

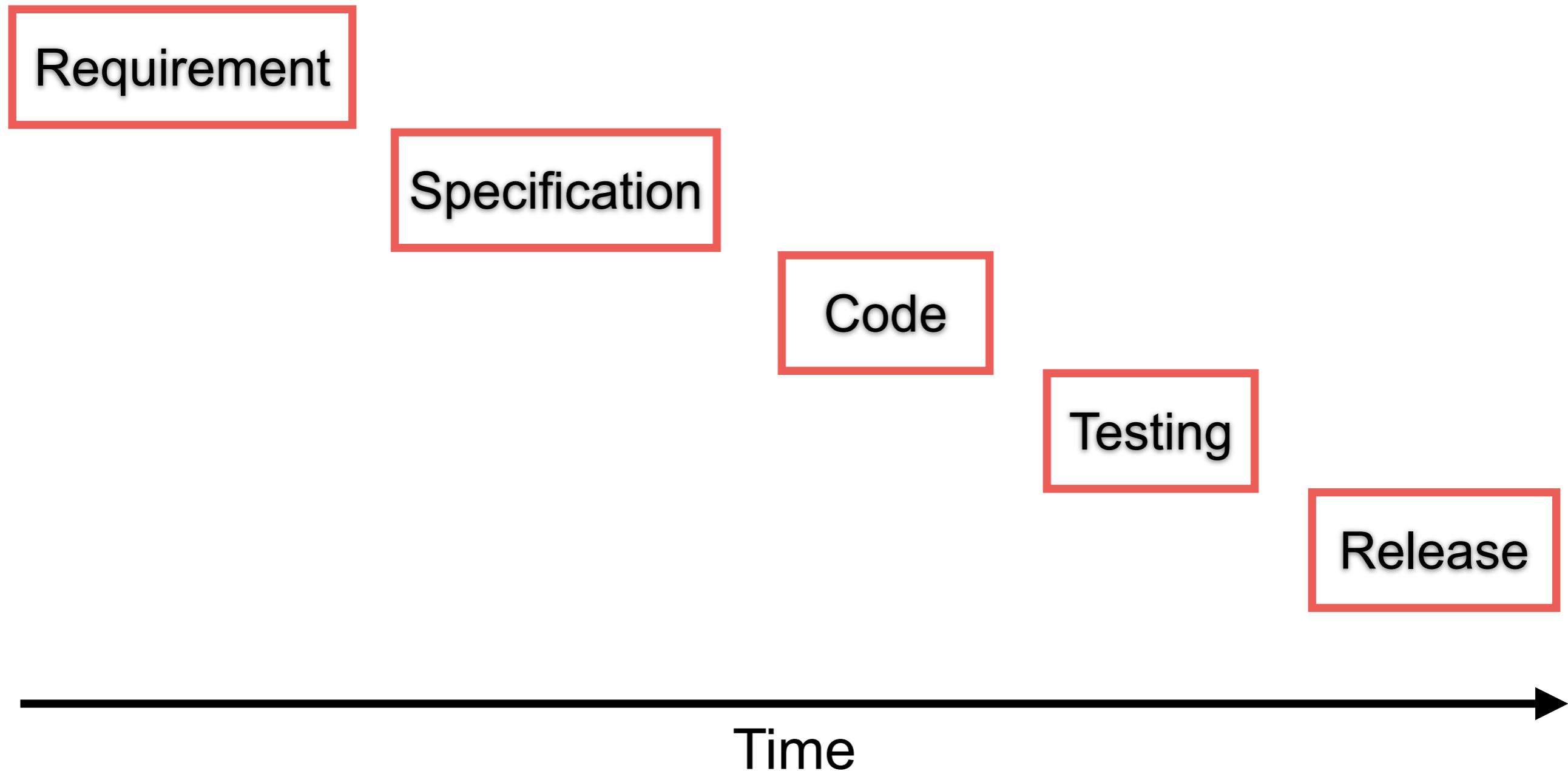
# Software Testing



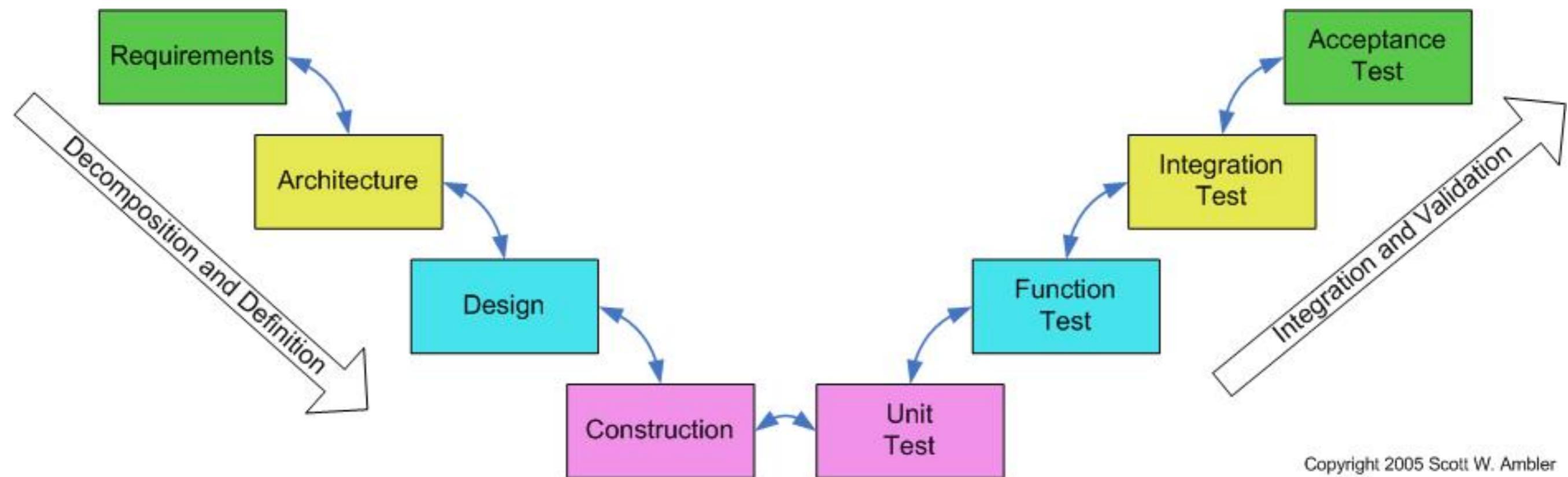
# Software Testing



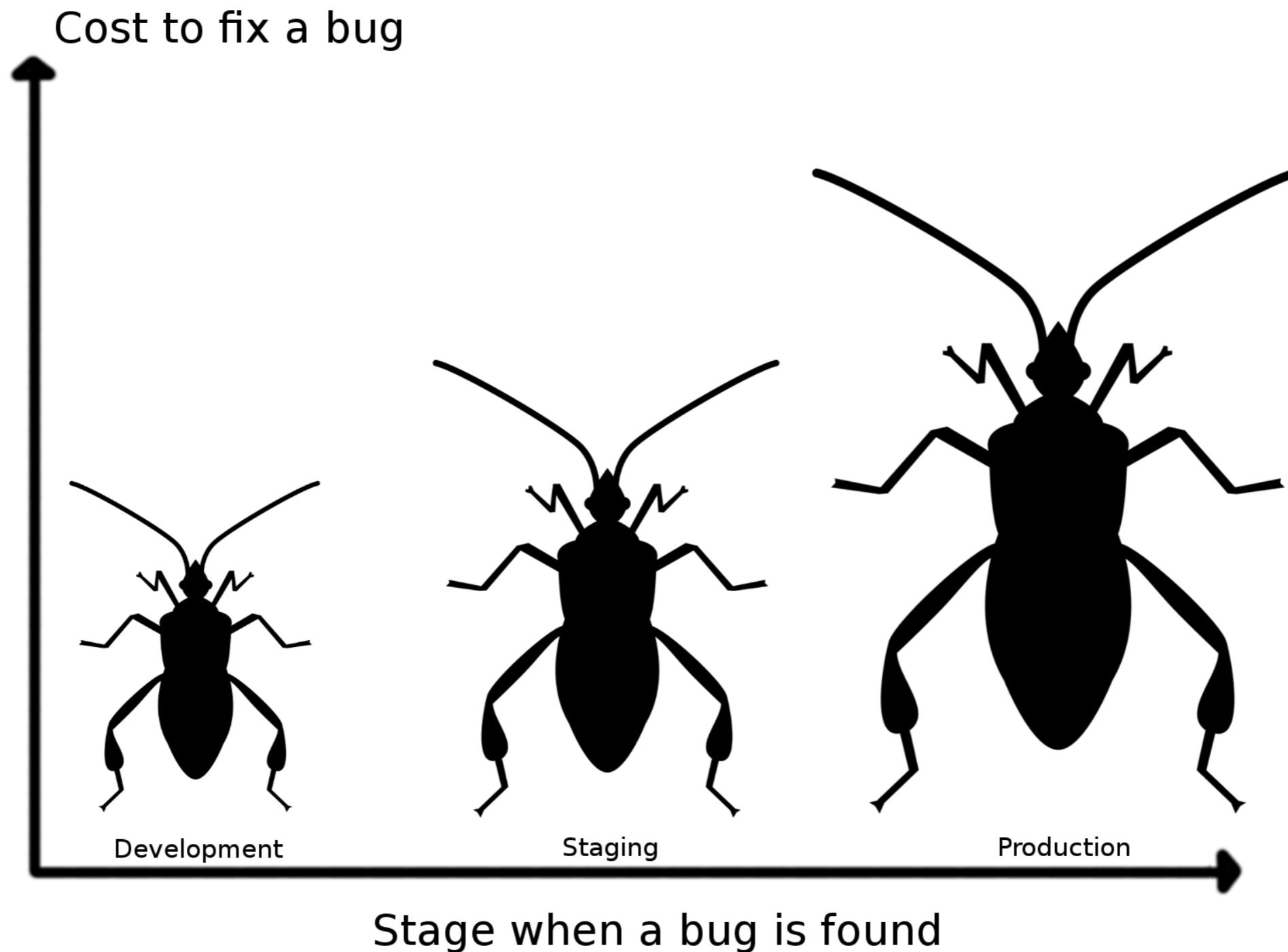
# Software Delivery Process



# V Model



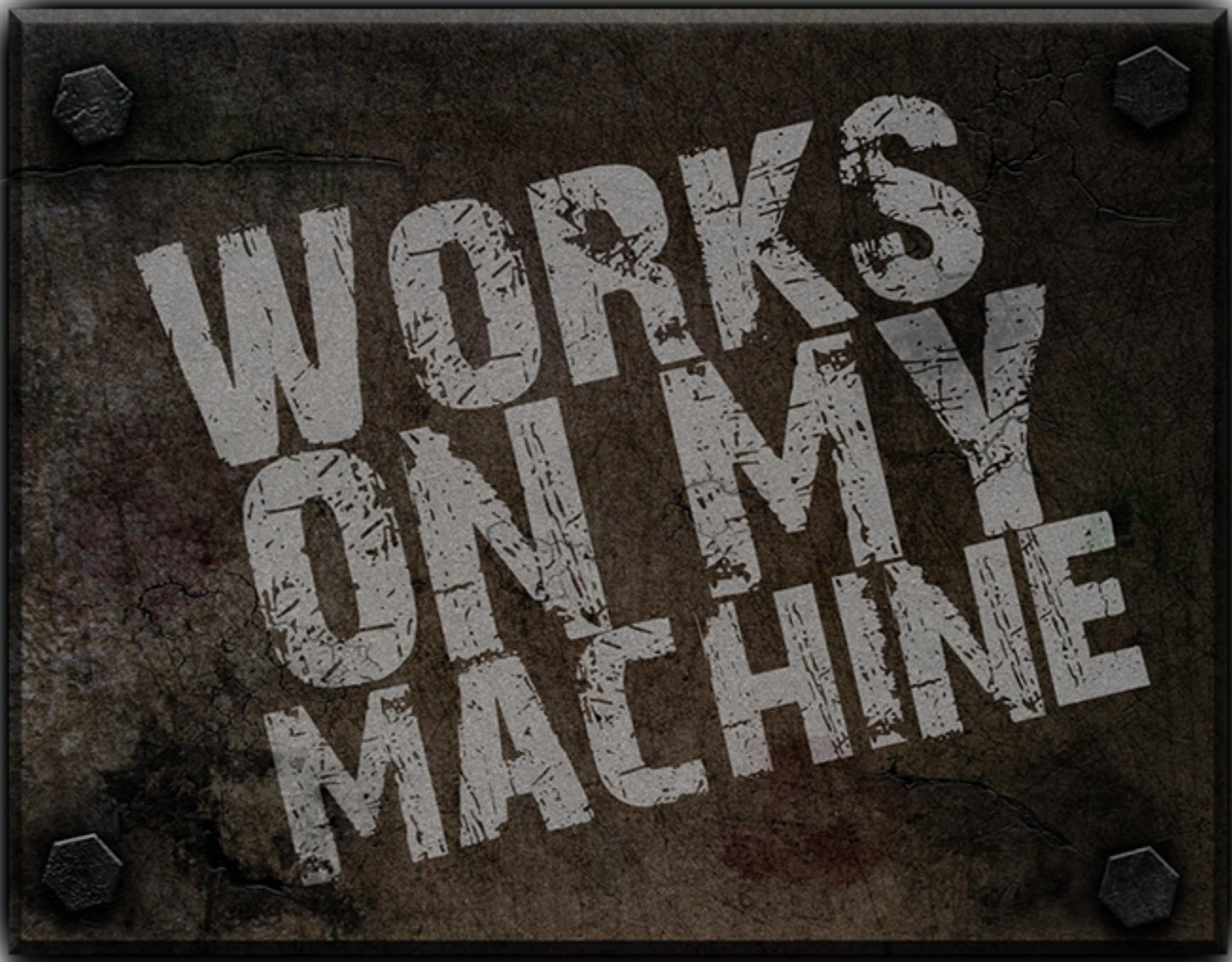
