Sofware Testing

#01 - Fundamentals

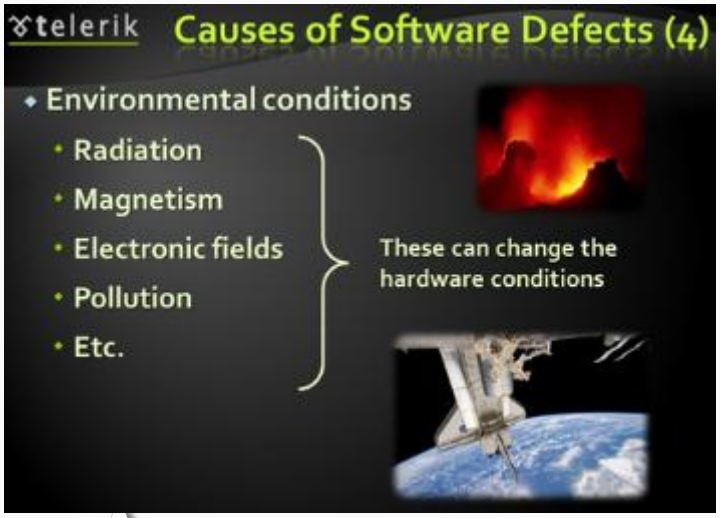
Herman Kabetta

Why is Testing Necessary

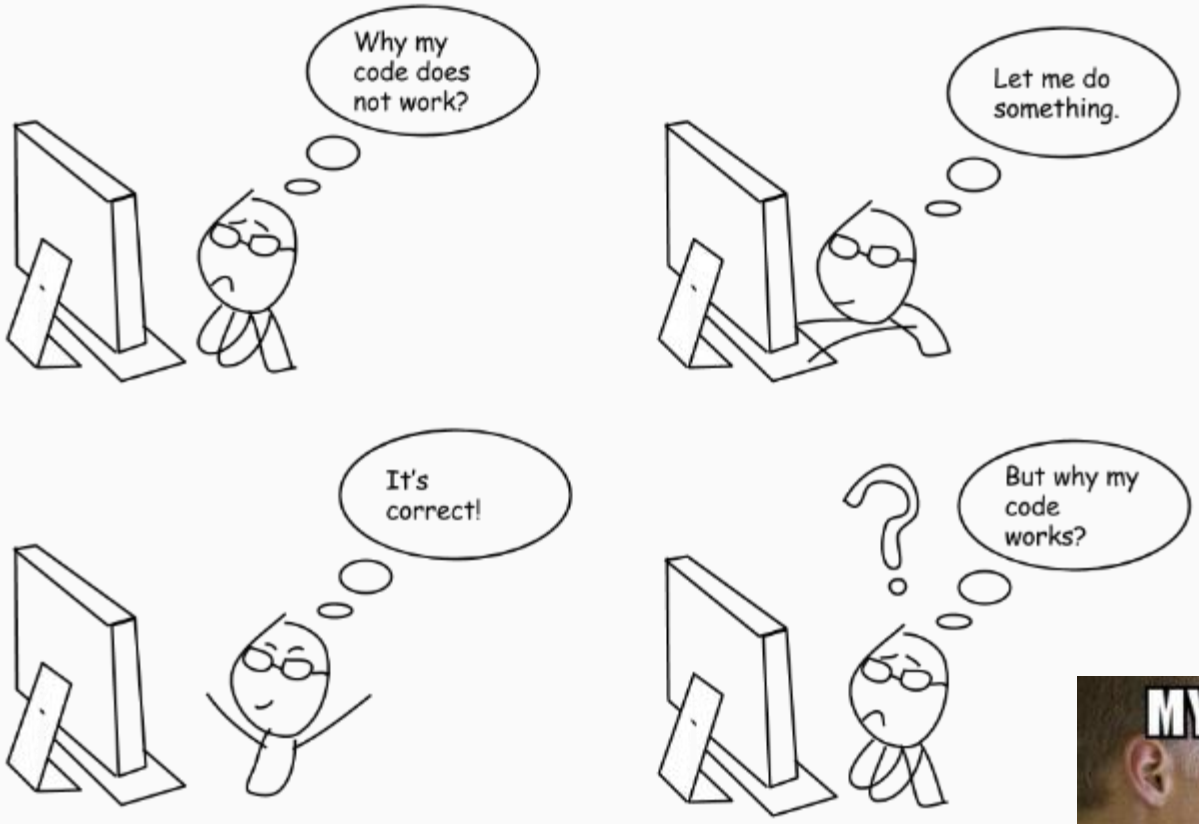
- Bug
- Defect
- Error
- Failure
- Fault
- Mistake
- Quality
- Risk
- Software
- Testing

