

Quality Practice for Developers





Somkiat Puisungnoen

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Intro

Software Craftsmanship

Software Practitioner at สยามชัมนาณกิจ พ.ศ. 2556

Agile Practitioner and Technical at SPRINT3r

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Java and Bigdata



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Module #1

Testing in general



Technical excellence



SPECIFICATION BY EXAMPLE



CONTINUOUS
INTEGRATION



CONTINUOUS DELIVERY



TEST AUTOMATION



TECHNICAL
EXCELLENCE



THINKING ABOUT TESTING



ARCHITECTURE
& DESIGN



ACCEPTANCE
TESTING



CLEAN CODE



TEST-DRIVEN DEVELOPMENT



UNIT TESTING

<https://less.works/less/technical-excellence/index>





SPECIFICATION BY EXAMPLE



TEST AUTOMATION



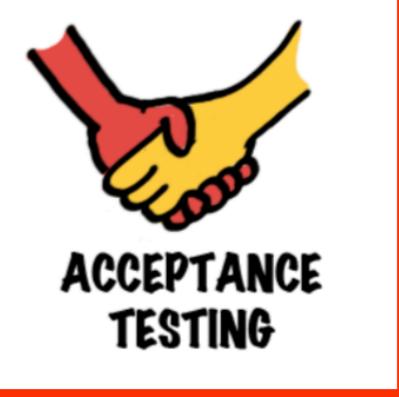
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INTEGRATION



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& DESIGN



CLEAN CODE



UNIT TESTING



**"Program testing can be used
to show the presence of bugs,
but never their absence."**

Edsger W. Dijkstra, 1970, Notes on Structured Programming

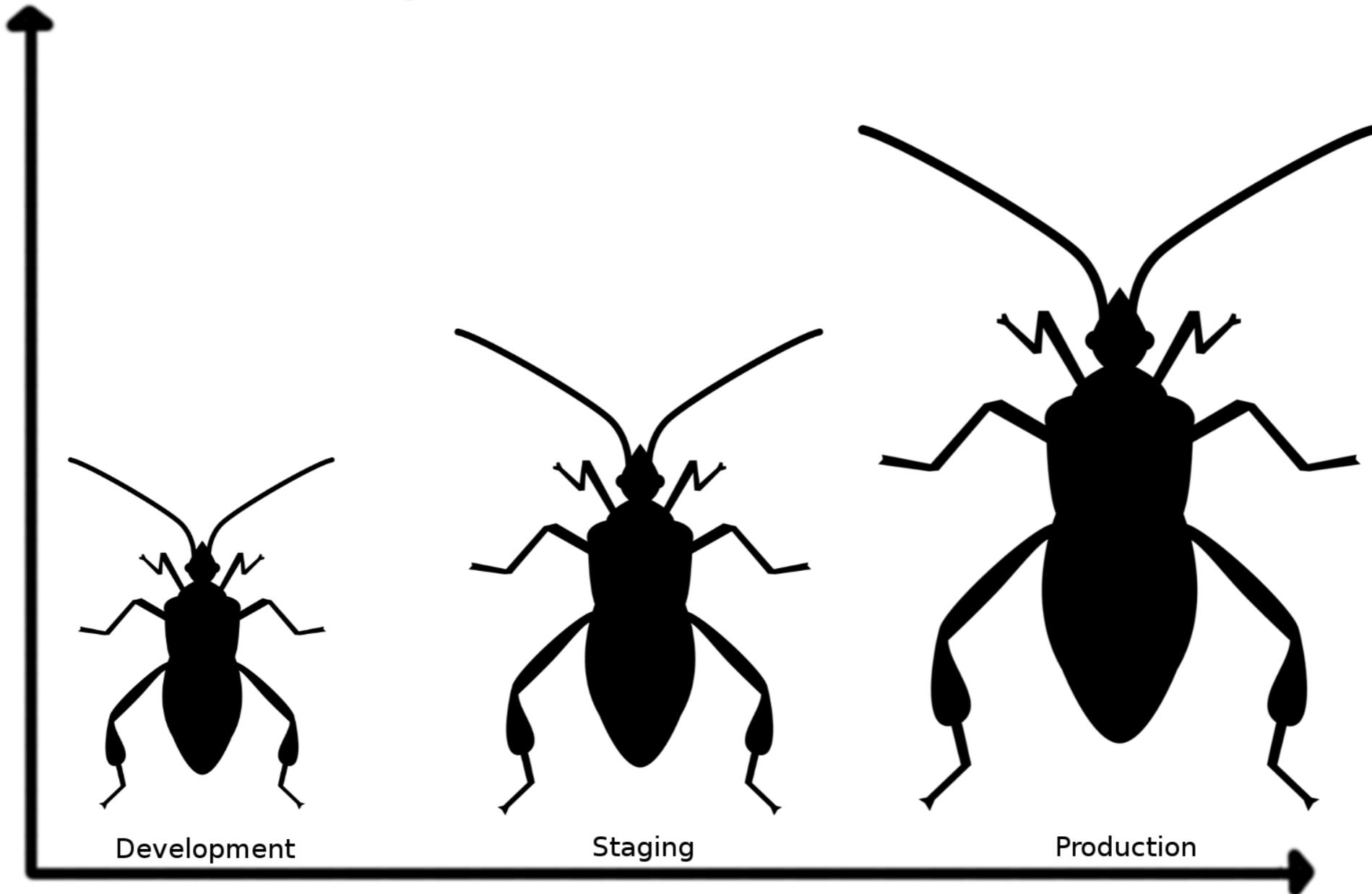


Start with Why ...



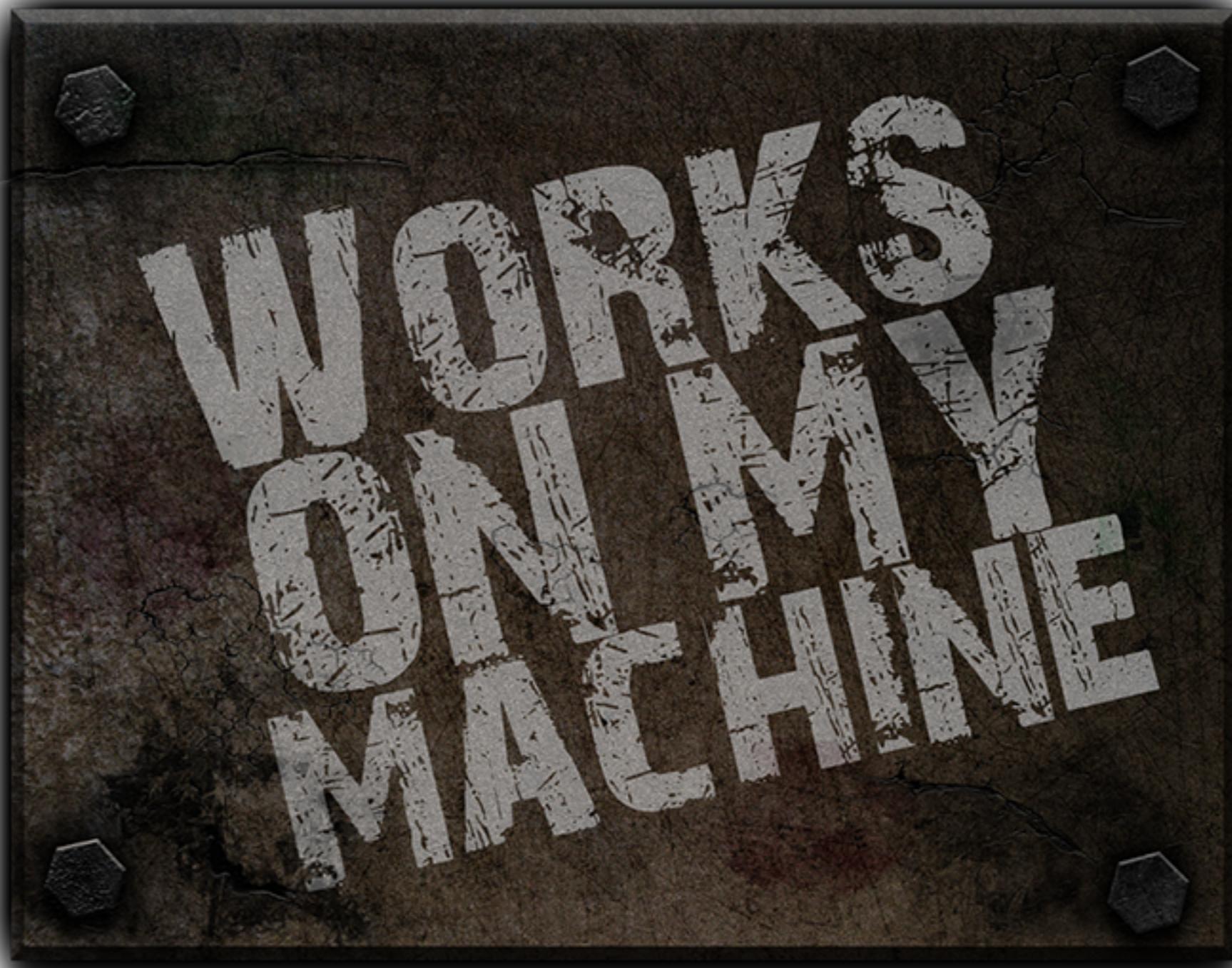


Cost to fix a bug



Stage when a bug is found





DDD

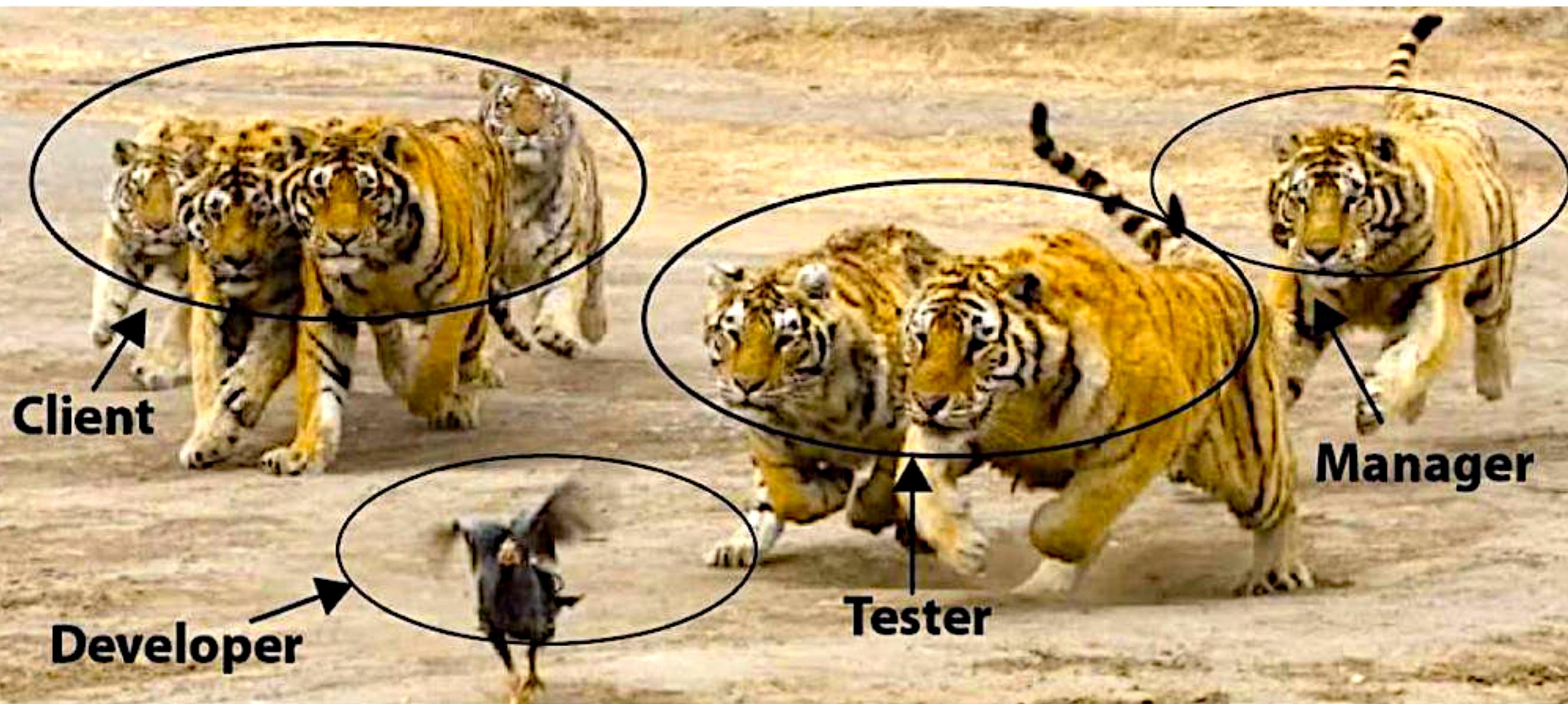


Deadline Driven Development

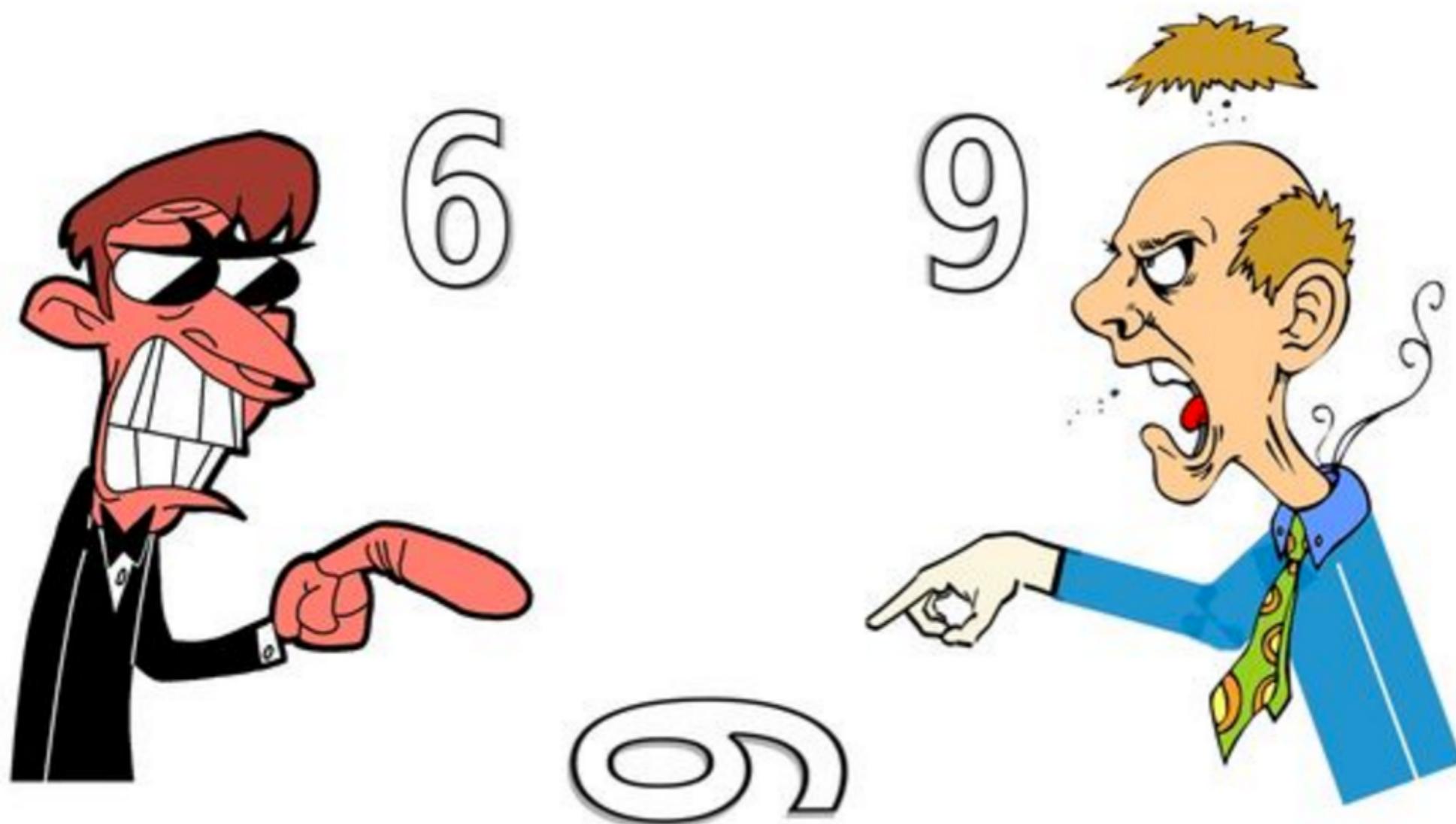


Quality practice for developers

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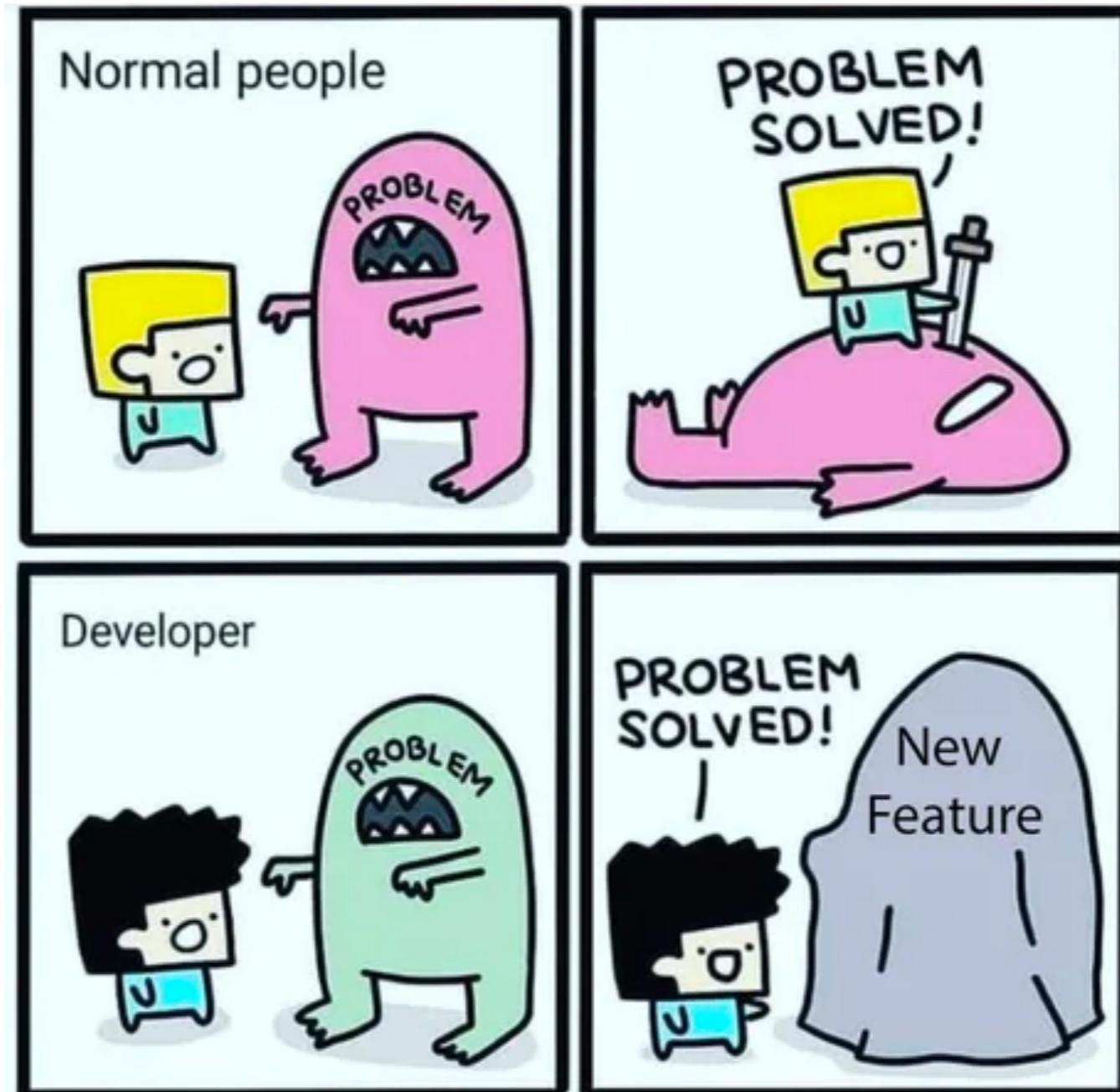
Developer vs Tester





www.cartoonistshilpa.com





Every time a developer changing the code !!







TONIGHT WE TEST

IN PRODUCTION!!!

memegenerator.net



Why we need to test ?

Help you to **catch bugs**

Boosted confidence

Quality code

Enforce **modularity** of your project

Develop features **faster**

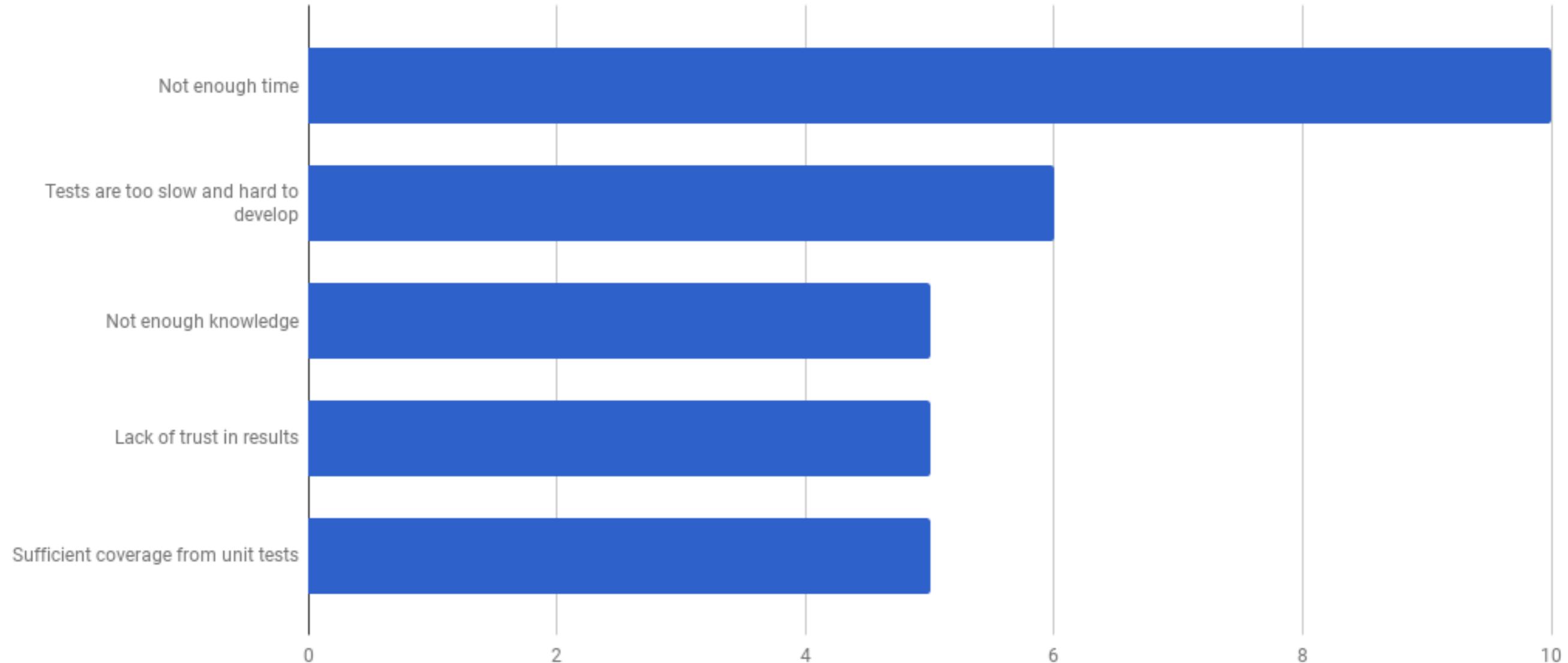
Better documentation



But,
It's take time to learning and
practice !!



Why not write automated tests ?

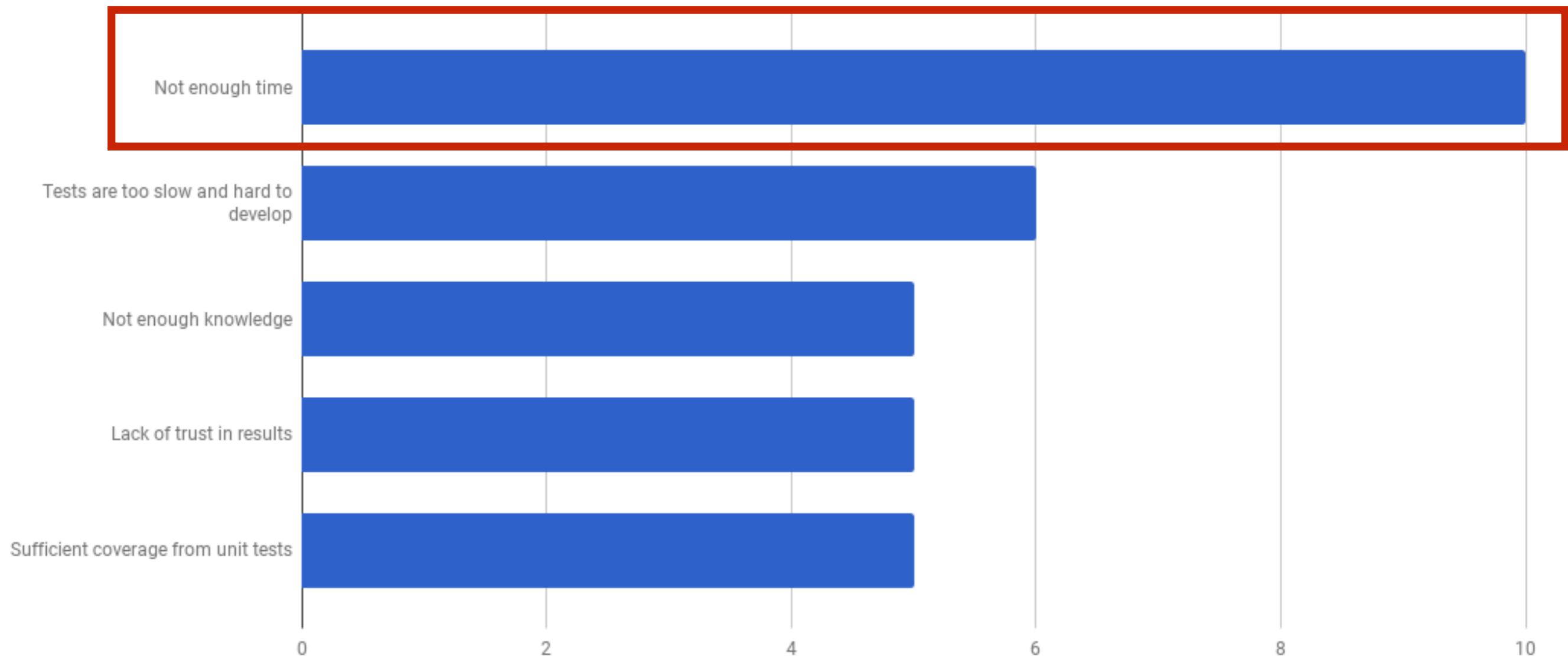


<https://slack.engineering/android-ui-automation-part-1-building-trust-de3deb1c5995>



Why not write automated tests ?

Not enough time !!!



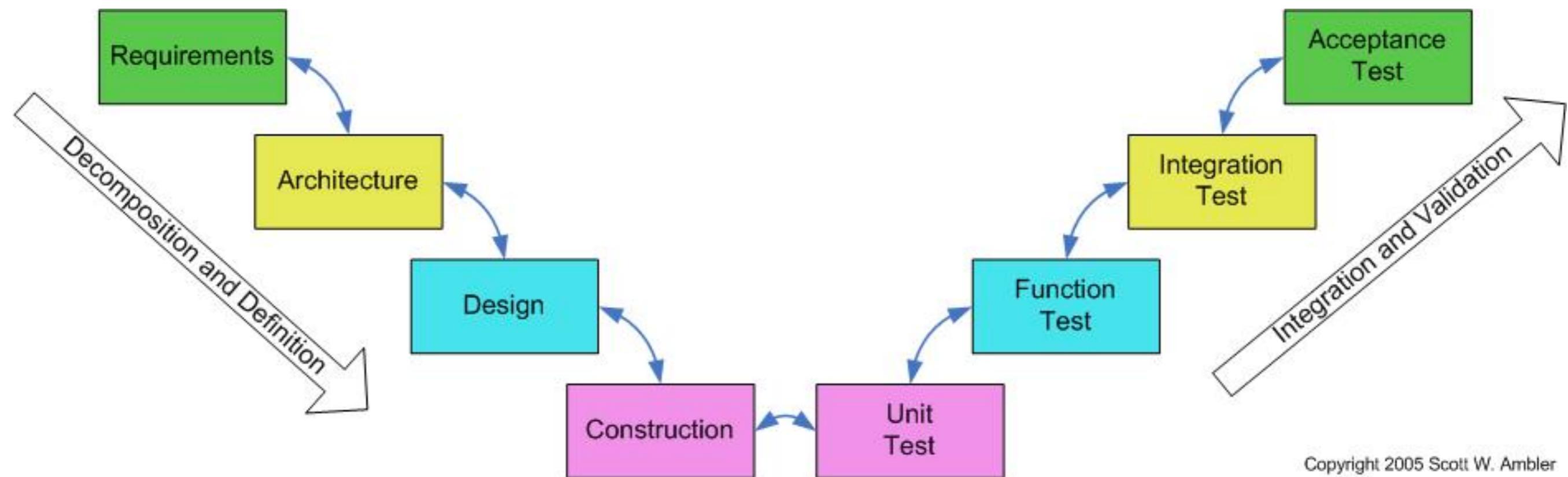
<https://slack.engineering/android-ui-automation-part-1-building-trust-de3deb1c5995>



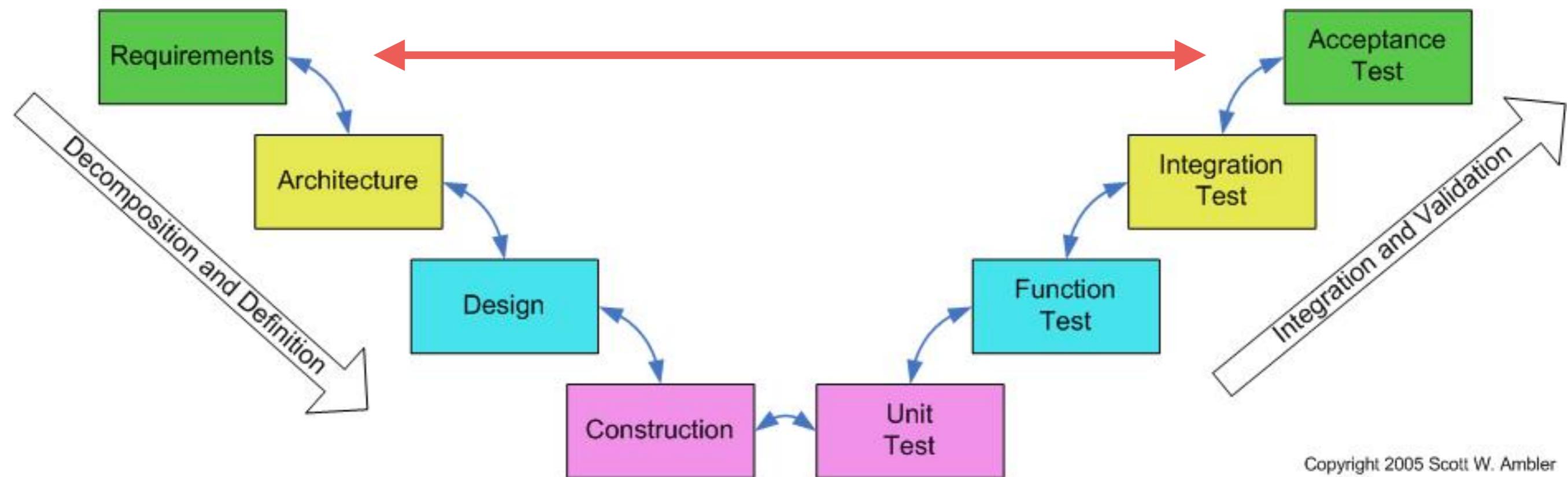
What kind of test should we write ?