# Cost of Change !!



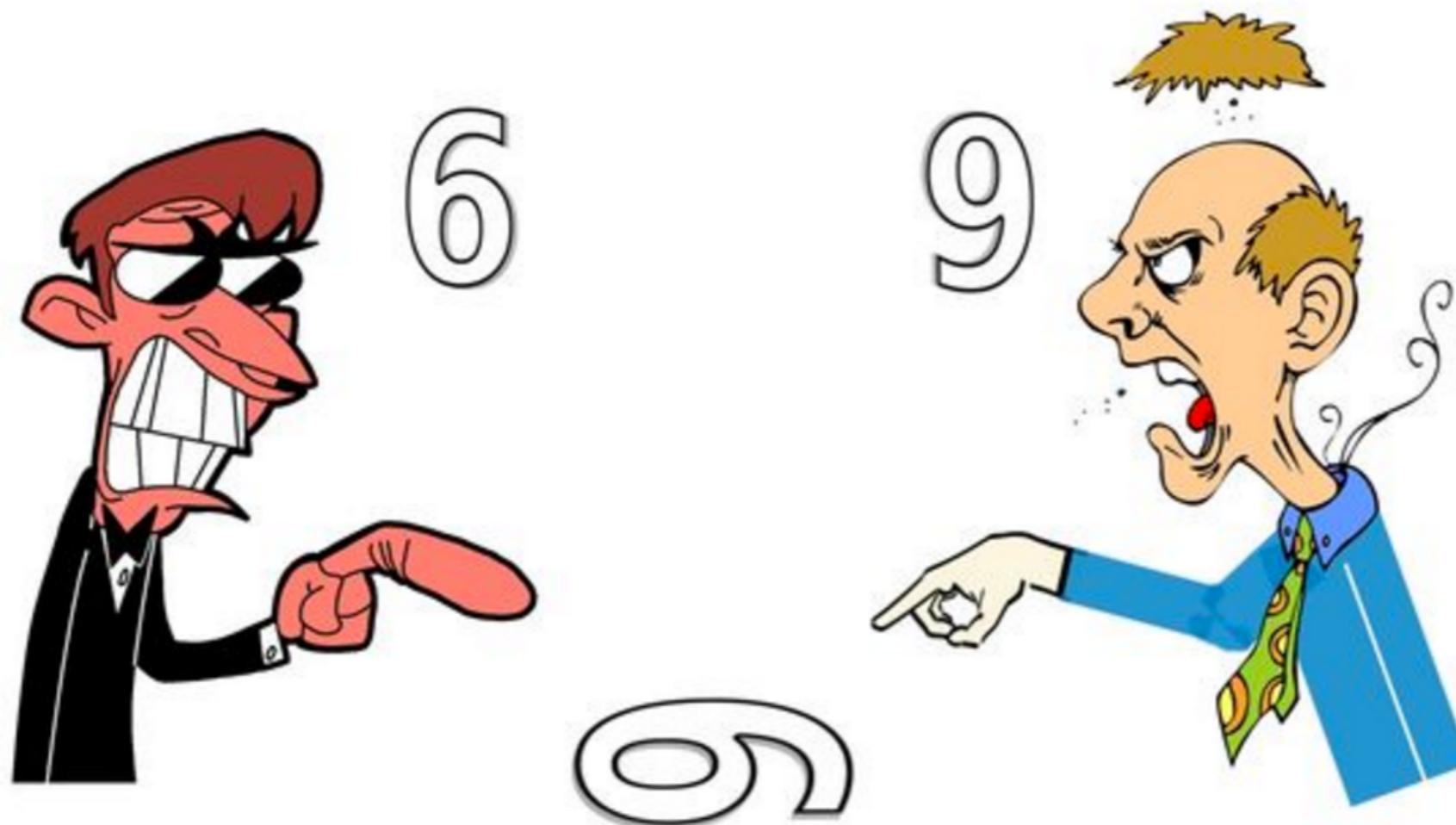
# Cost of Change !!

1. Merging the code
2. Duplicate changes
3. Test again again !!
4. Fixing bugs
5. Impact on stability





# Developer vs Tester







Who ?