Cause Of Defect

- Human
- Environmental



When programmers debug the code

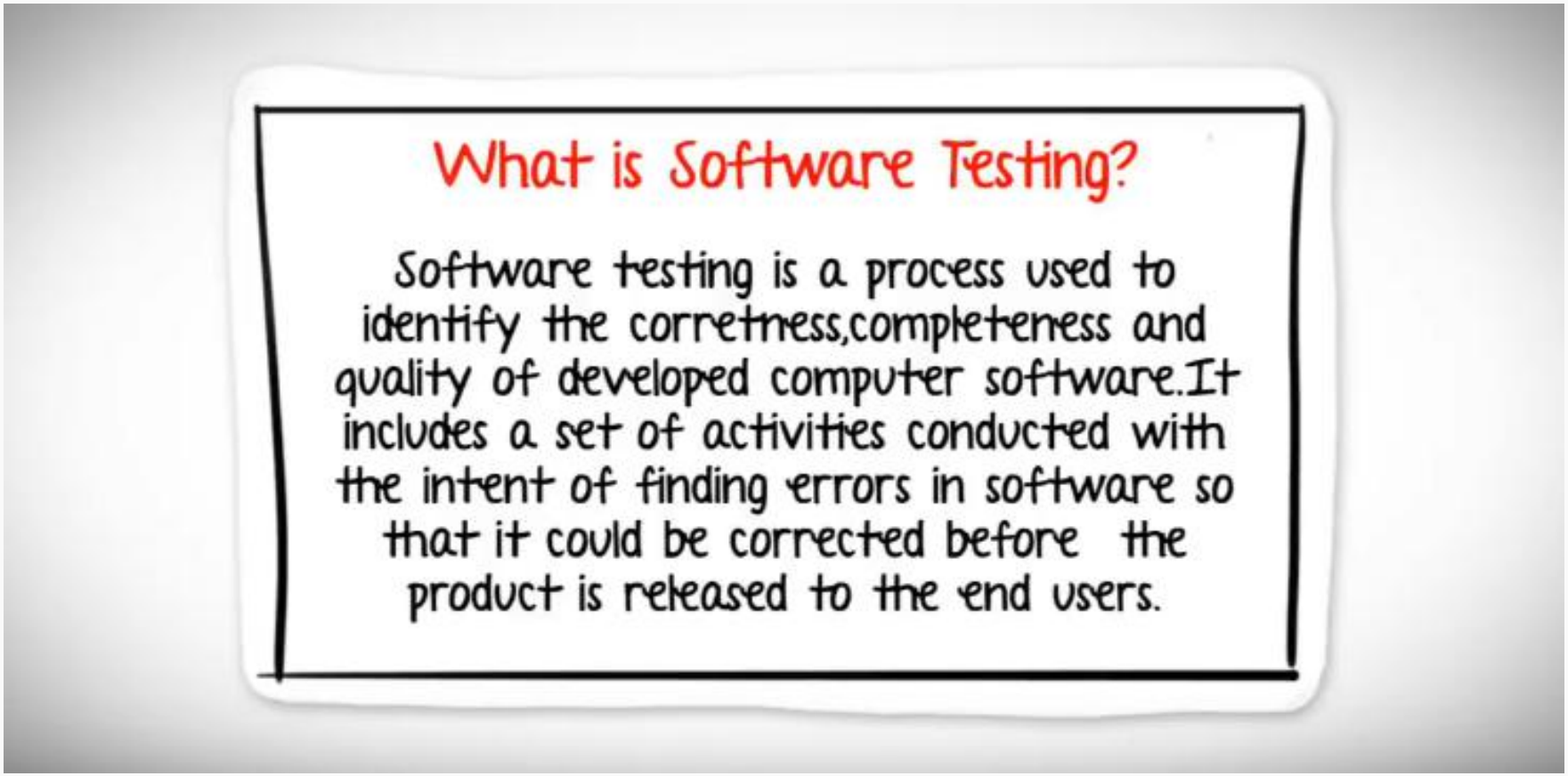


Development Testing Process

There can be different test objectives:

- Finding defects;
- Gaining confidence about the level of quality and providing information;
- Preventing defects.


What is
Software Testing?


What is Software Testing?
Software testing is a process used to identify the corretness,completeness and quality of developed computer software.It includes a set of activities conducted with the intent of finding errors in software so that it could be corrected before the product is released to the end users.


In simple words, software testing
is an activity to check
that the software system is
defect free.