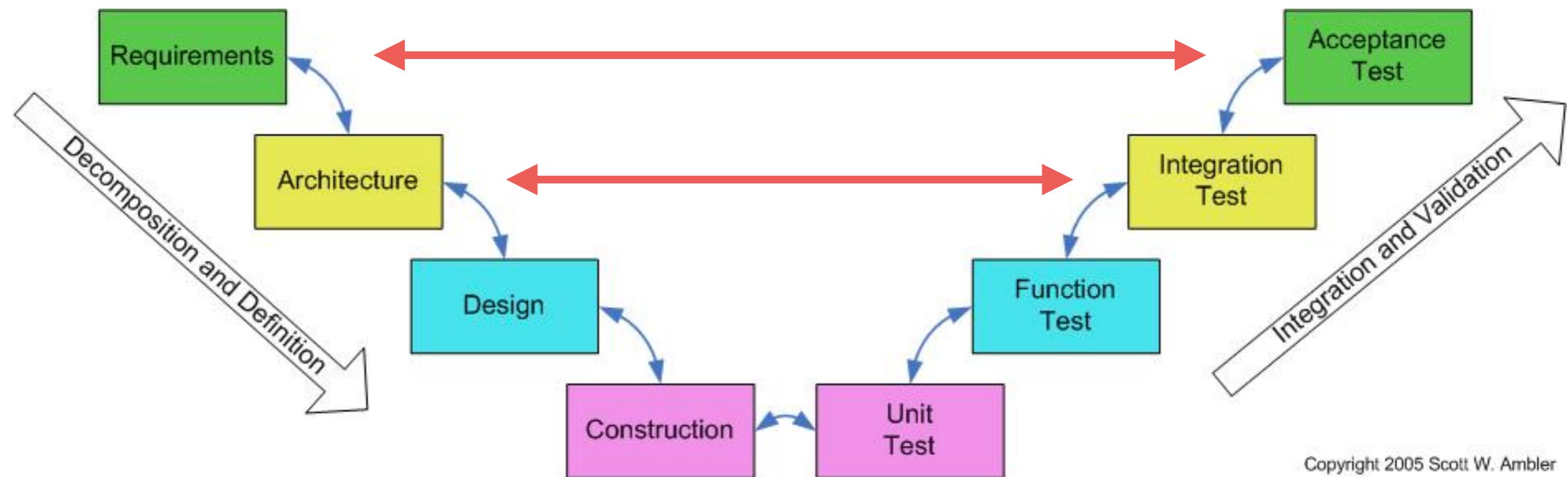
V Model



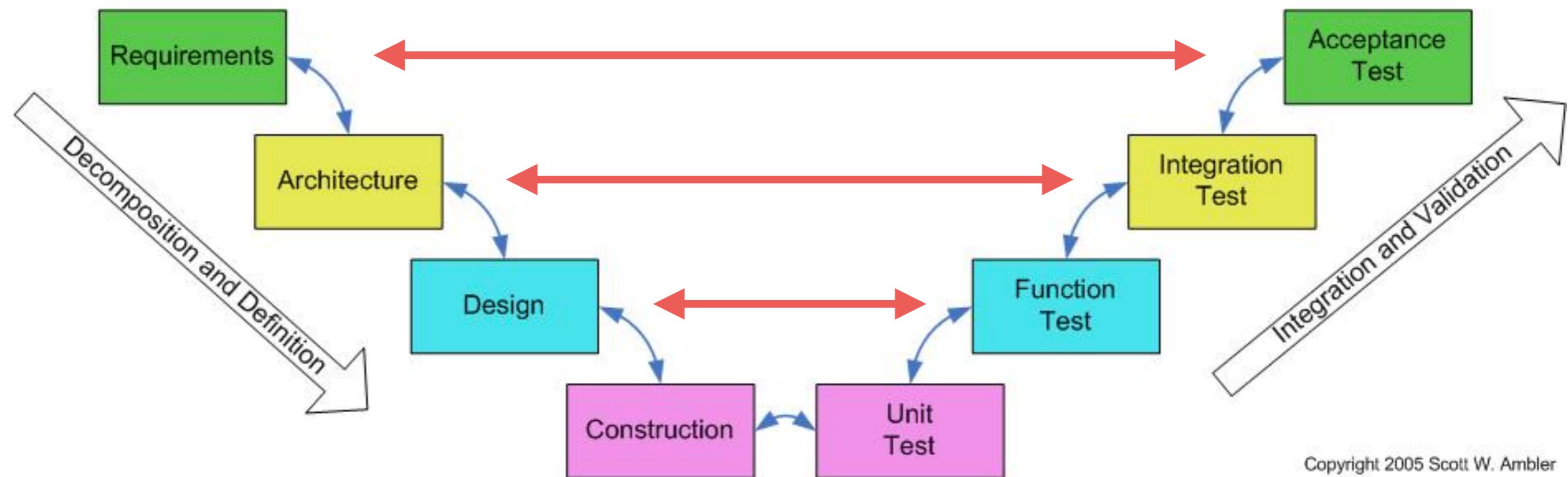
V Model



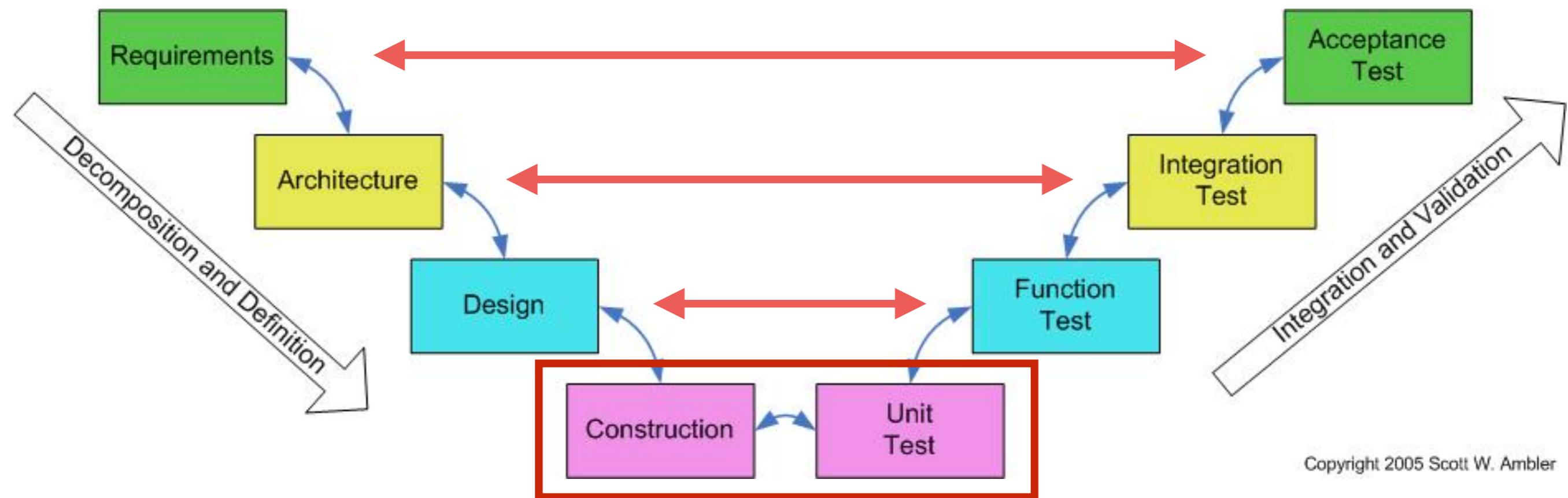
V Model



V Model



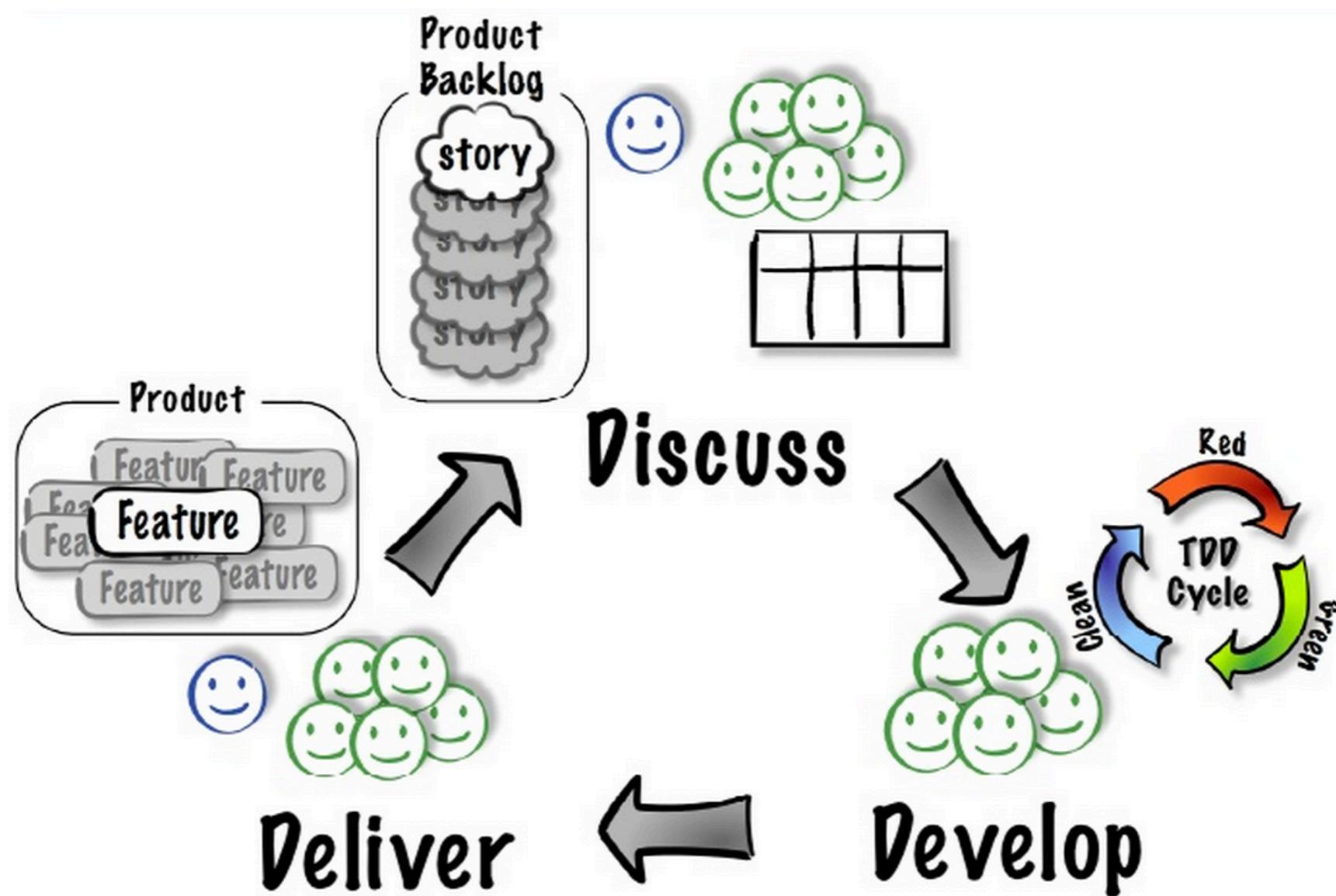
V Model



THINK before coding



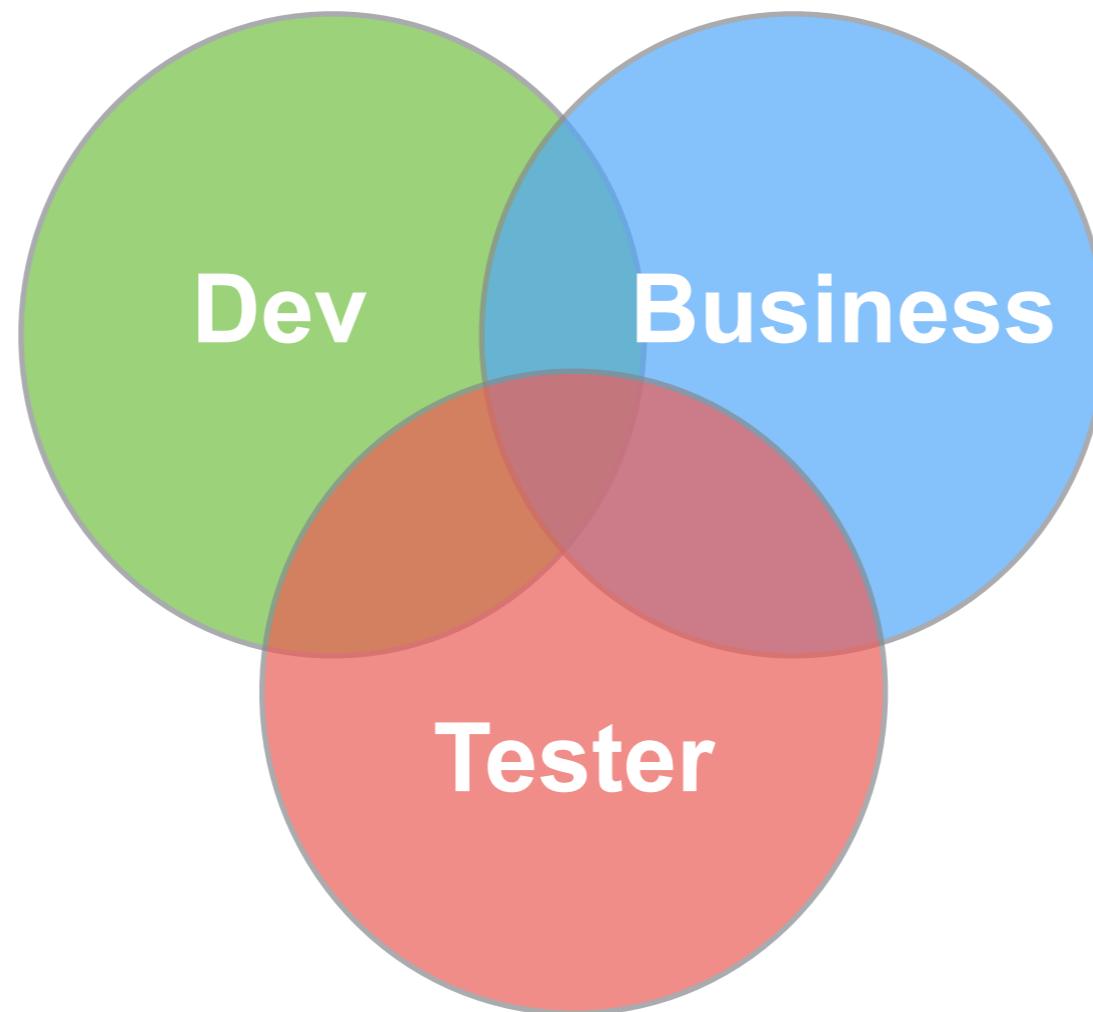
Acceptance Test-Driven Development



(Model developed with Pekka Klärck, Bas Vodde, and Craig Larman.)



Acceptance Test-Driven Development



Acceptance Tests

=

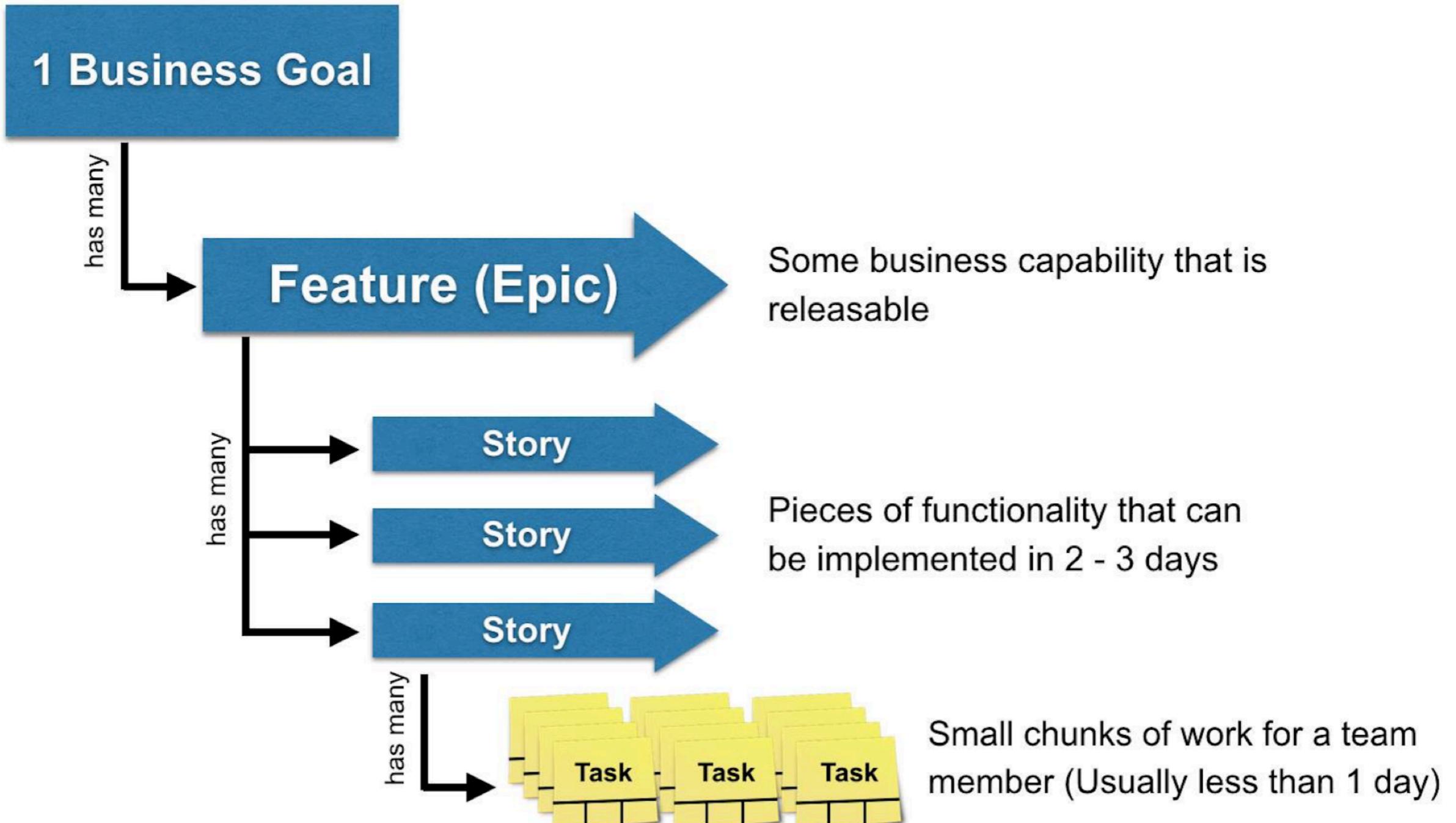
Business Criteria

+

Examples (data)



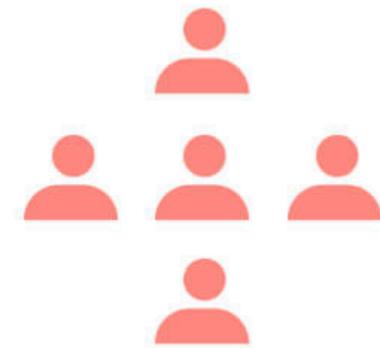
Work break down



Whole team approach

Functional

Common functional expertise



System analysts



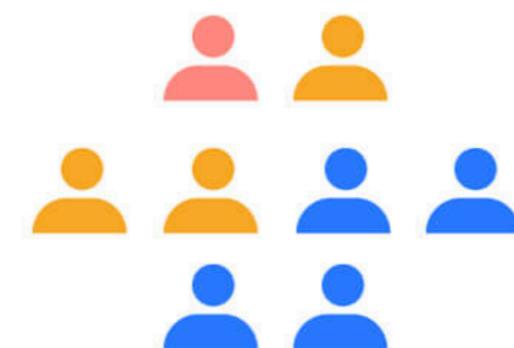
Developers



Testers

Cross - Functional

Representatives from the various functions



Development Team



Key success factors

Whole team solve problems

Whole team thinks about testing

Whole team **committed to quality**

Everyone collaborates



Iterative and incremental process

Feature 1

Time



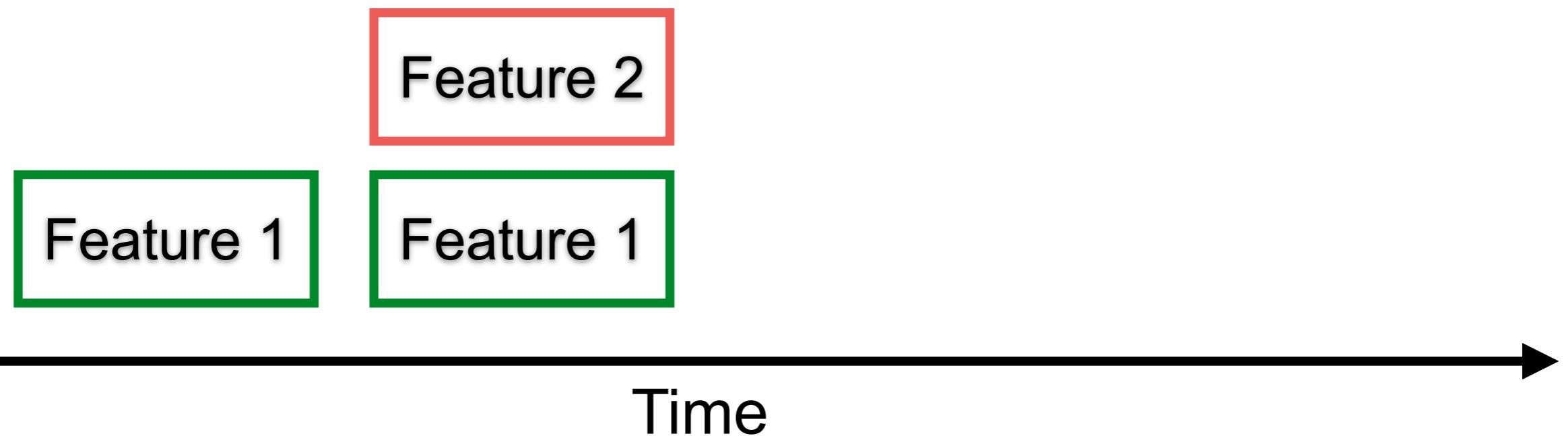
Iterative and incremental process

Done = coded and tested



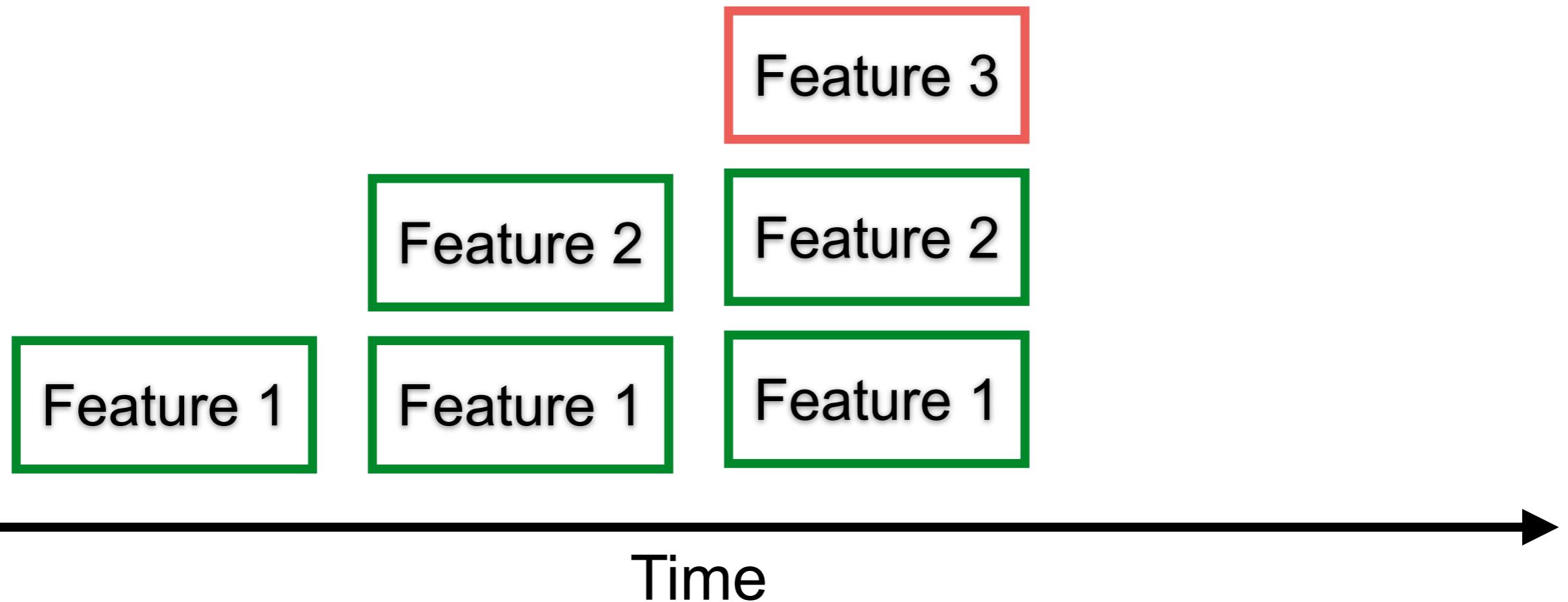
Iterative and incremental process

Done = coded and tested



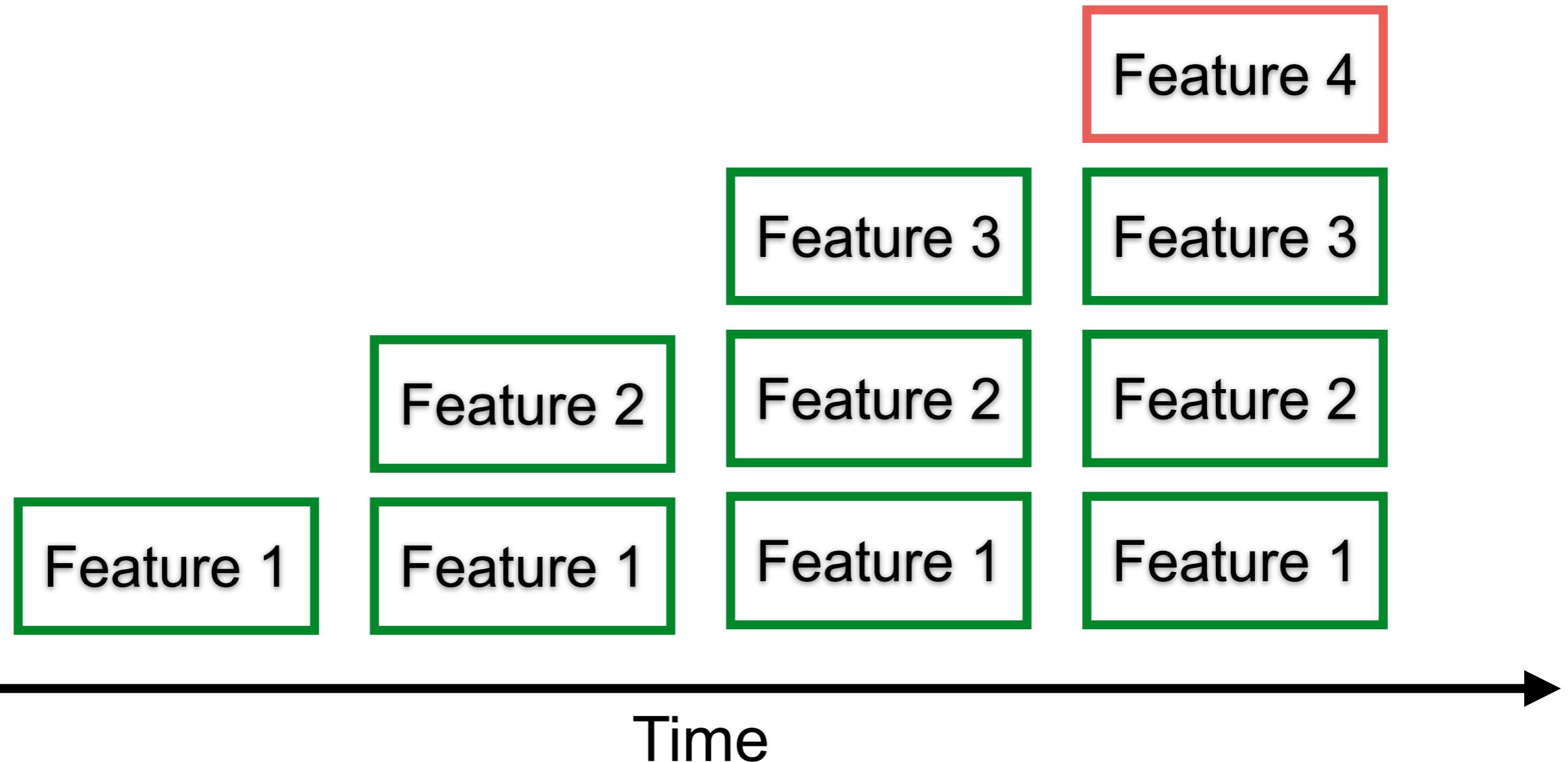
Iterative and incremental process

Done = coded and tested



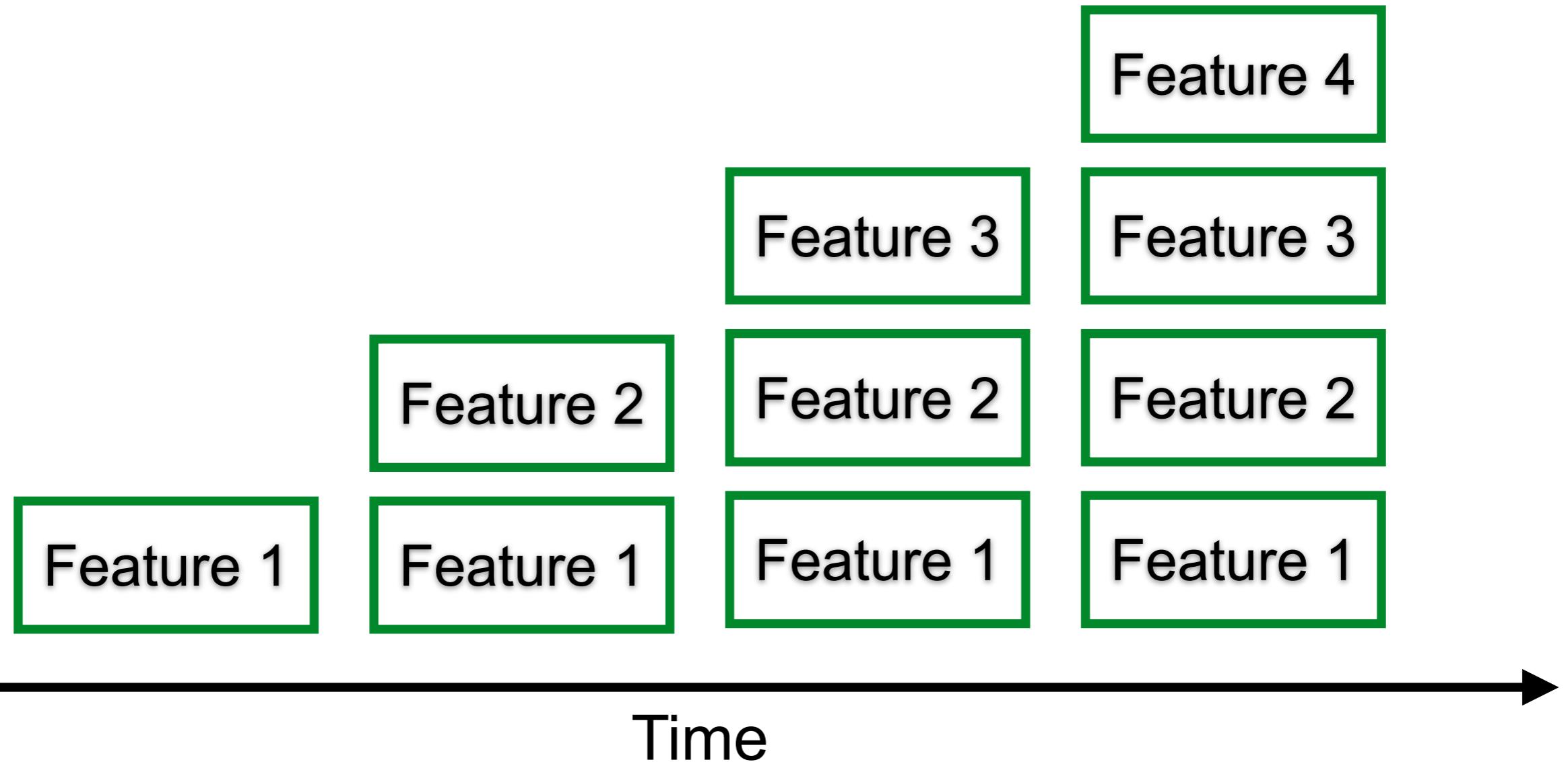
Iterative and incremental process

Done = coded and tested



Iterative and incremental process

Done = coded and tested



Testing is activity

~~Test phase~~

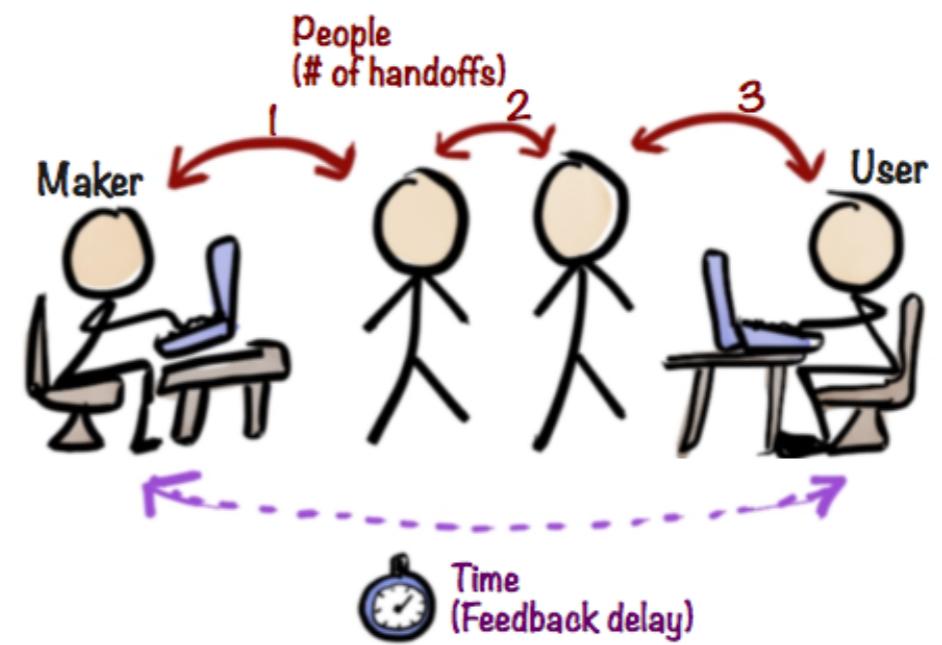
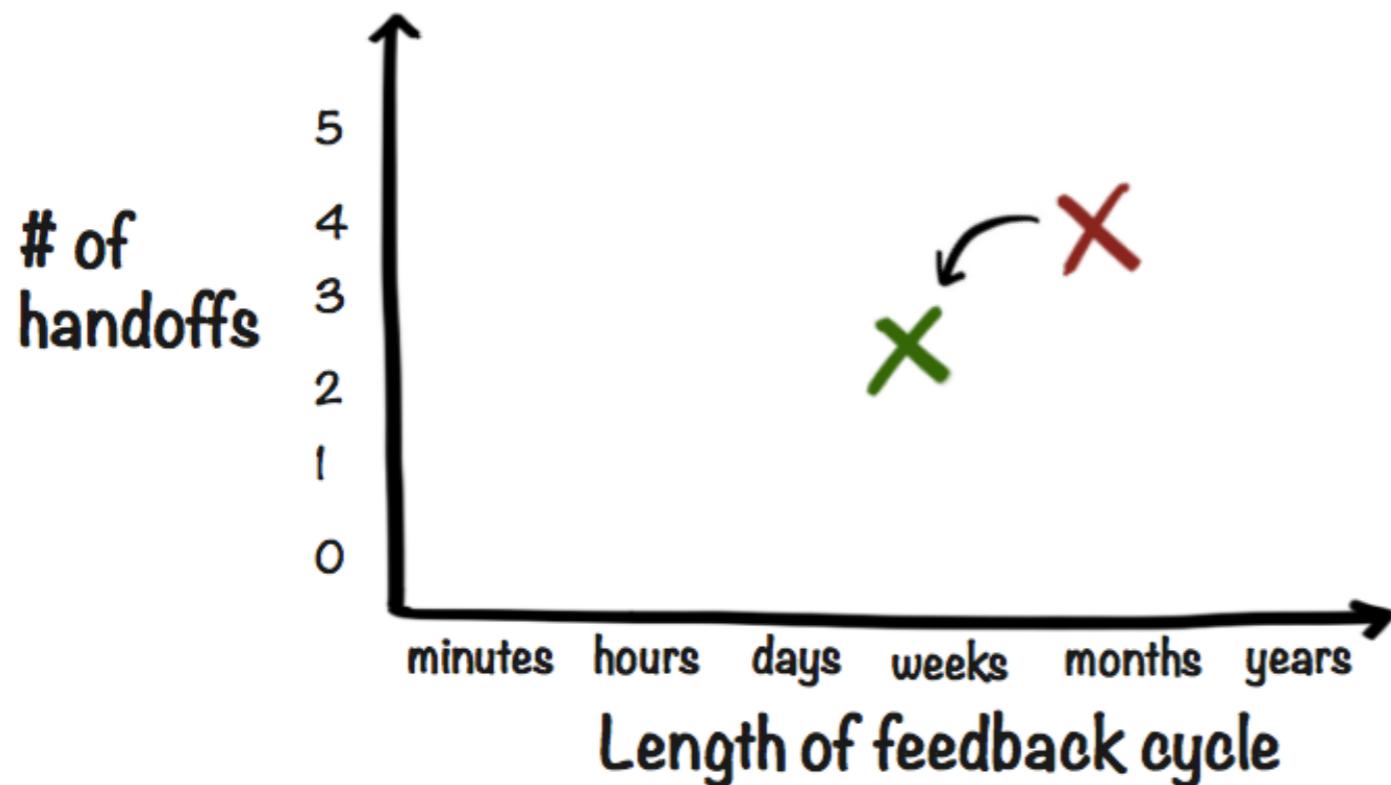
~~Test team~~