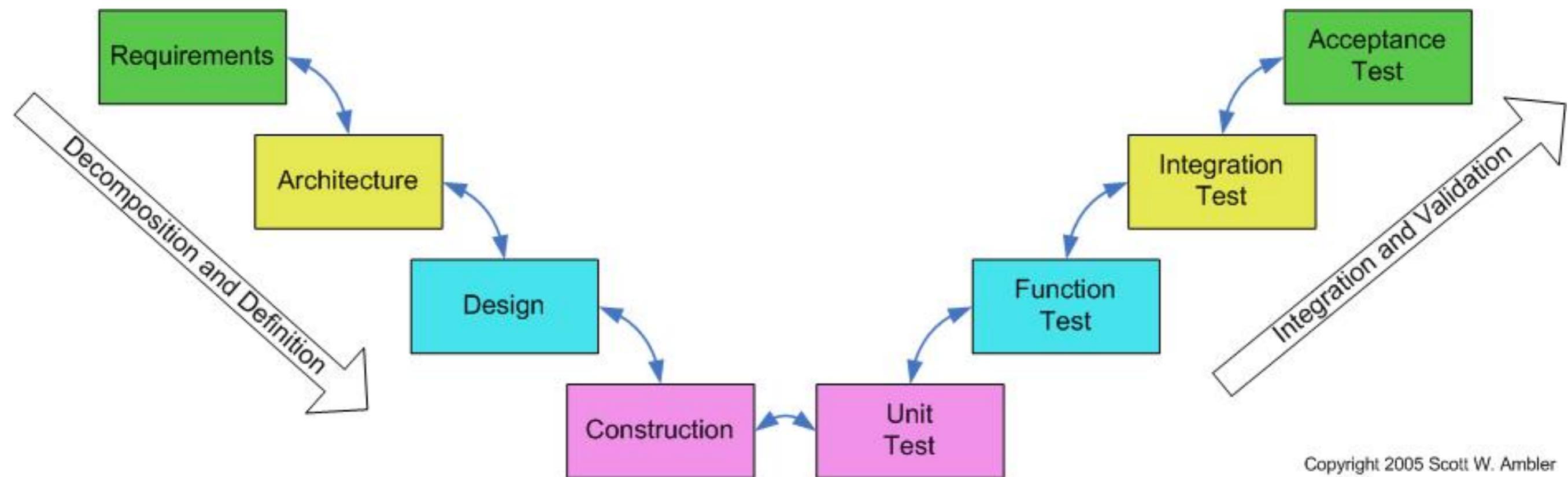
**TONIGHT WE TEST**

**IN PRODUCTION!!!**

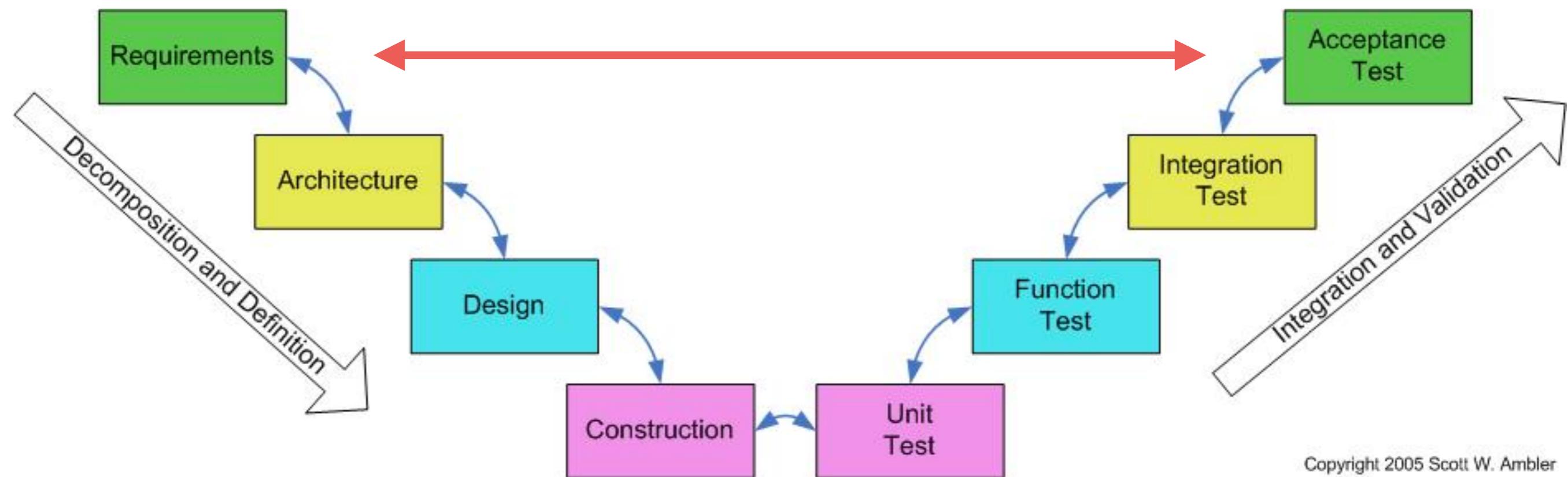
memegenerator.net



# V Model



# V Model



# **Acceptance Tests**

=

## **Business Criteria**

+

## **Examples (data)**



# **Acceptance Test Driven Development**

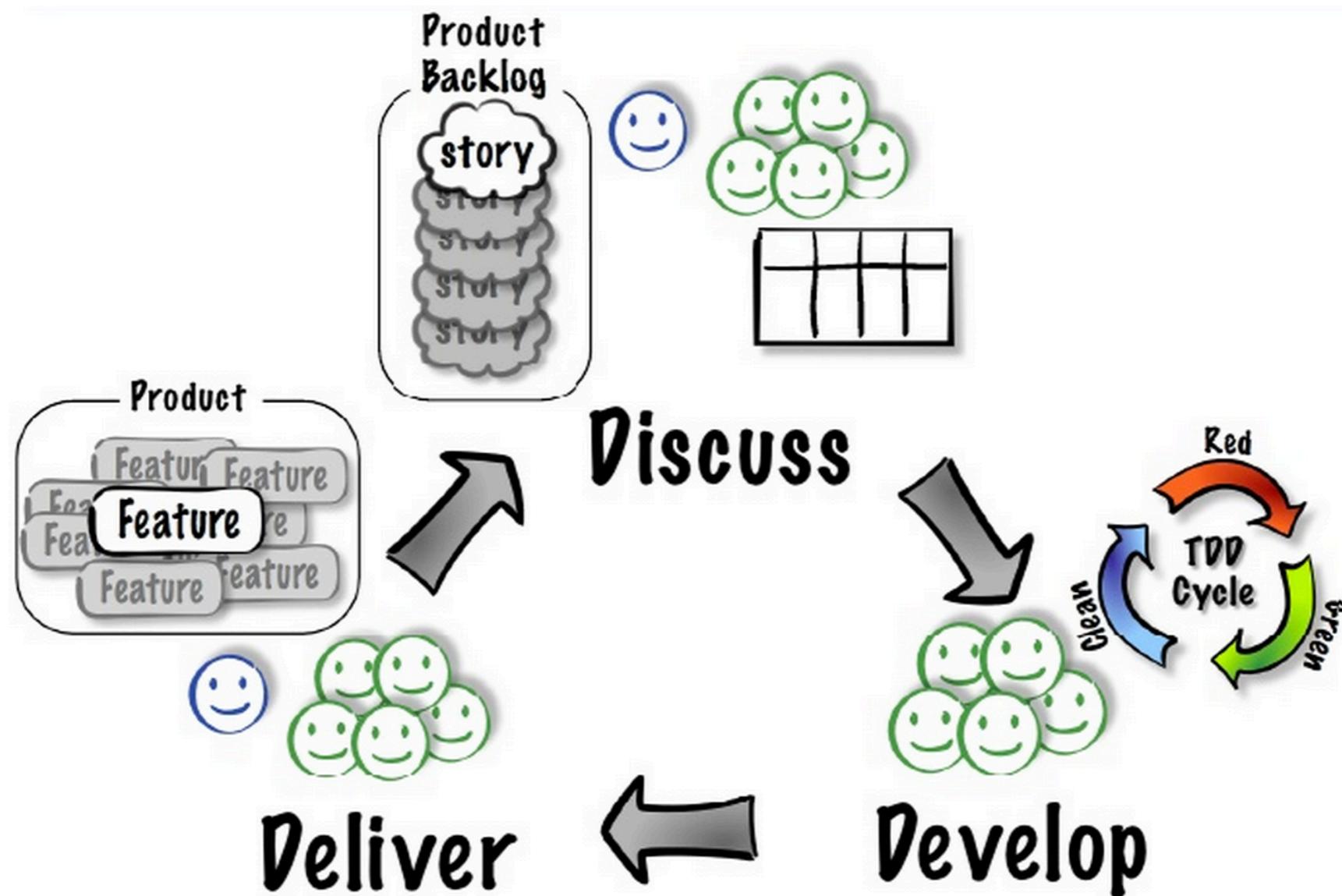


# ATDD

Common language  
Common and share understanding  
Executable requirements or examples  
Living document