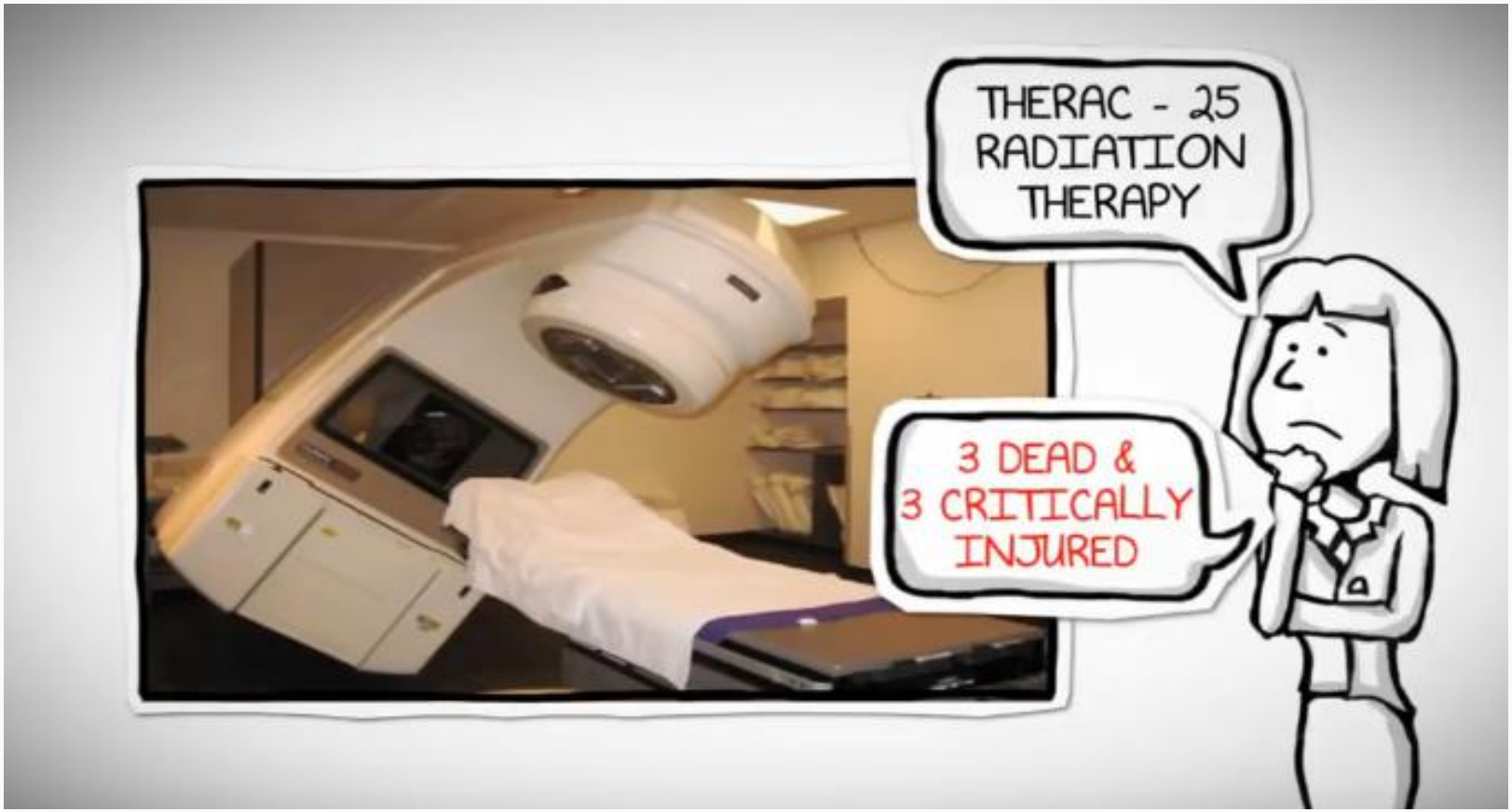

Why is Testing Important?

Why is testing necessary ?

- **Rigorous testing reduces the risk** of failures occurring during operation
- When defects are fixed, quality increases
- Software testing may also be required to meet contractual or legal requirements or industry-specific standards