~~Tester role~~

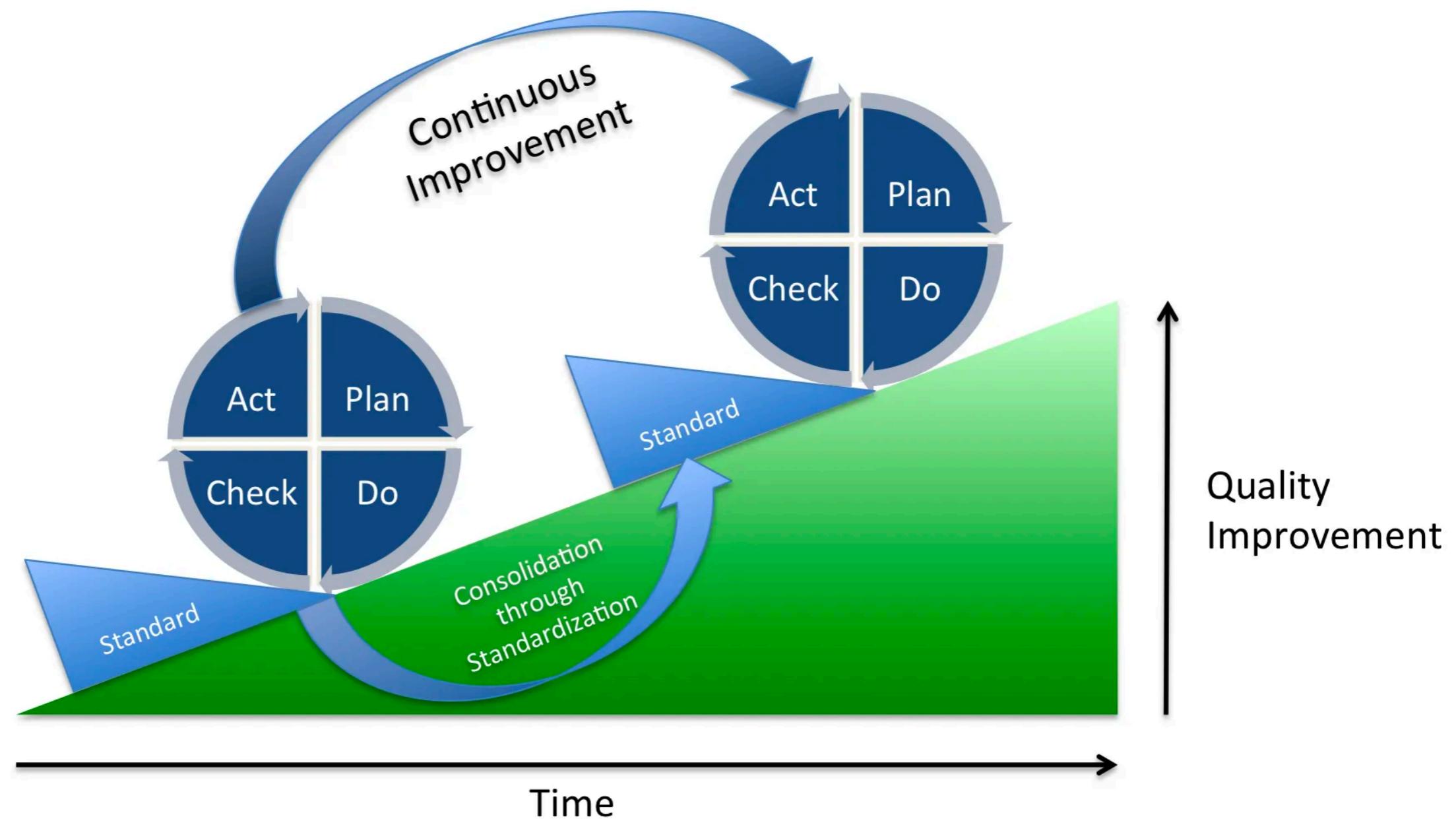


Fast feedback loop

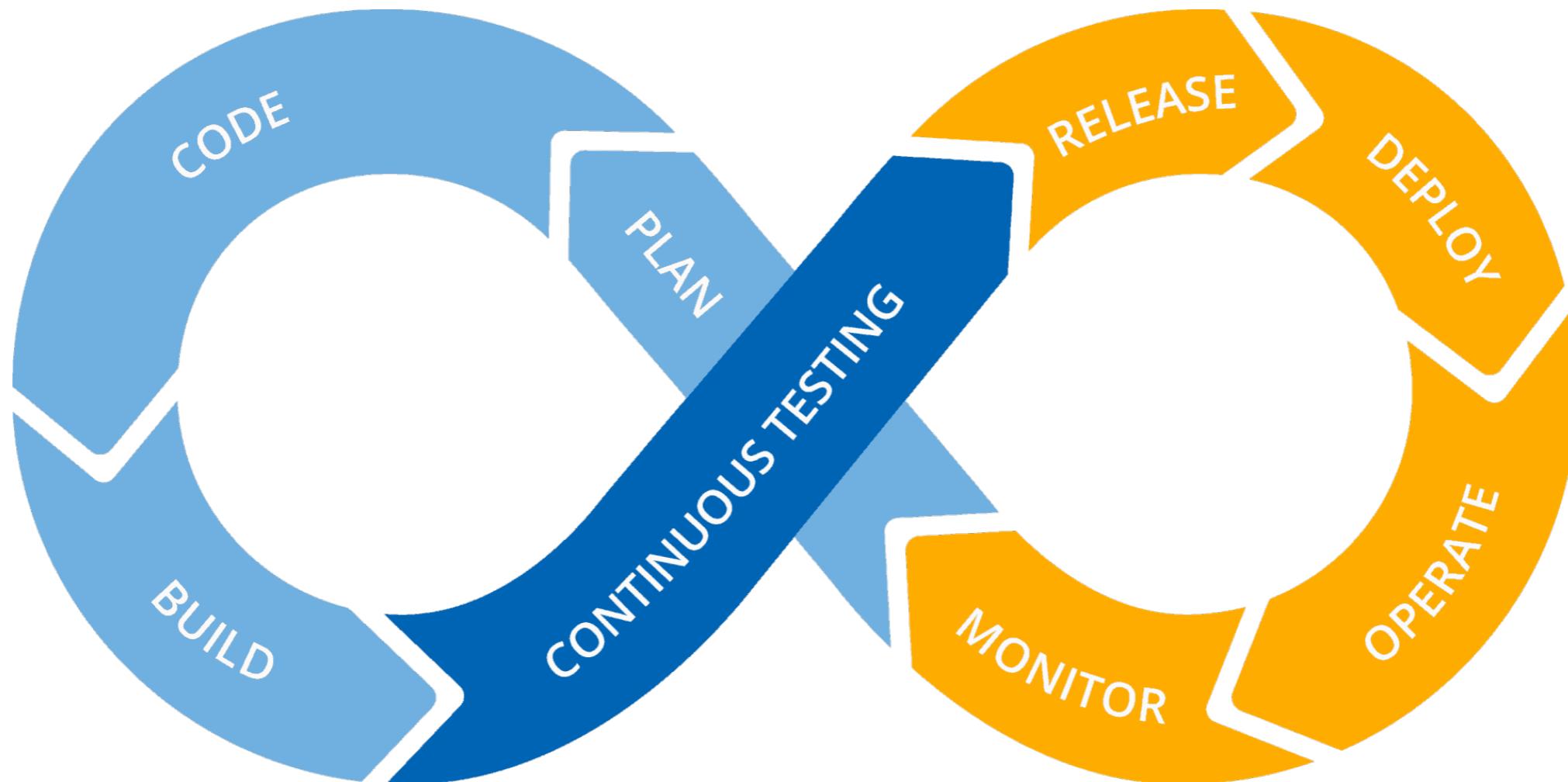
Shorten the feedback loop



Continuous improvement



Continuous testing



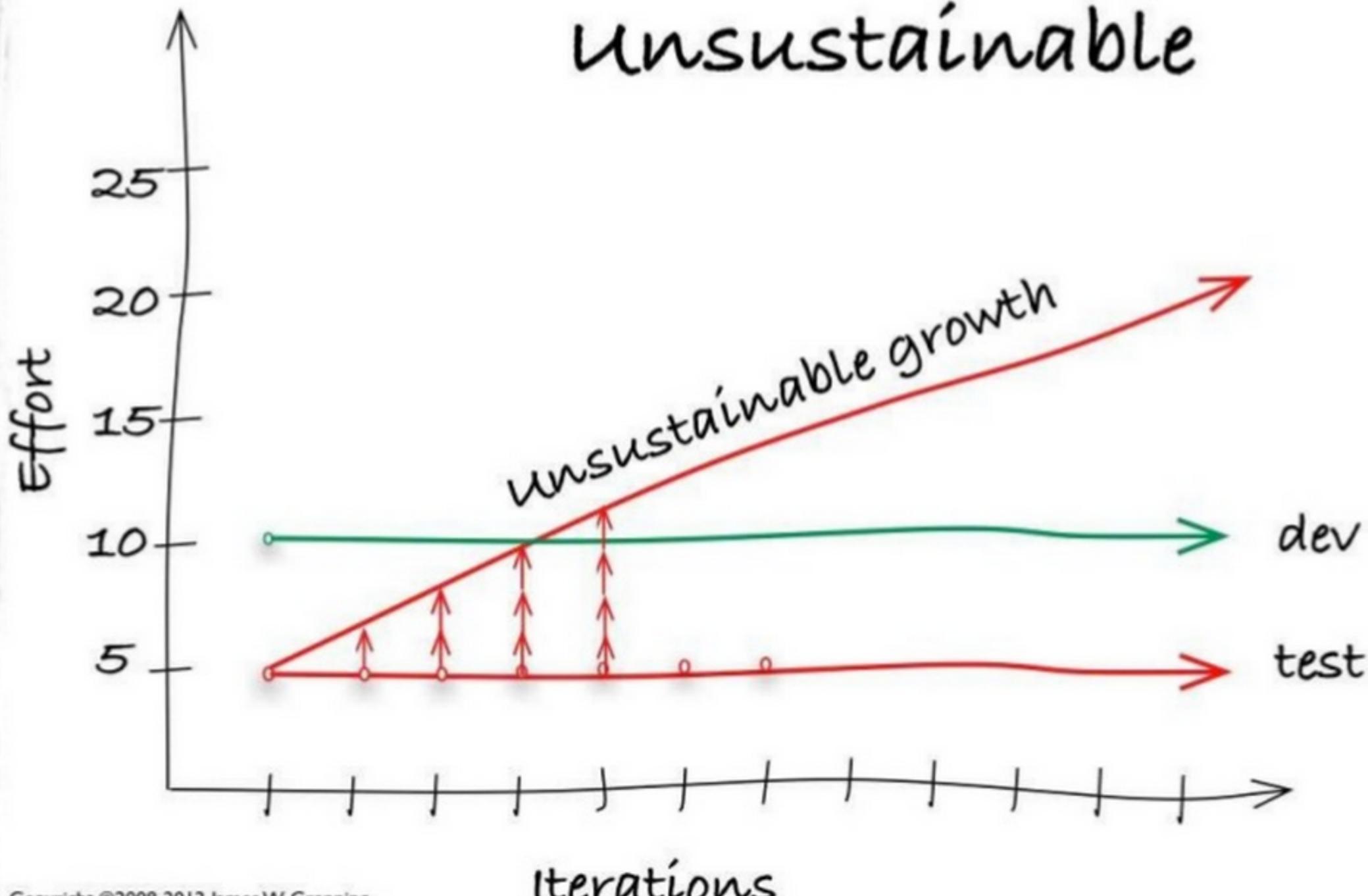
But ...



Manual testing ?



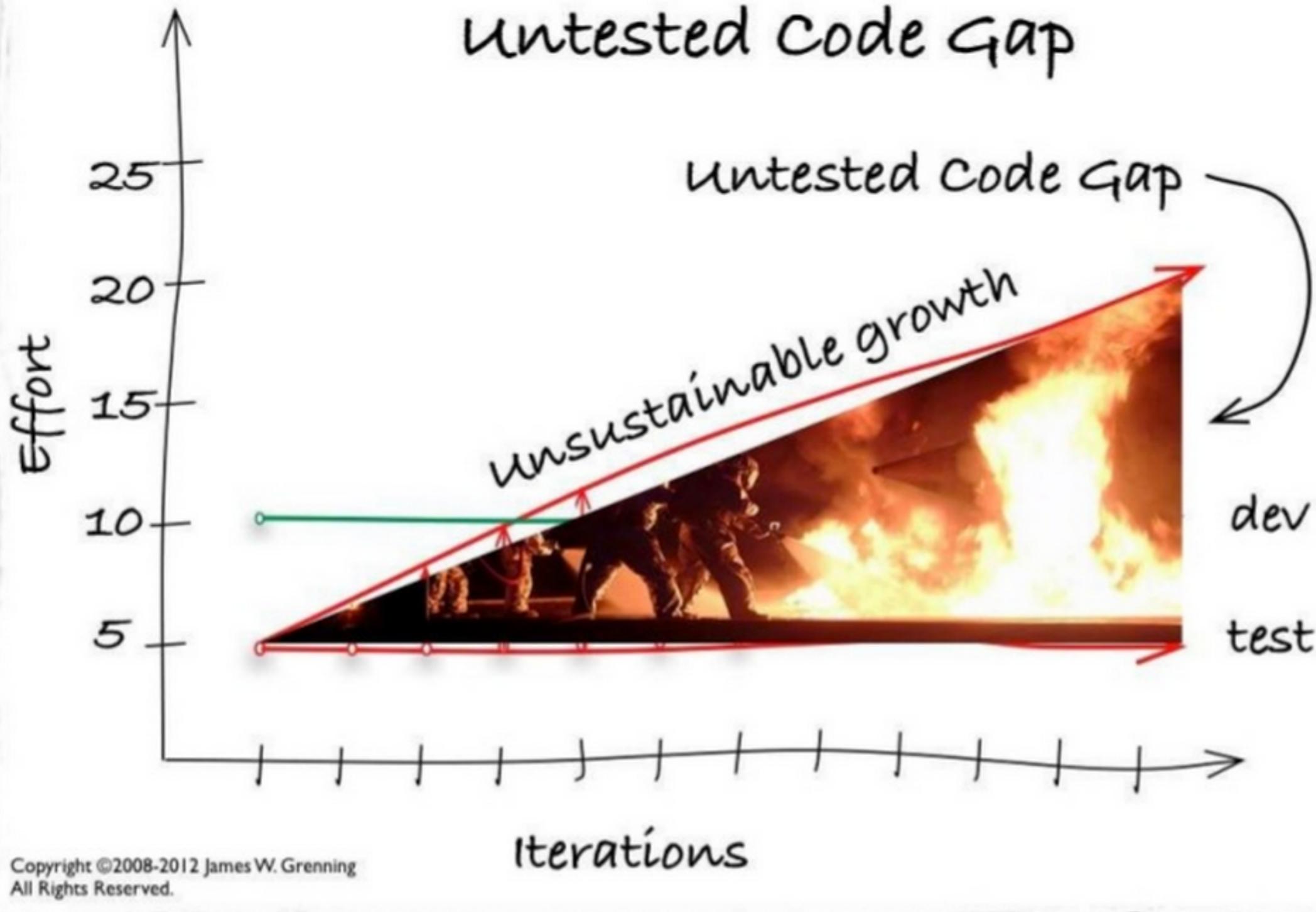
Manual Test is unsustainable



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Risk Accumulates in the Untested Code Gap



We need automation !!



Why should you automate ?

Manual checking take too long

Manual checks are error prone

Free people to do their best work

Provides living document

Repeatable

Save time



Workshop

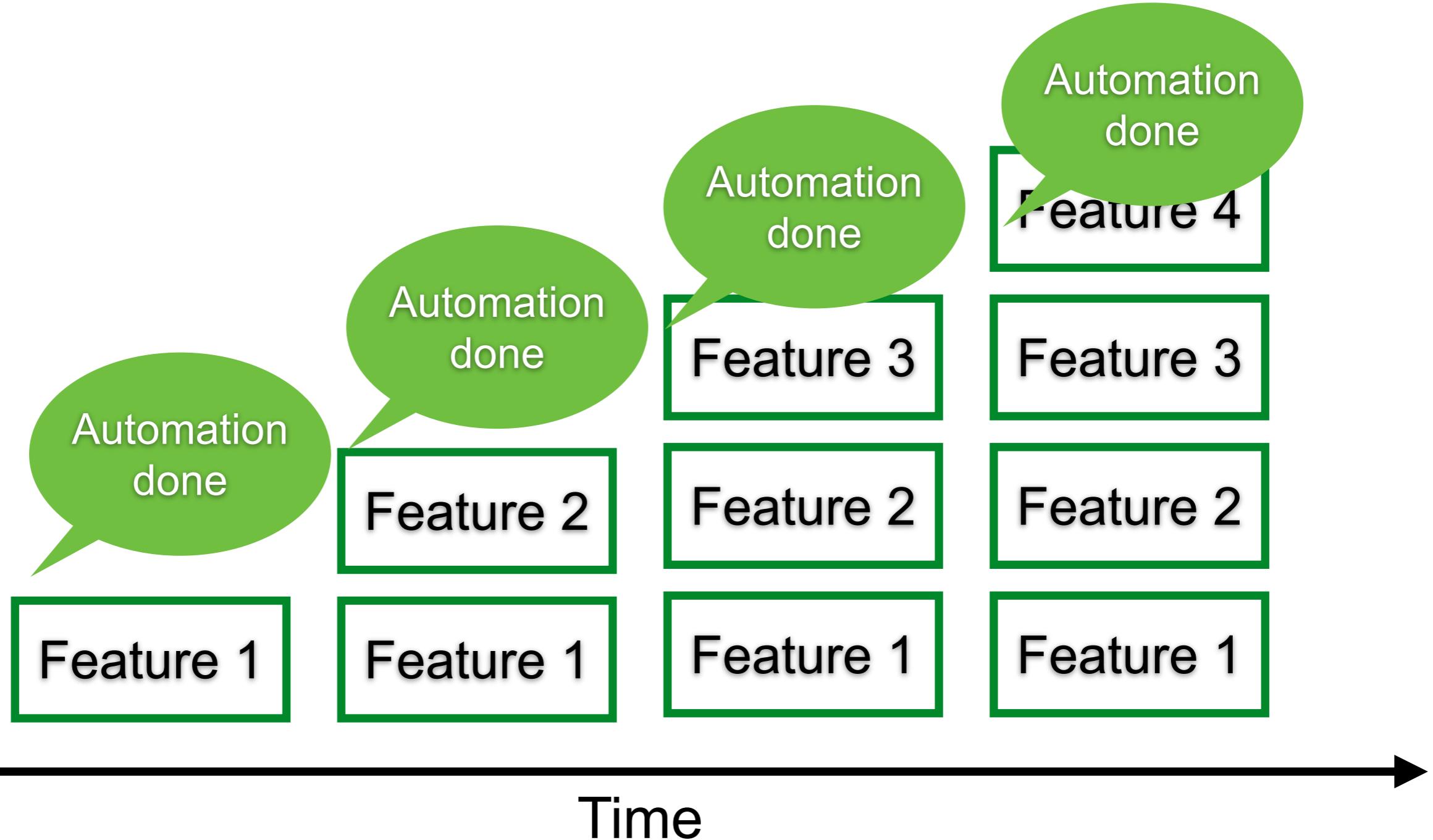
Why aren't you automate ?
Share obstacles in your group