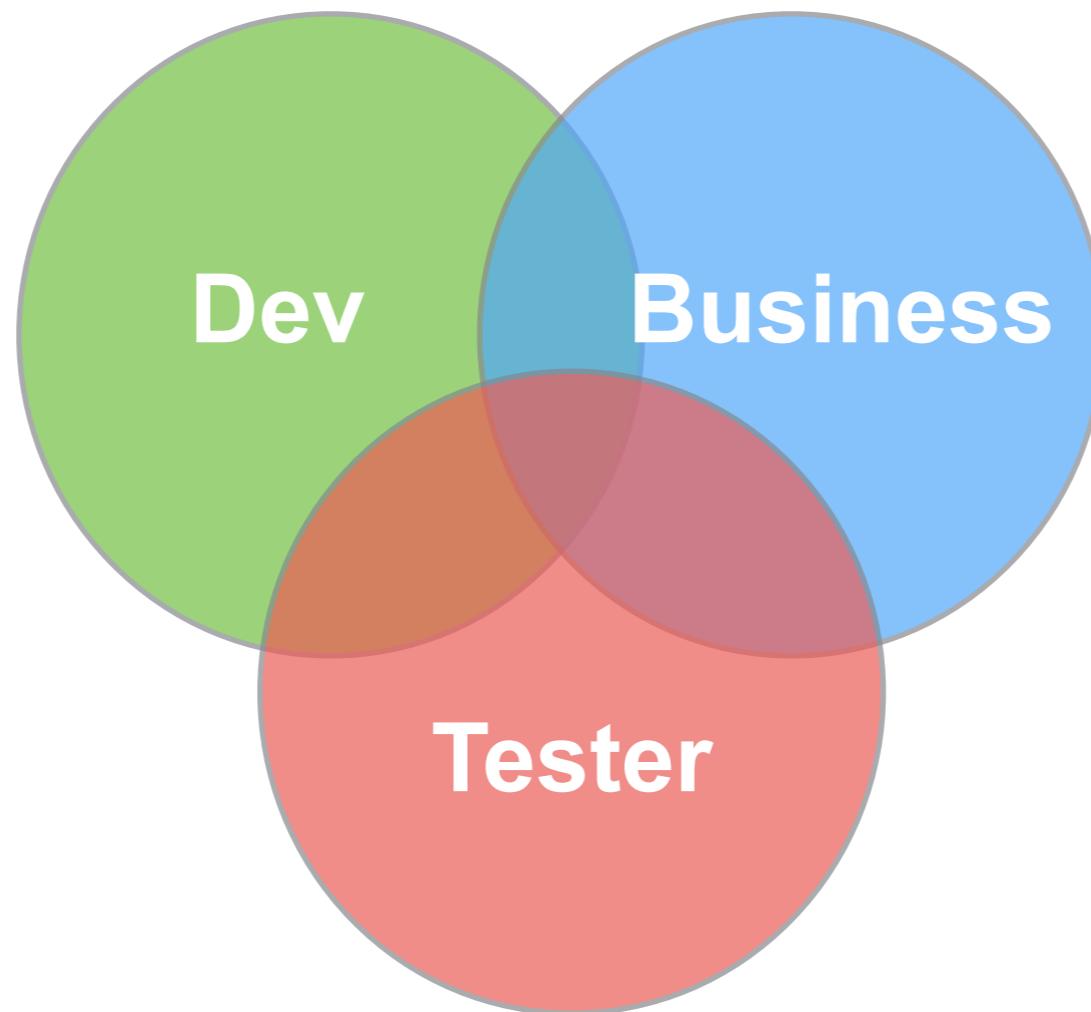
# ATDD



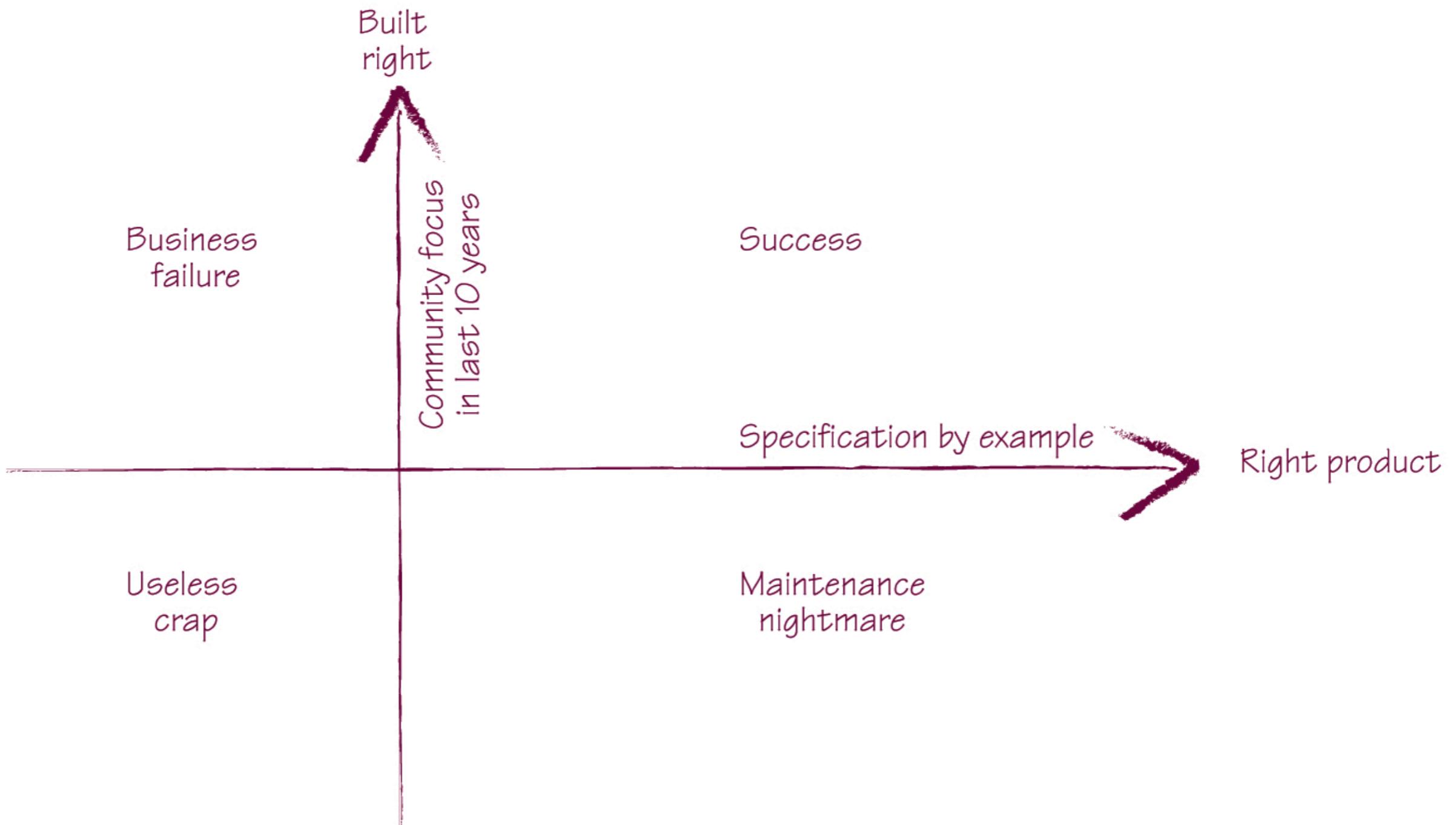
*(Model developed with Pekka Klärck, Bas Vodde, and Craig Larman.)*