A China Airlines Airbus Industrie A300 crashes on April 26, 1994


Software Bugs can potentially cause Monitary or even loss of life


THERAC - 25
RADIATION
THERAPY
3 DEAD &
3 CRITICALLY
INJURED

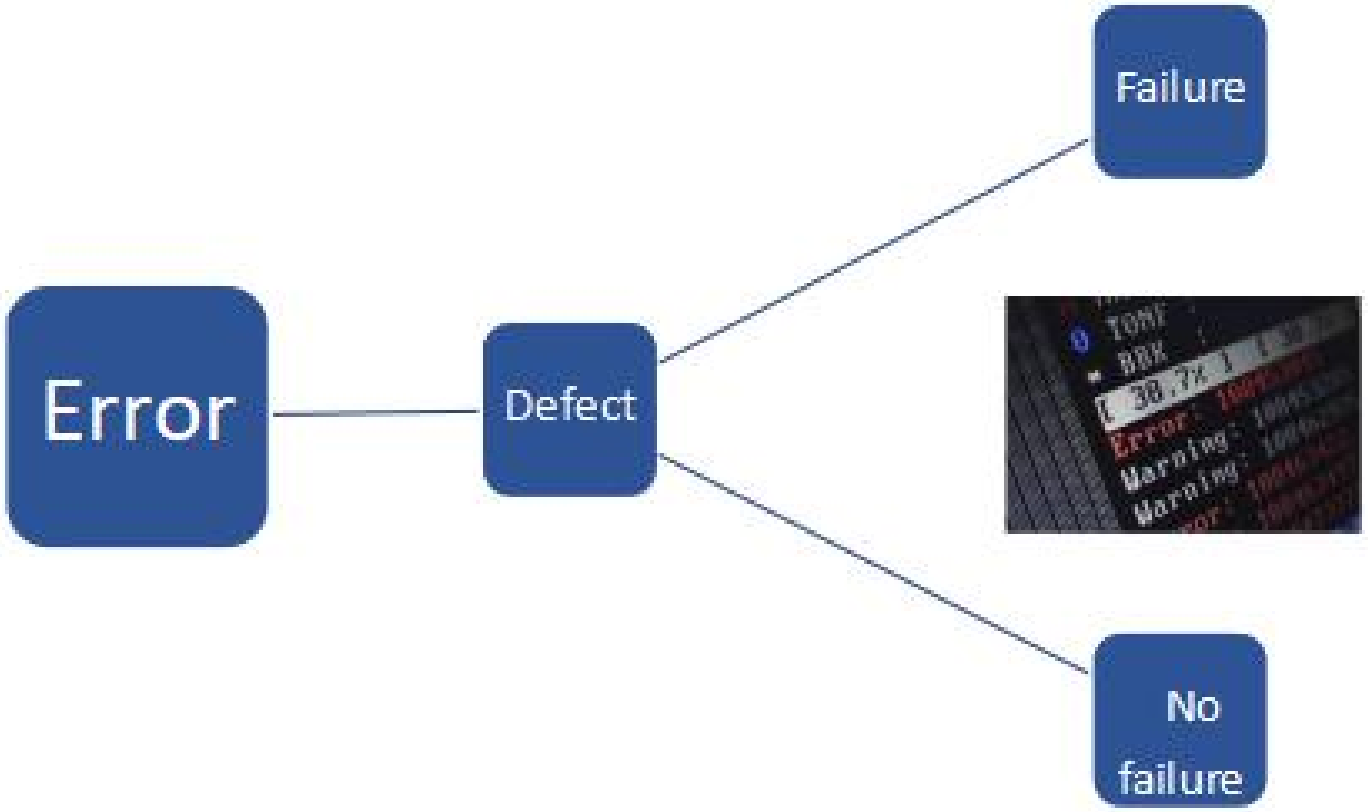
Failed Satellite Launch

$ 1.2 billion lost

In April of 1999, a software bug caused the failure

May, 1996


Software Bugs can be
Expensive or even
Dangerous

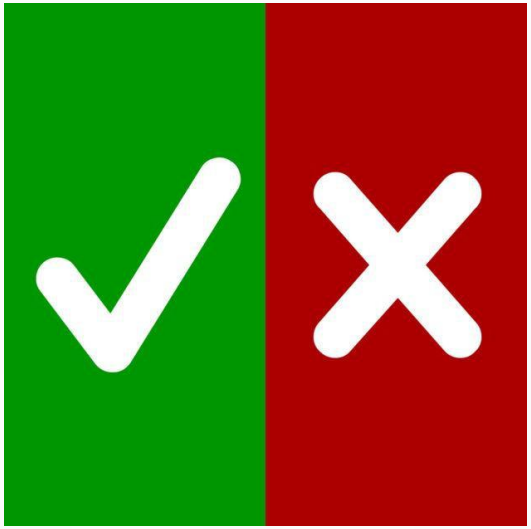

Error
Defect
Failure
No failure

Why do errors happen ?

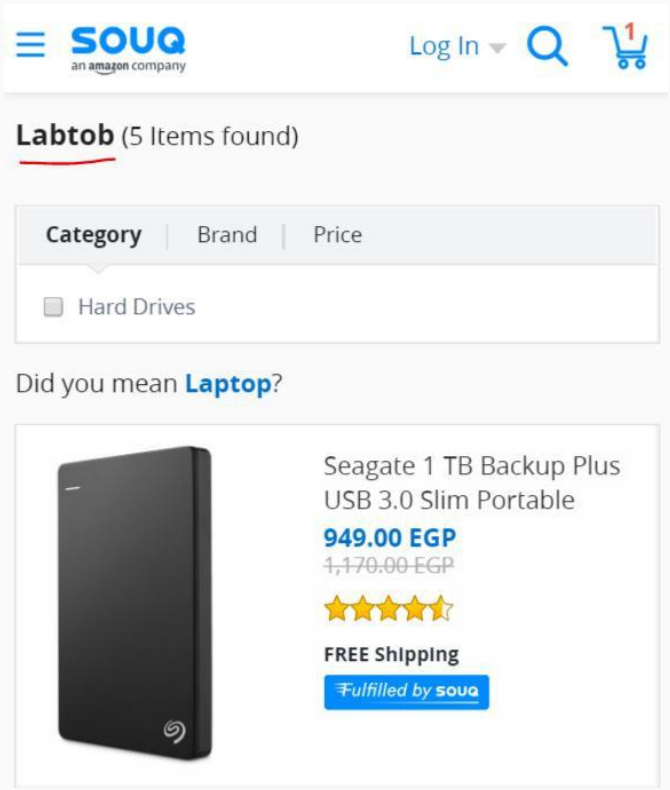
- Time pressure
- Human fallibility
- Lack of Experience
- Miscommunication

- Complexity of work products
- System Interactions
- New technologies
- environmental conditions

False Positive



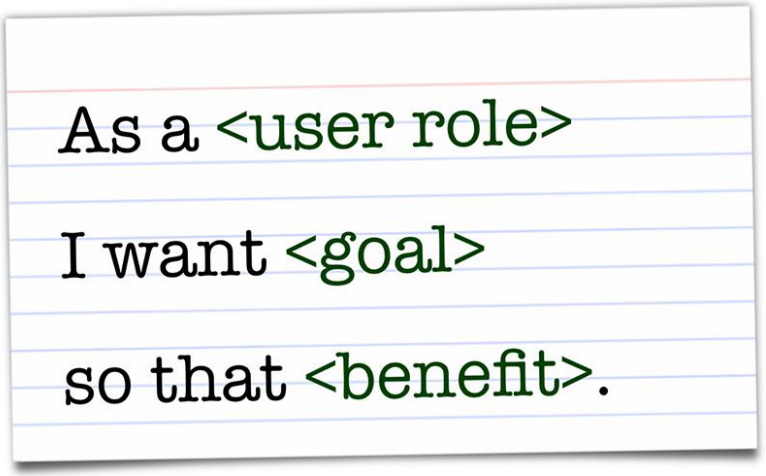
False Negative



False positive or false negative ?

Defects, root causes and effects

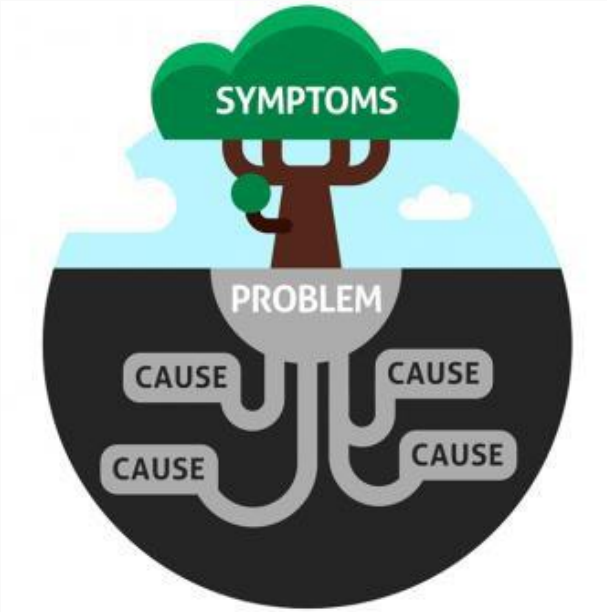
- For example, suppose incorrect interest payments, due to a single line of incorrect code, result in customer complaints



- The defective code was written for a user story which was ambiguous, due to the product owner's misunderstanding of how to calculate interest

