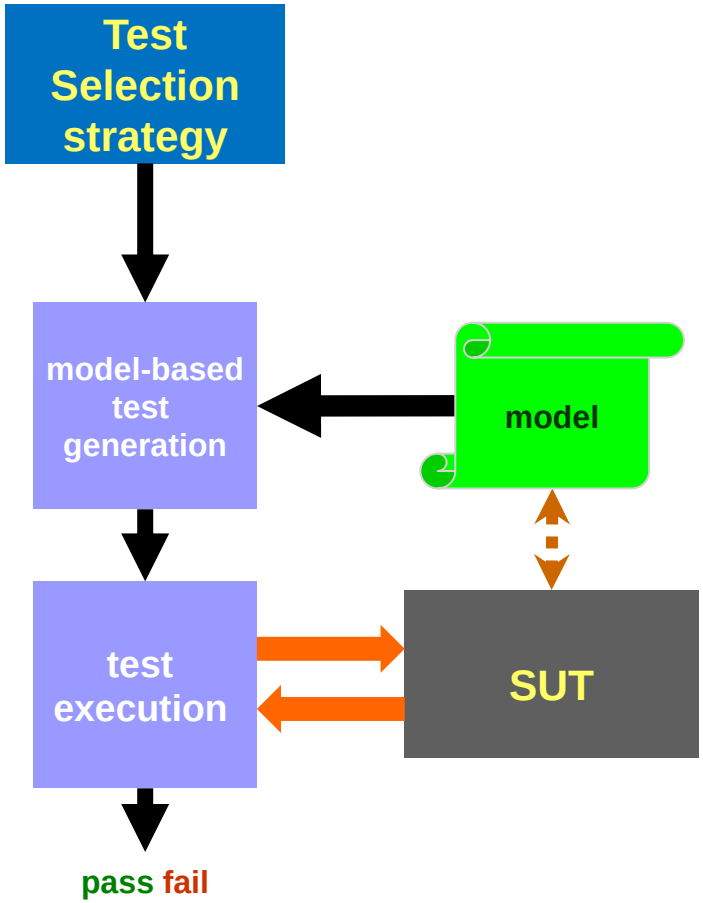
- When is the product really needed?
  This depends on the market situation.
- What level of product/system quality is needed.
  Also depends on the market situation

Test Selection

test selection = test **suite** selection

- test absolute value function – compare test suites:
  - **-123 0 7**
  - **-123 -7 7**
  - **3 5 7**

Test Selection



Extra (domain) information required :

- strategy : coverage of model
- which test cases have high value?
- which errors are likely?
- which errors have high impact?

} ***risk***

- what is the user / customer doing?