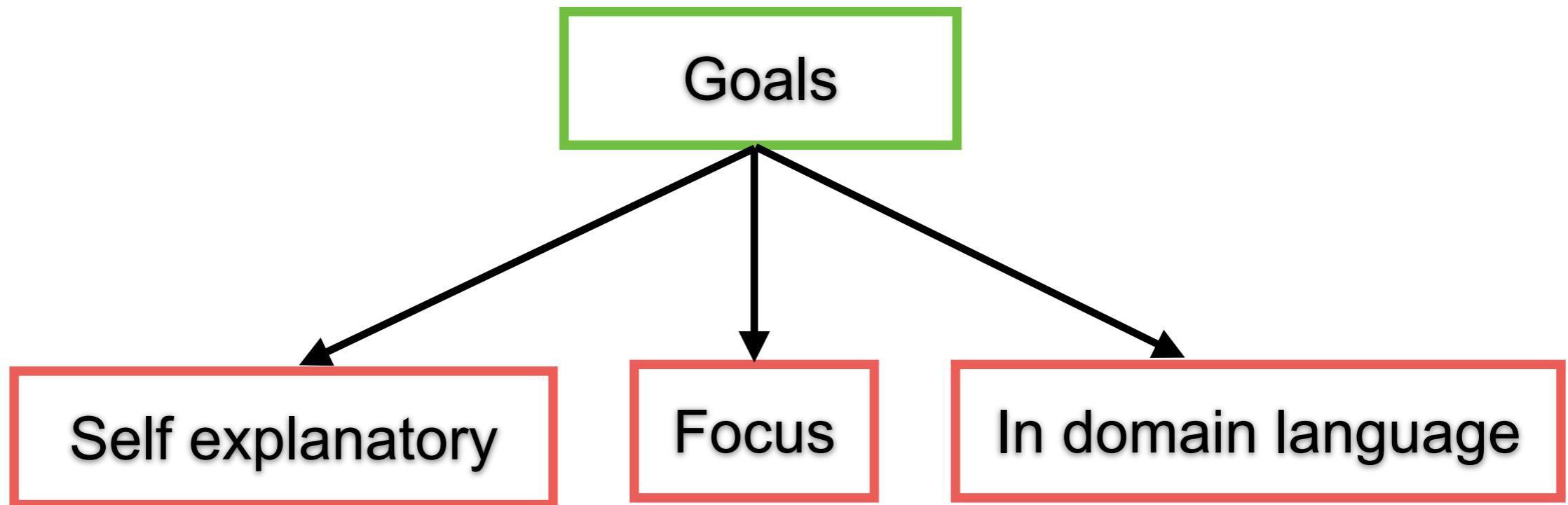
# Acceptance testing



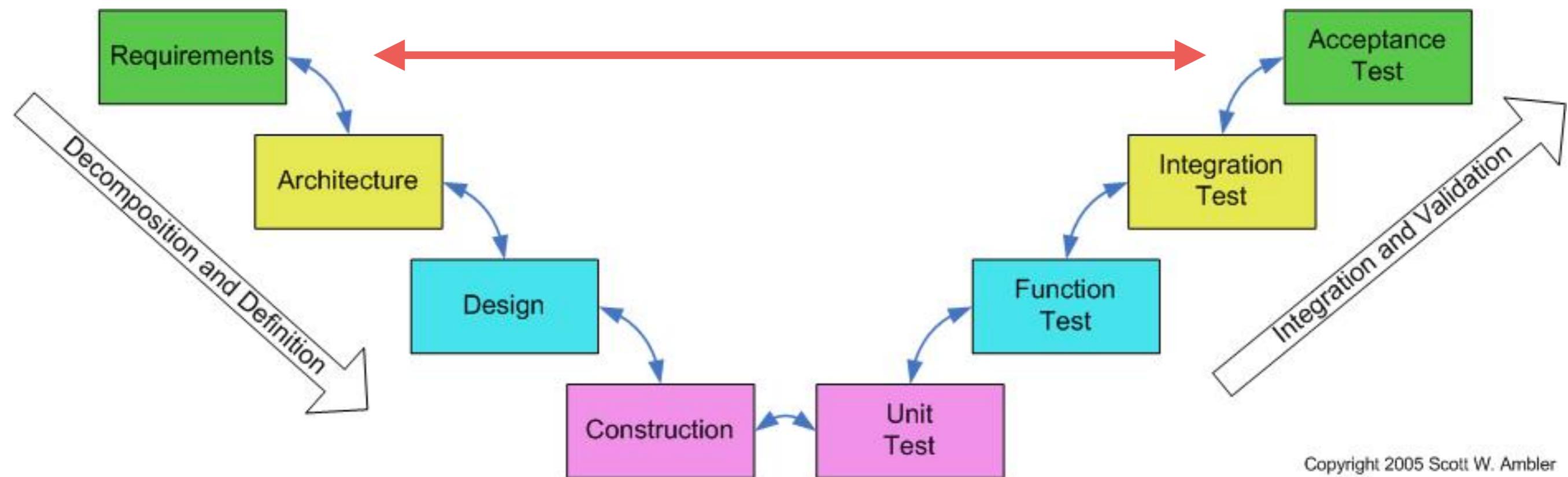
# Acceptance testing



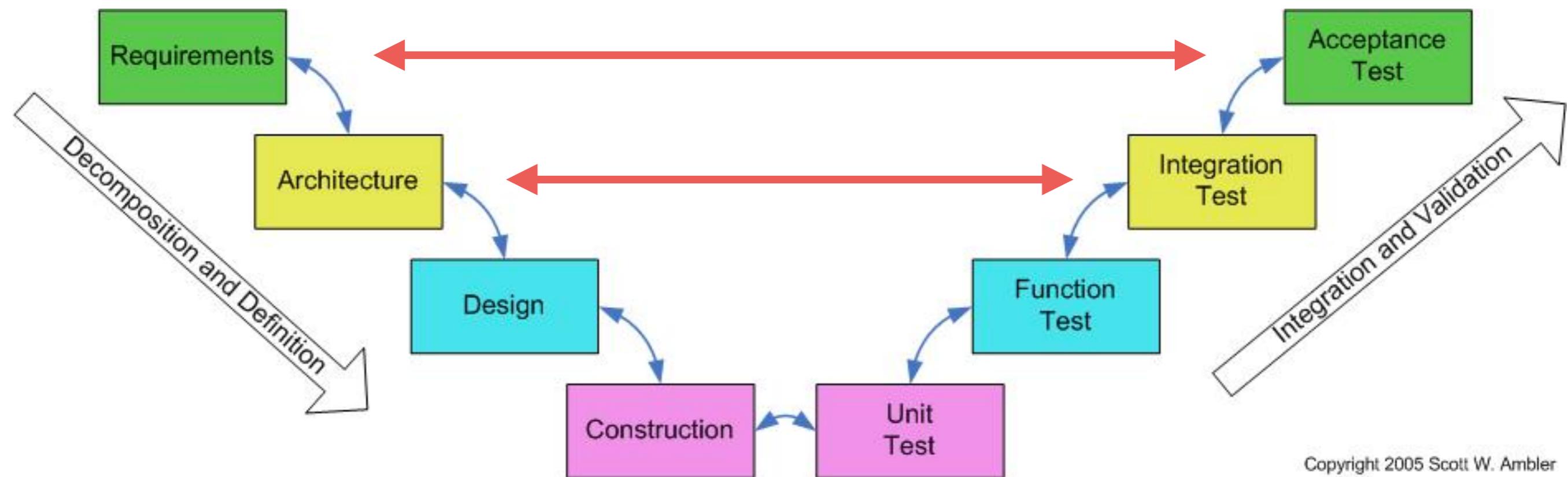
# Workshop



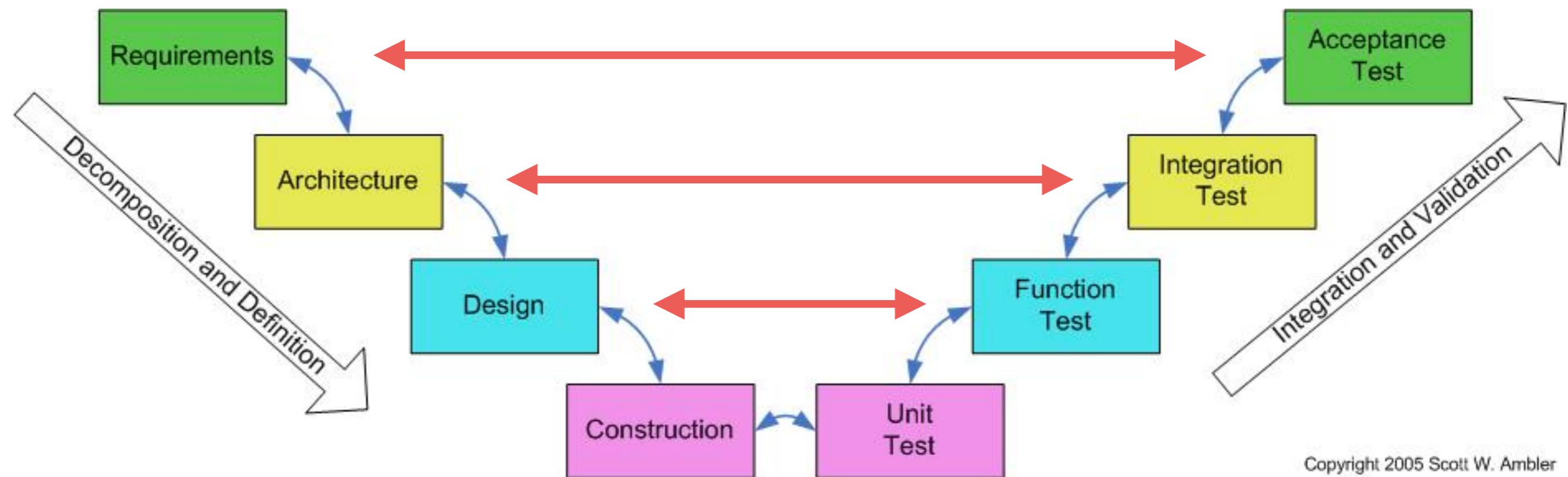
# V Model



# V Model



# V Model



# Need the new way !!



# Iterative and Incremental Development: A Brief History



**Although many view iterative and incremental development as a modern practice, its application dates as far back as the mid-1950s. Prominent software-engineering thought leaders from each succeeding decade supported IID practices, and many large projects used them successfully.**

**Craig Larman**  
Valtech

**Victor R. Basili**  
University of Maryland

**A**s agile methods become more popular, some view iterative, evolutionary, and incremental software development—a cornerstone of these methods—as the “modern” replacement of the waterfall model, but its practiced and published roots go back decades. Of course, many software-engineering students are aware of this, yet surprisingly, some commercial and government organizations still are not.

This description of projects and individual contributions provides compelling evidence of iterative

development” merely for rework, in modern agile methods the term implies not just revisiting work, but also evolutionary advancement—a usage that dates from at least 1968.

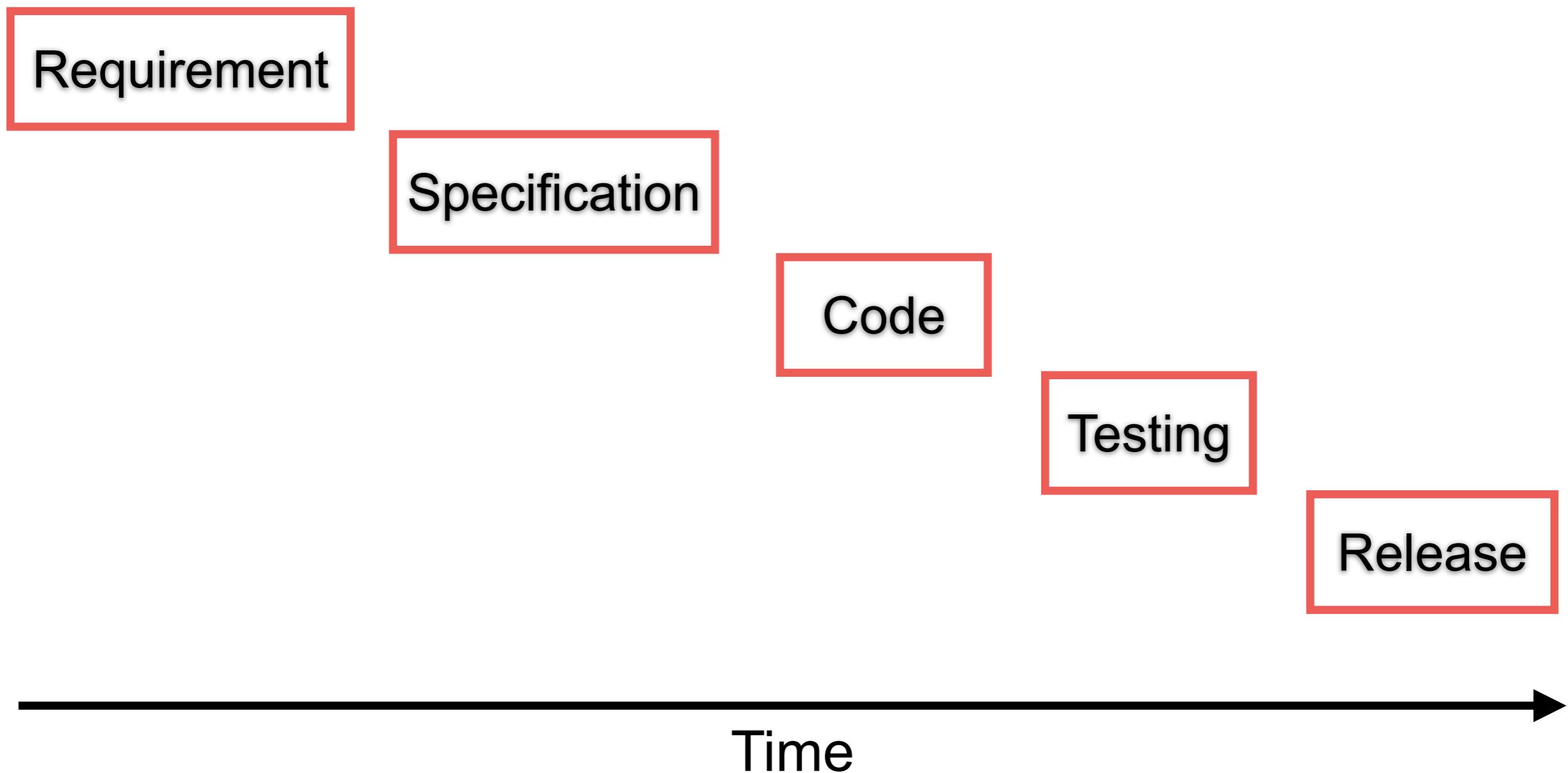
## PRE-1970

IID grew from the 1930s work of Walter Shewhart,<sup>1</sup> a quality expert at Bell Labs who proposed a series of short “plan-do-study-act” (PDSA) cycles for quality improvement. Starting in the 1940s, quality guru W. Edwards Deming began