Defects, root causes and effects

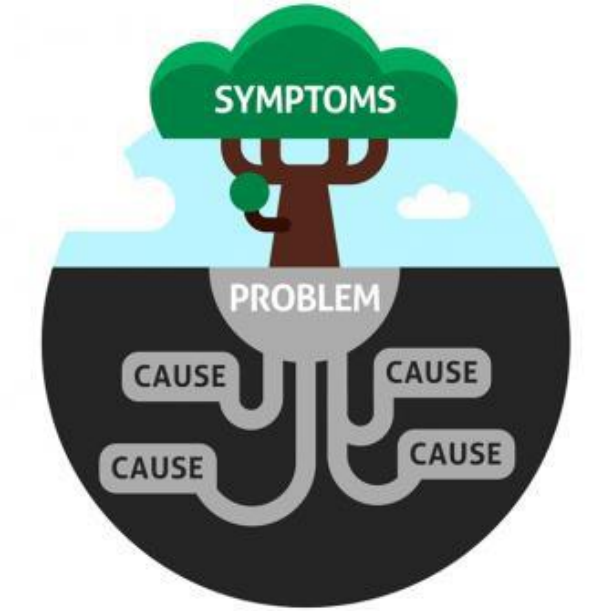
- In this example, the customer complaints are **effects**
- The incorrect interest payments are **failures**