<https://bit.ly/2XSPmAH>



Iterative and incremental process

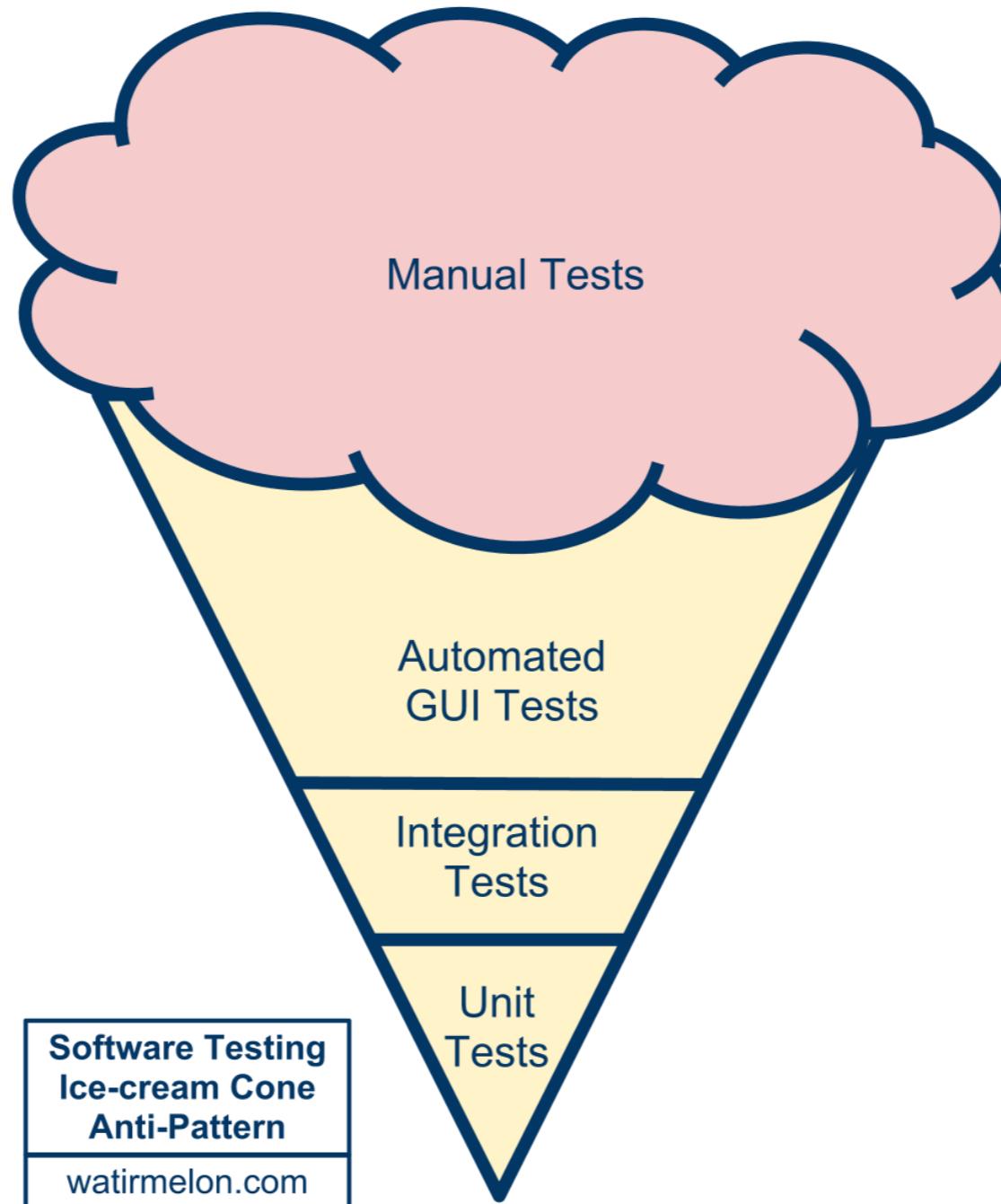
Done = coded and tested



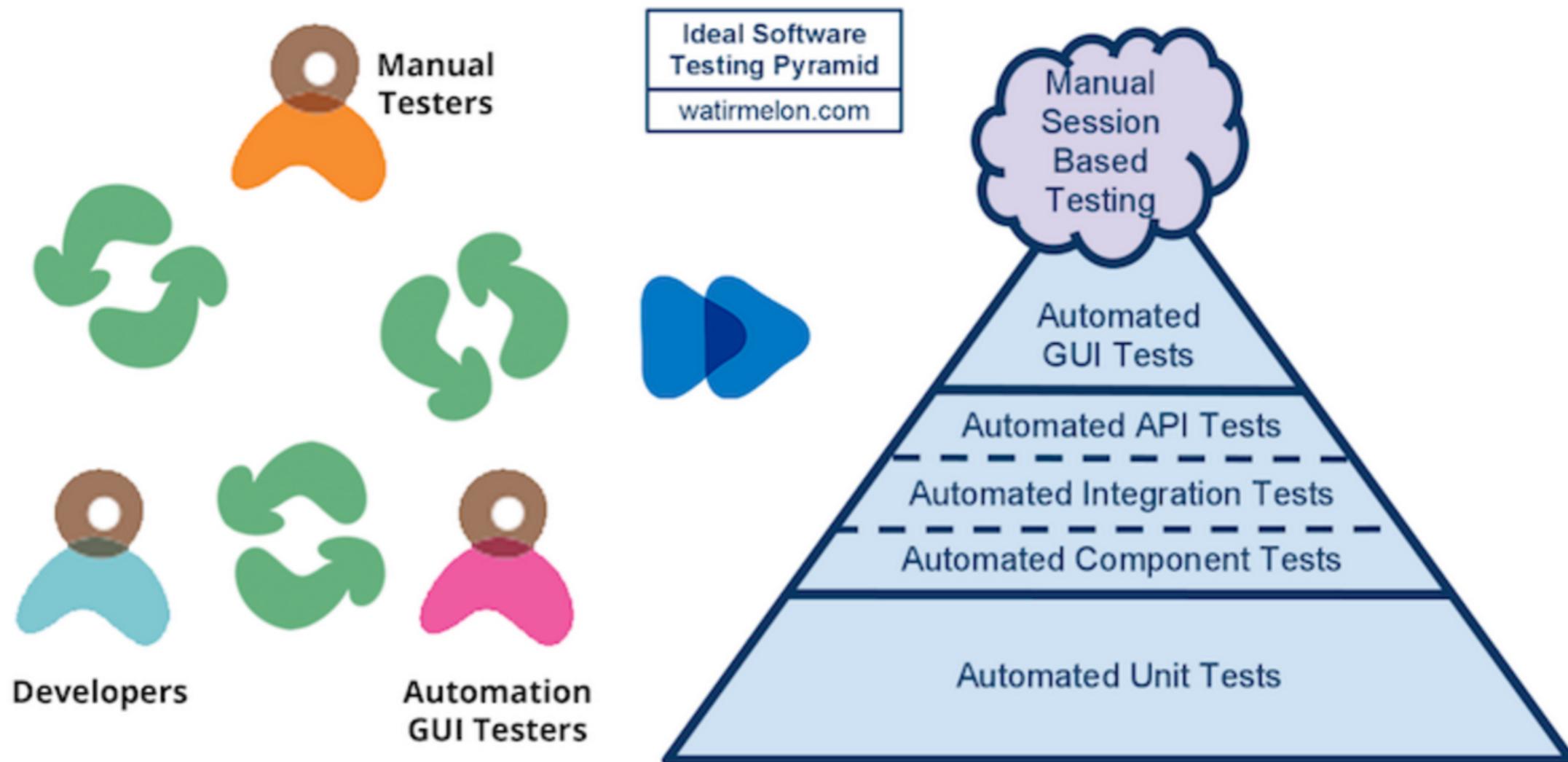
Testing pyramid



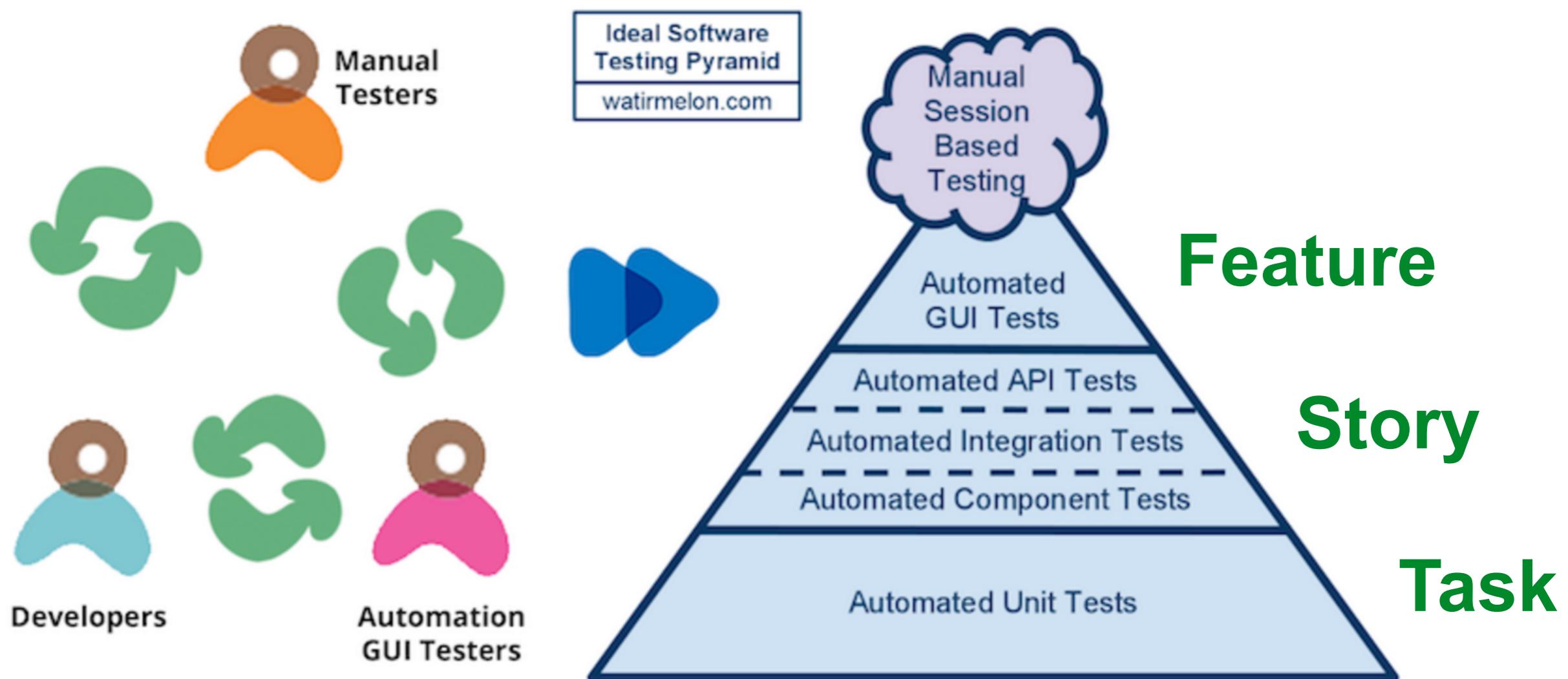
Ice-cream testing



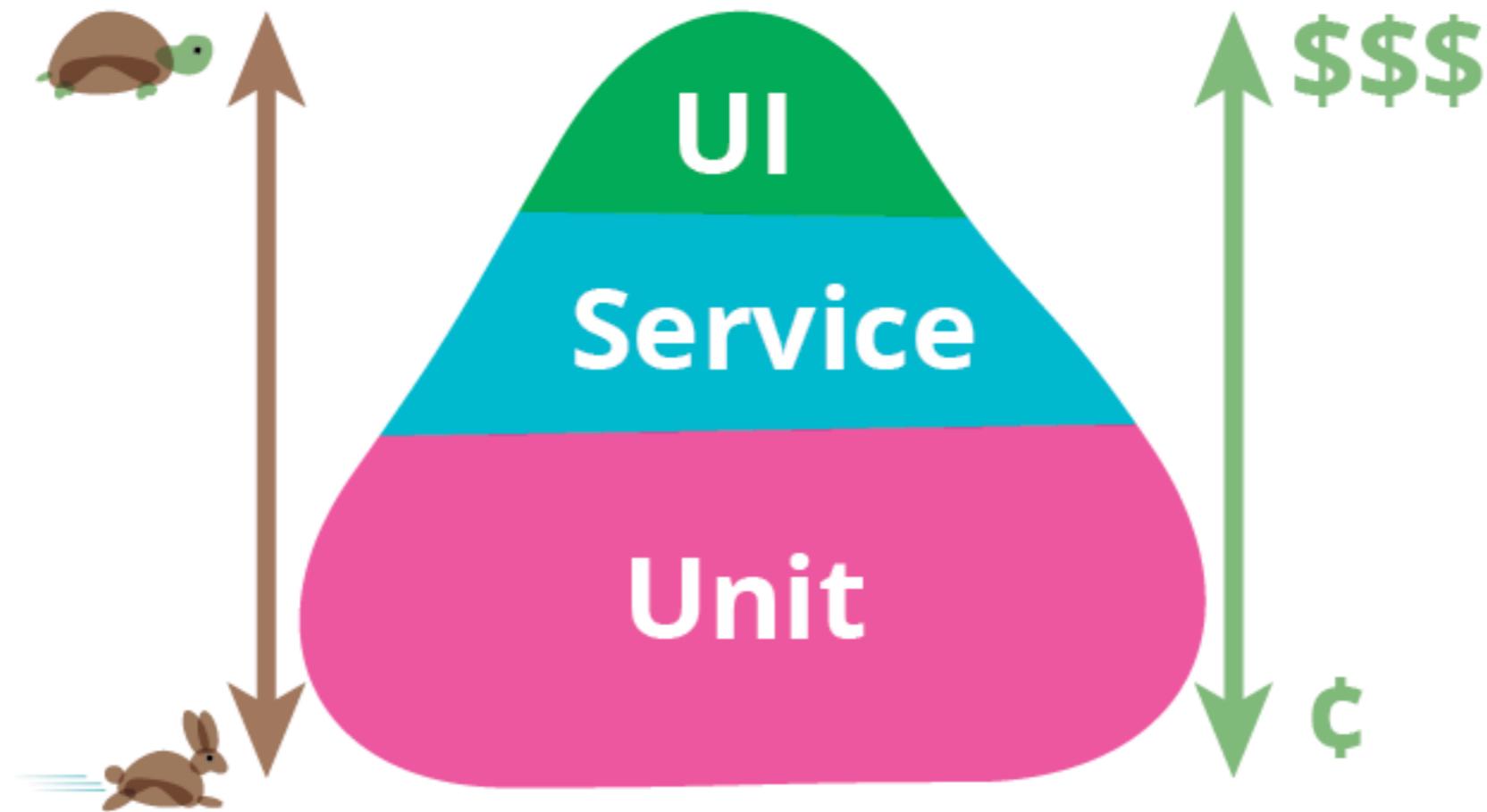
Testing Pyramid



Testing Pyramid

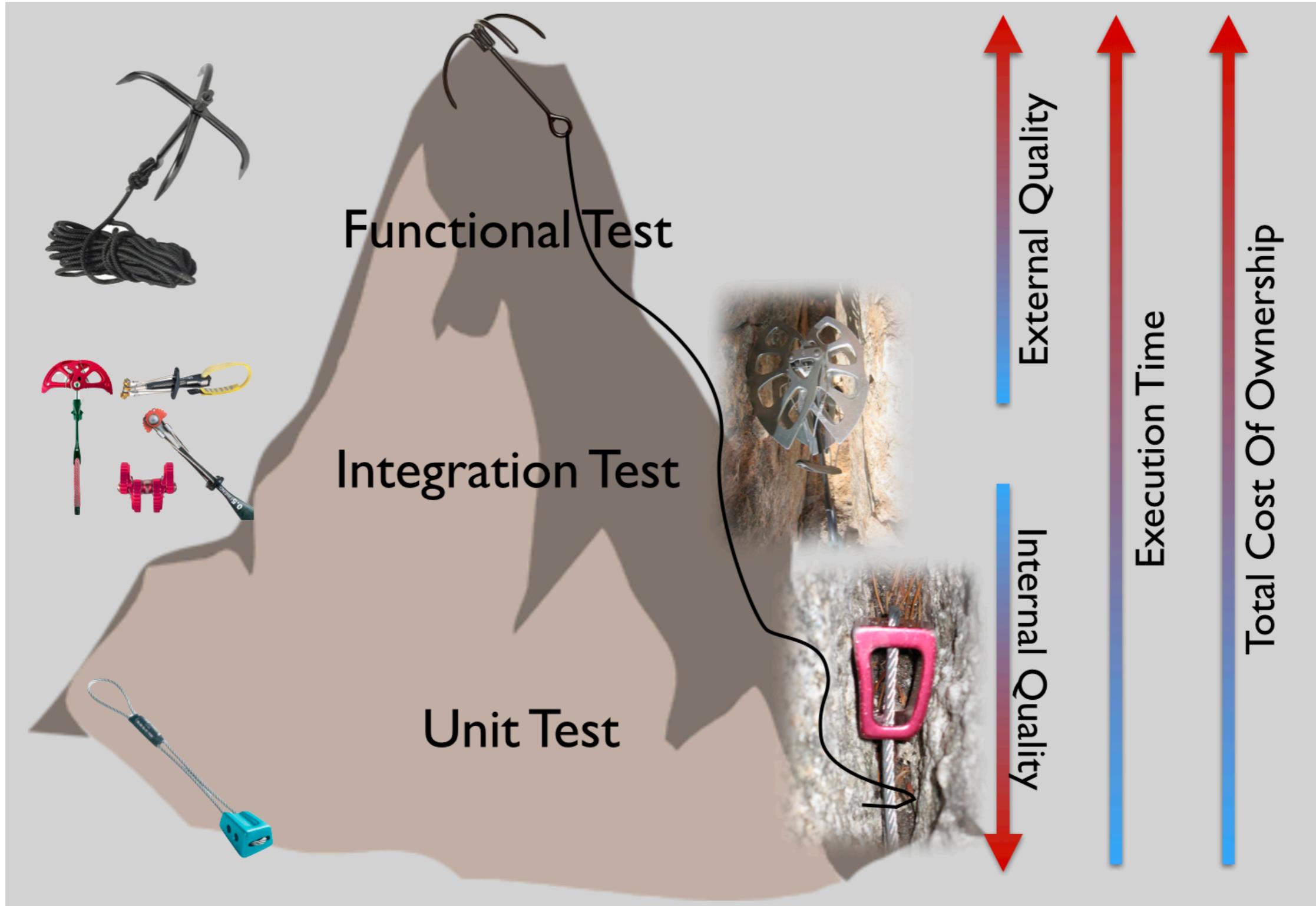


Testing Pyramid



<https://martinfowler.com/bliki/TestPyramid.html>

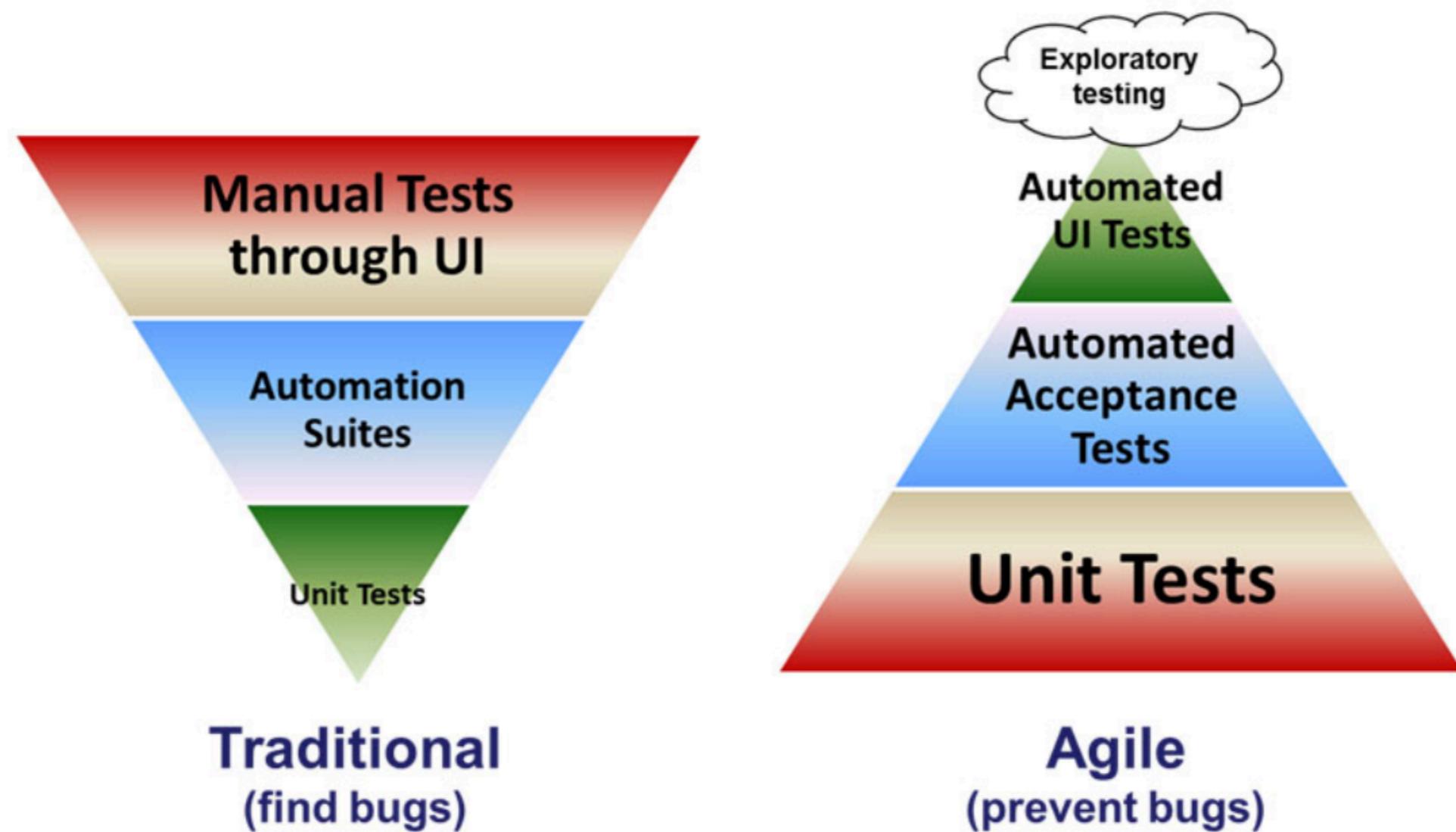




<https://less.works/less/technical-excellence/unit-testing.html>



Find vs Prevent



<https://martinfowler.com/bliki/TestPyramid.html>



Mind-set switch

Instead of

We are here to **find bug**

We are here to **ensure requirement are met**

We are here to **break the software**



Mind-set switch

Instead of

We are here to **find bug**

We are here to **ensure requirement are met**

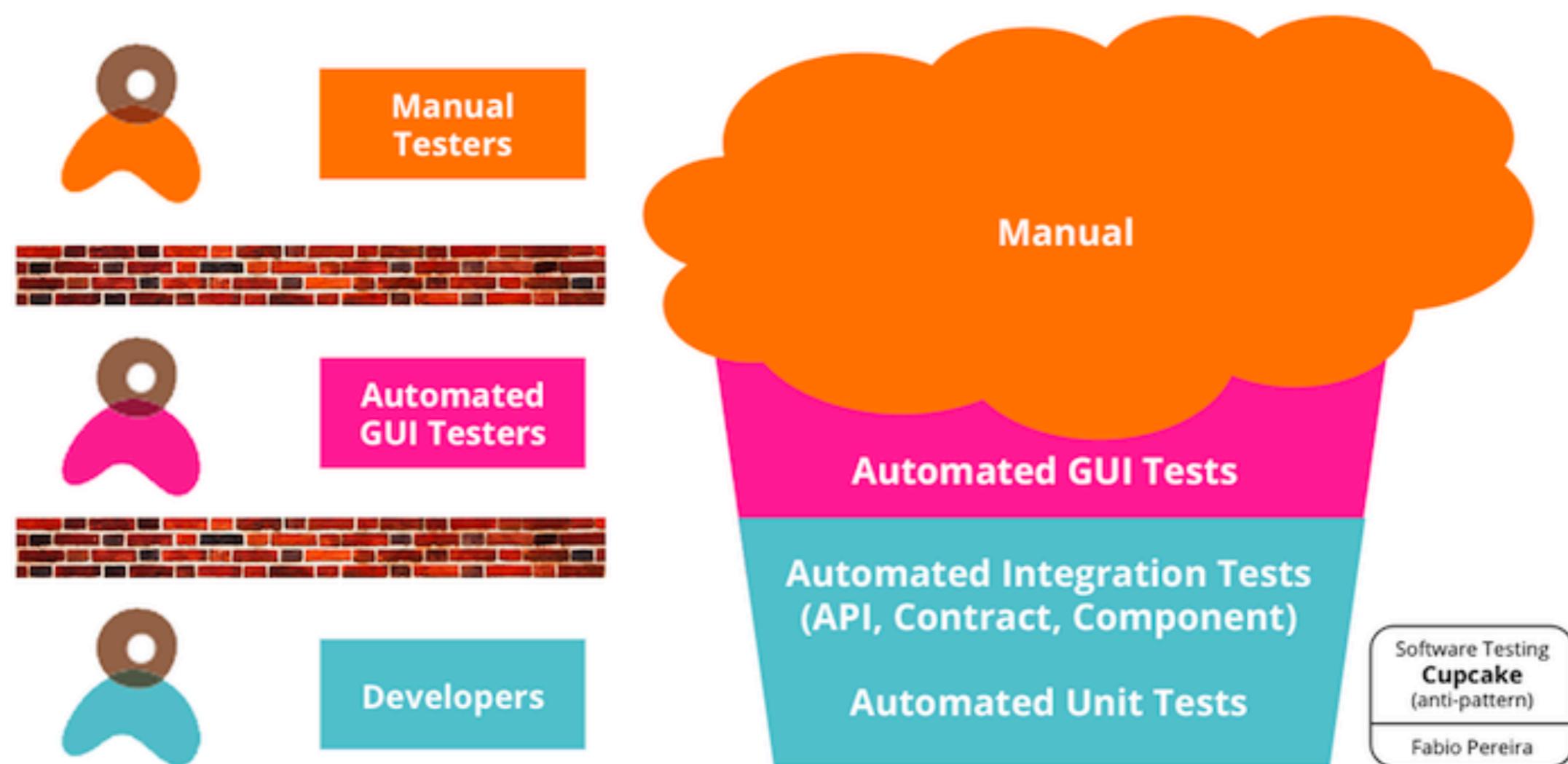
We are here to **break the software**

Think

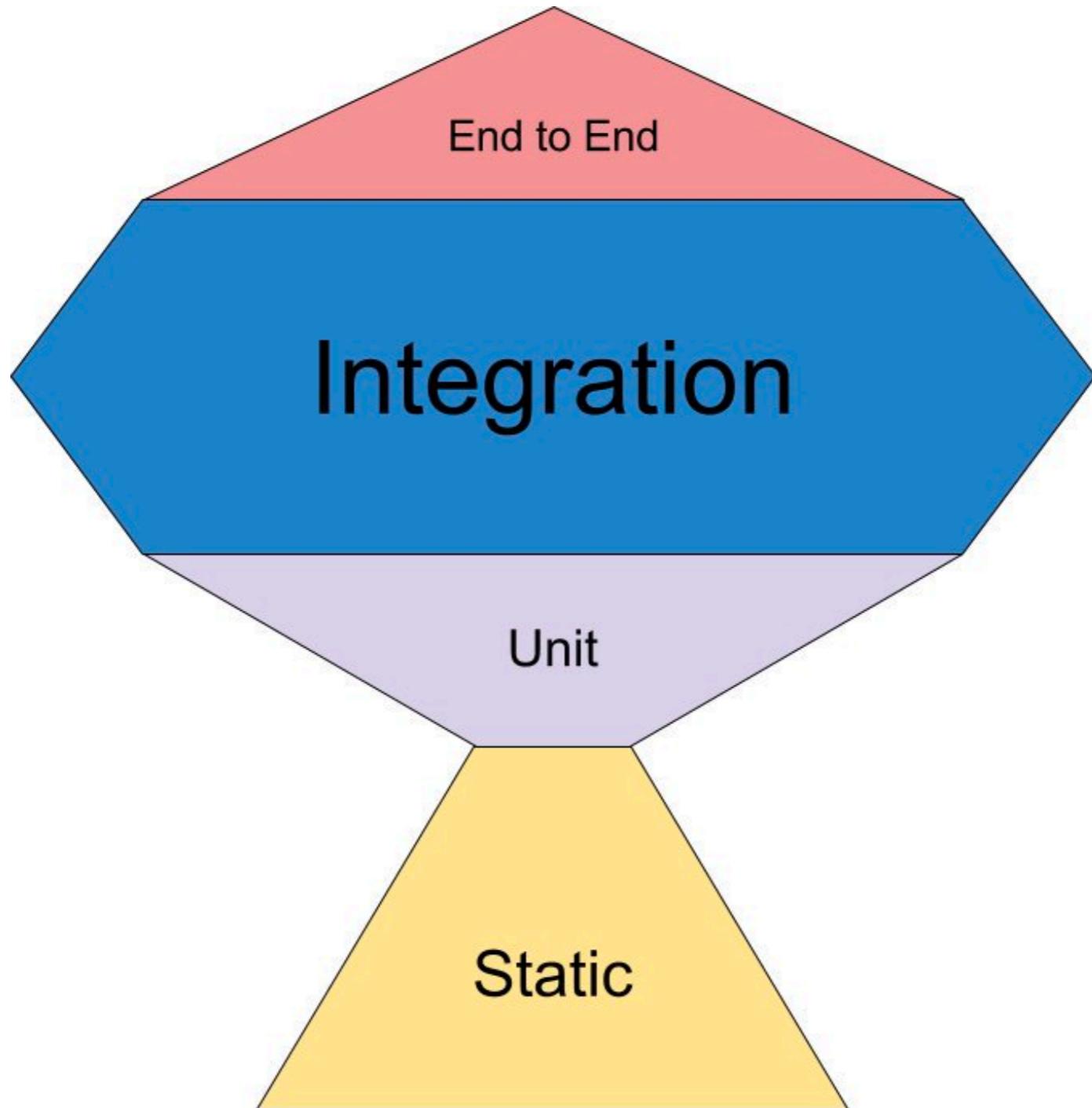
**What can I do to help deliver the software
successfully !!**



Cupcake testing



Trophy testing



Workshop Test Pyramid



Test login

User name	Password	Expected result	Comment
Somkiat	PasswordSomKiat	Access to system as Somkiat	Valid
Som kiat	PasswordSomKiat	Error	Space in user
Somkiat	Password SomKiat	Error	Space in password
Somkiat	1234	Error	Password too short



Workshop

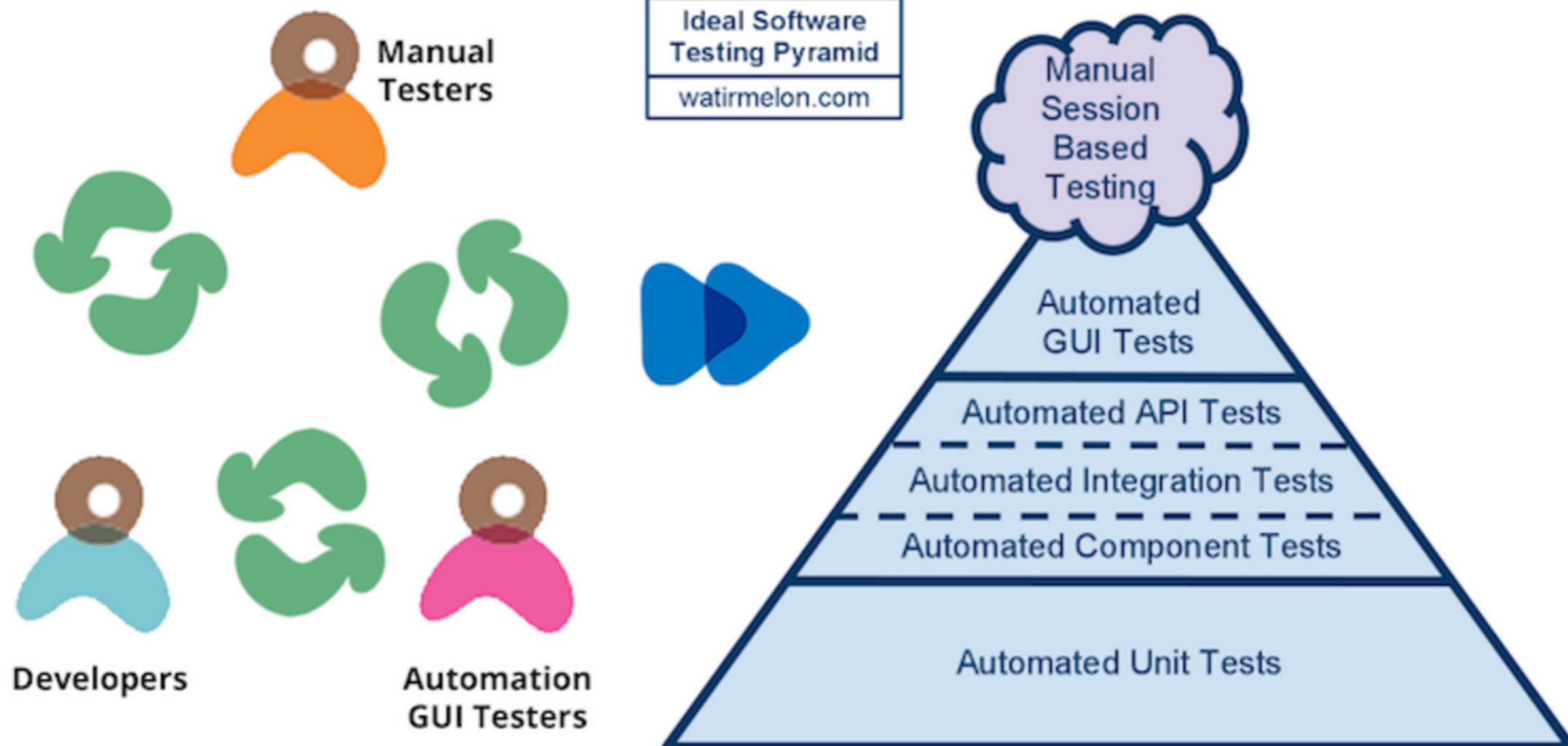
1. Draw a test pyramid
2. Identify tests at each level
3. Think about value (business and customer)
4. What tests should be manual ?

<https://bit.ly/2XPAjrl>

<https://bit.ly/3aofbLD>

<https://bit.ly/2Vp52dv>





Understand What and How to test ?

Discussion is very important



Remember !!

Test pyramid is a tool
To talk about automation tasks
How to prioritise and help to do automation ?
Way to make **visible to the whole team**



Where to start ?



What are the **biggest**
obstacles ?

Time/Tools/System/People



What should be careful ?

- Automating end-to-end tests
- User Interface are slow
- Working with database
- Working with external system
- Automating every paths



Testing Quadrant



Testing Quadrants

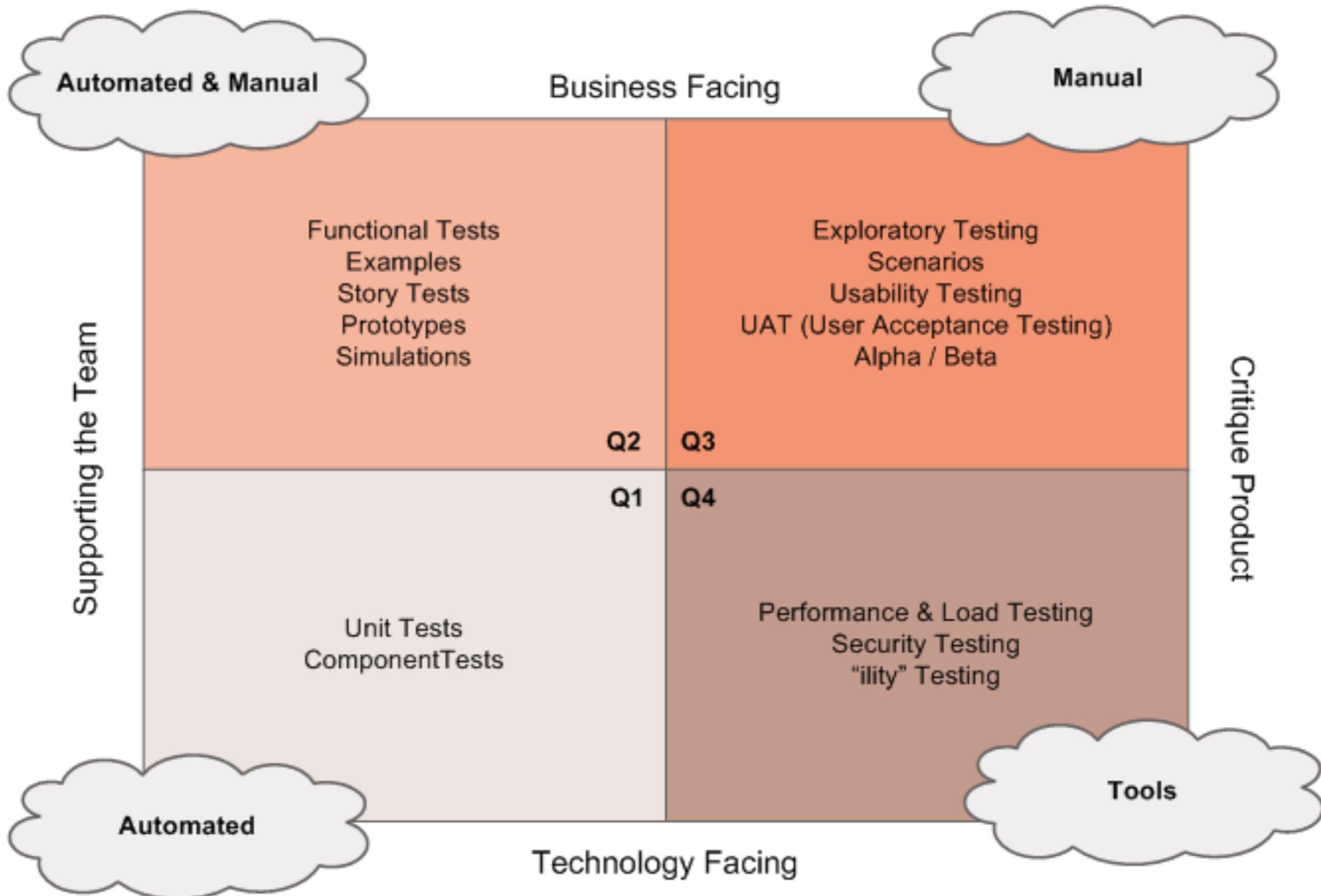
Scope of tests

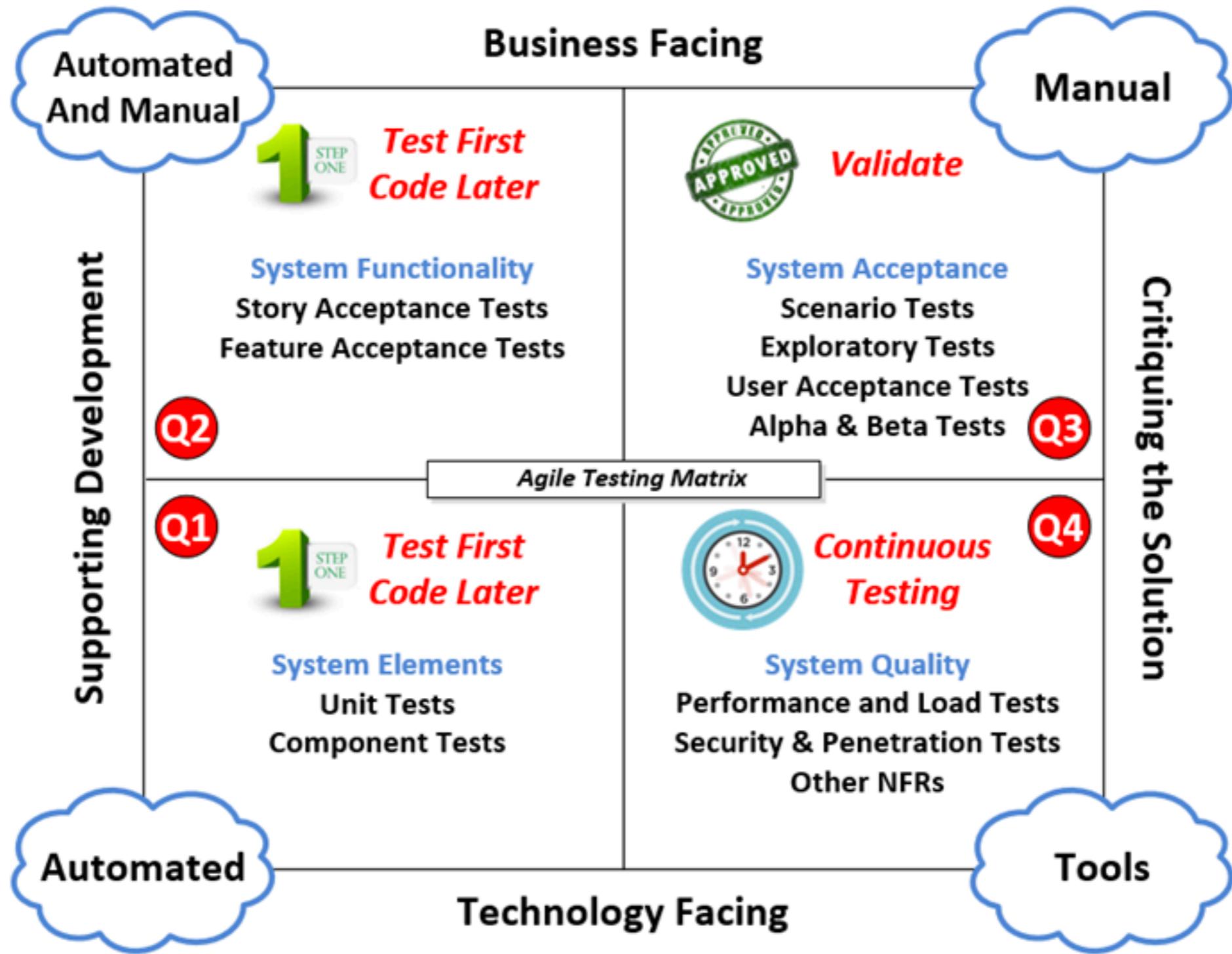
Classify your tests

Visible your tests

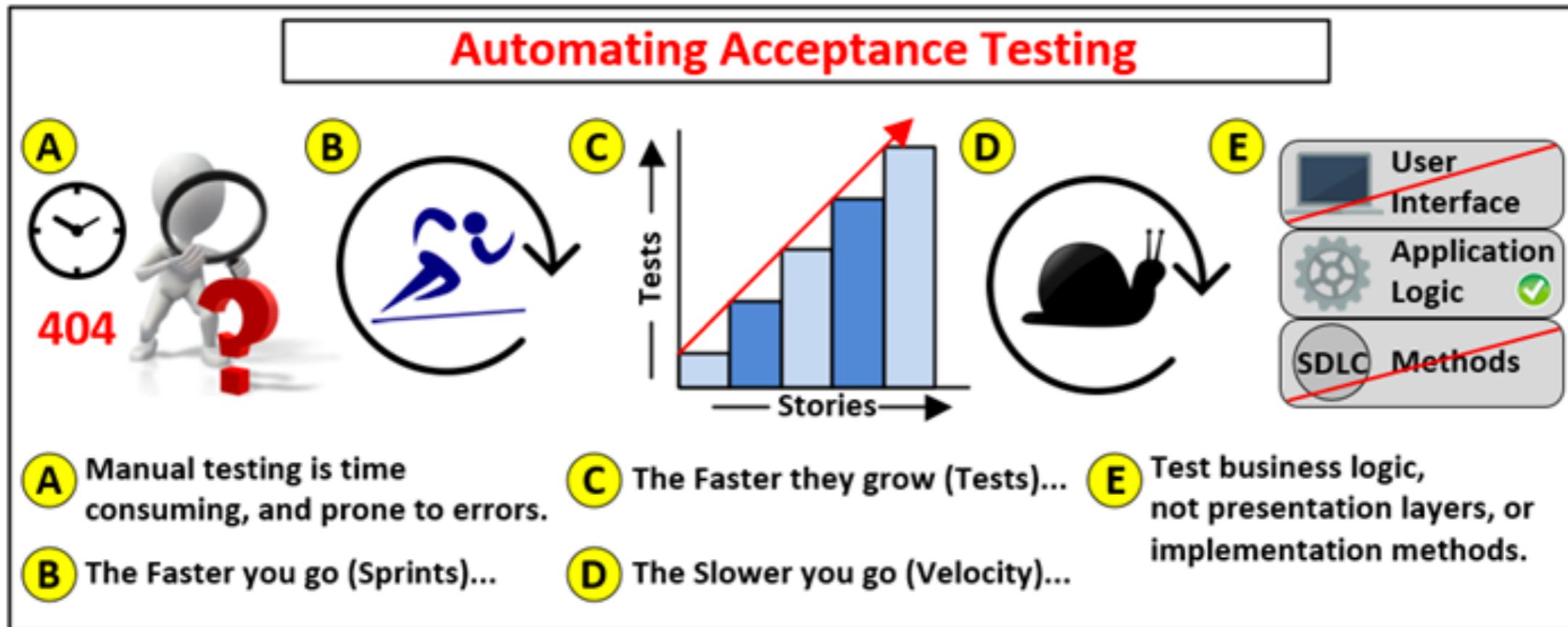


Agile Testing Quadrants





Test automation is essential

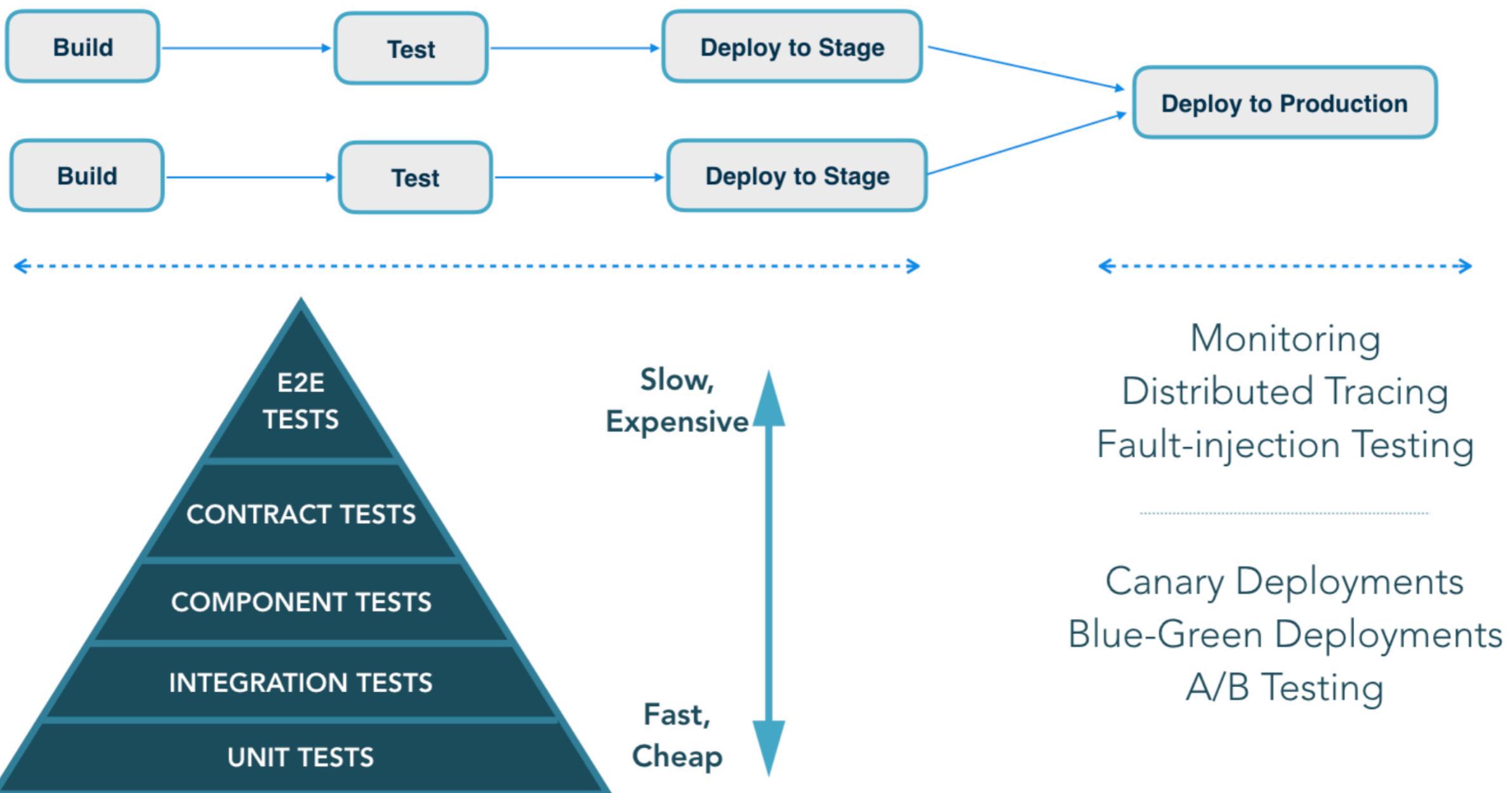


Test strategy

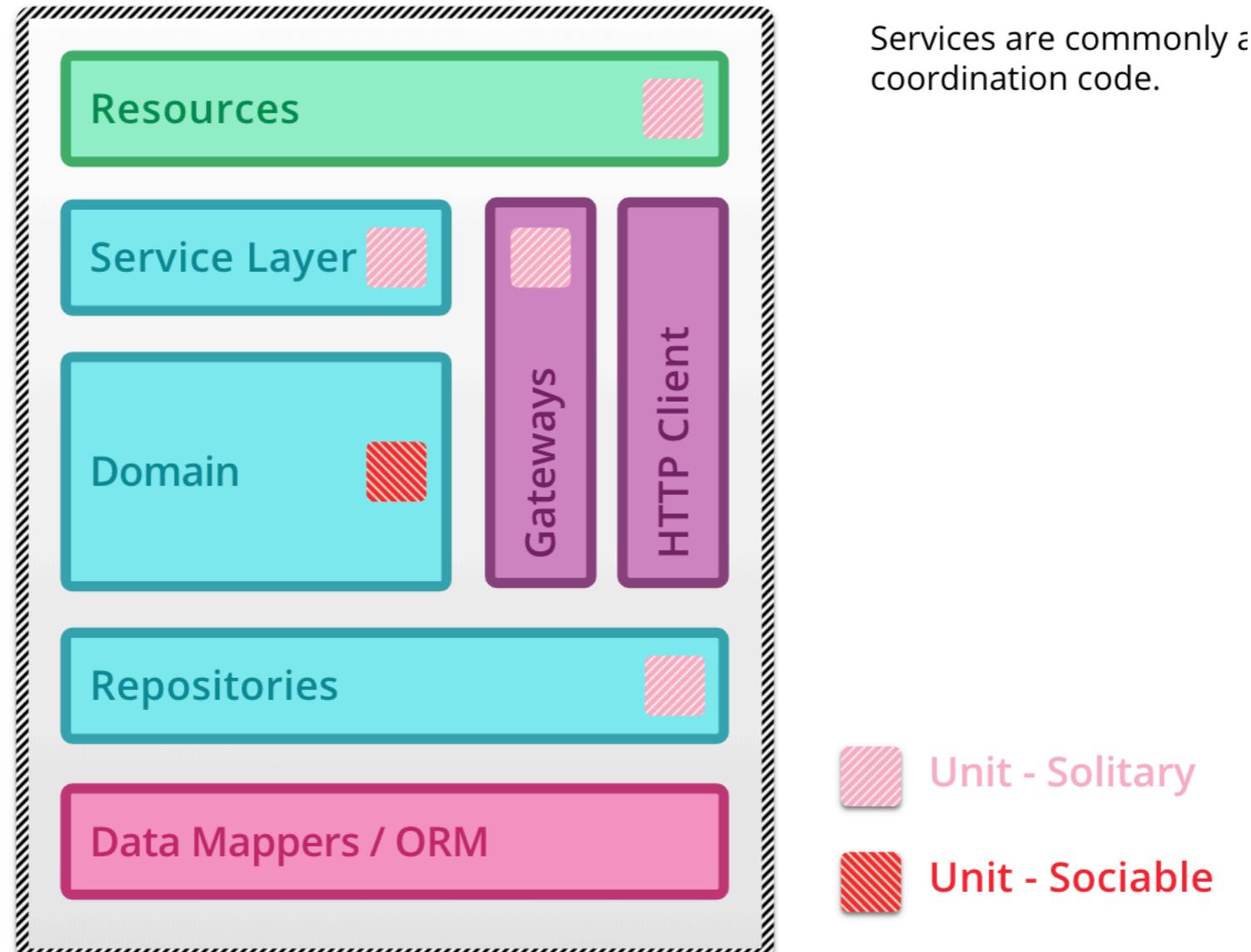
<https://martinfowler.com/articles/microservice-testing/>



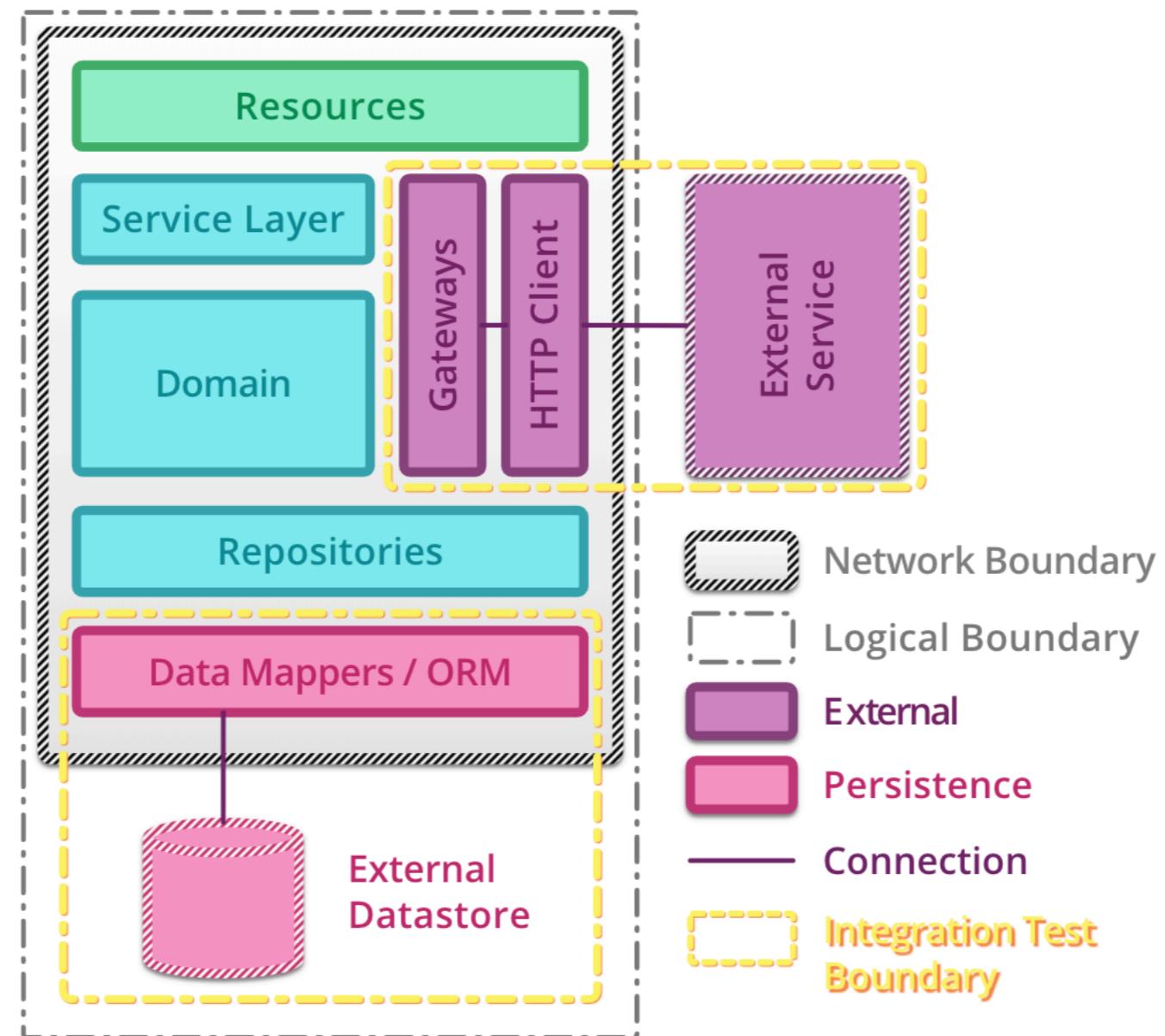
Test strategy



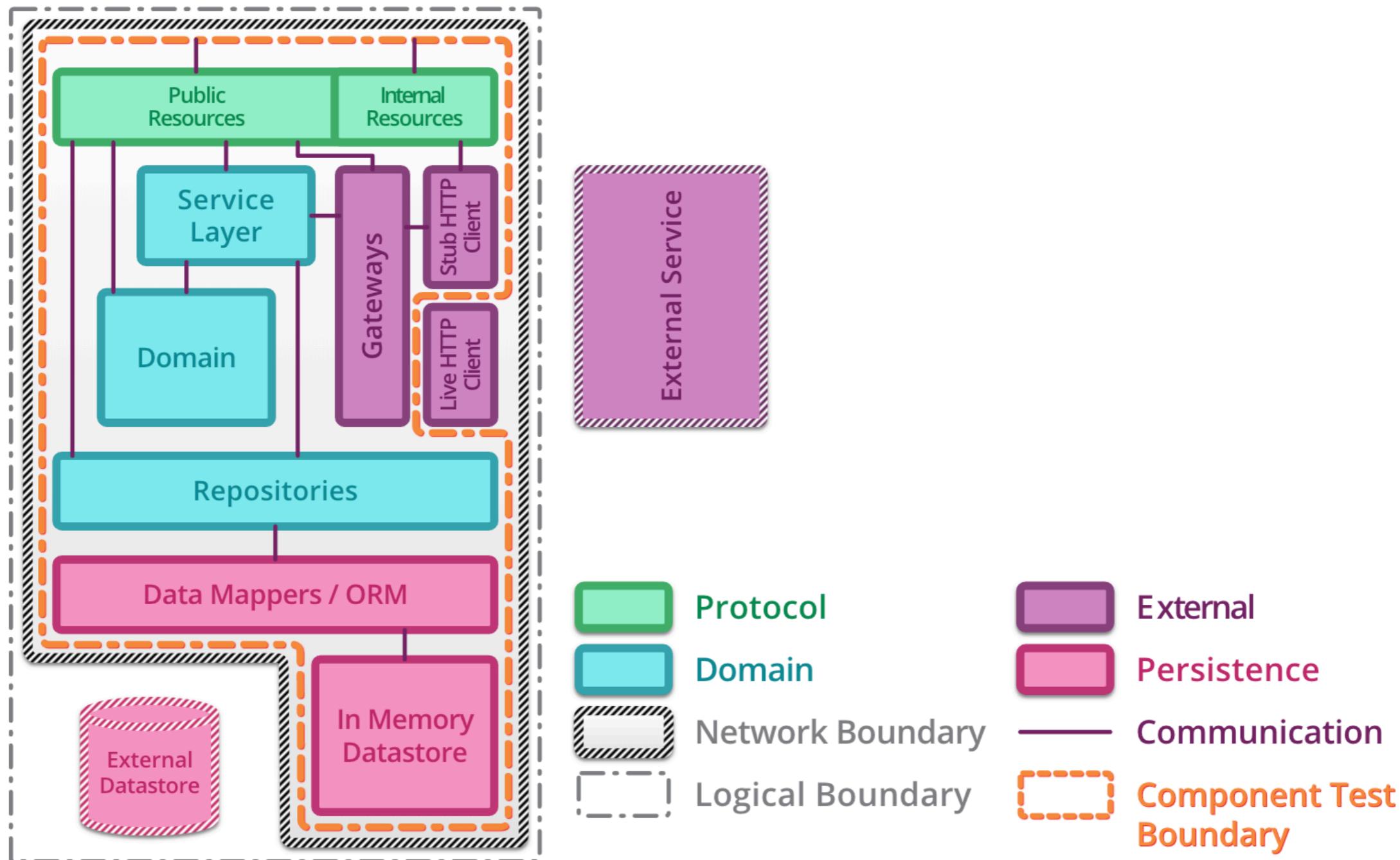
Unit testing



Integration testing



Component testing



Test design



Economy of Test Design

Easy to understand

Easy to maintain

Readable by the business

One purpose per test

Re-runnable



Economy of Test Design

Easy to understand

Easy to maintain

Readable by the business

One purpose per test

Re-runnable

Poor test practices reduce the benefits



Respect your tests

Don't ignore it if it fails

Fix the code or fix the test

100% of regression tests must pass all the time

Always refactor or improve



Test data !!