<http://www.craiglarman.com/wiki/downloads/misc/history-of-iterative-larman-and-basili-ieee-computer.pdf>

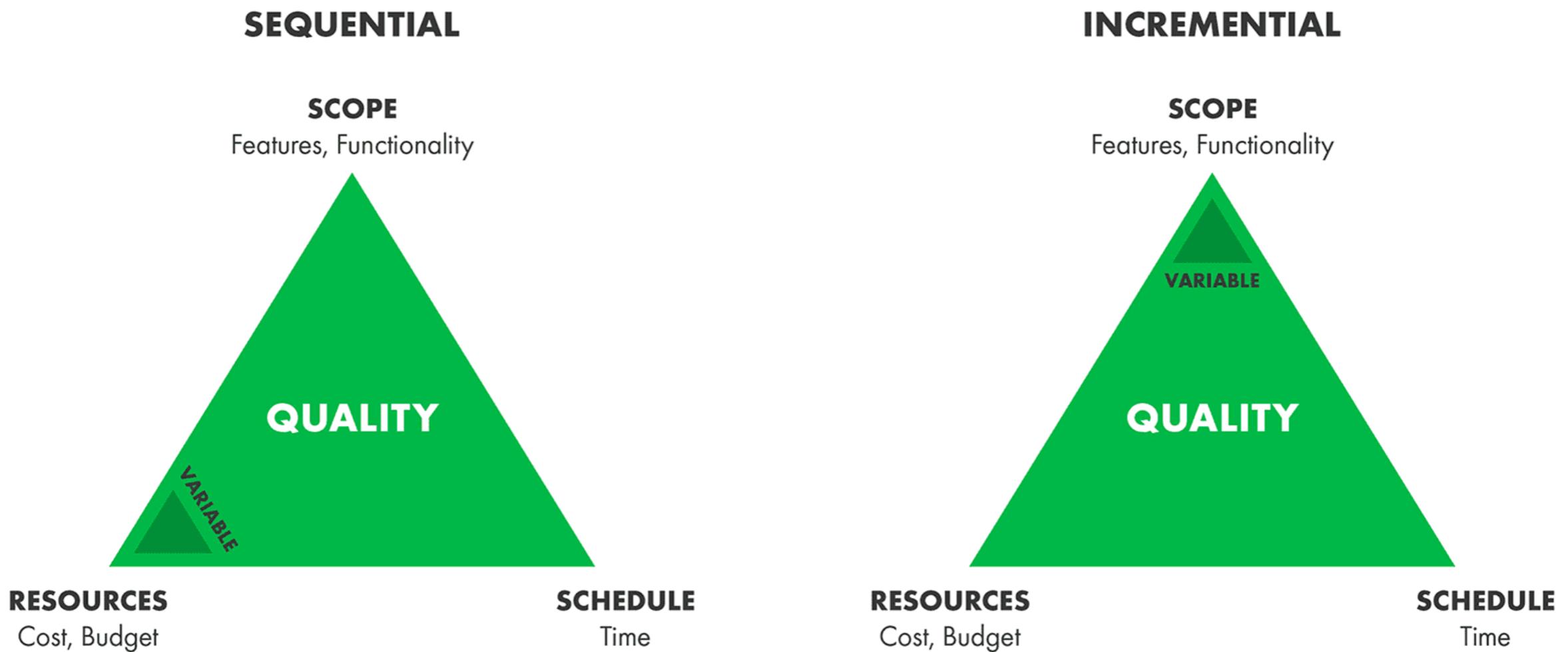


# Sequential process



# Iterative and incremental process

Time boxed delivery  
Fix time and flexible scopes



Business Technology Standard  
[www.managebt.org](http://www.managebt.org)