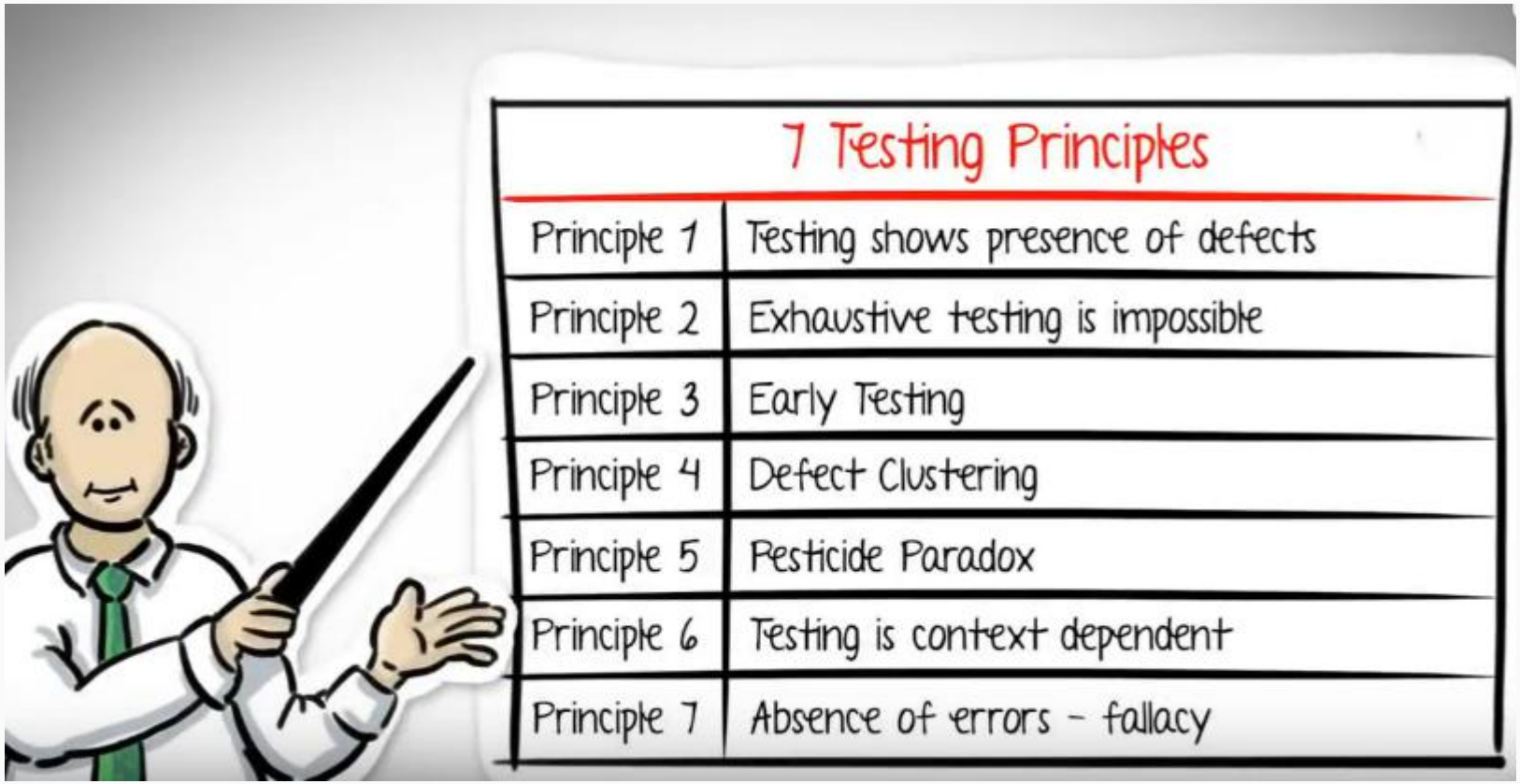


Defects, root causes and effects

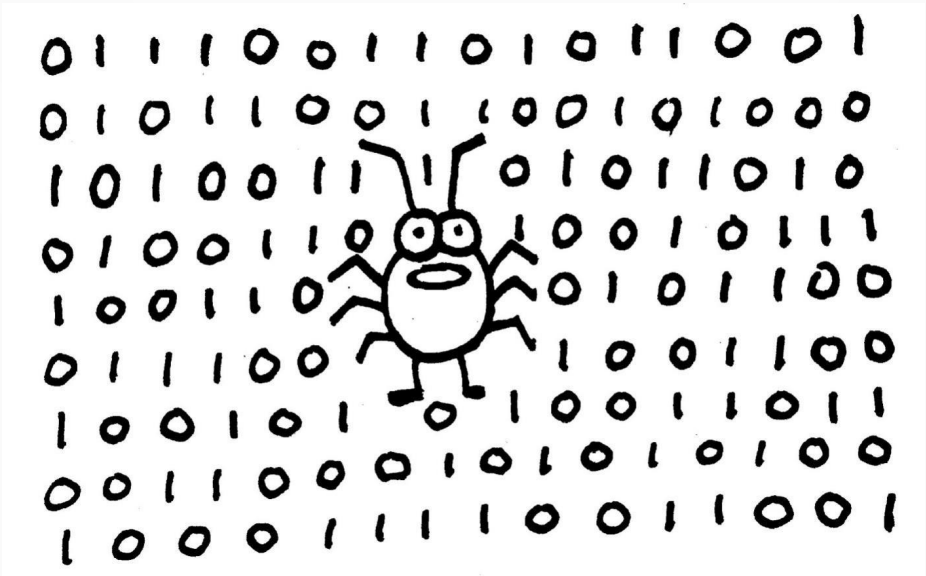
- The improper calculation in the code is a defect, and it resulted from the original defect, the ambiguity in the user story

- The root cause of the original defect was a lack of knowledge on the part of the product owner, which resulted in the product owner making a mistake while writing the user story




7 Testing Principles
Principle 1
Testing shows presence of defects
Principle 2
Exhaustive testing is impossible
Principle 3
Early Testing
Principle 4
Defect Clustering
Principle 5
Pesticide Paradox
Principle 6
Testing is context dependent
Principle 7
Absence of errors - fallacy

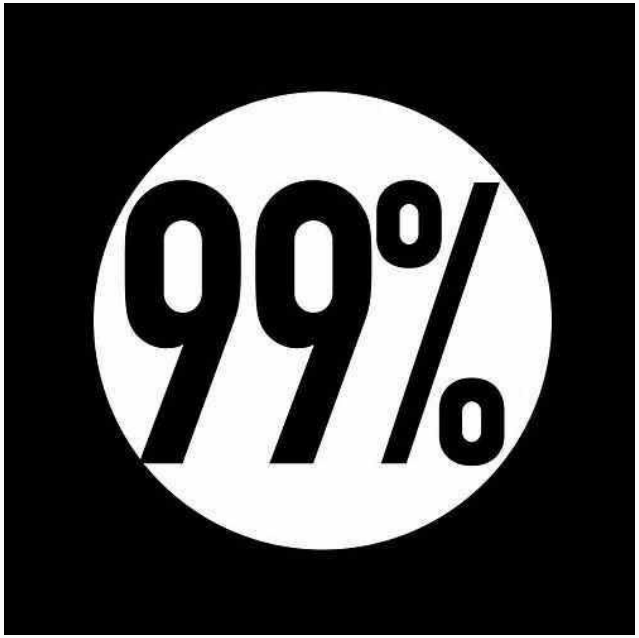
1.Testing shows the presence of defects, not their absence



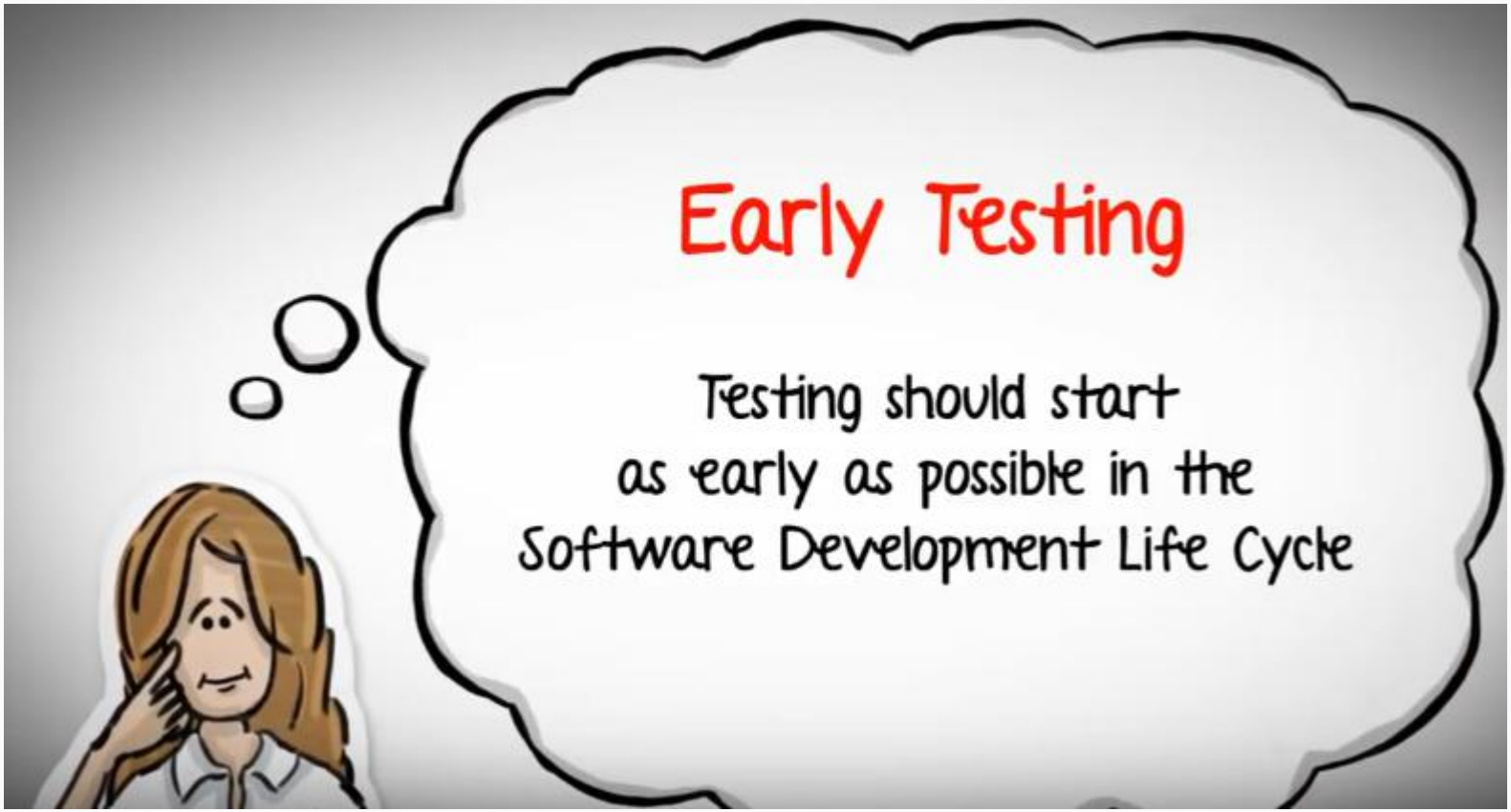
Testing reduces the probability of undiscovered defects remaining in the software, but even if no defects are found, testing is not proof of correctness