Avoid database/external system access

Setup/ tear down test data

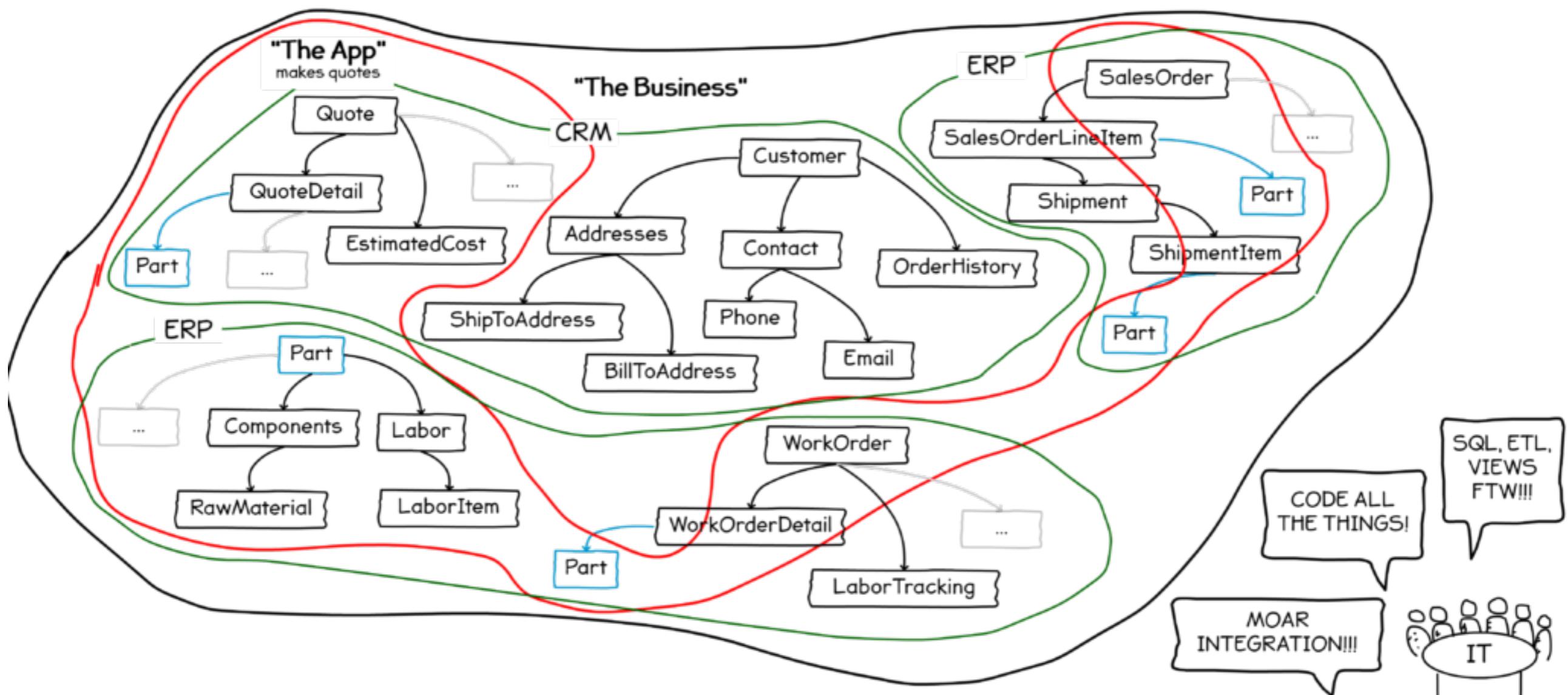
Use production-like data

Need to control your data test



System impacts !!

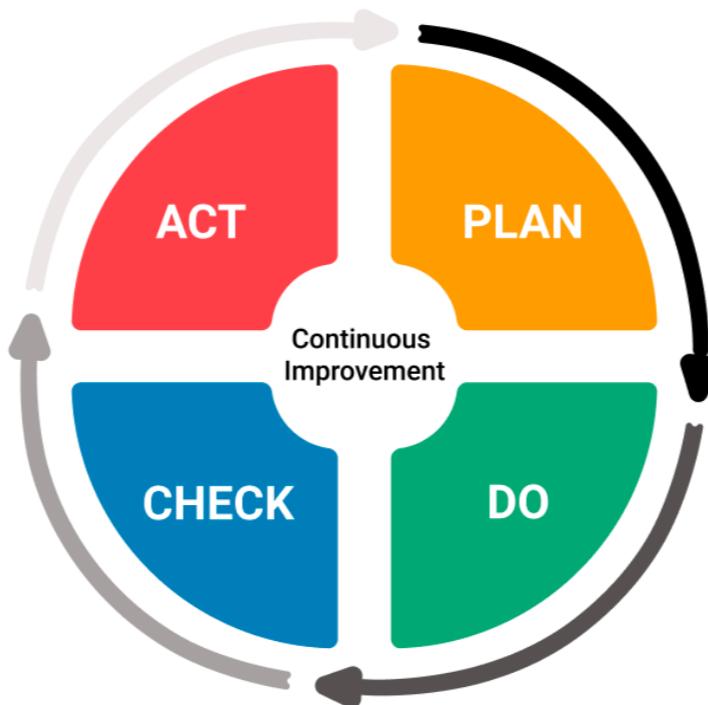
Know your systems



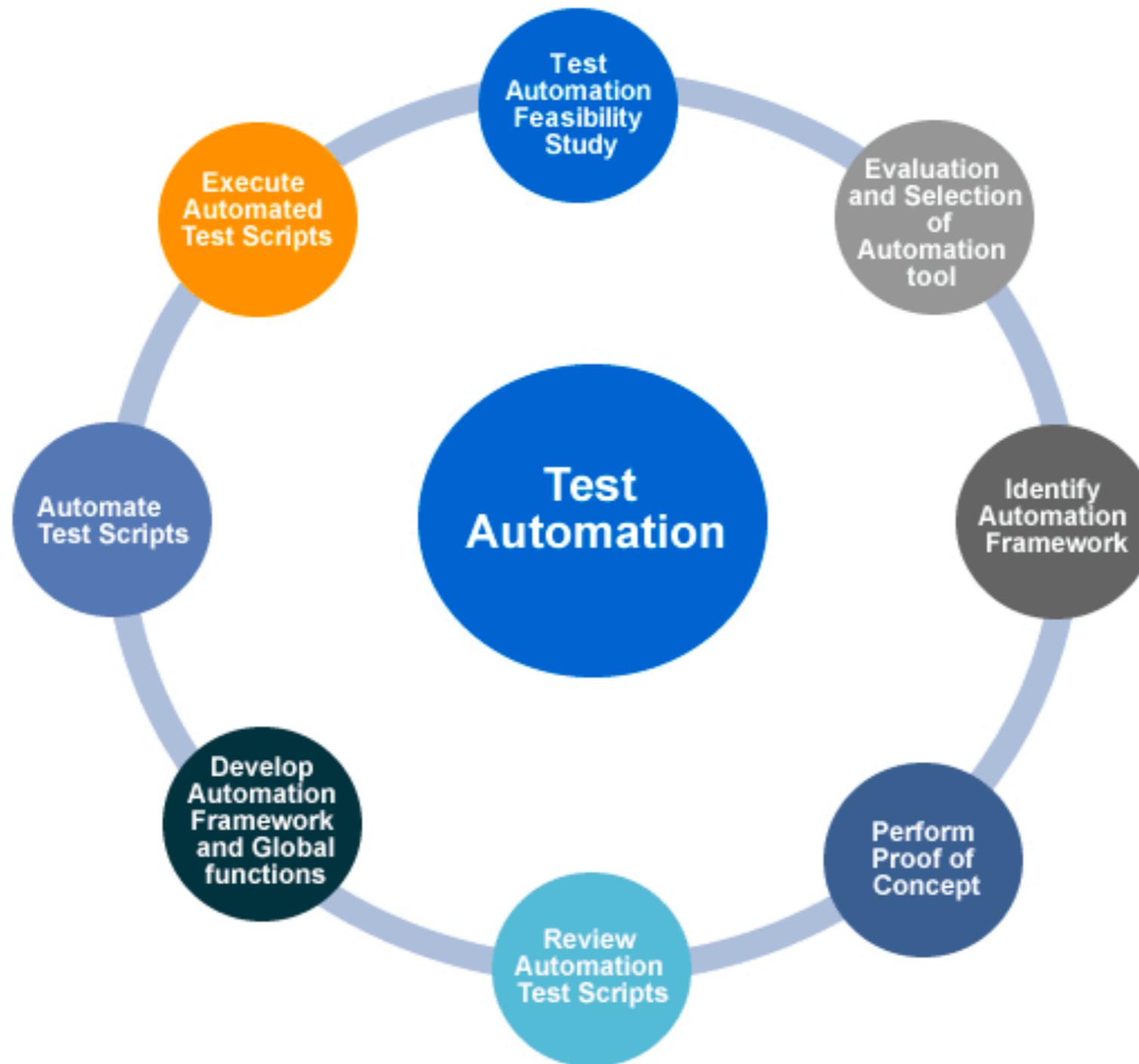
Automation feedback

Easier over time ?

Time spent on maintenance ?
Test find regression bugs ?



Test Automation selection



Manage automated tests

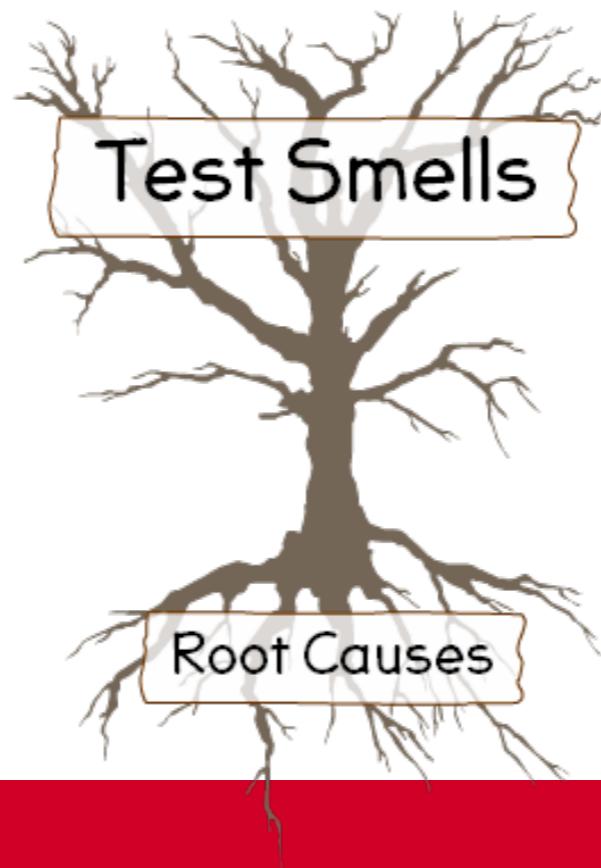
Use source control

Continuous integration to run tests on every change

Keep all tests passed

Analyse failures tests

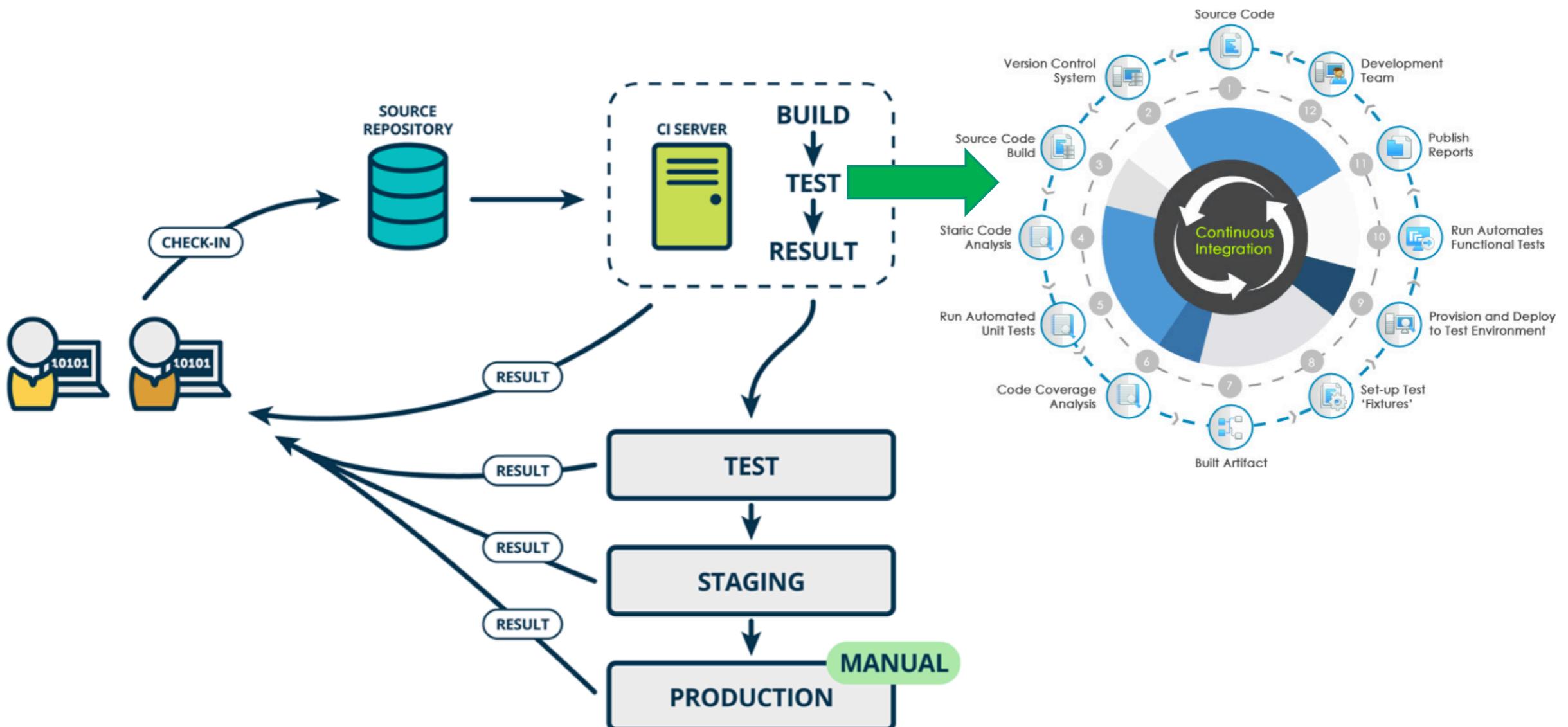
Create test standard



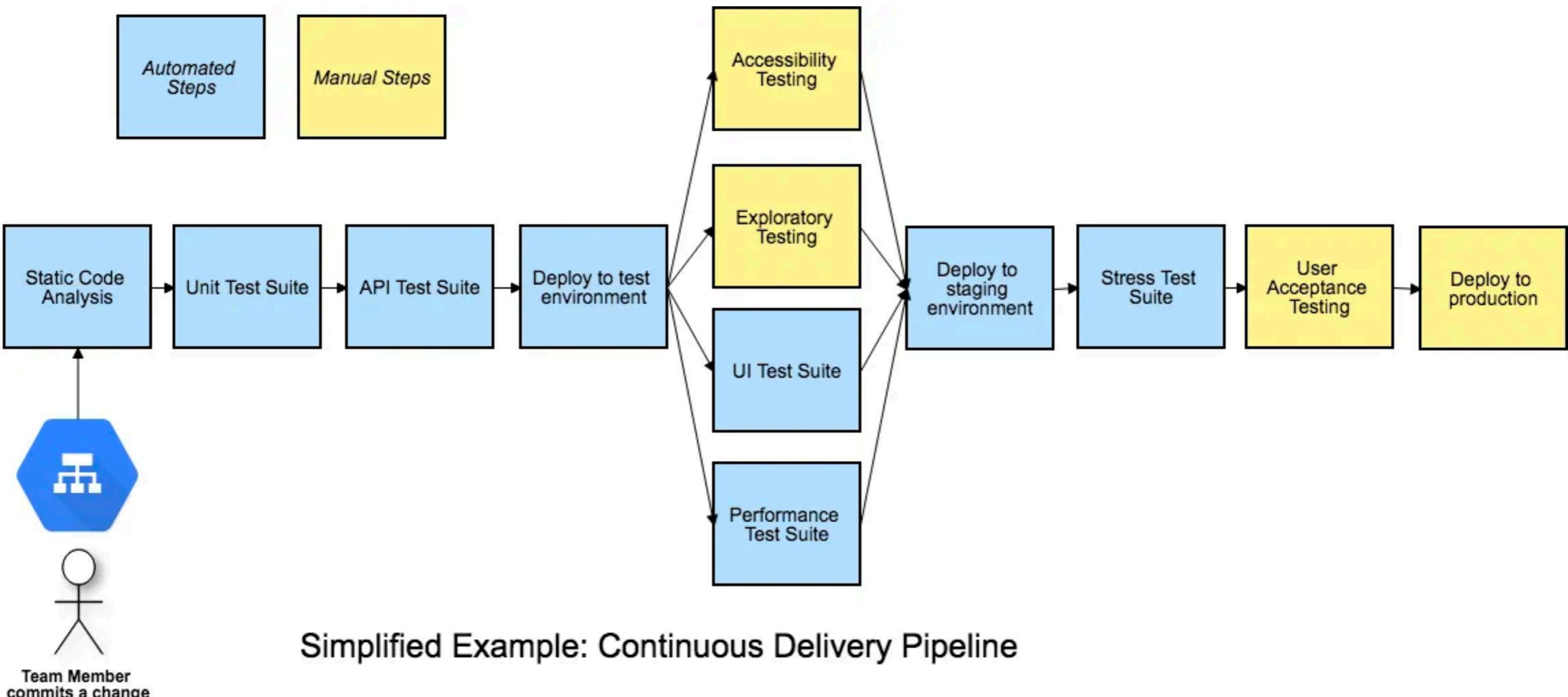
Continuous integration



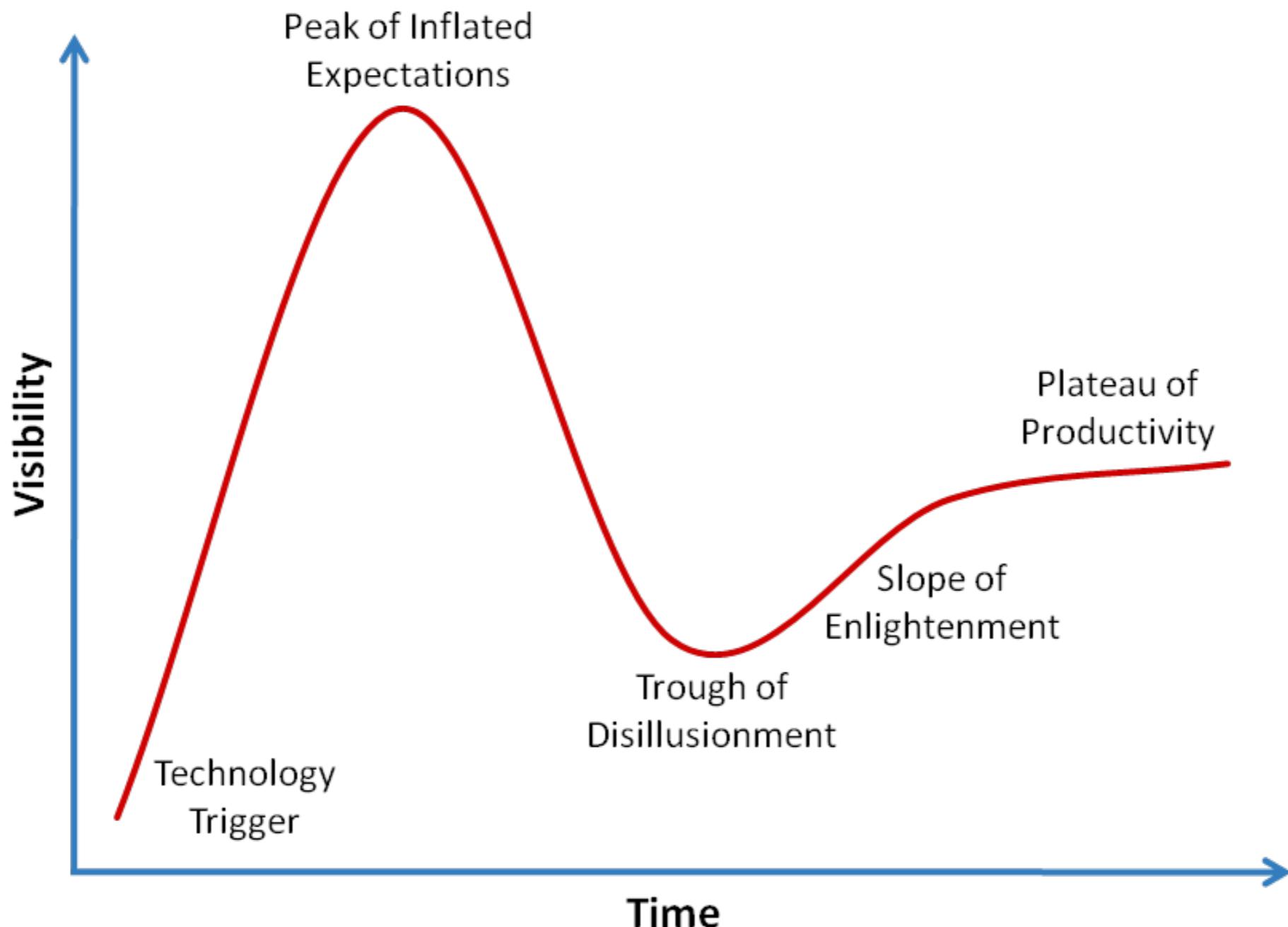
Continuous integration



Design your pipeline/process



Hype cycle



Start with simple



Use **feedback** to improve



Module #2

Automate Unit Tests



What Unit test ?

Software programs written to exercise other software programs with **specific preconditions** and verify the **expected behaviours**

Usually written in the **same programming language**

Test code

Production
code



What Unit test ?

Small and test only limited line of code functionality

Run very fast (100+ within a few seconds)

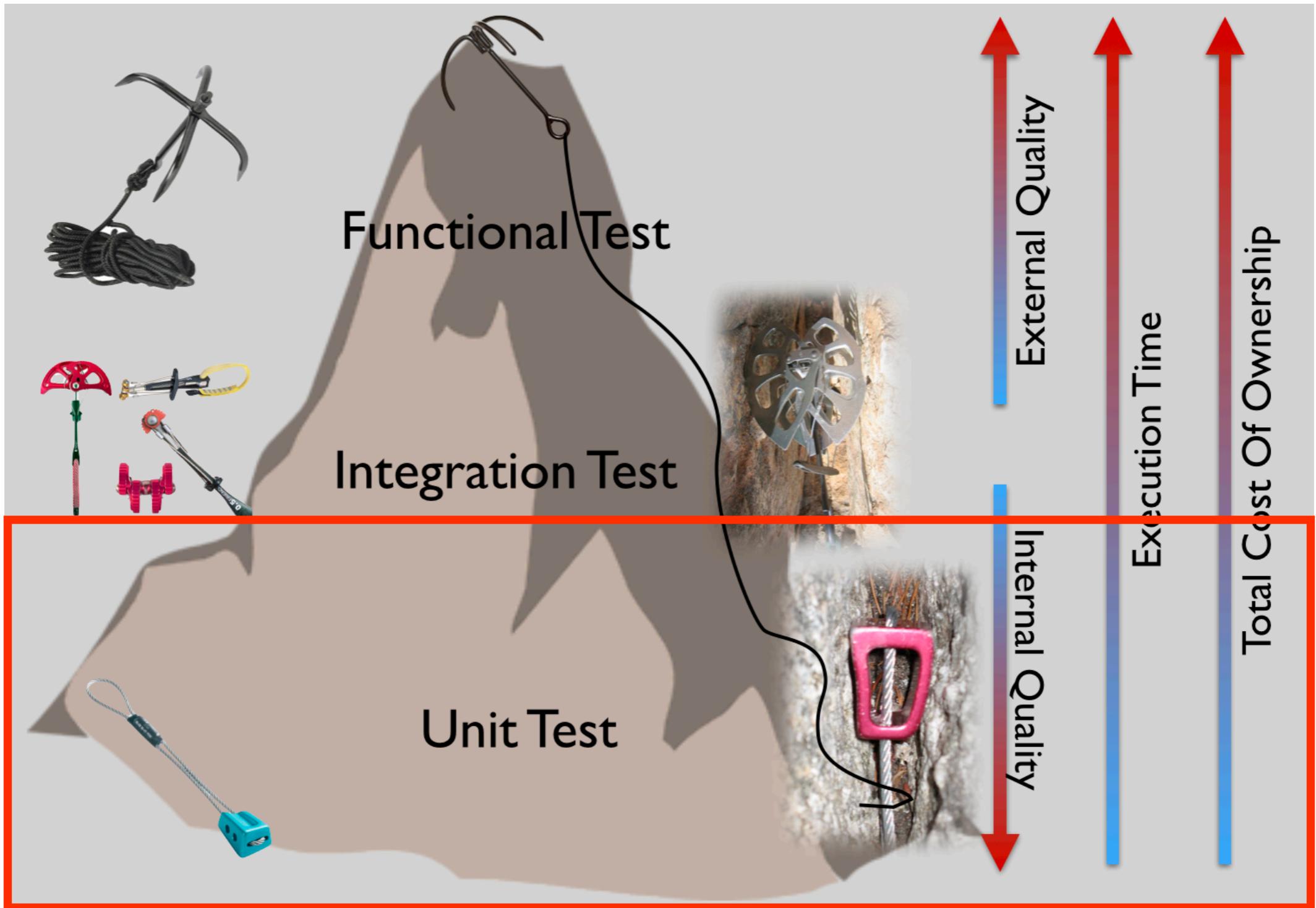


Golden rule of Unit test

Each unit test case should be
very limited in scope

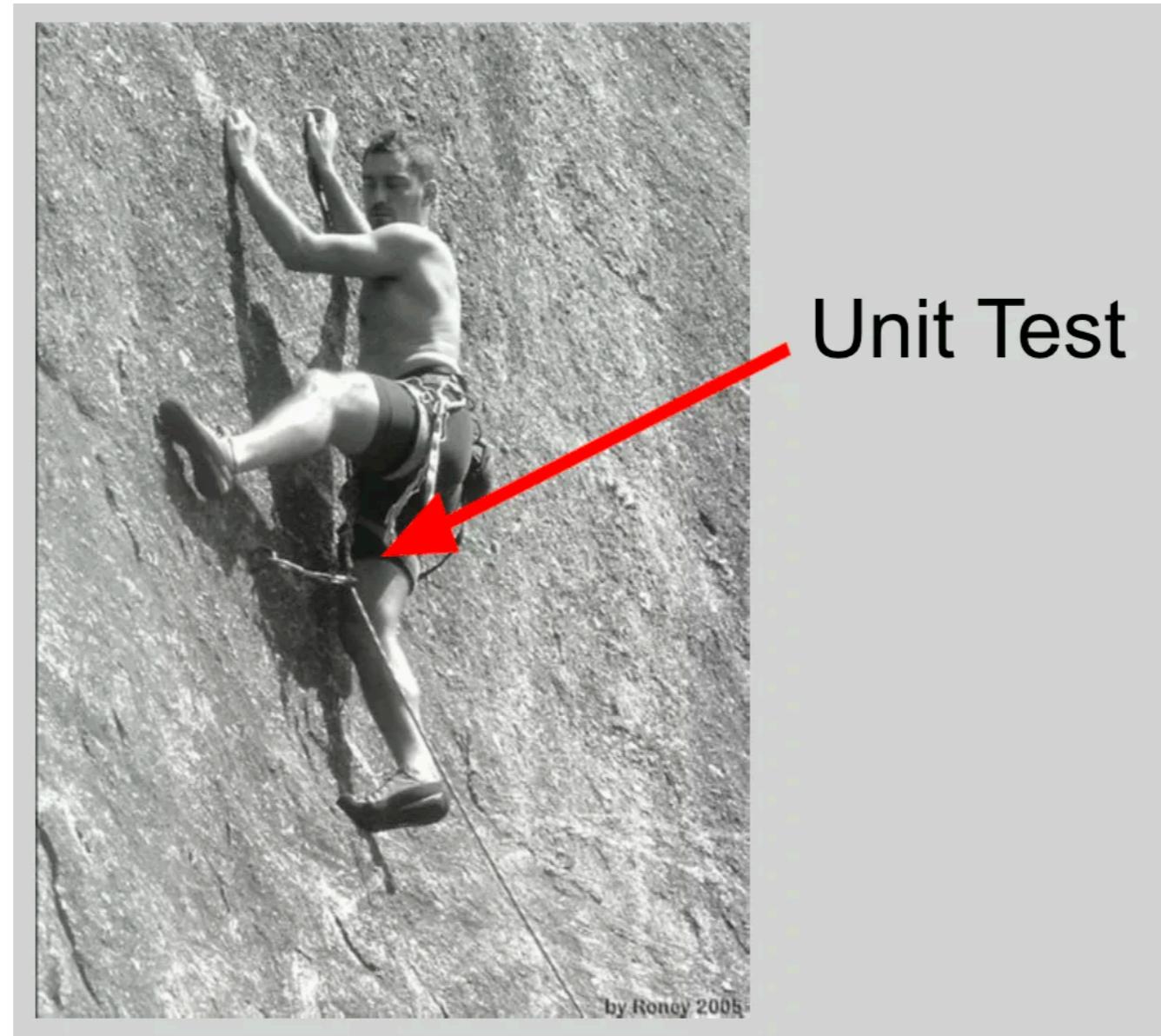


Why Unit test ?



Why Unit test ?

Protect what we have implemented than to find any defects



Purpose of Unit test

Facilitates changes
Simplifies integration
Documentation
Design tool



Good Unit Tests (F.I.R.S.T)