# Iterative and incremental process

Feature 1

Time



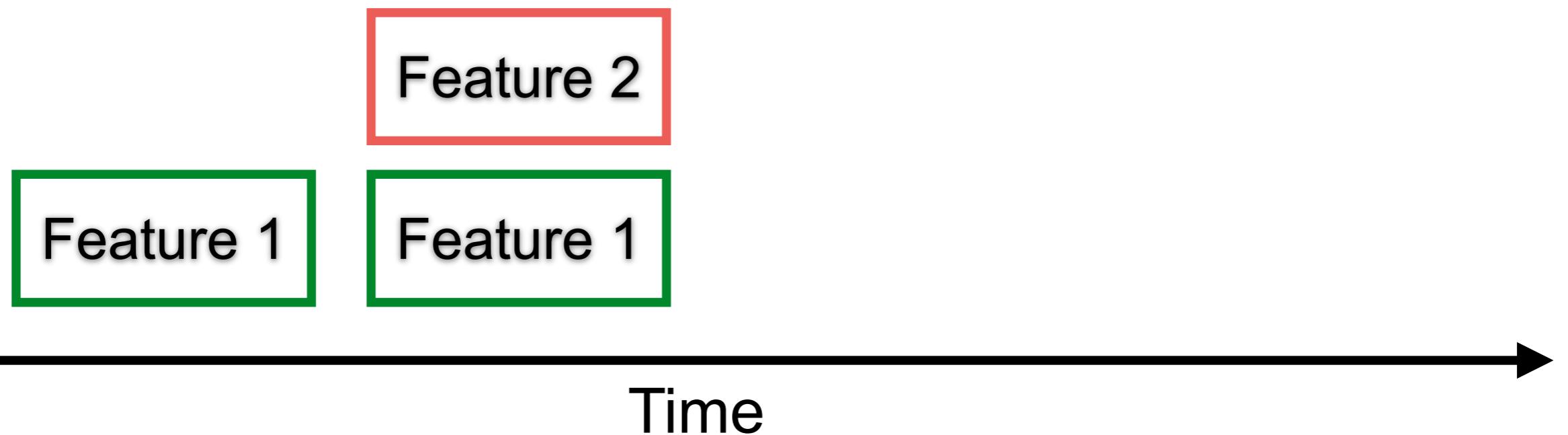
# Iterative and incremental process

Done = coded and tested



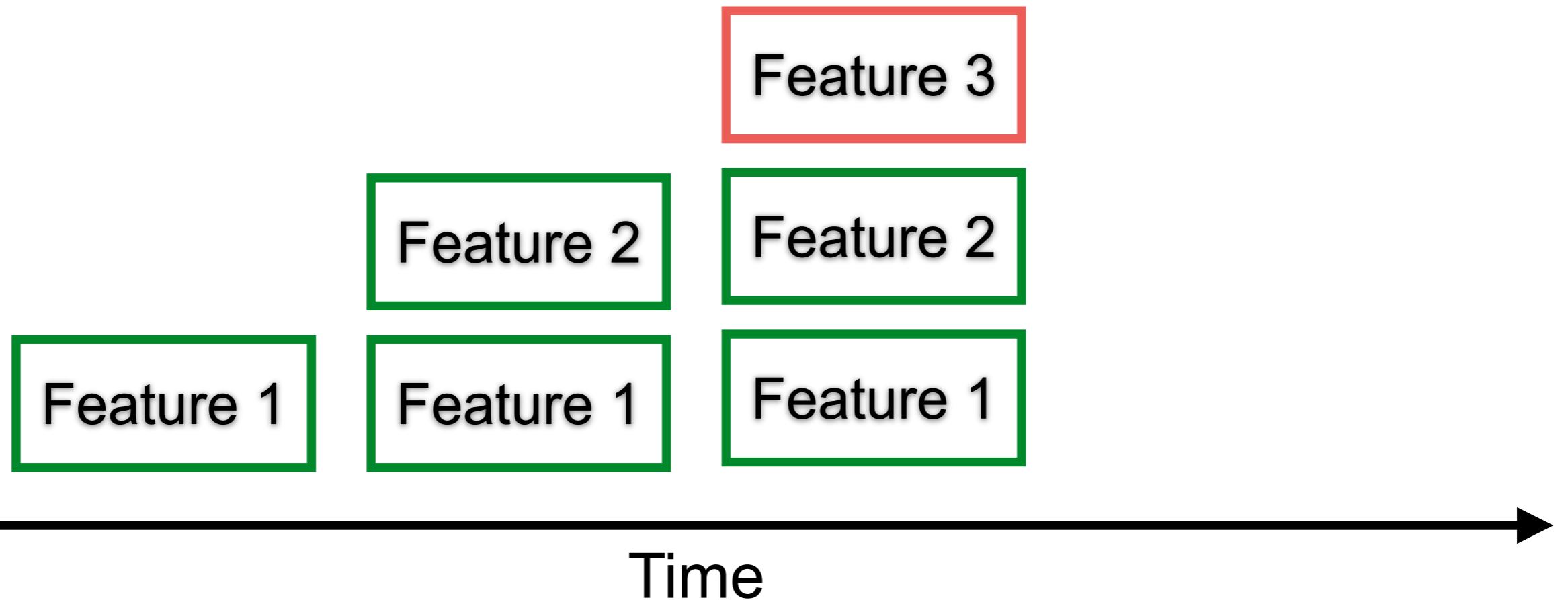
# Iterative and incremental process

Done = coded and tested



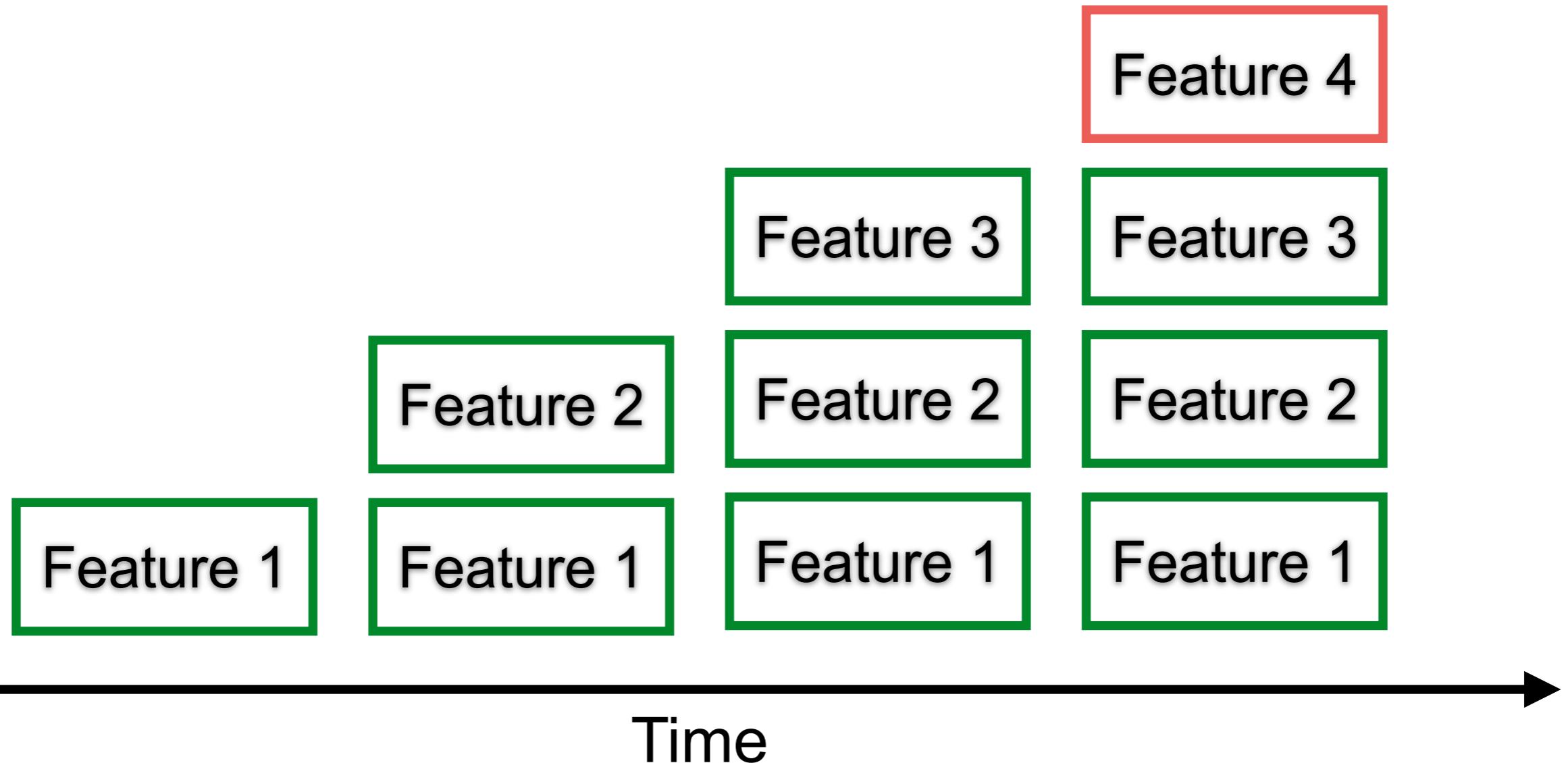
# Iterative and incremental process

Done = coded and tested



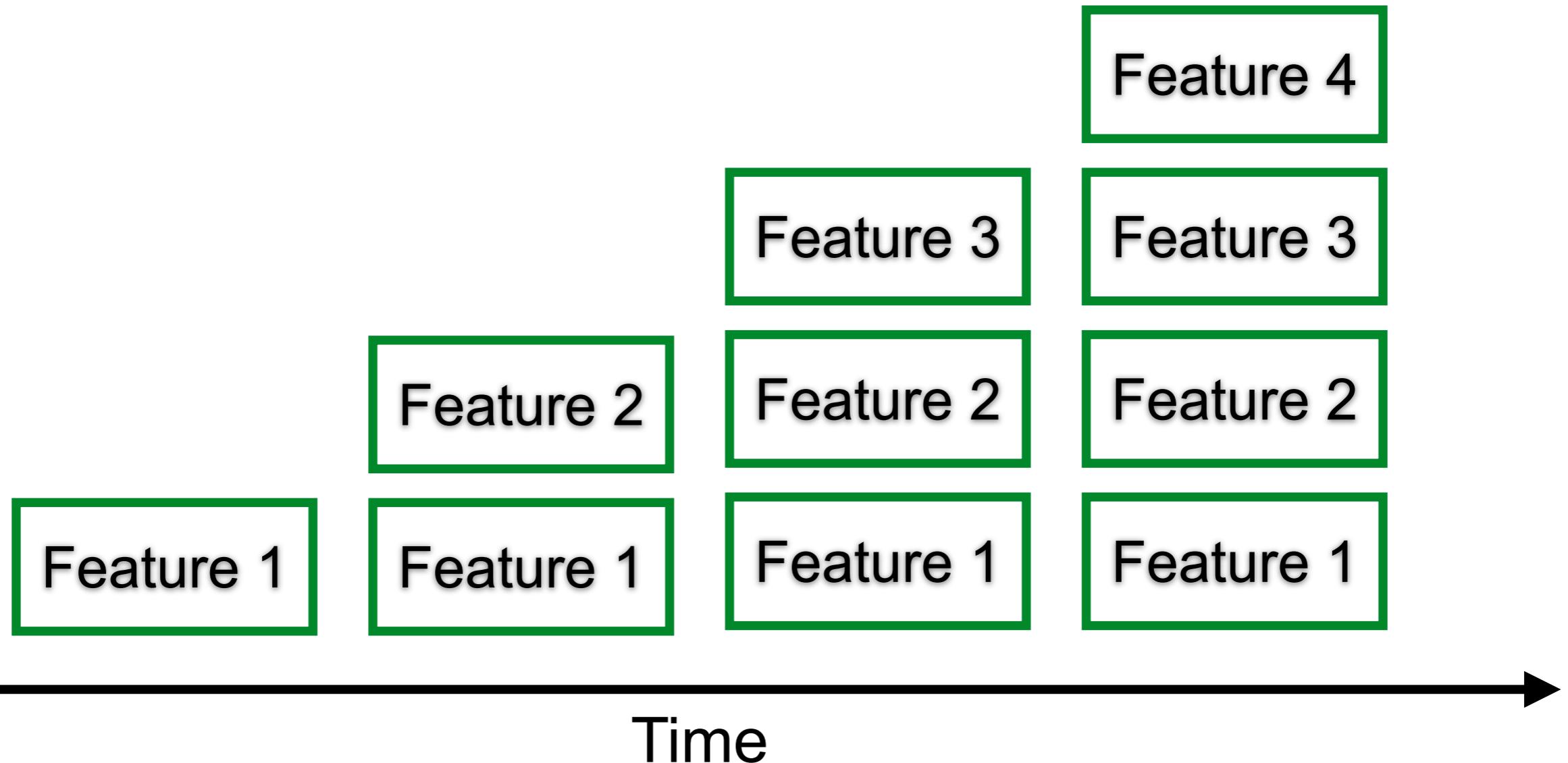
# Iterative and incremental process

Done = coded and tested

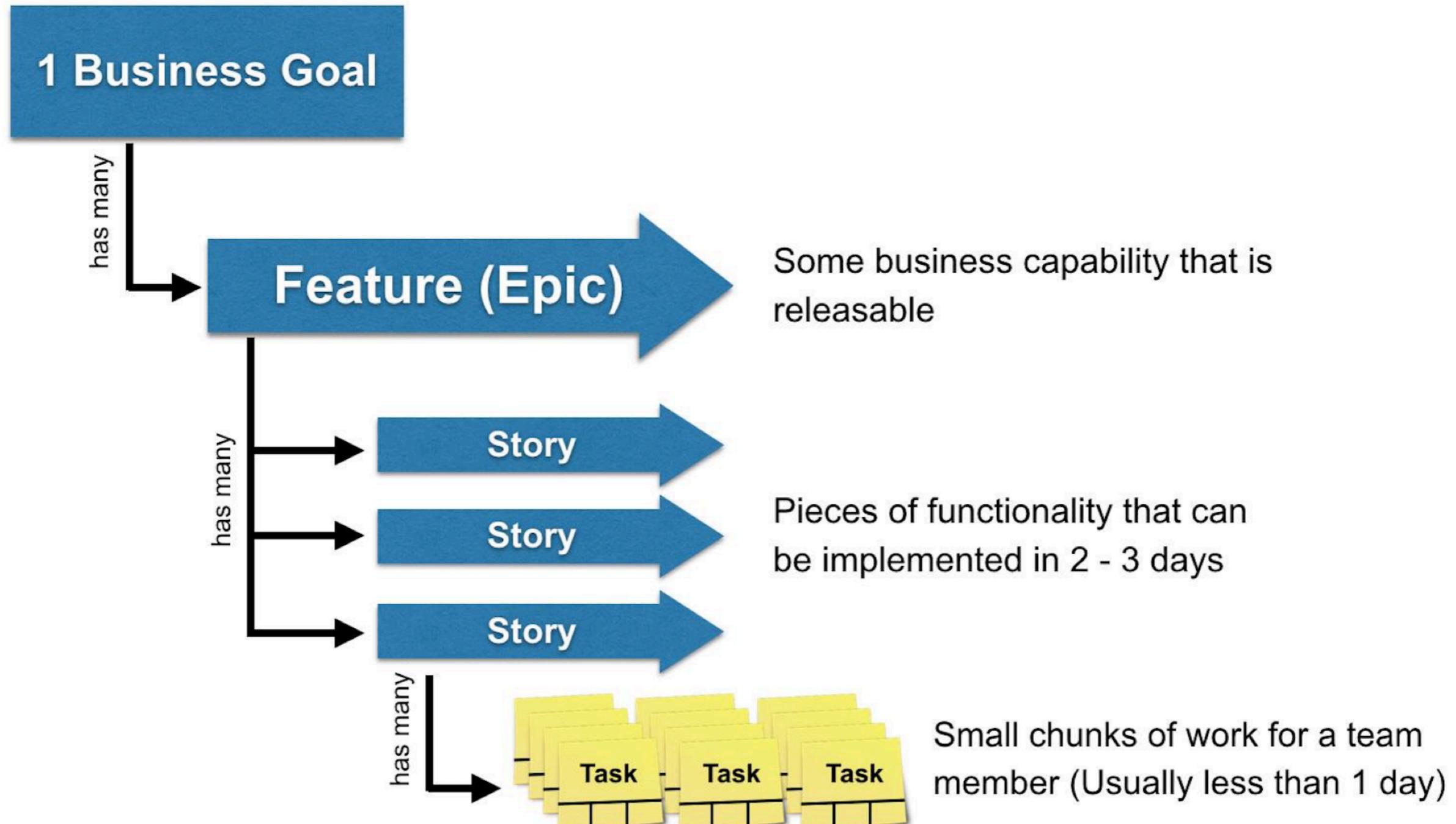


# Iterative and incremental process

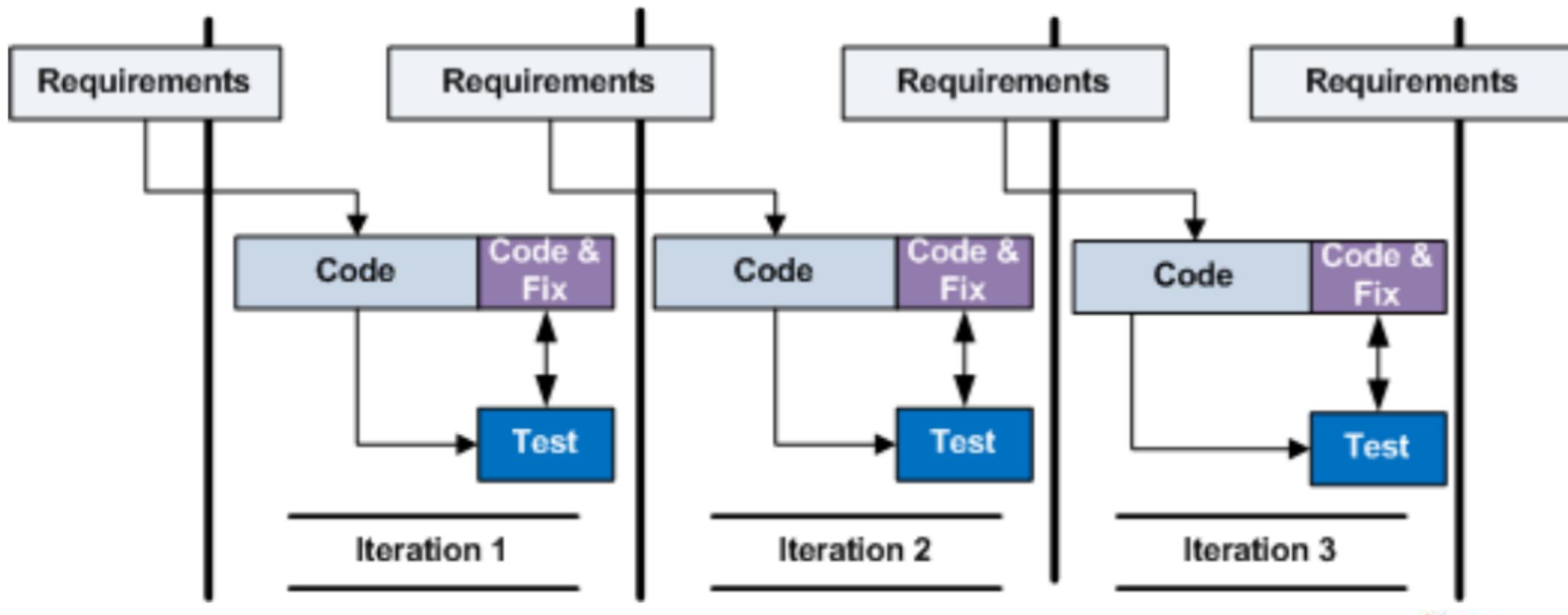