2-Exhaustive Testing is impossible

- **Testing everything (all conditions of inputs and preconditions) is not feasible except for trivial cases**
- Rather than attempting to test exhaustively, risk analysis, test techniques, and priorities should be used to focus test efforts.

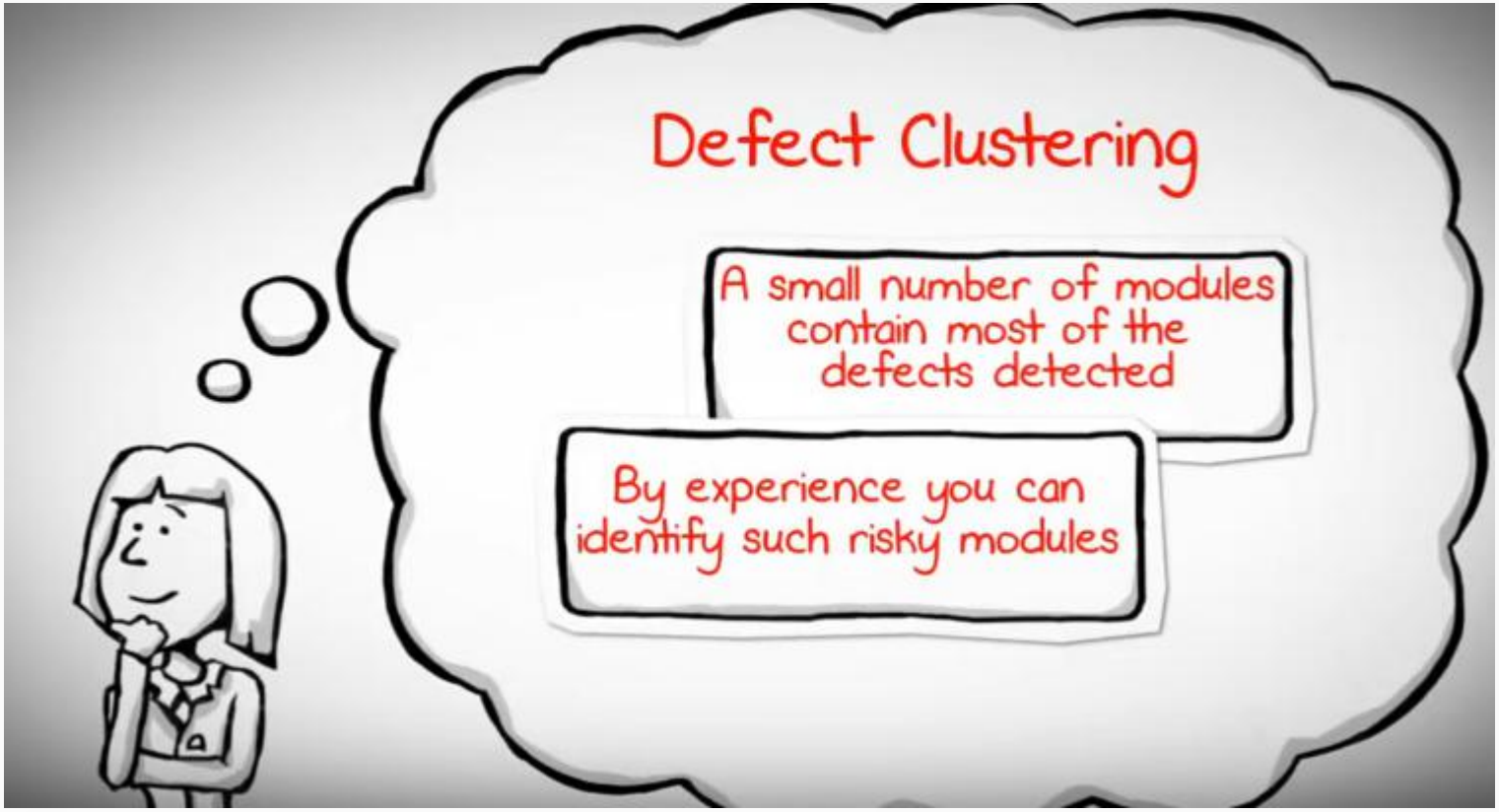


3-Early Testing saves time & money (Shift Left)



To find defects early, both static and dynamic test activities should be started as early as possible

4-Defects Cluster Together



A small number of modules usually contains most of the defects discovered during pre-release testing