Fast
Independent/Isolate
Repeat
Self-validate
Thorough/Timely



We need testable code and easy to test



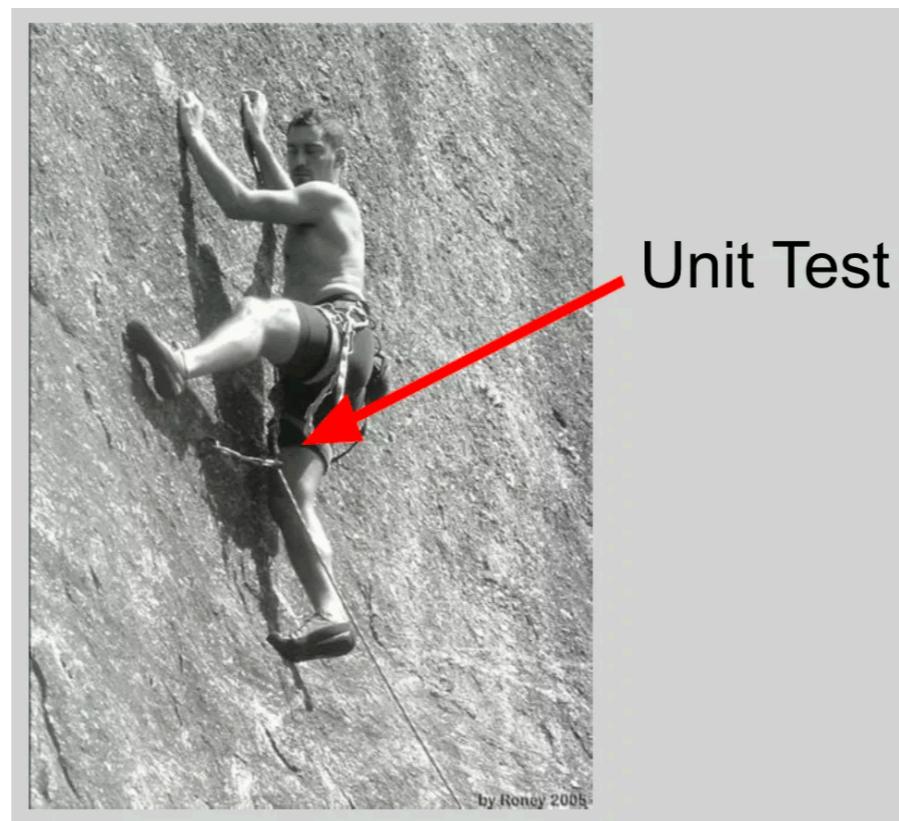
Misconception of Unit test

Not as important as the production code

Done by testing engineers

Write unit test without changing production code

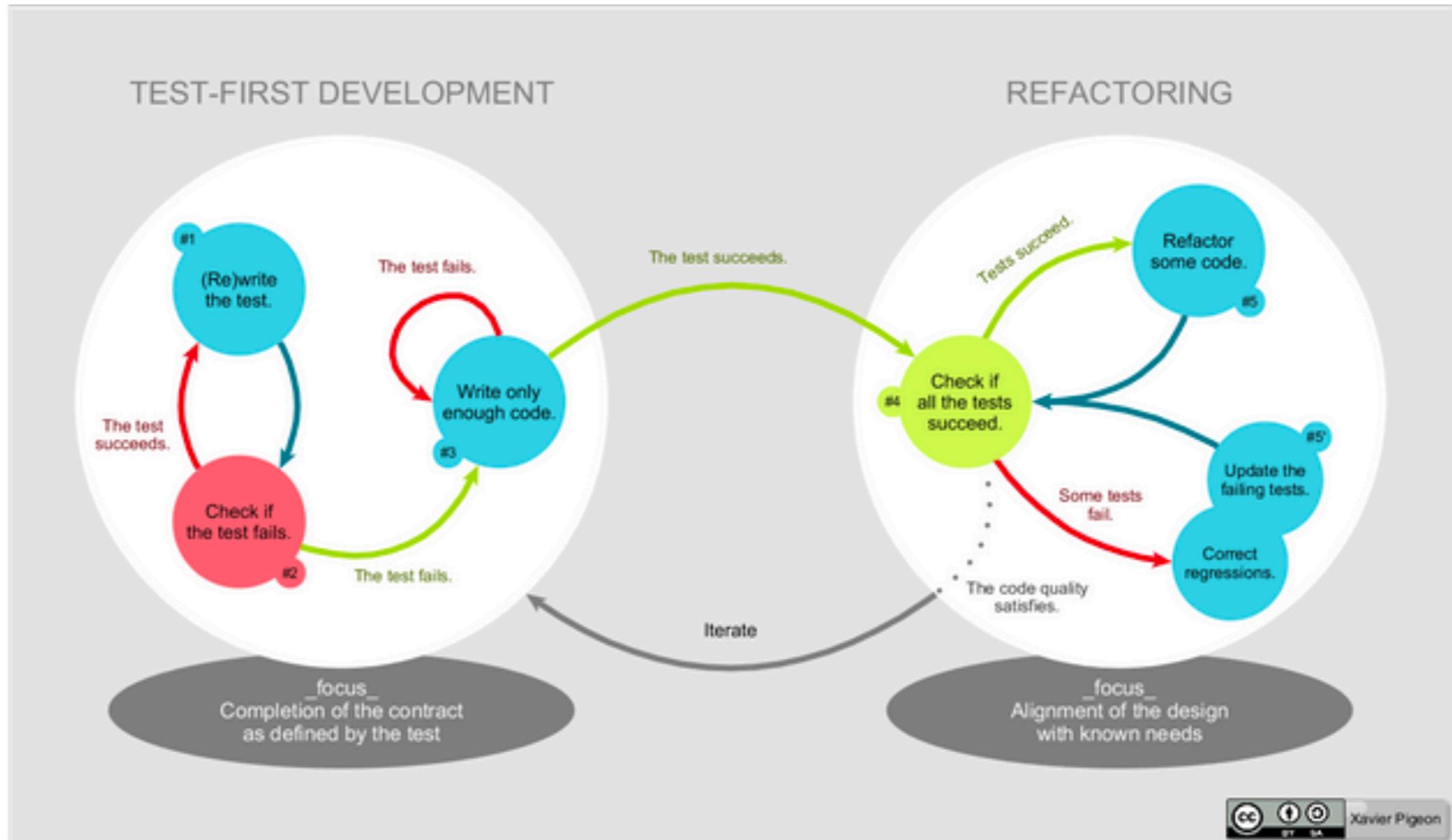
Add unit test later



Let's start with Test-First



Test-First





TDD

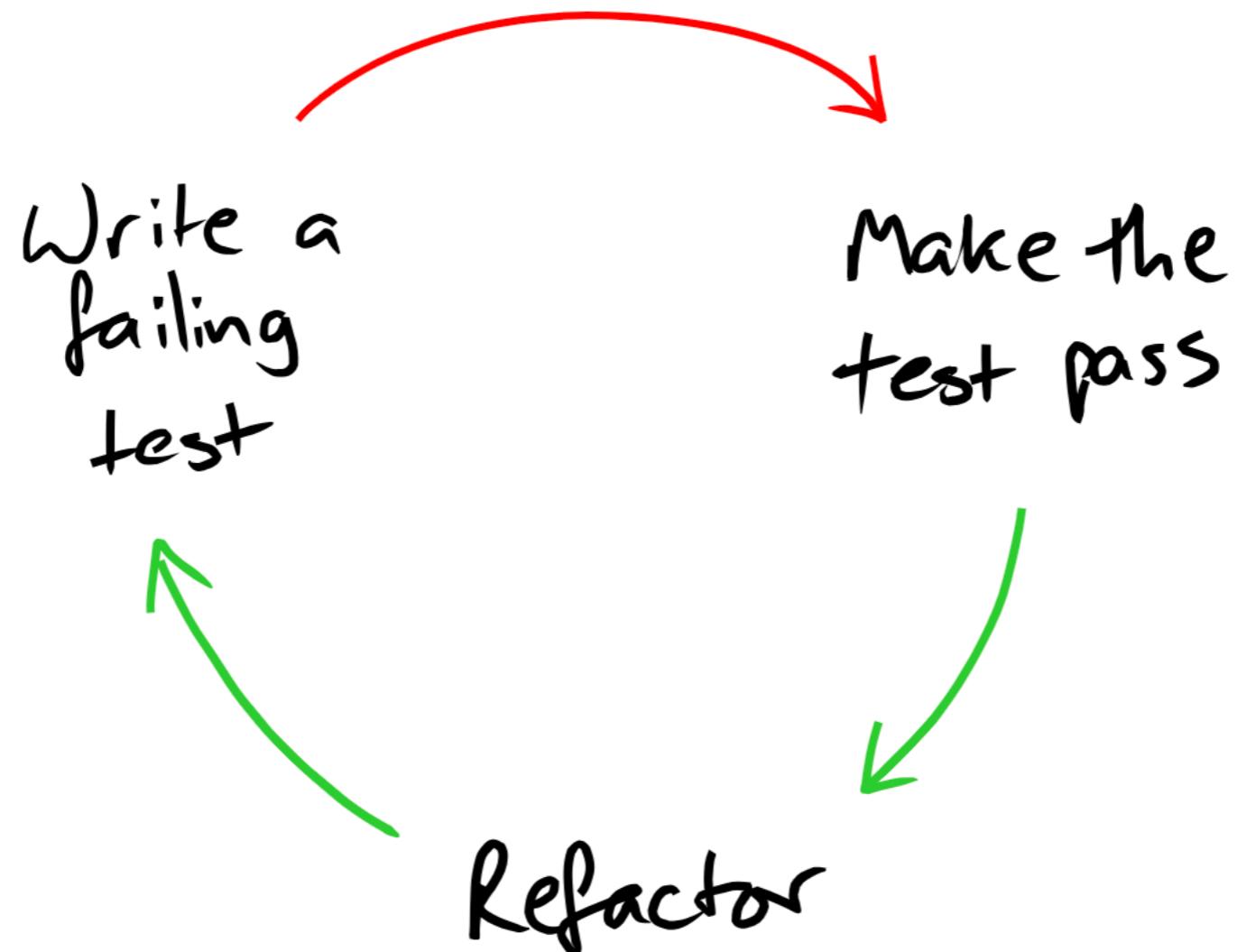
**ALL CODE IS GUILTY
UNTIL PROVEN INNOCENT**



TDD == ทำดีดี



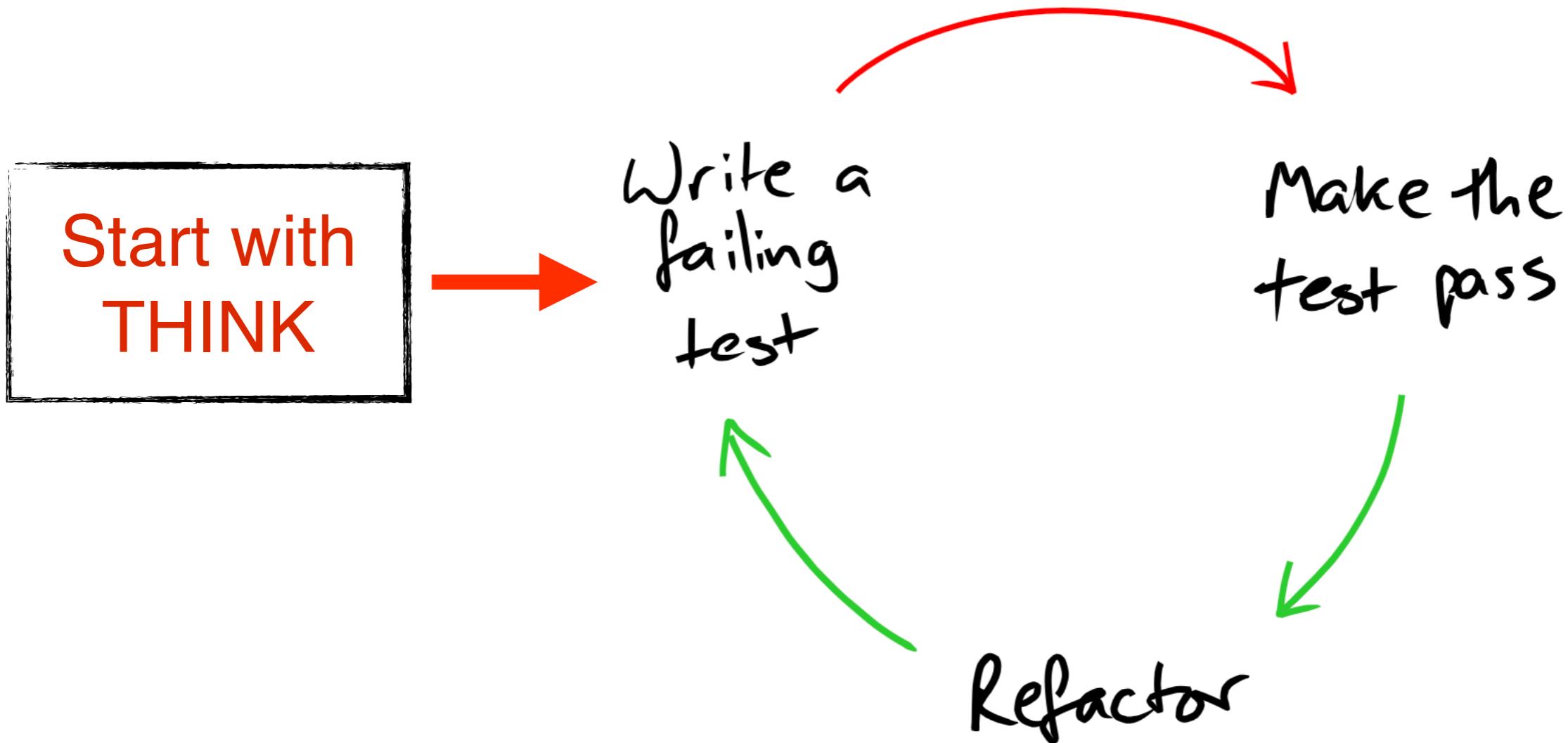
TDD Cycle



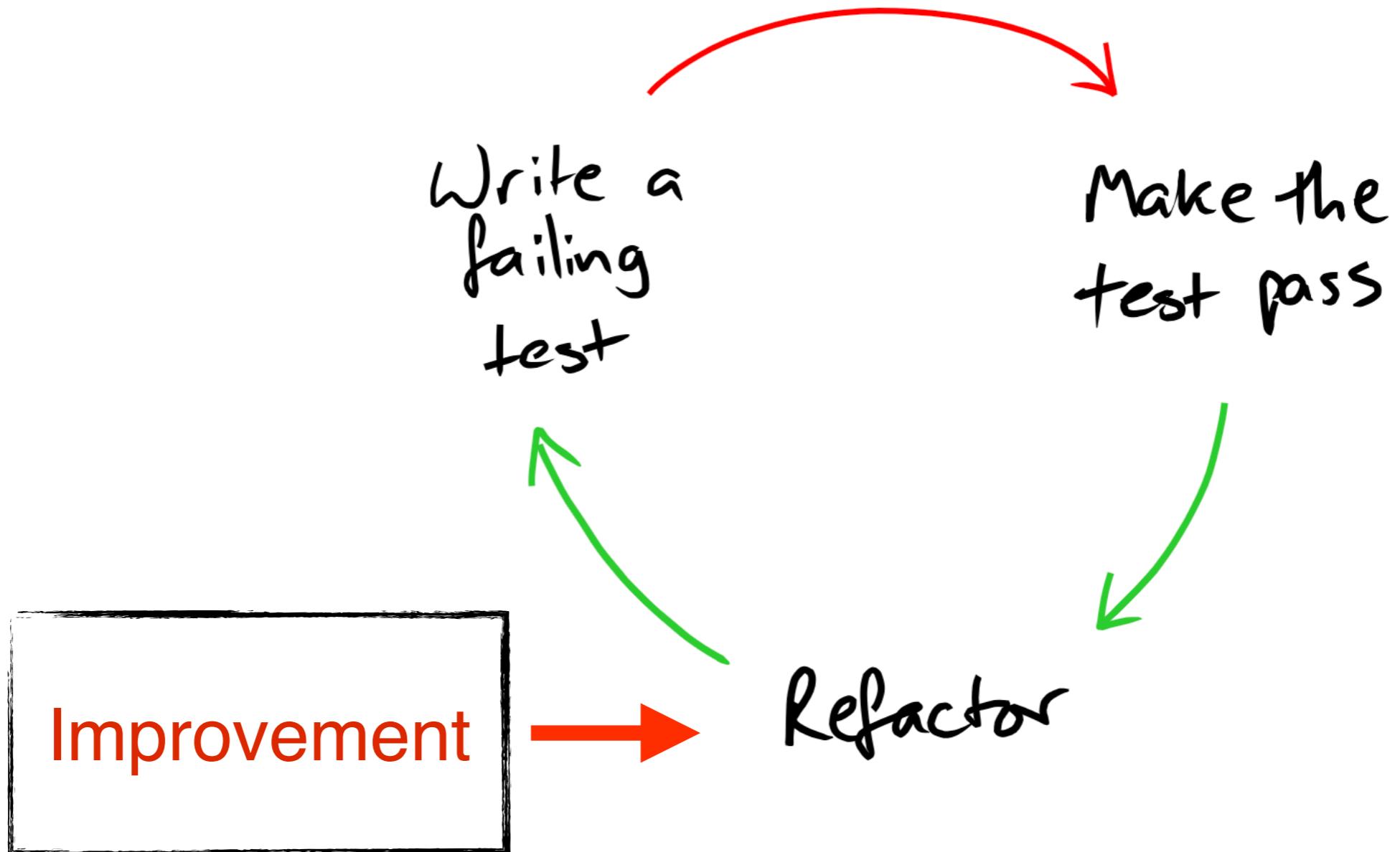
Red Green Refactor



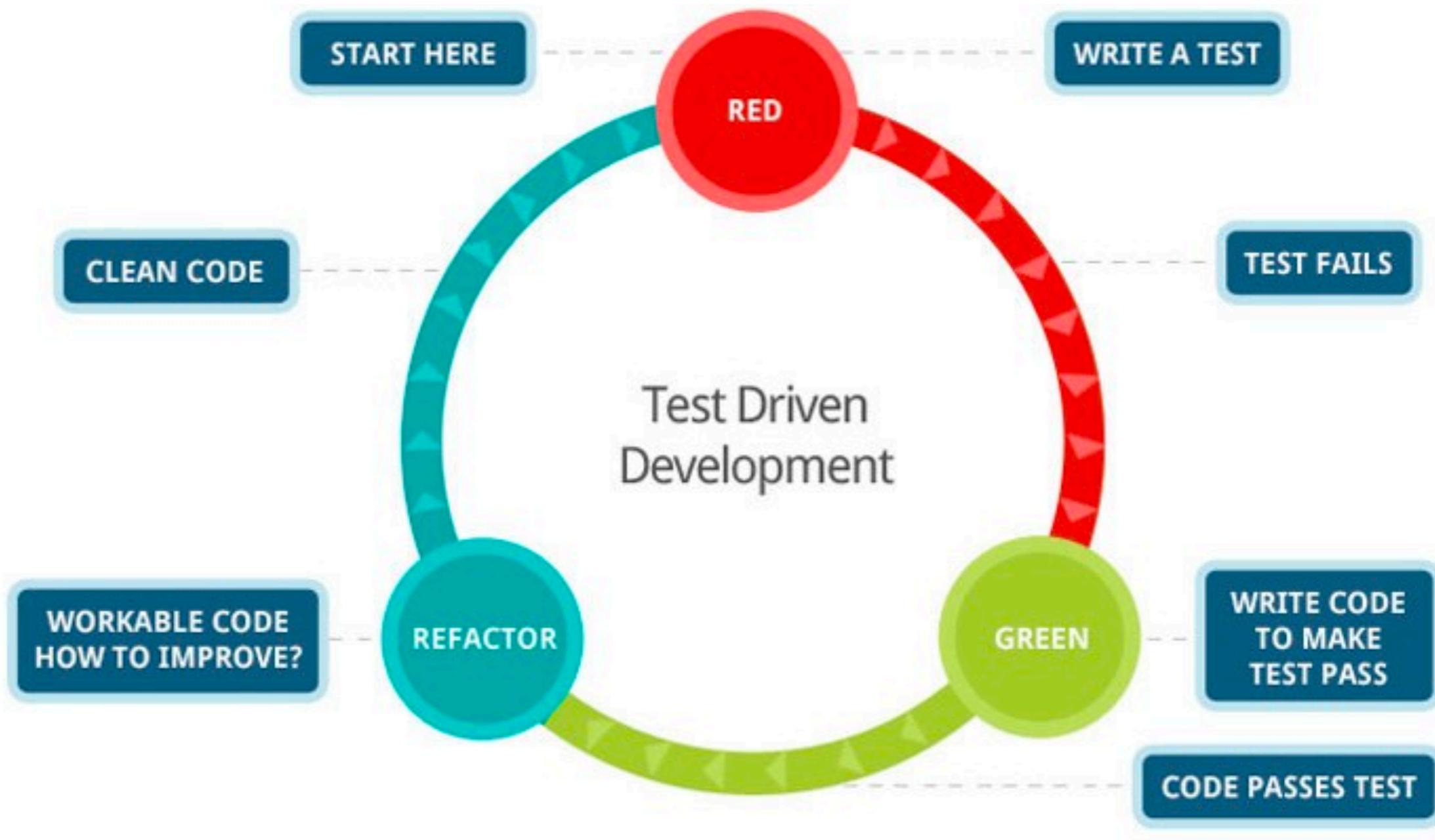
Improve TDD Cycle



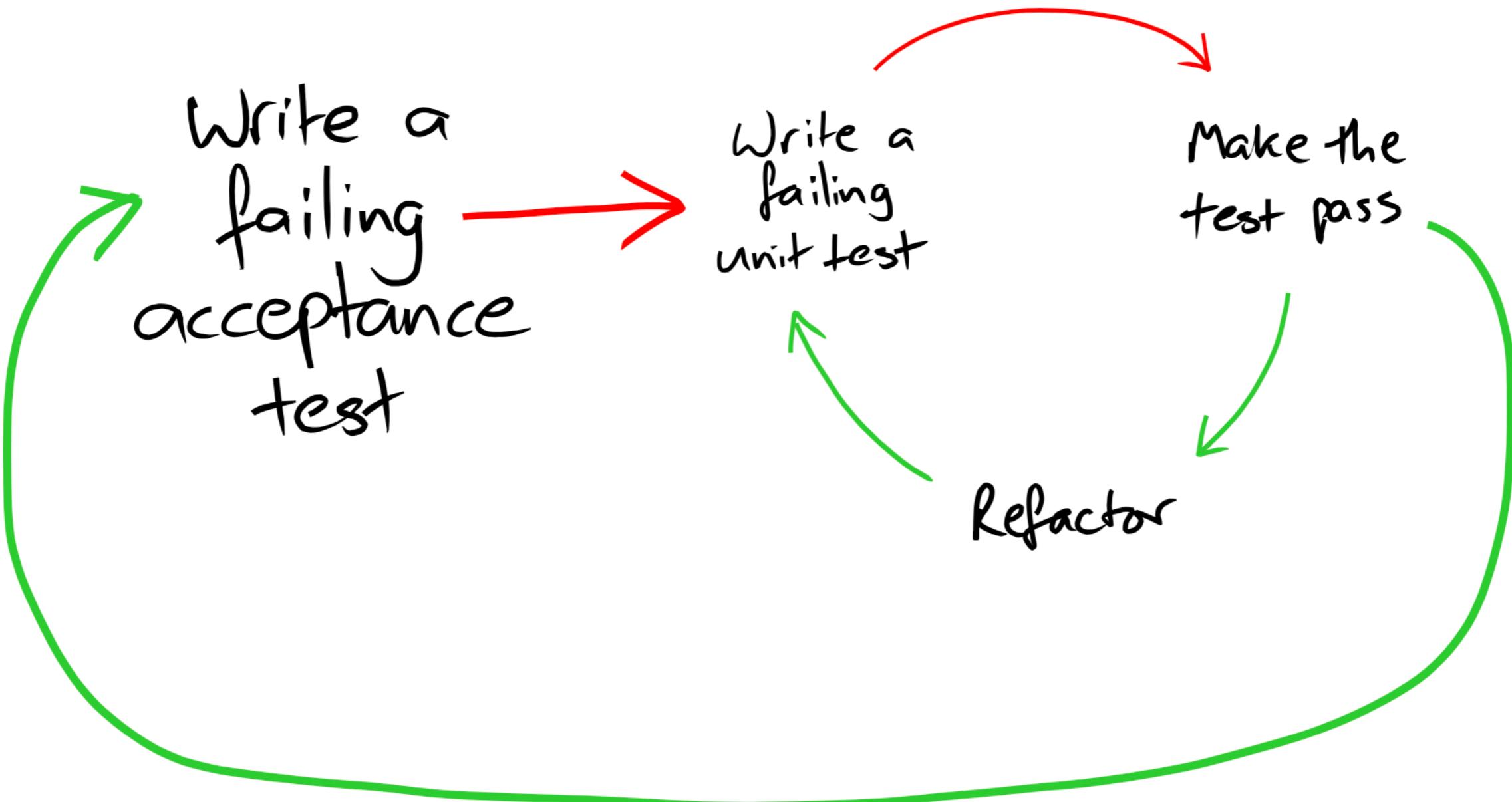
Improve TDD Cycle



Improve TDD Cycle



Acceptance tests



The Golden rule of TDD

“Never write a line of code
without a failing test”

- *Kent Beck* -



Workshop

Input	Expected result
[1, 5]	1,2,3,4,5
[1, 5)	1,2,3,4
(1, 5]	2,3,4,5
(1, 5)	2,3,4

<http://codingdojo.org/kata/Range/>



Organize your tests

How to make your tests visually **consistent** ?
Keeping tests maintainable by testing behavior
The importance of test naming
Using test's life cycle



Good test structure

1. Setup the test data
2. Call your method under test
3. Assert that the expected results are returns



Good test structure

AAA (Arrange Act Assert)

Given When Then from BDD style

<https://xp123.com/articles/3a-arrange-act-assert/>

<https://www.martinfowler.com/bliki/GivenWhenThen.html>



Code coverage



"Code coverage can show the high risk areas in a program, but never the risk-free."

Paul Reilly, 2018, Kotlin TDD with Code Coverage



Code coverage

A tool to measure how much of your code is covered by tests that break down into classes, methods and lines.



Code coverage

```
1. public class MyRange {  
2.     public boolean startWithInclude(String input) {  
3.         return input.startsWith("[");  
4.     }  
5.  
6.     public boolean endWithInclude(String input) {  
7.         if(input == null) {  
8.             return false;  
9.         }  
10.        return input.endsWith("]");  
11.    }  
12.  
13.    public boolean startWithInclude2(String input) {  
14.        return input.startsWith("[");  
15.    }  
16. }
```



Code coverage

But 100% of code coverage **does not mean** that your code is 100% correct



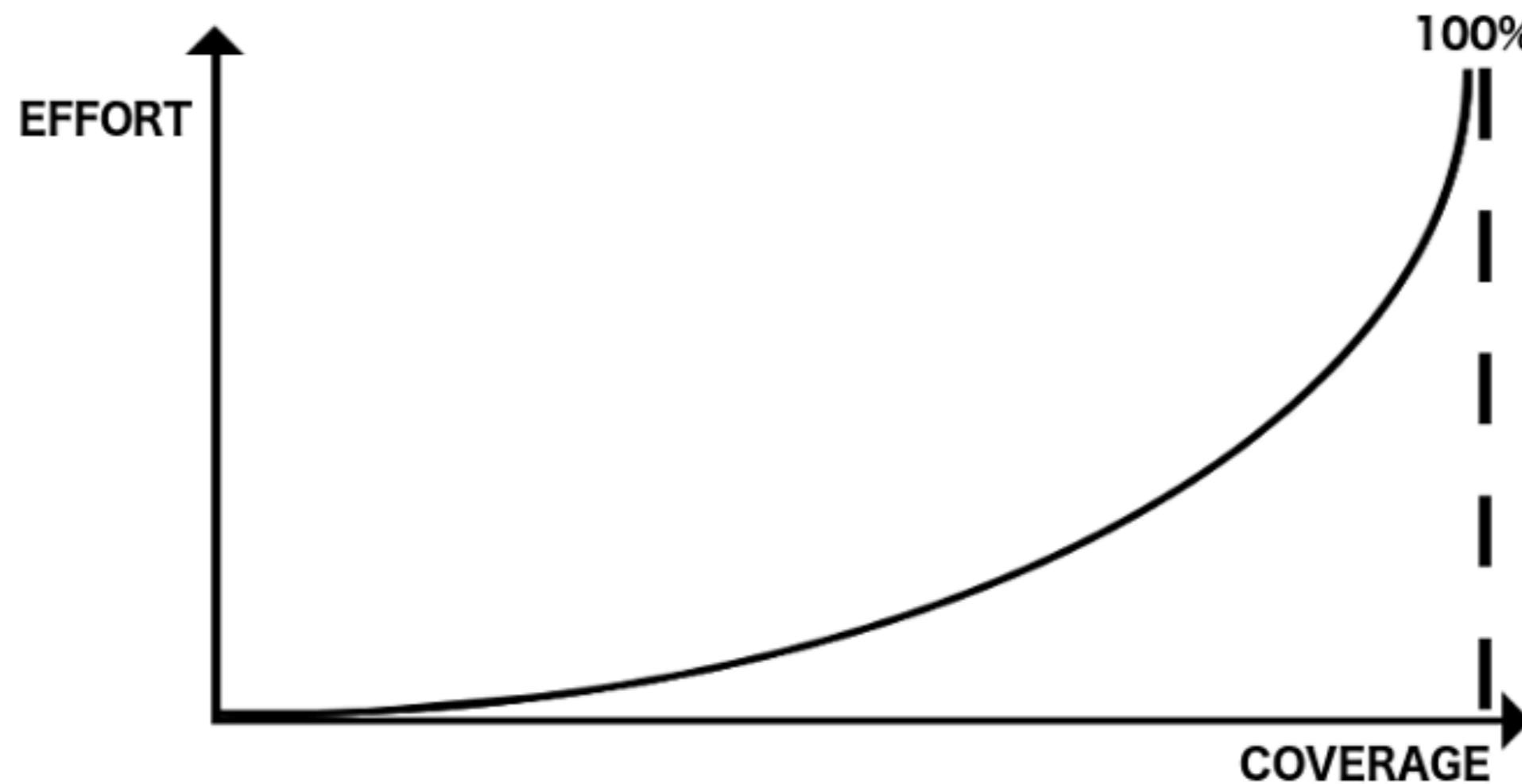
Code coverage

Powerful tool to improve the quality of your code

Code coverage != quality of tests



Code coverage 100% ?



Test as Design



Workshop

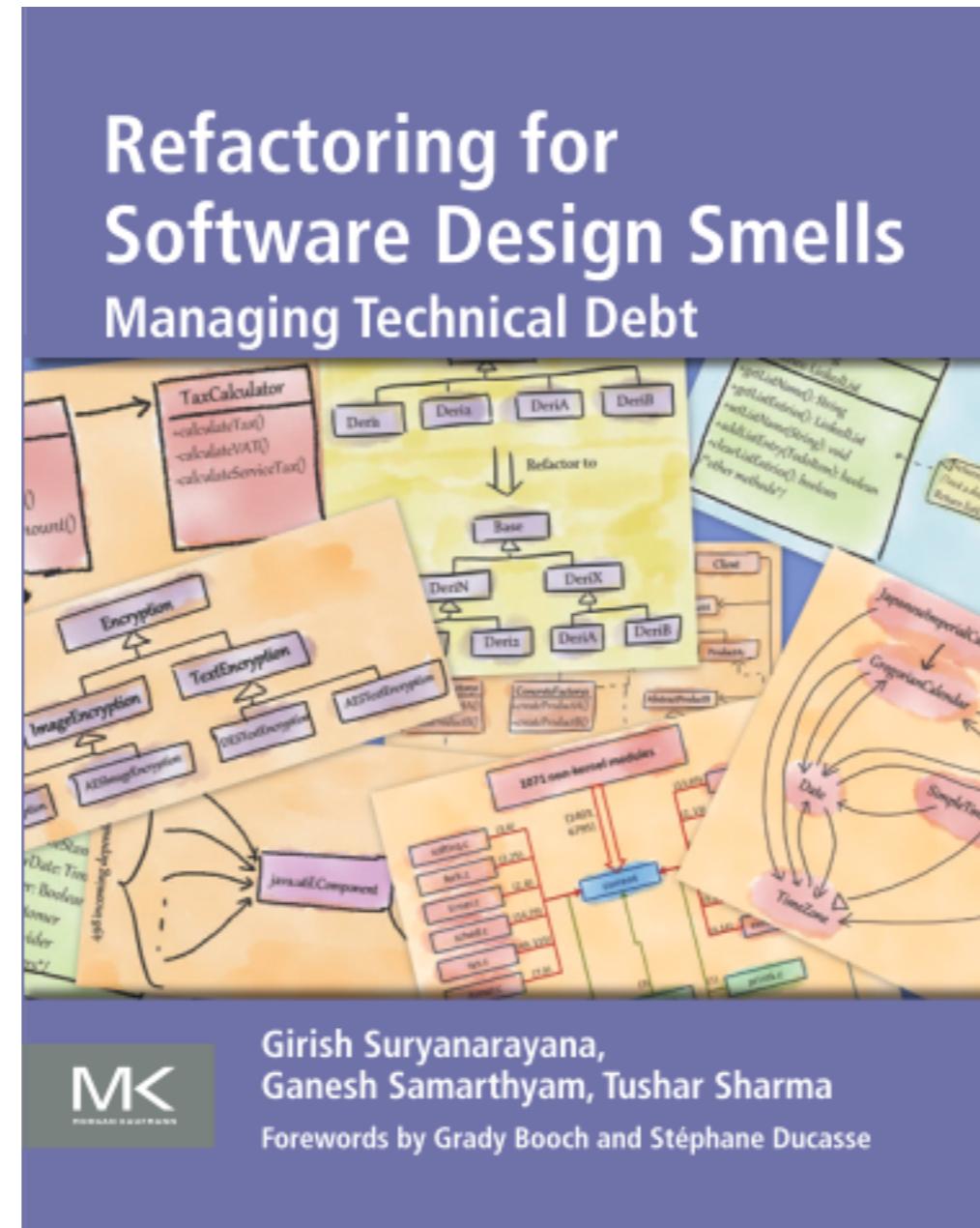


<http://codingdojo.org/kata/Potter/>



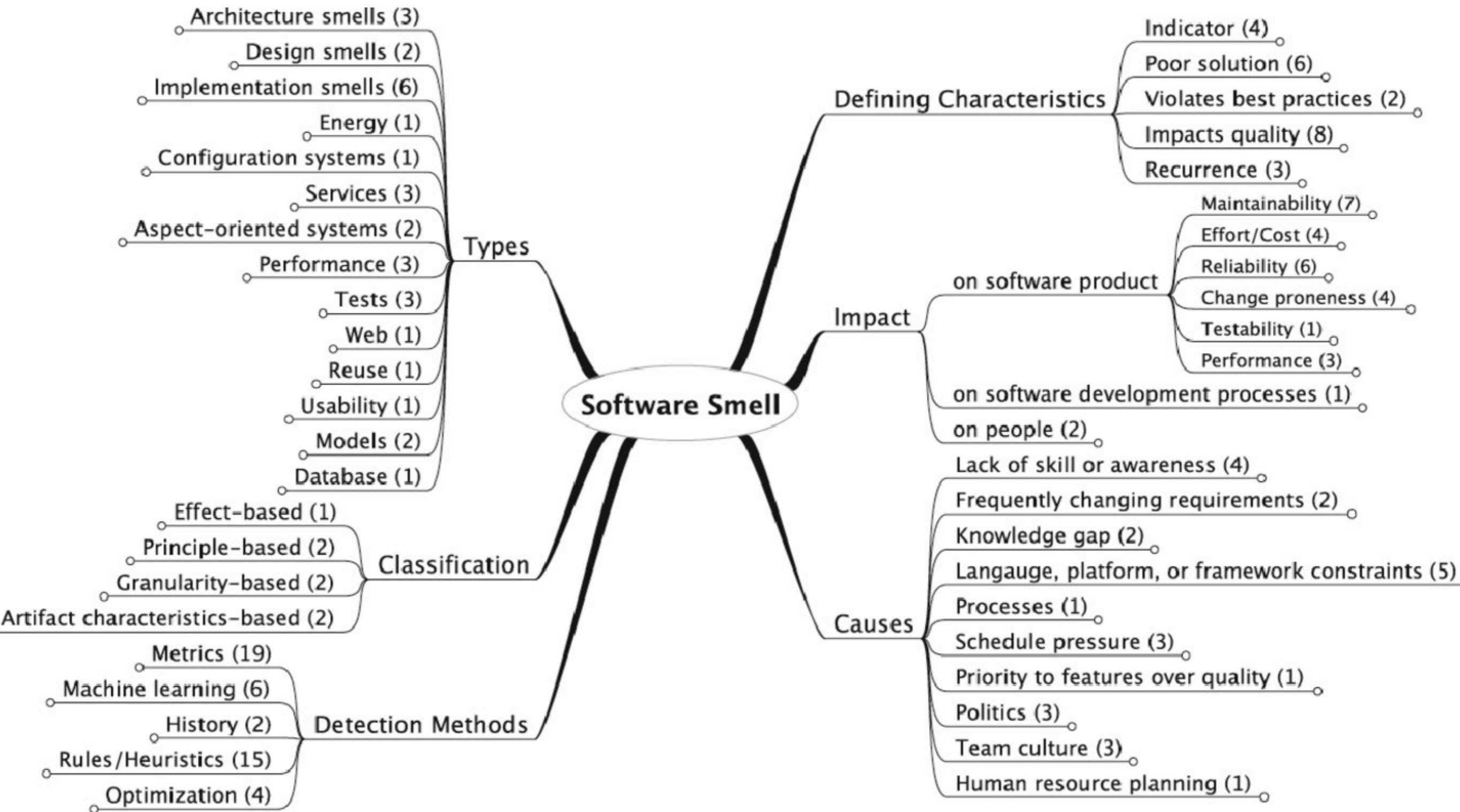
Don't forgot Refactoring





<http://www.tusharma.in/smells/>





<https://www.sciencedirect.com/science/article/pii/S0164121217303114>



Code Smell



Code Smells

- What? How can code "smell"??
- Well it doesn't have a nose... but it definitely can stink!



Bloaters

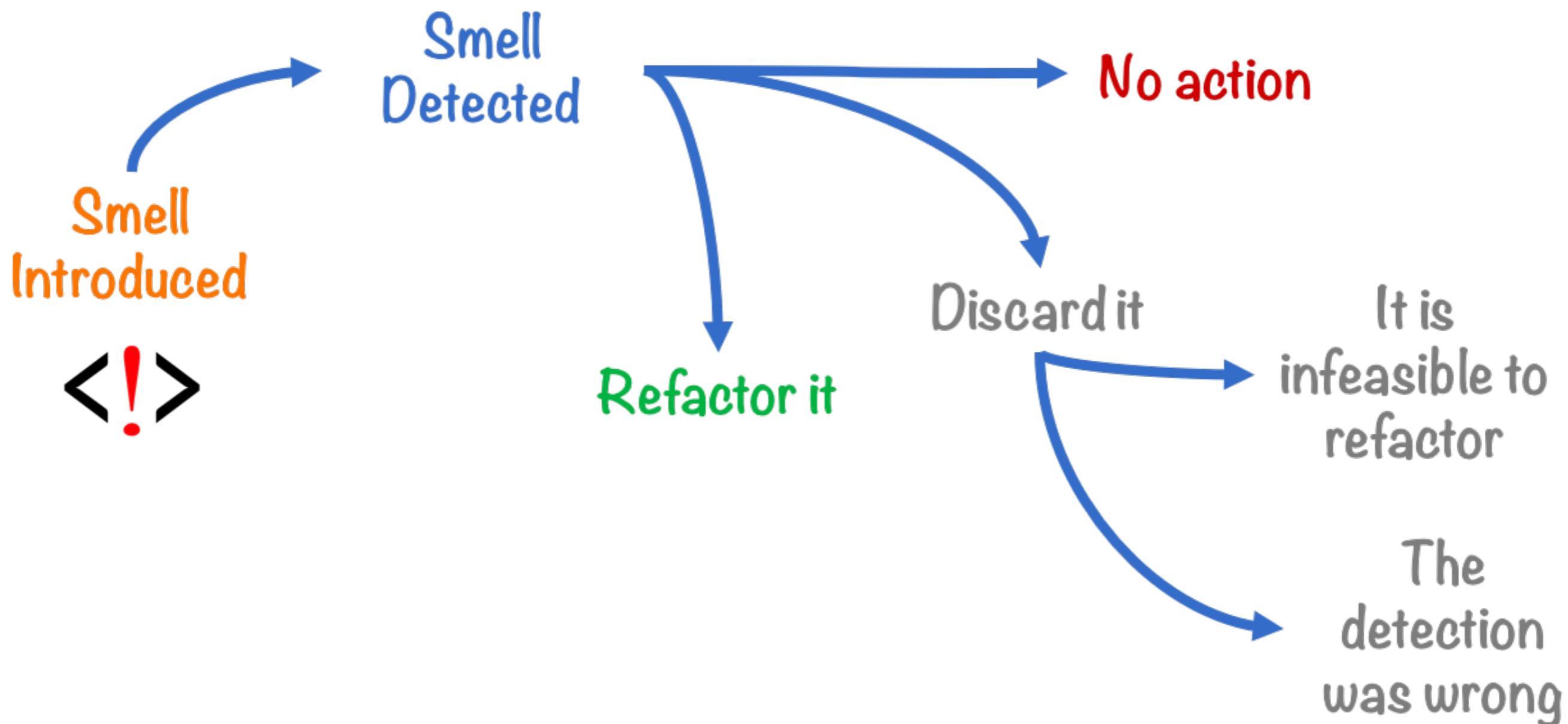
Bloaters are code, methods and classes that have increased to such gargantuan proportions that they are hard to work with. Usually these smells do not crop up right away, rather they accumulate over time as the program evolves (and especially when nobody makes an effort to eradicate them).