} ***usage profiling***

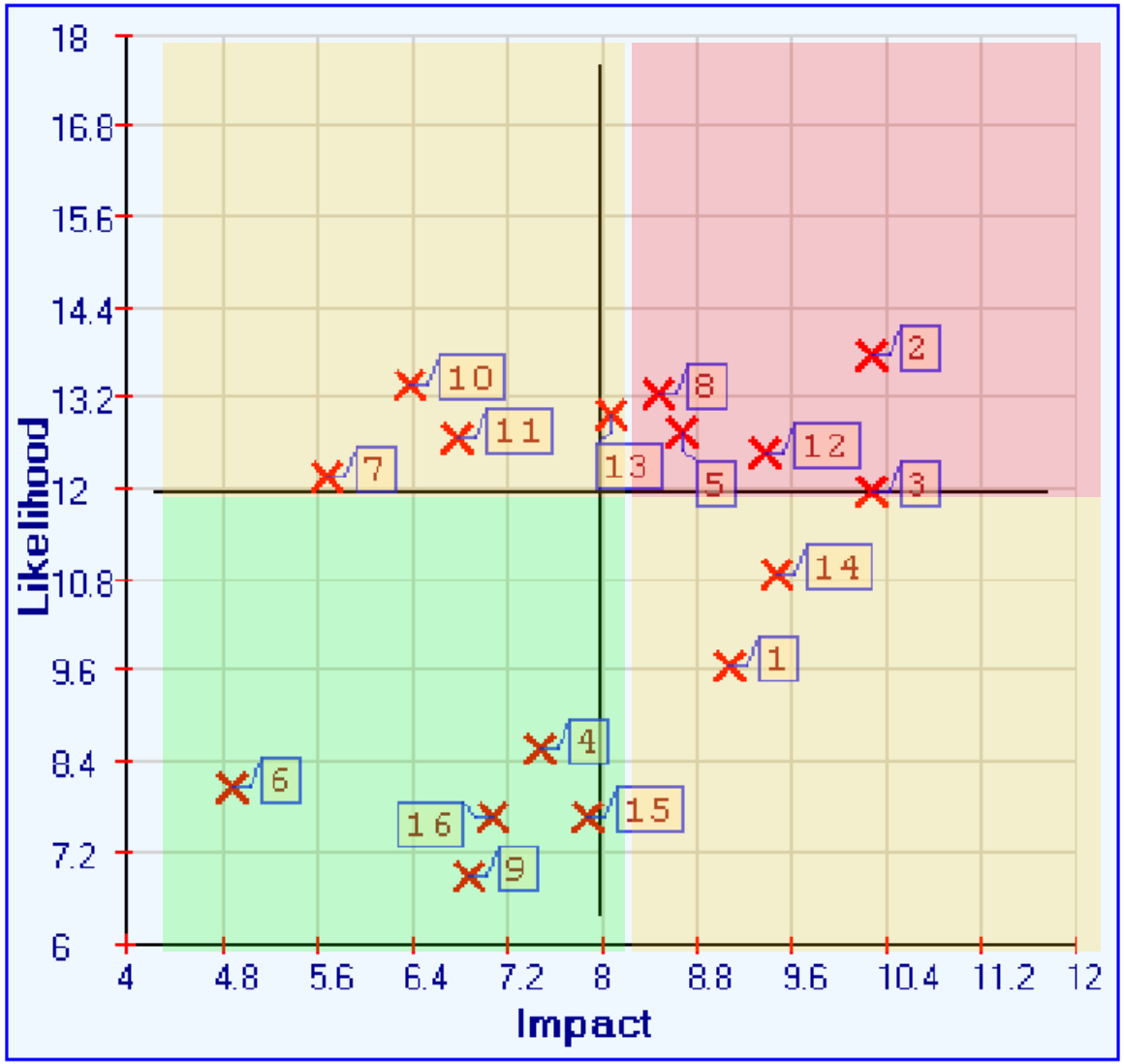
statistical testing

Risk Analysis

Red quadrant:
high priority

Yellow quadrant:
medium priority

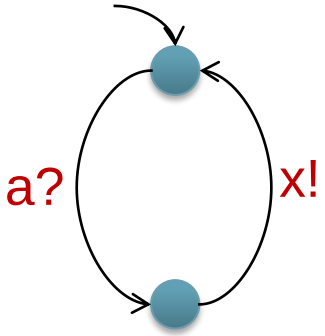
Green quadrant:
low priority



Test Selection: Approaches

1. random
2. domain / application specific, guided by user :

   test purposes, test goals, …
3. generic strategy: model / code based: coverage
   - usually structure based

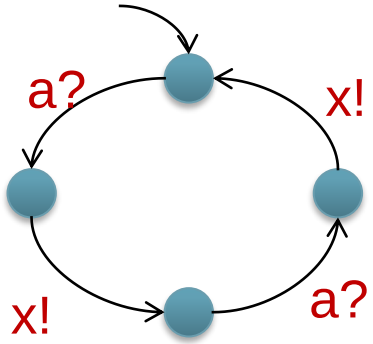


test: a! x?

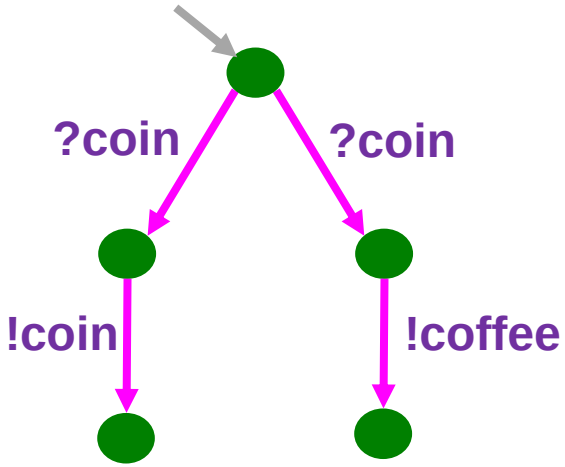
100%

50%

transition coverage



Test Selection: Test Purpose



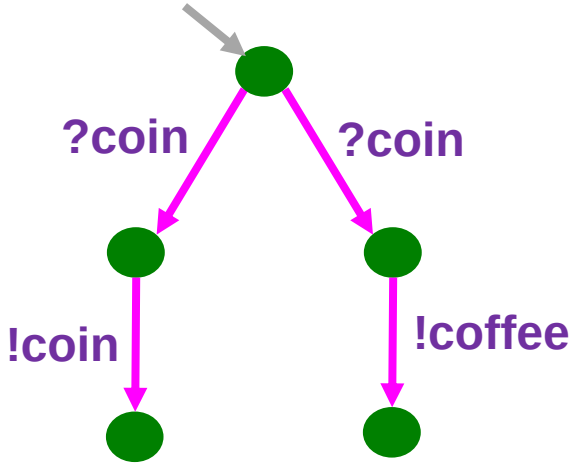
Test: can the machine deliver coffee?

Desired observation: **coffee** after **coin**

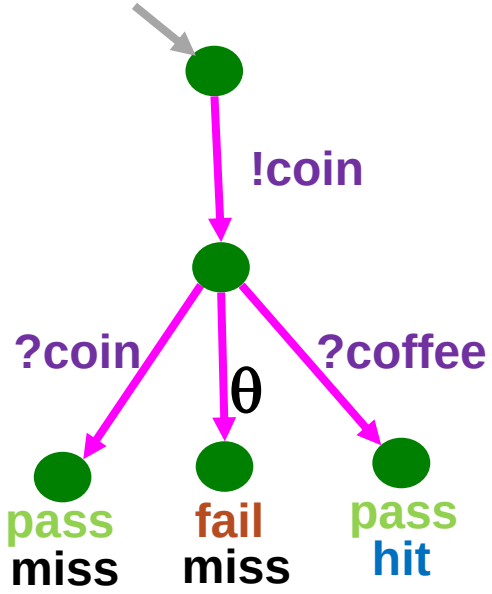
More confidence in correctness

We can only draw conclusions based on observations

Test Selection: Test Purpose



Test purpose:
can the machine
deliver **!coffee** ?



Desired observation
= observation objective
?coin.!coffee