5-Beware of Pesticide Paradox

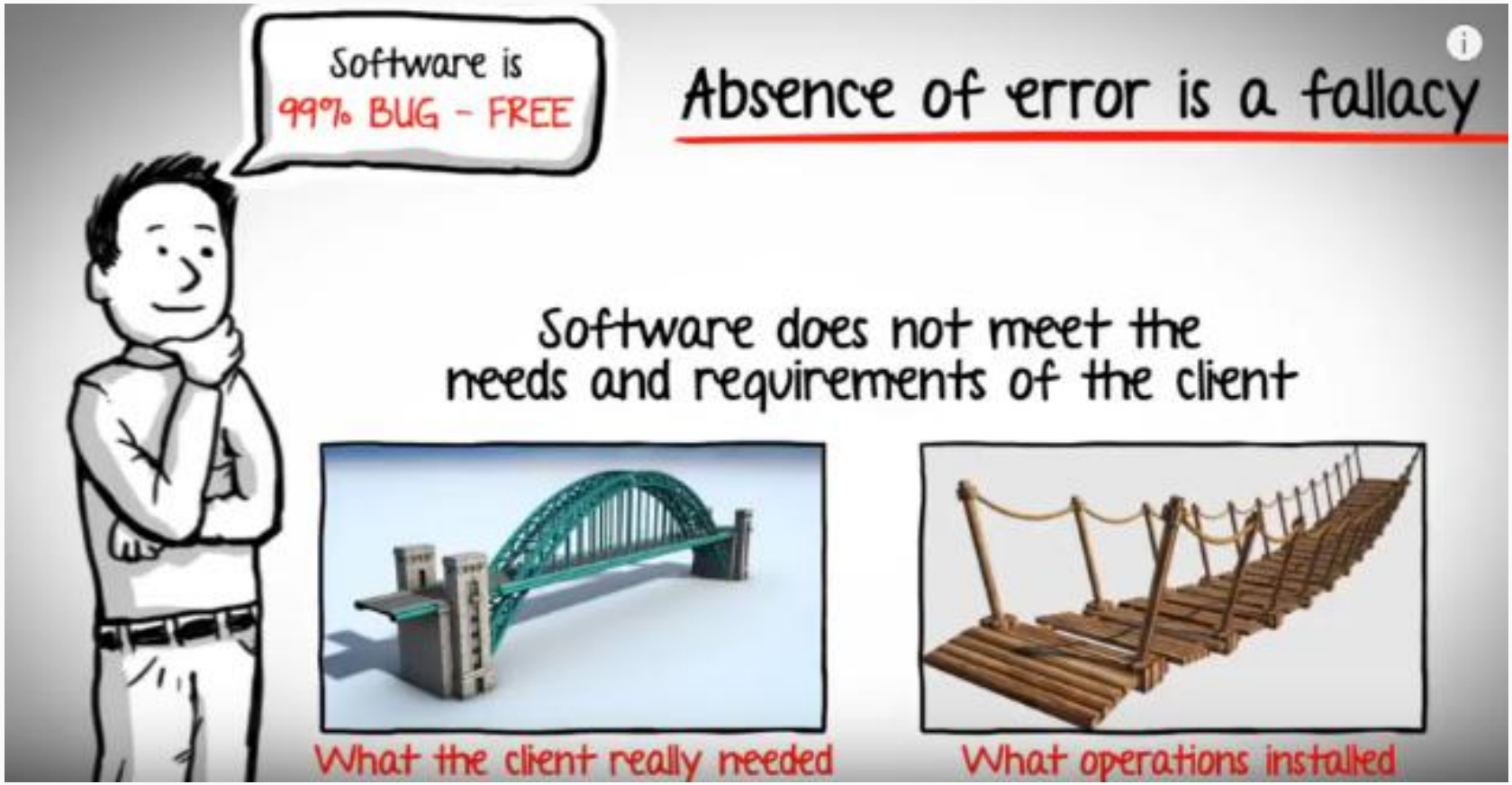
- If the same tests are repeated over and over again, these tests no longer find any new defects
- Use different test cases to help find more defects
- In some cases, such as regression testing, the pesticide paradox has a benefical outcome, which is the relatively low number of regression defects
- Regression testing is performed when changes are made

6-Testing is Context Dependent

Testing is done differently in different contexts

7-Absence of Error is a fallacy

it is a fallacy to expect that *just* finding and fixing a large number of defects will ensure the success of a system


Software is
99% BUG - FREE
Absence of error is a fallacy
Software does not meet the
needs and requirements of the client
What the client really needed
What operations installed

No. 1

Which of the following statements CORRECTLY describes one of the seven key principles of software testing?

a. By using automated testing it is possible to test everything

b. With sufficient effort and tool support, exhaustive testing is feasible for all software

c. It is impossible to test all input and precondition combinations in a system

d. The purpose of testing is to prove the absence of defects

No. 2

Which of the following is a true statement about exhaustive testing?

a. It is a form of stress testing
b. It is not feasible except in the case of trivial software
c. It is commonly done with test automation
d. It is normally the responsibility of the developer during unit testing

No. 3

Why is it important to avoid the pesticide paradox?

a. Dynamic testing is less reliable in finding bugs
b. Pesticides mixed with static testing can allow bugs to escape detection
c. Tests should not be context dependent
d. Running the same tests over and over will reduce the chance of finding new defects

No. 4

A new retail product was released to production by your company. Shortly after the release it was apparent that there were numerous problems with the point of sale application. This resulted in a number of customer complaints and negative postings on social media encouraging people to take their business to your competitor.
You have investigated the problems and have discovered that the production point of sale equipment is a later model than the model used in testing. The software functions correctly on the old version, but fails on the later model. Given this scenario, what is the root cause and what is the effect?

a. The root cause is the old equipment and the effect is the new equipment
b. The root cause is the customer complaints and the effect is the social media postings
c. The root cause is conducting the testing on the wrong version of the equipment and the effect is the customer complaints and postings
d. The root cause is the software failing on the later model and the effect is the customer complaints

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