- Long Method
- Large Class
- Primitive Obsession
- Long Parameter List
- Data Clumps

<https://sourcemaking.com/refactoring/smells>



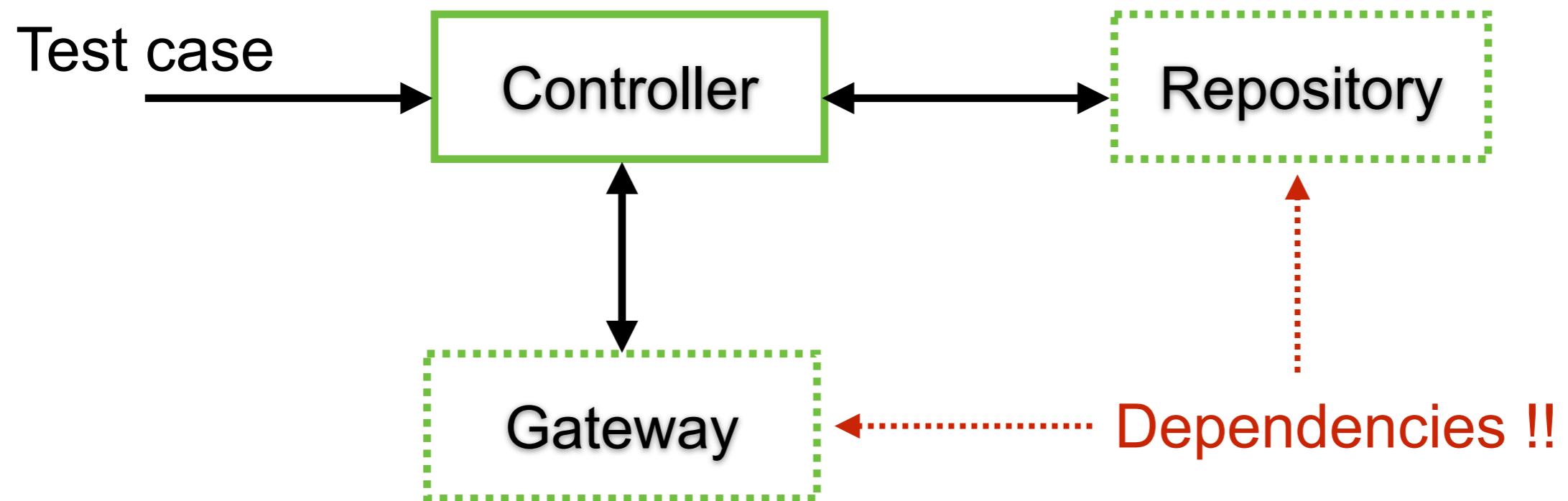
Life-cycle of a smell



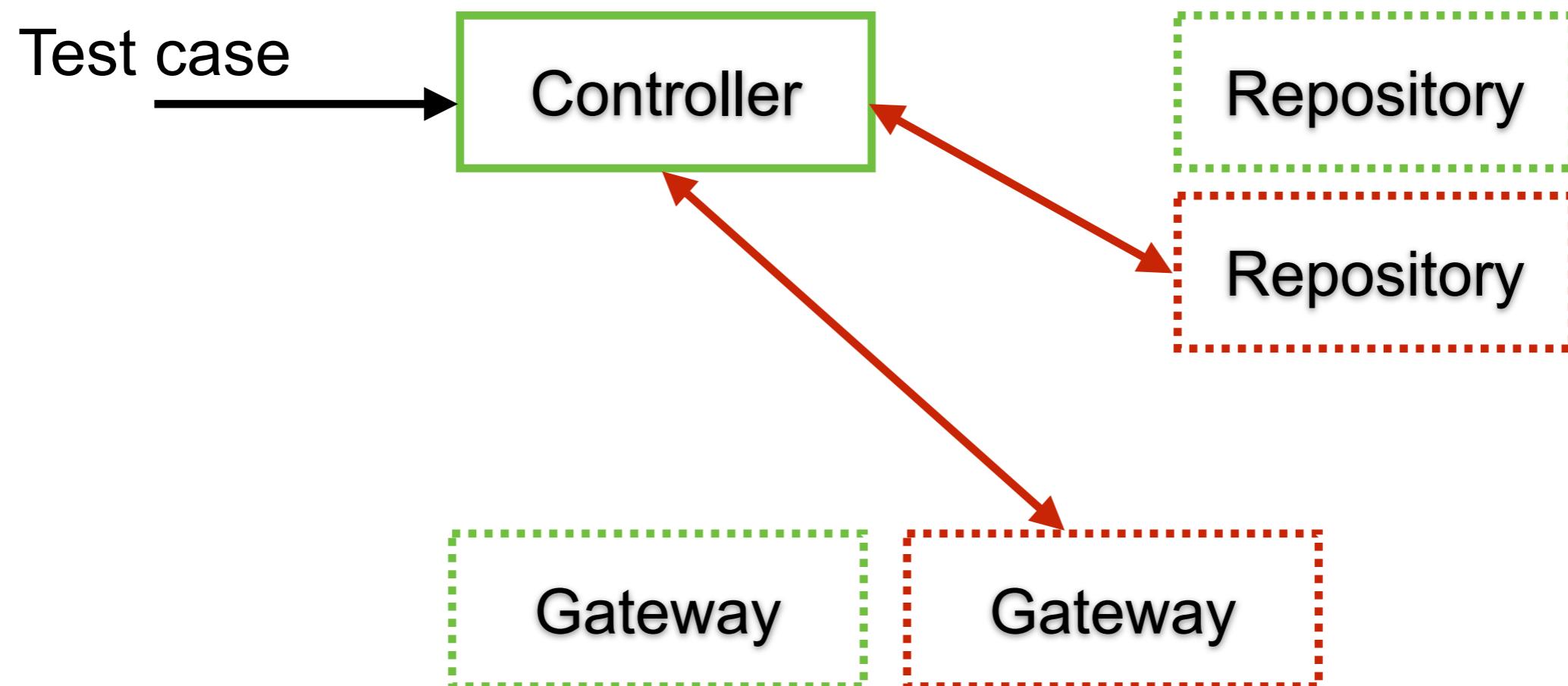
Manage your dependencies



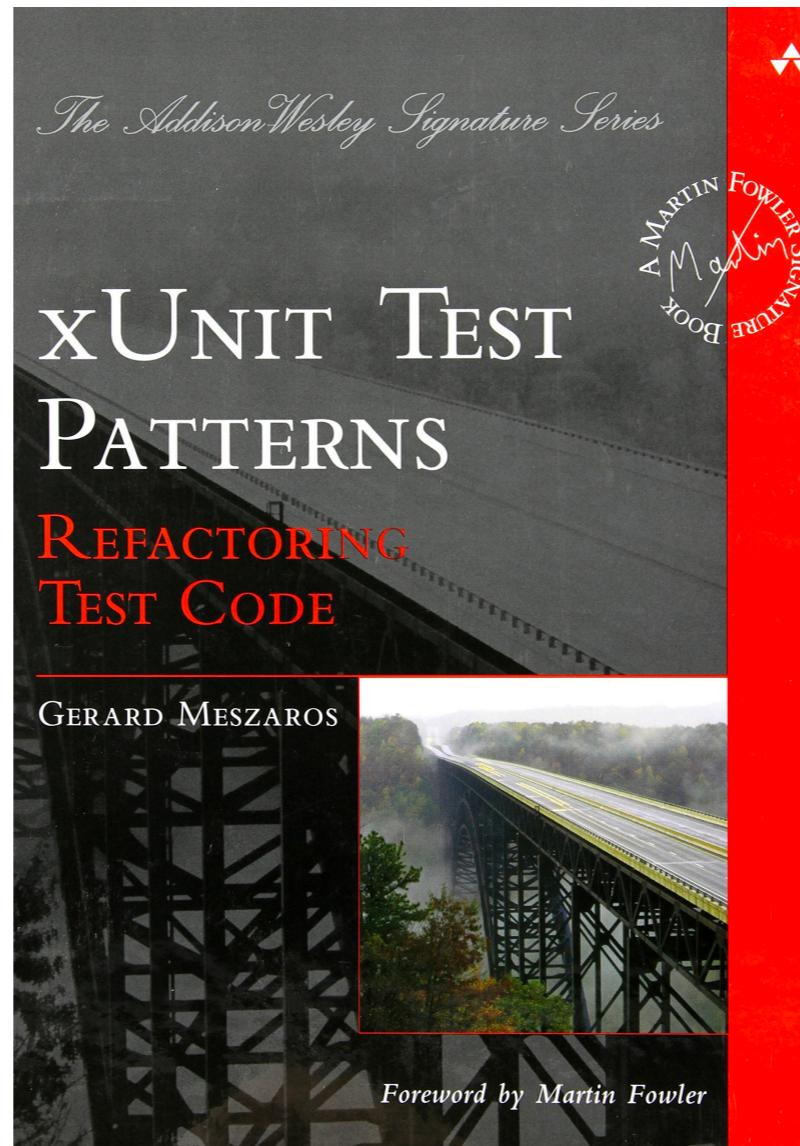
How to test Controller ?



Working with dependencies



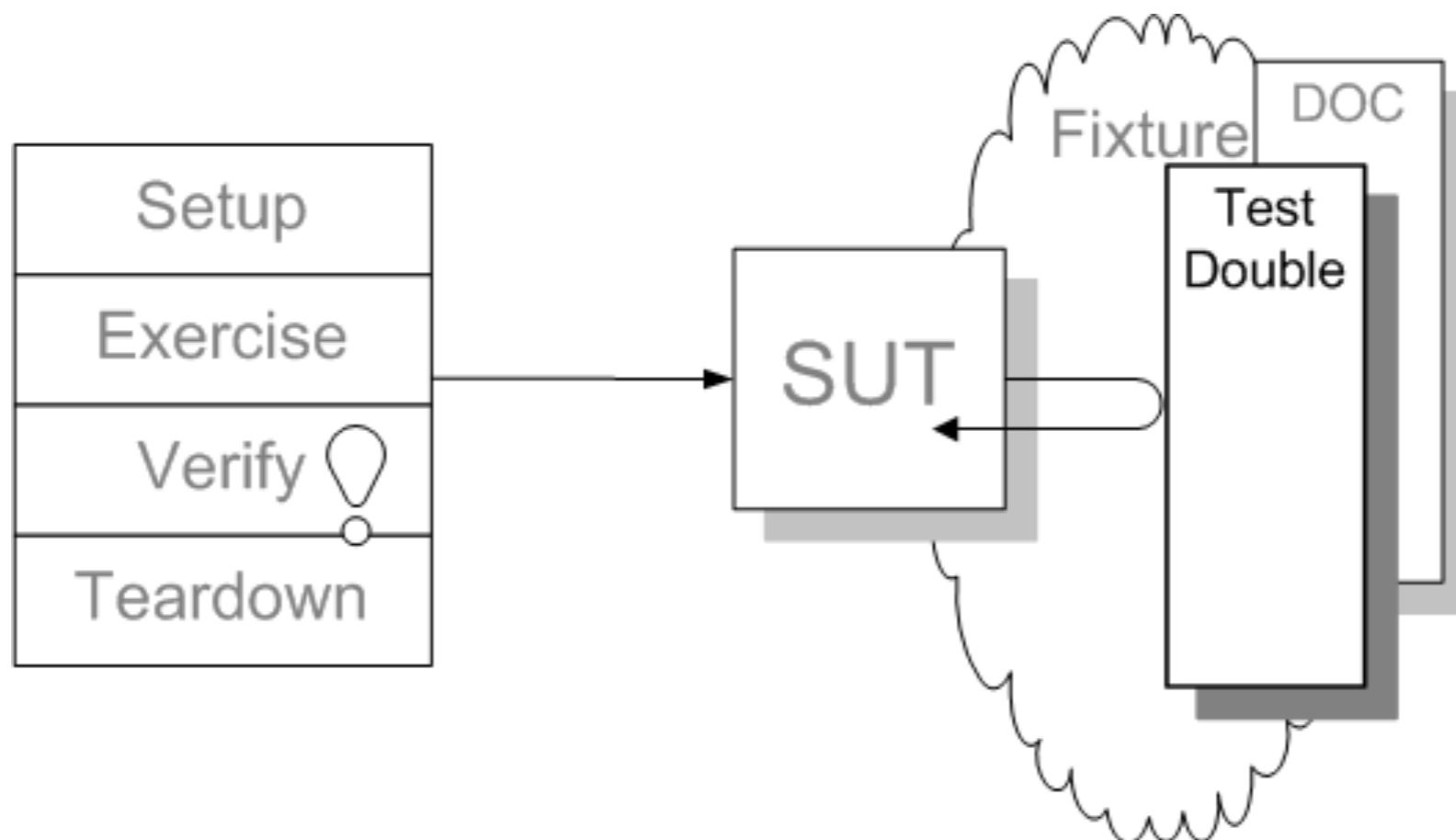
Test double ?



<http://xunitpatterns.com>



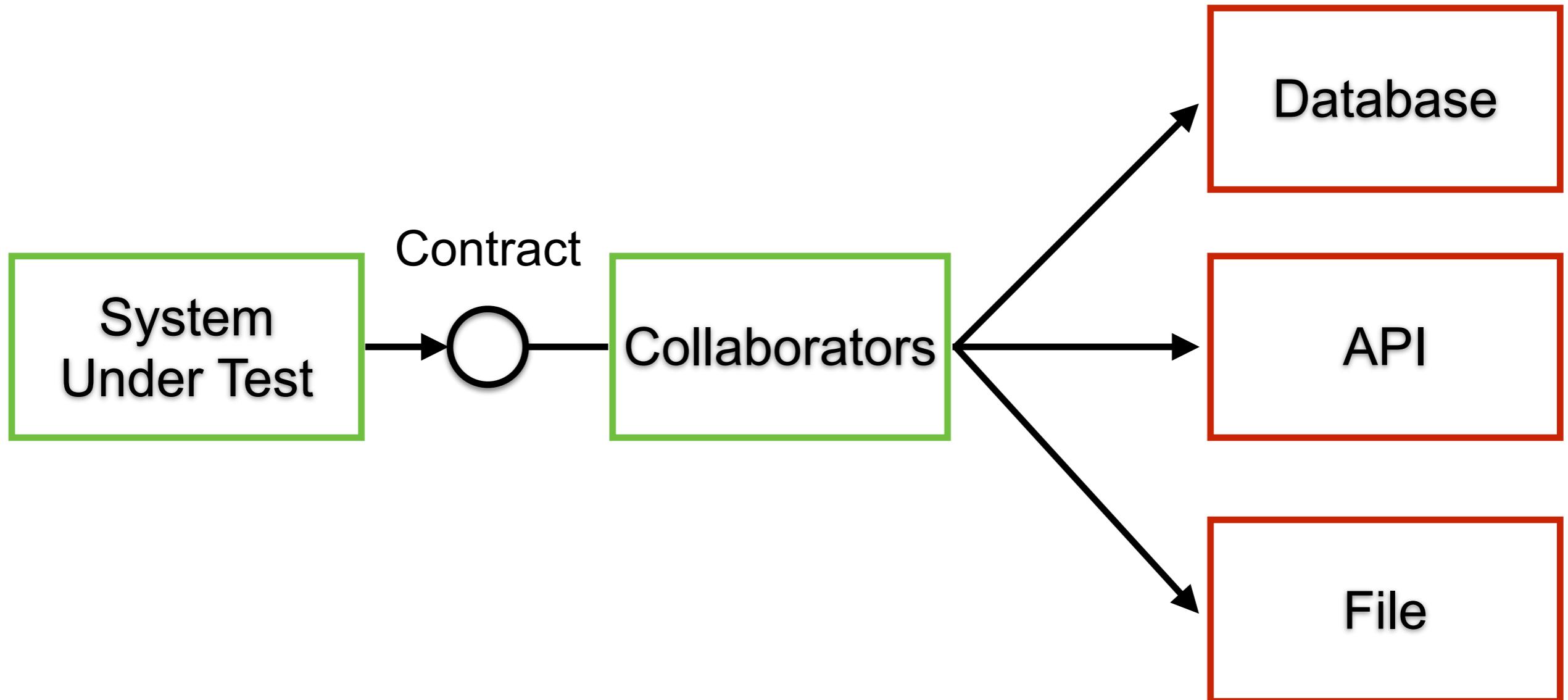
Test double ?



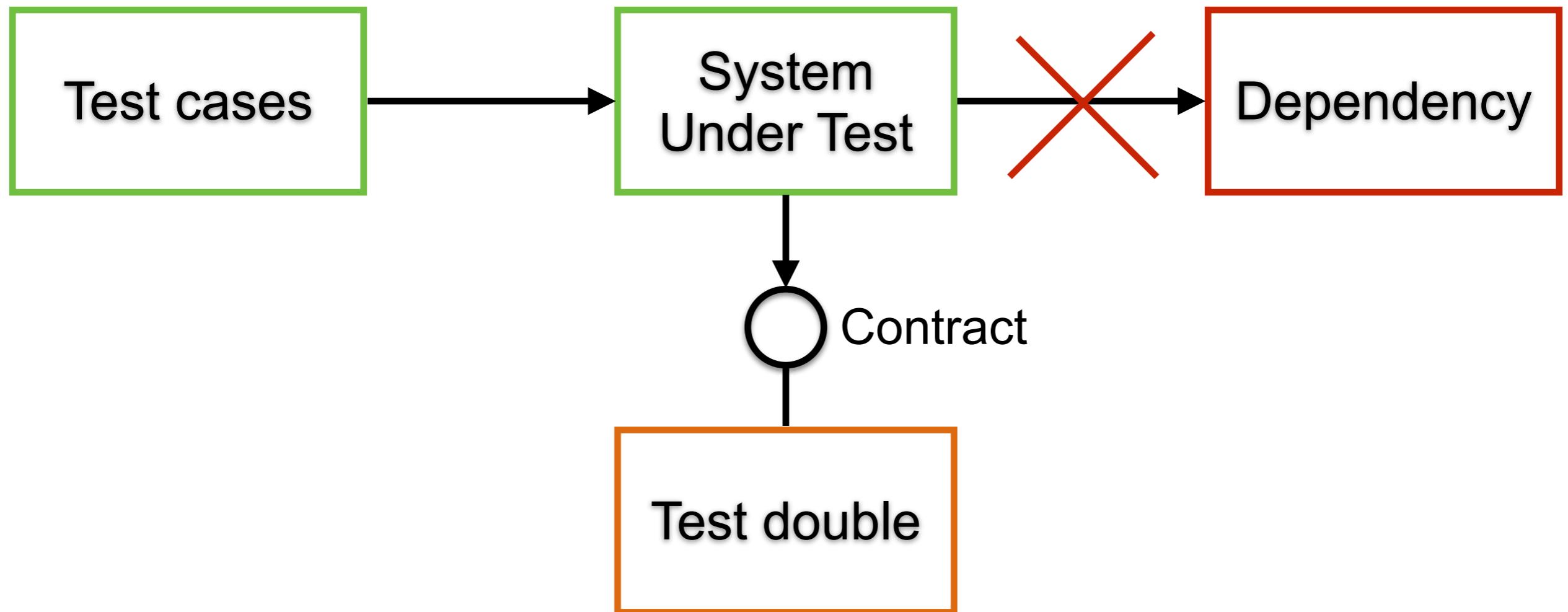
<http://xunitpatterns.com/Test%20Double.html>



Real implementation



With Test double



Test double ?

Dummy
object

Stub

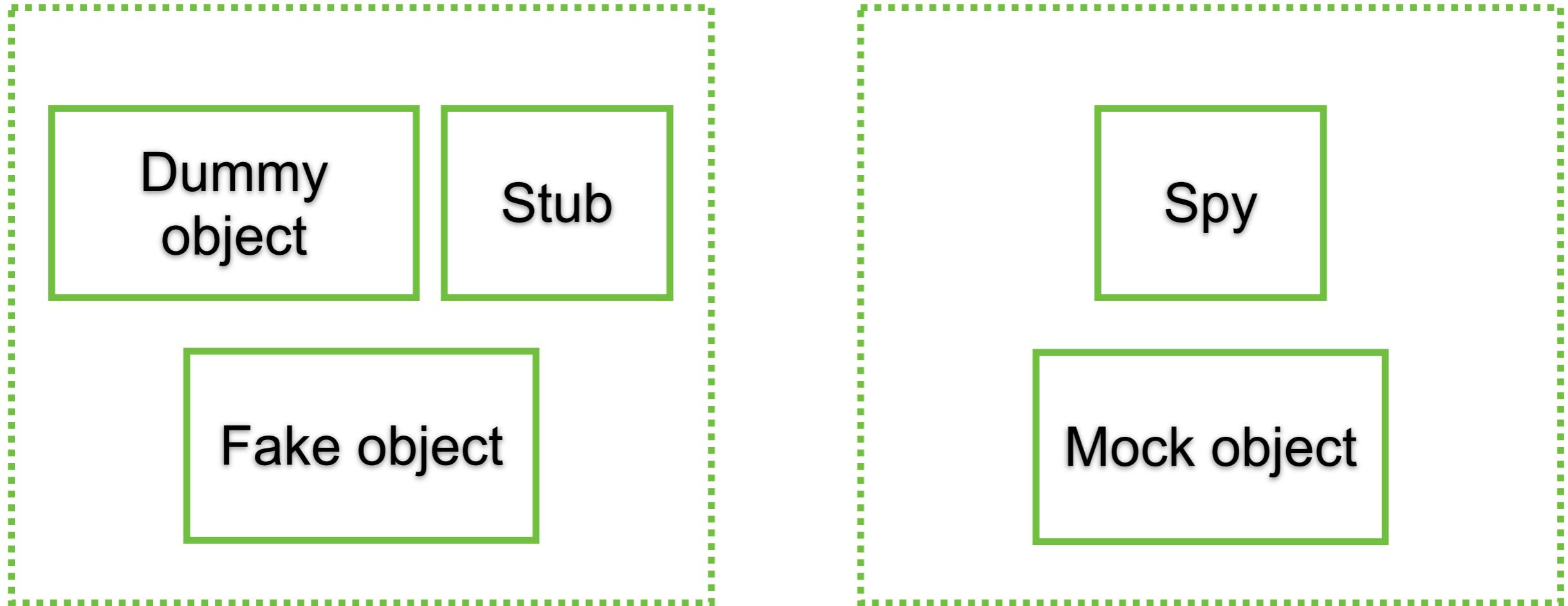
Spy

Mock object

Fake object

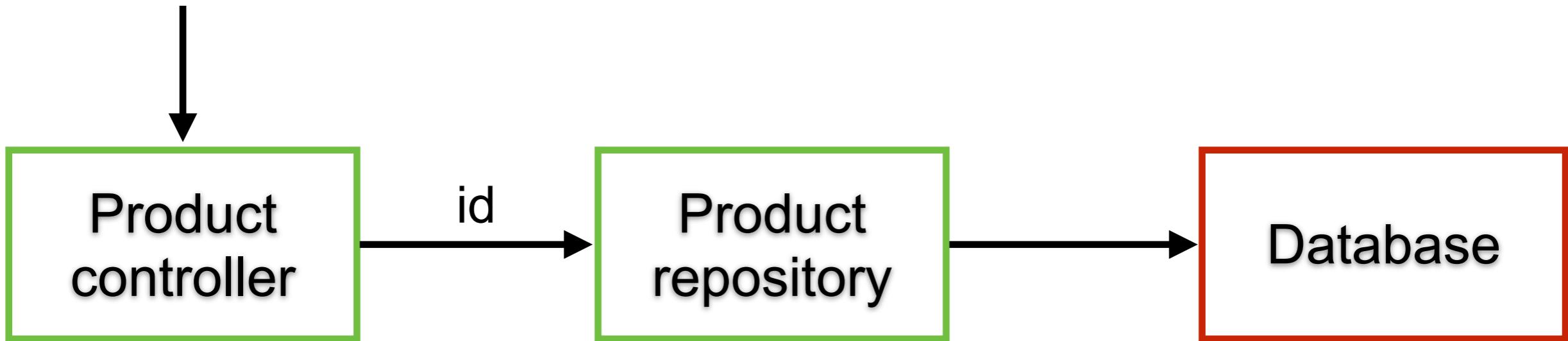


Test double ?



Example

Get product detail by ID



Fake

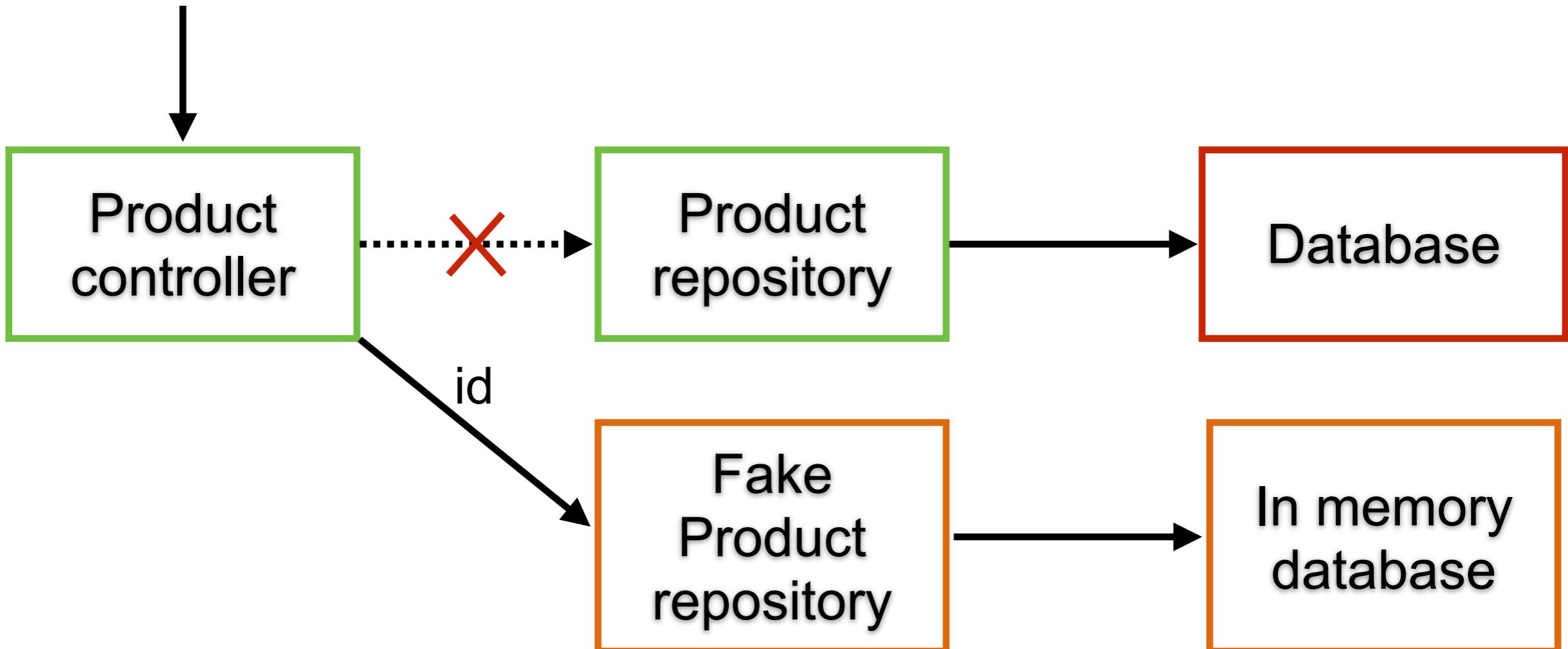
Working with implementation but take some shortcut
Not suitable for production

E.g. In-memory database, Fake API server



Fake

Get product detail by ID



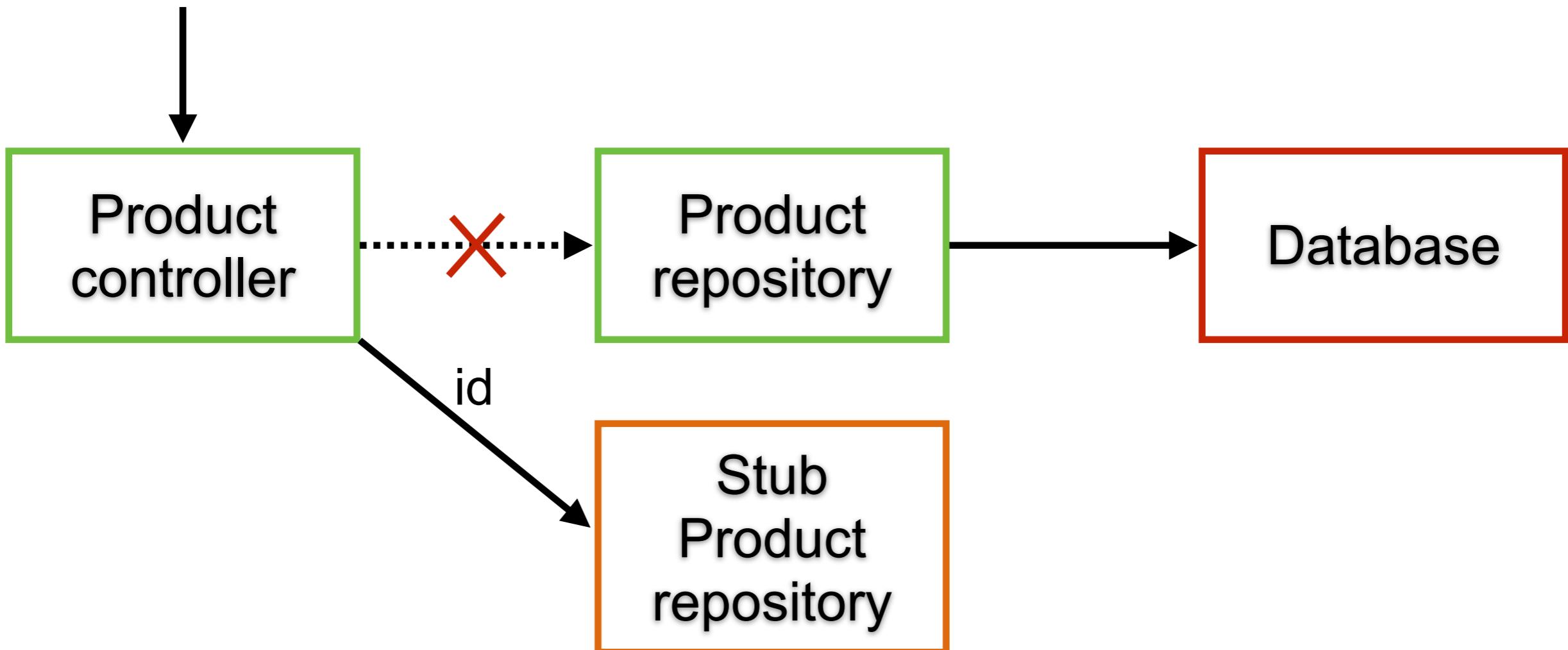
Stub

Provide answers to calls made during the test



Stub

Get product detail by ID



Spy

Like stub

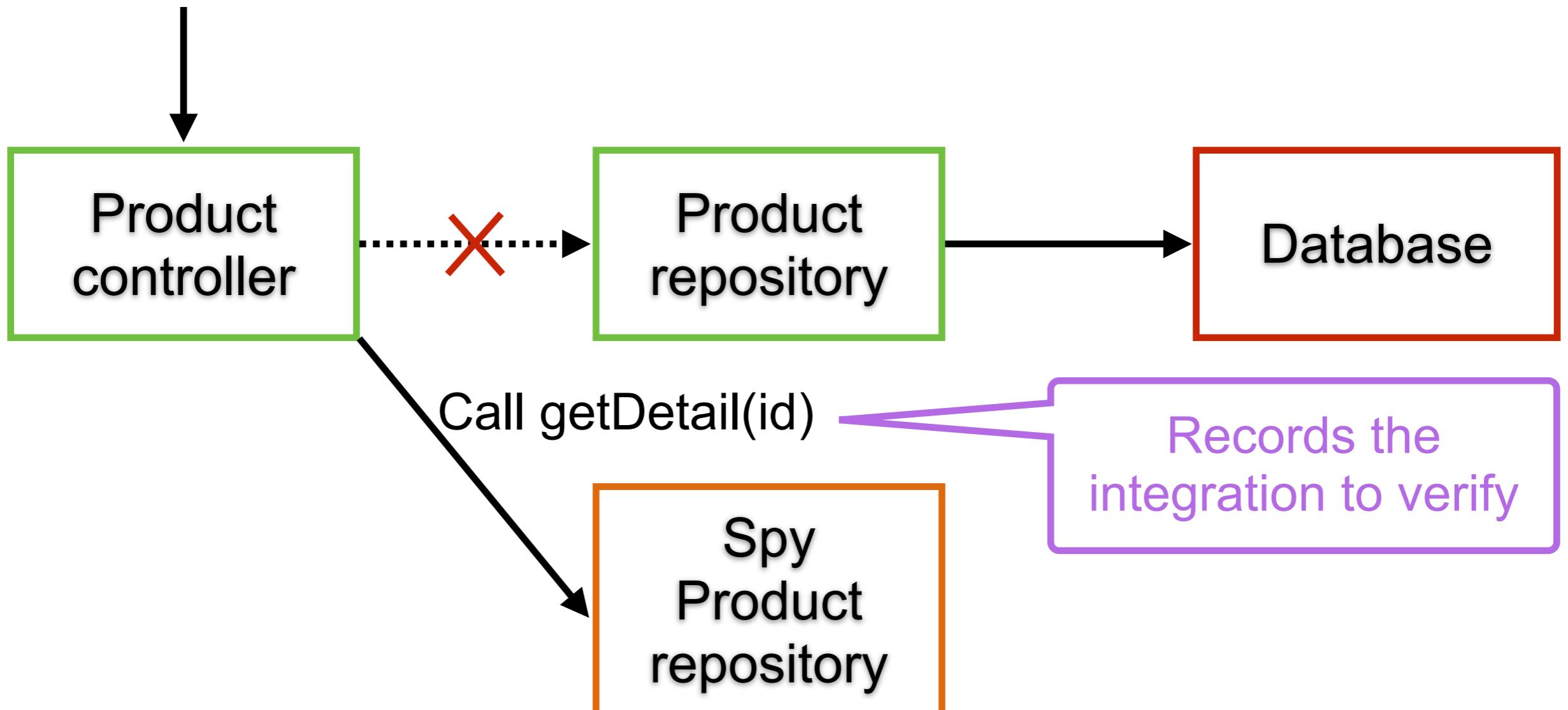
Record some information based on how its called

E.g. how many message it was sent via email service



Spy

Get product detail by ID



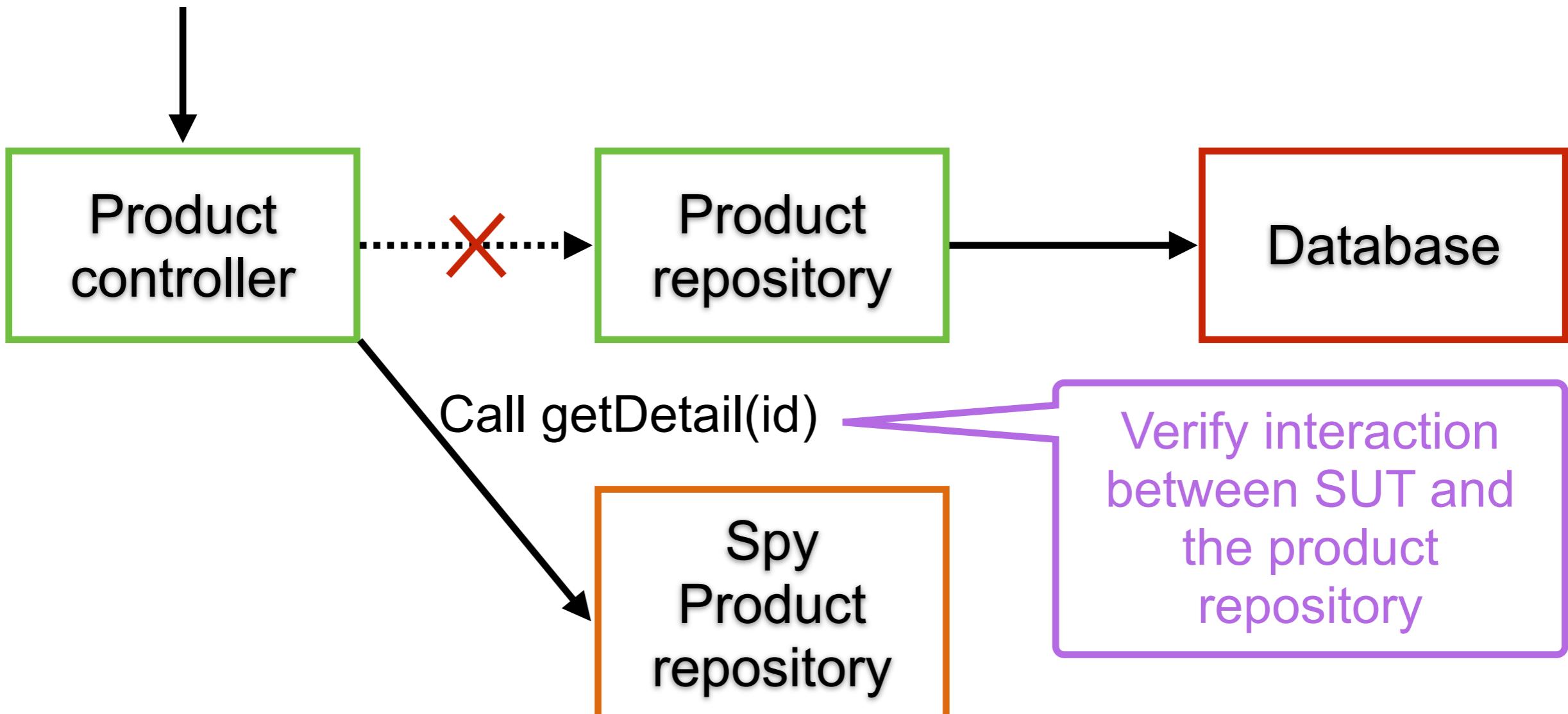
Mock object

Pre-programmed with expectations with spec
Mock object can throw an exception if receive a call
that don't expect



Mock object

Get product detail by ID



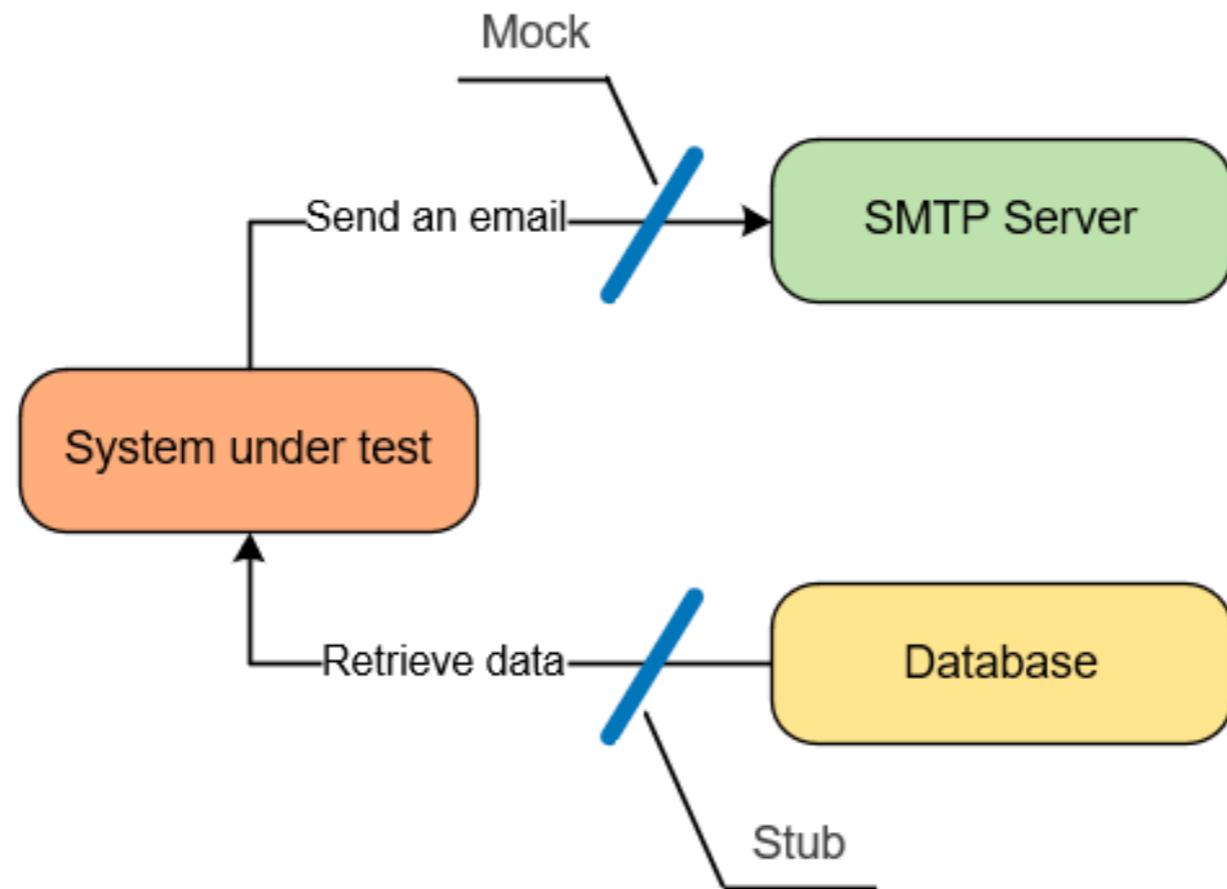
Dummy object

Passed around but never actually used
Used to fill parameter lists

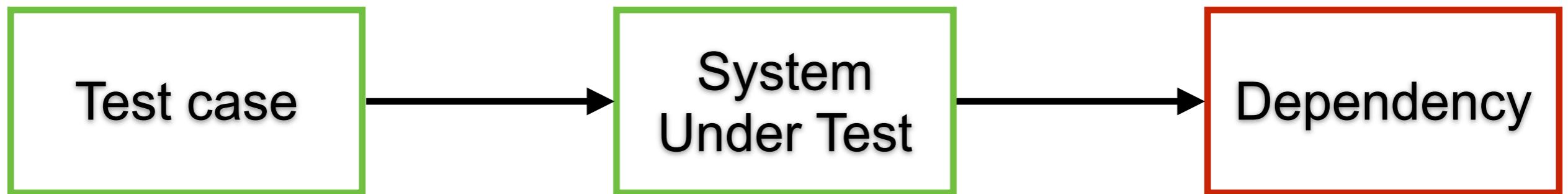


Mock vs Stub

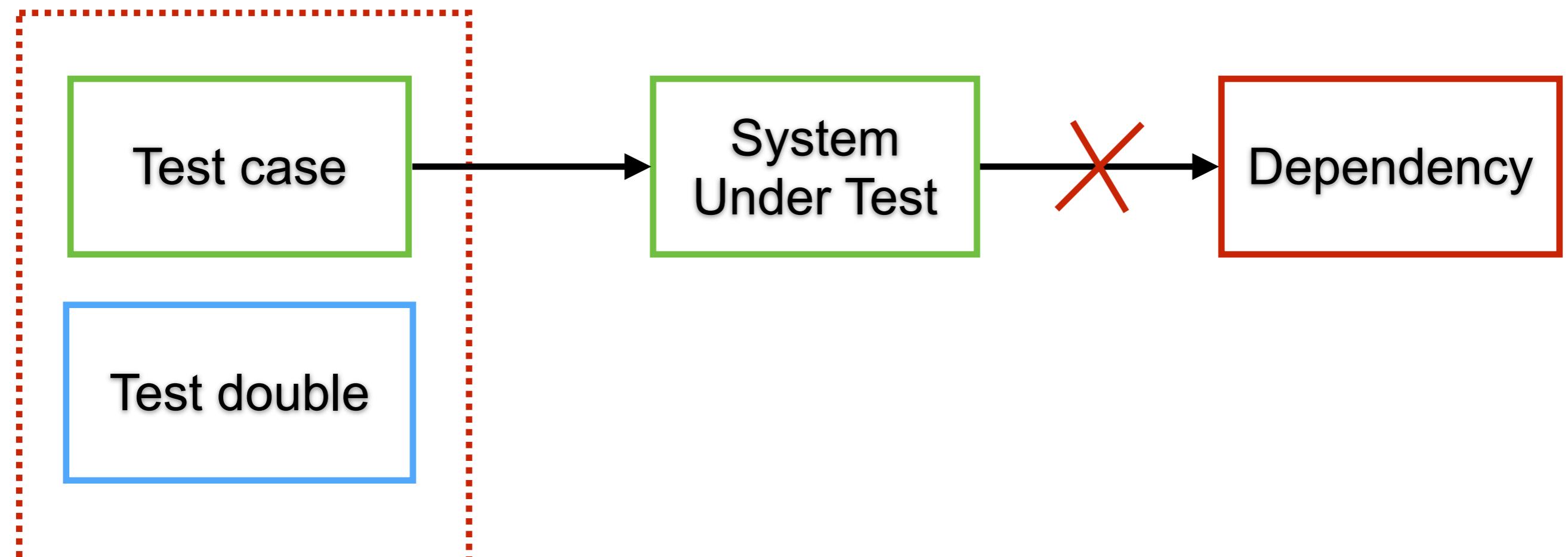
Mock for outgoing interaction
Stub for incoming interaction



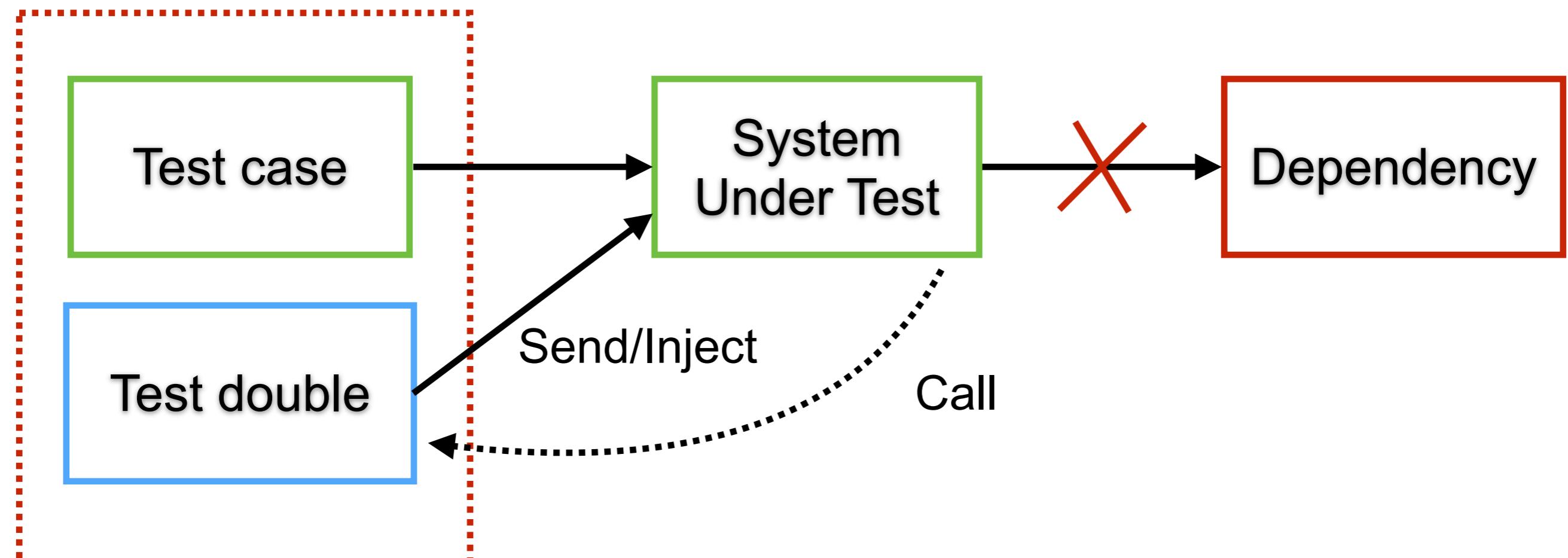
Test double ?



Create test double



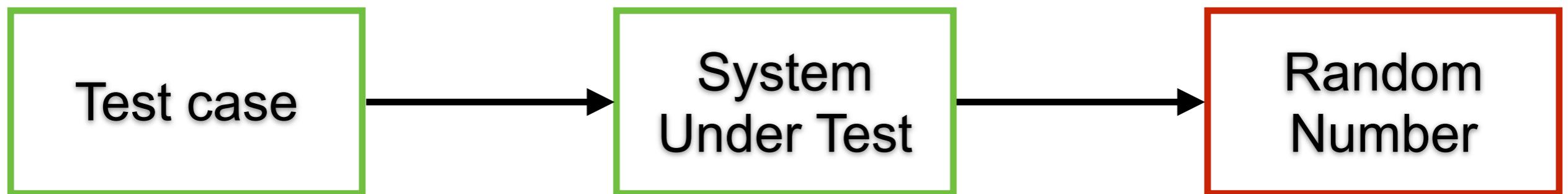
Send/inject test double to SUT



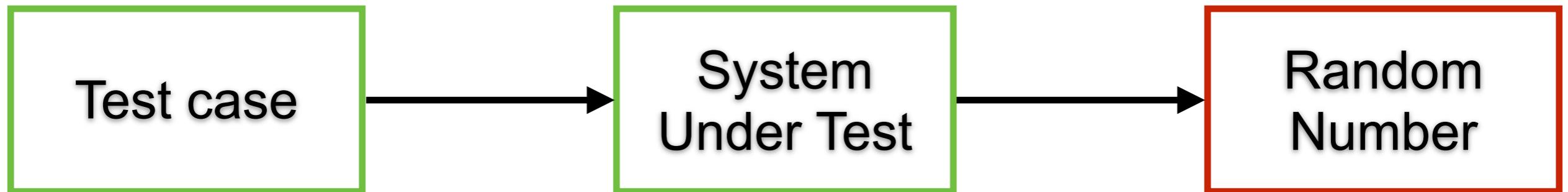
Workshop



Workshop



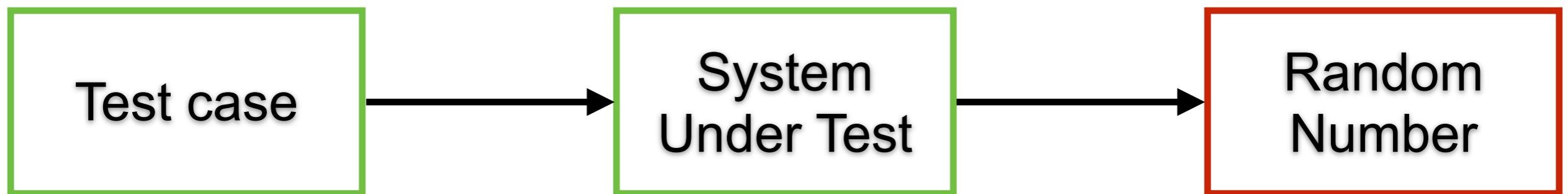
Workshop



Test random number = 5 ?



Workshop



Test random number must called 1 time ?



Workshop :: Login

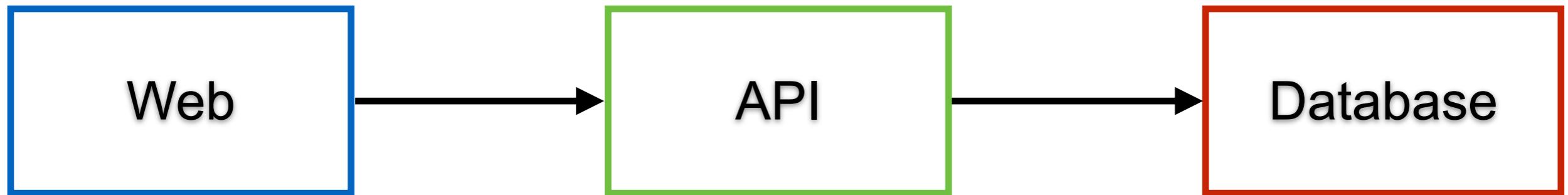


Test login

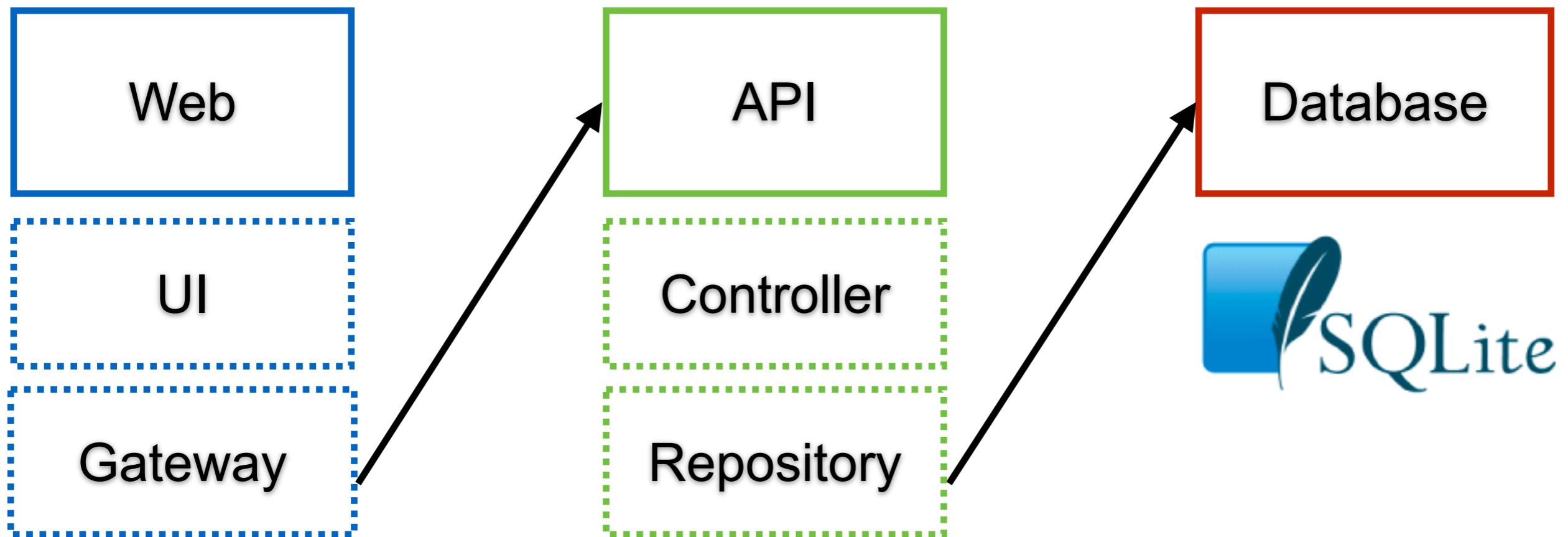
User name	Password	Expected result	Comment
Somkiat	PasswordSomKiat	Access to system as Somkiat	Valid
Som kiat	PasswordSomKiat	Error	Space in user
Somkiat	Password SomKiat	Error	Space in password
Somkiat	1234	Error	Password too short



Workshop :: Login



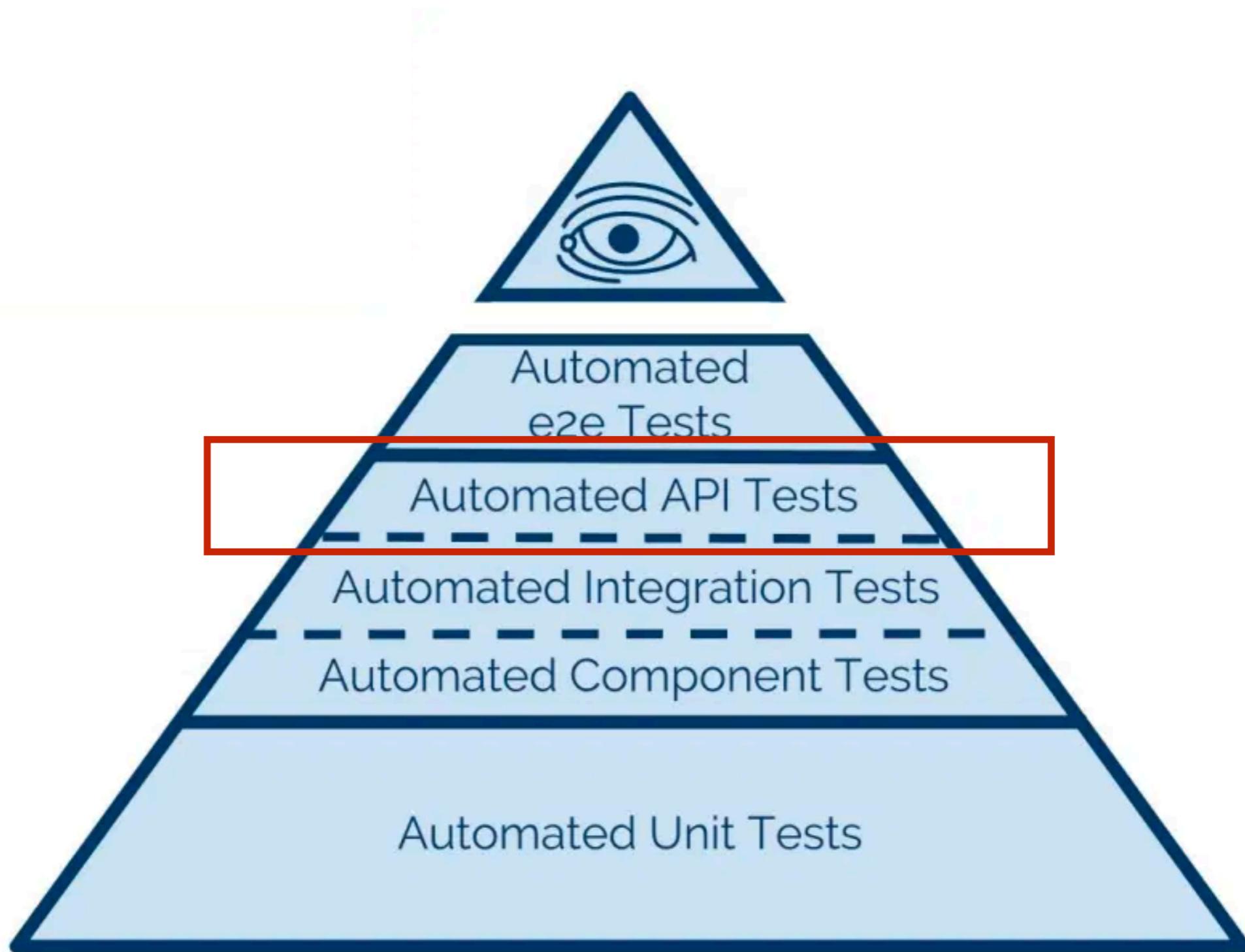
Workshop :: Login



What to test ?



Somkiat	PasswordSomKiat	Access to system as Somkiat	Valid
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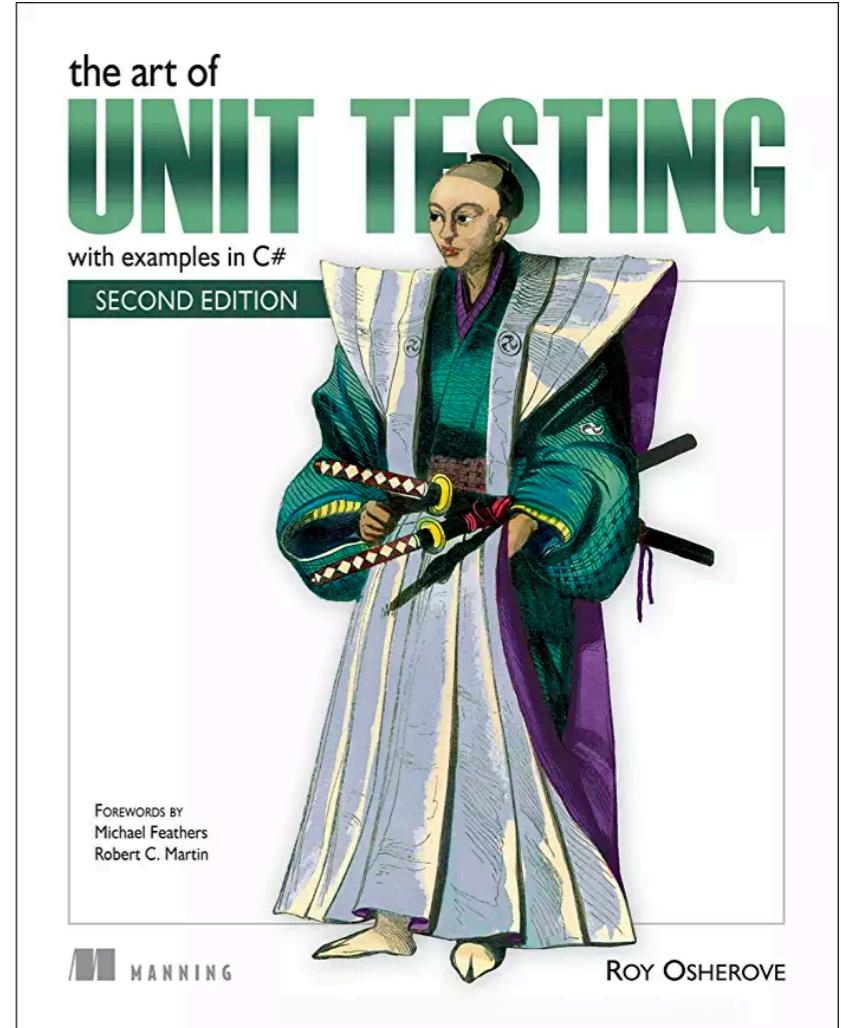
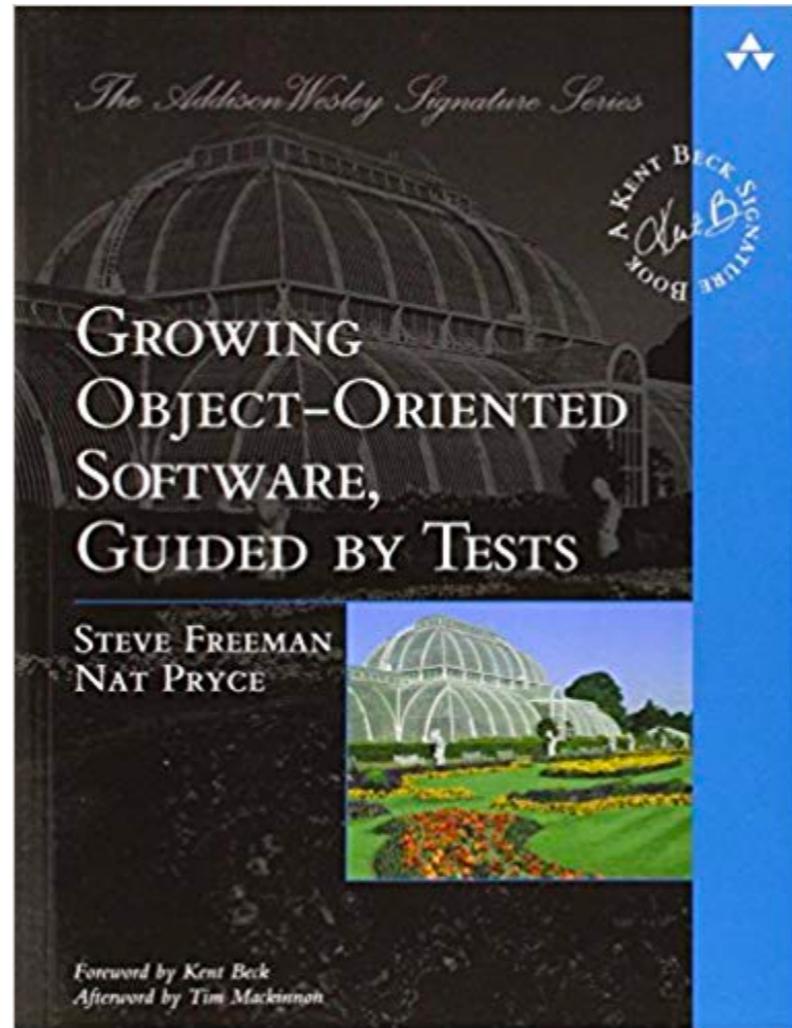
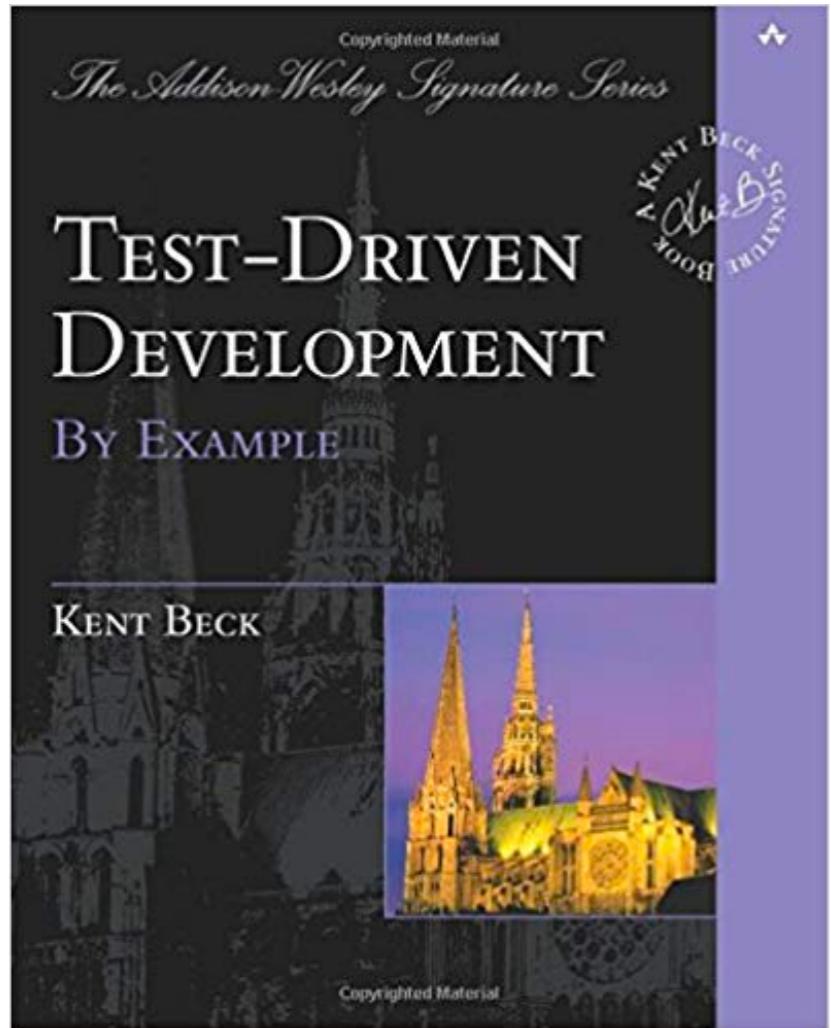
Code Example

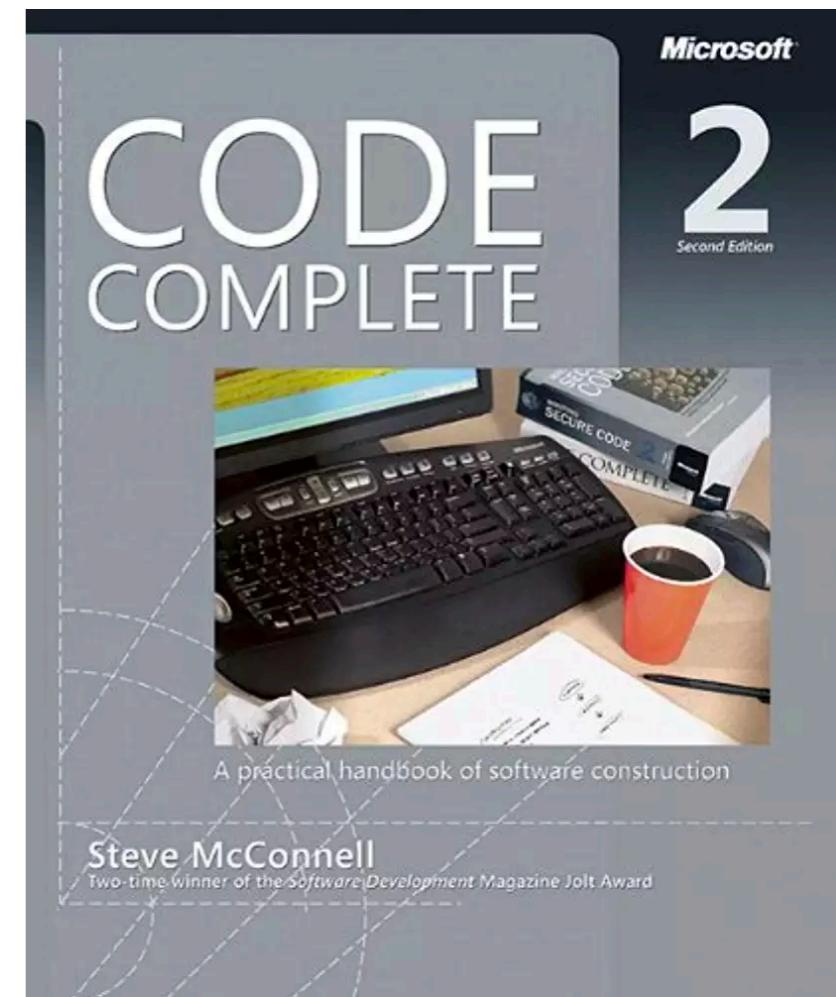
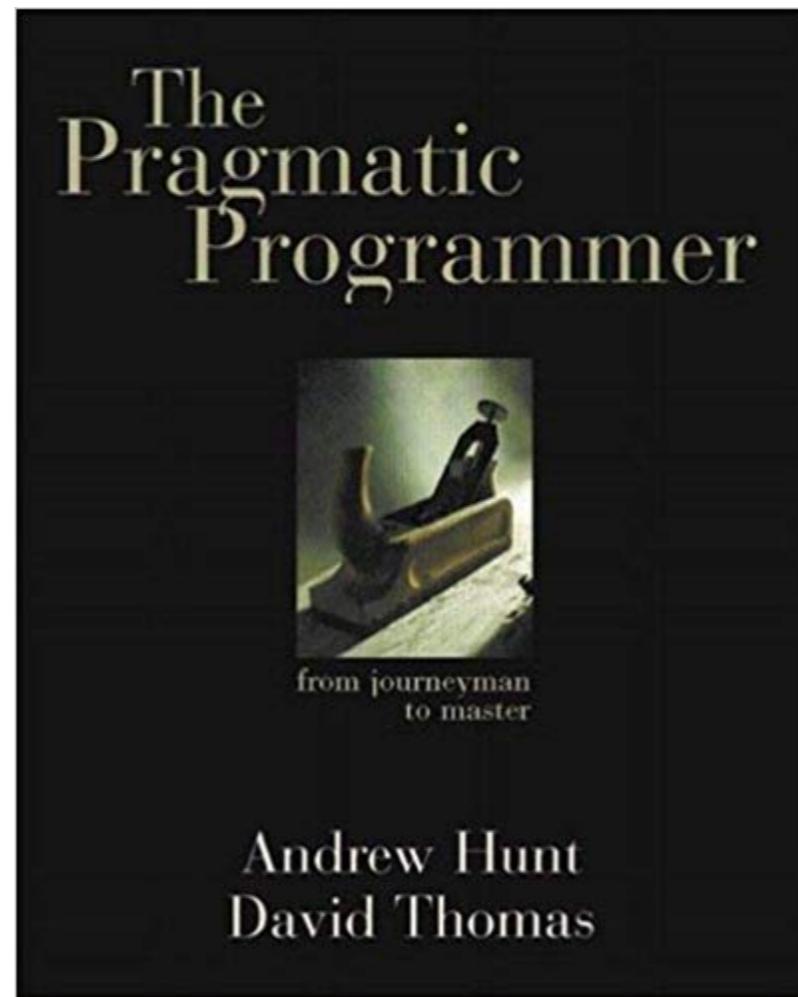
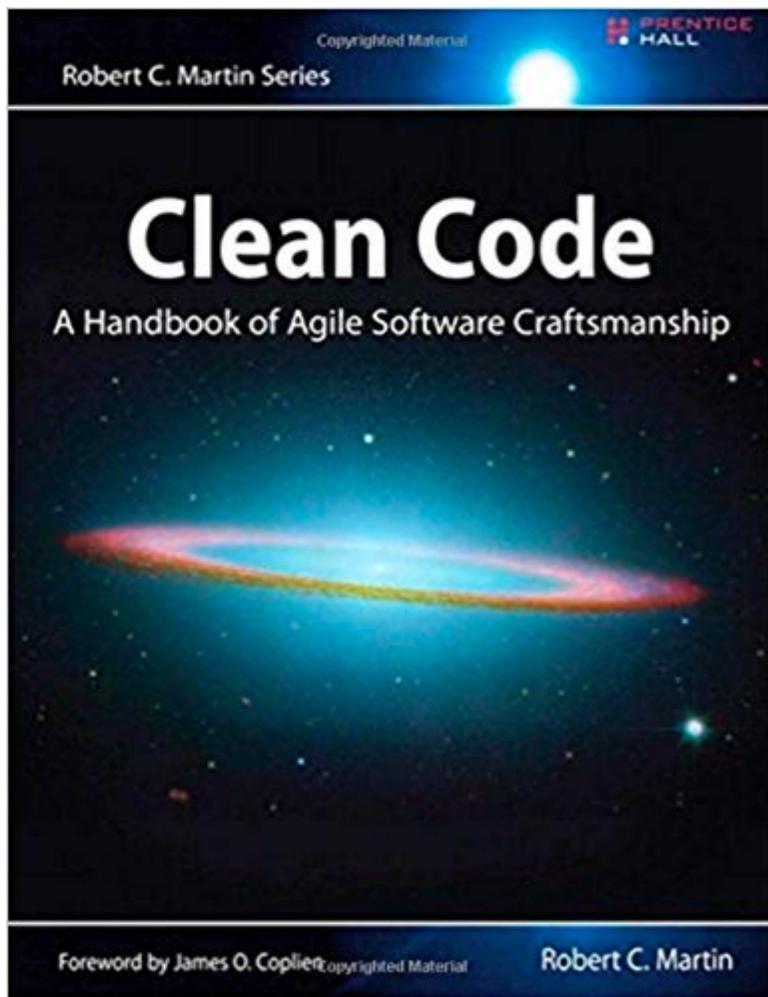
<https://github.com/up1/demo-login-api>

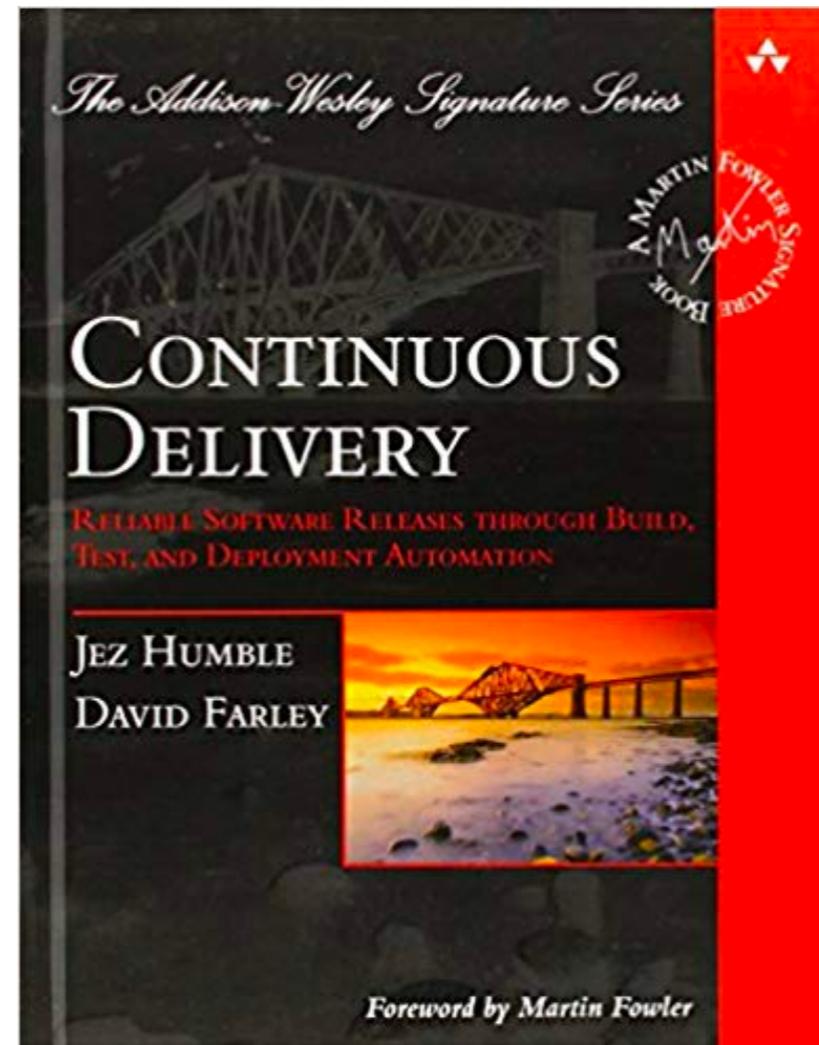
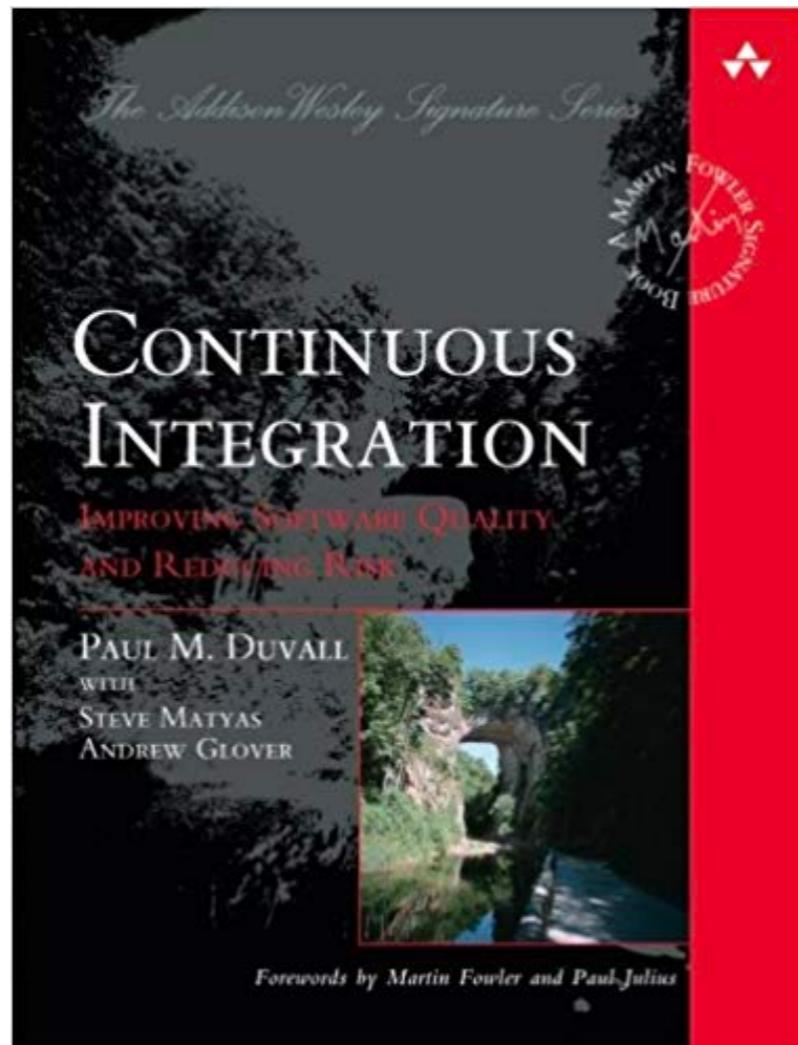


Books









Module #3

Software Engineering Practices