Done = coded and tested



# Start with business goal to tasks



# Mini Waterfall !!



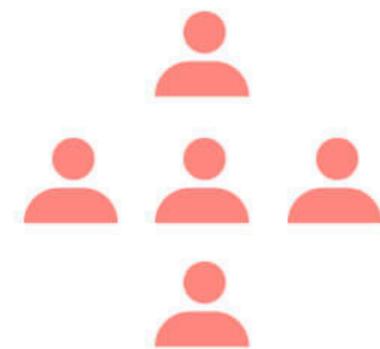
# Whole team approach



# Whole team approach

## Functional

Common functional expertise



System analysts



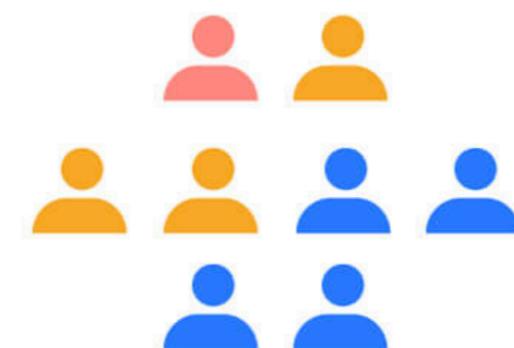
Developers



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**



**Role** → **Competency**

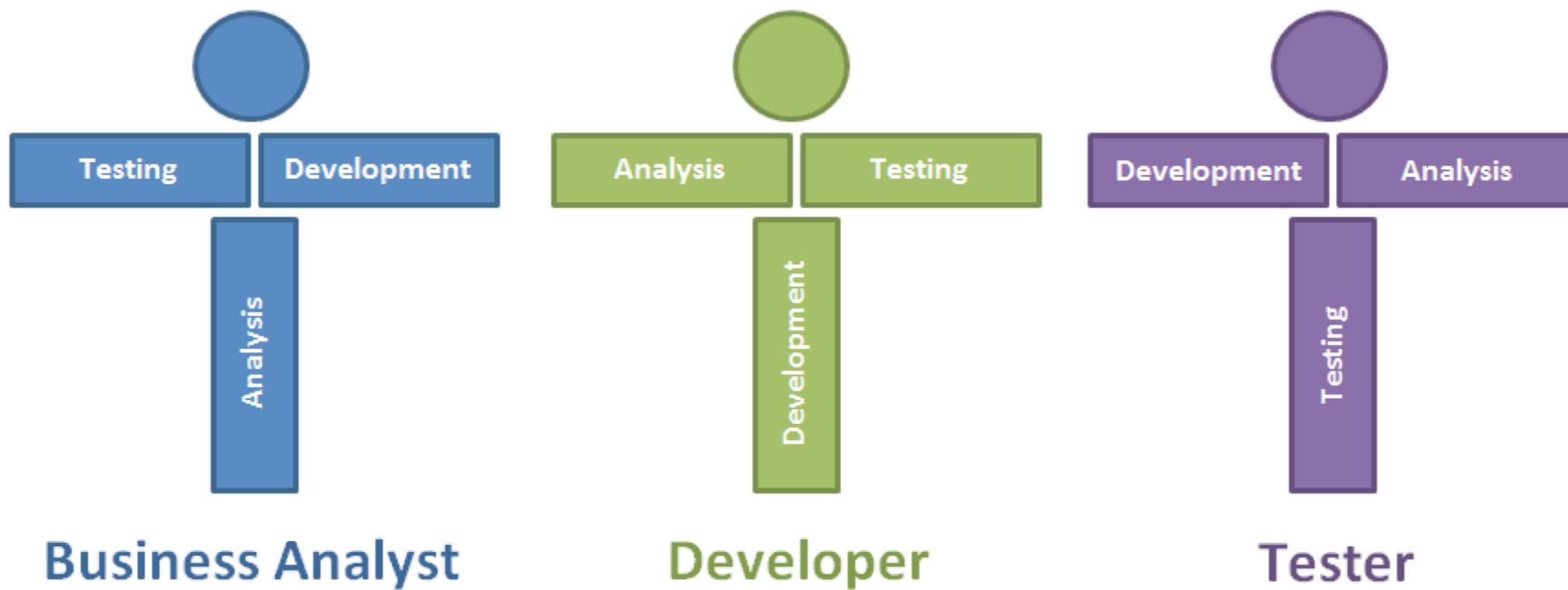


**Cross-functional development team**

~~QA = Quality Assurance~~  
= Quality Assistance



# T-shaped skills



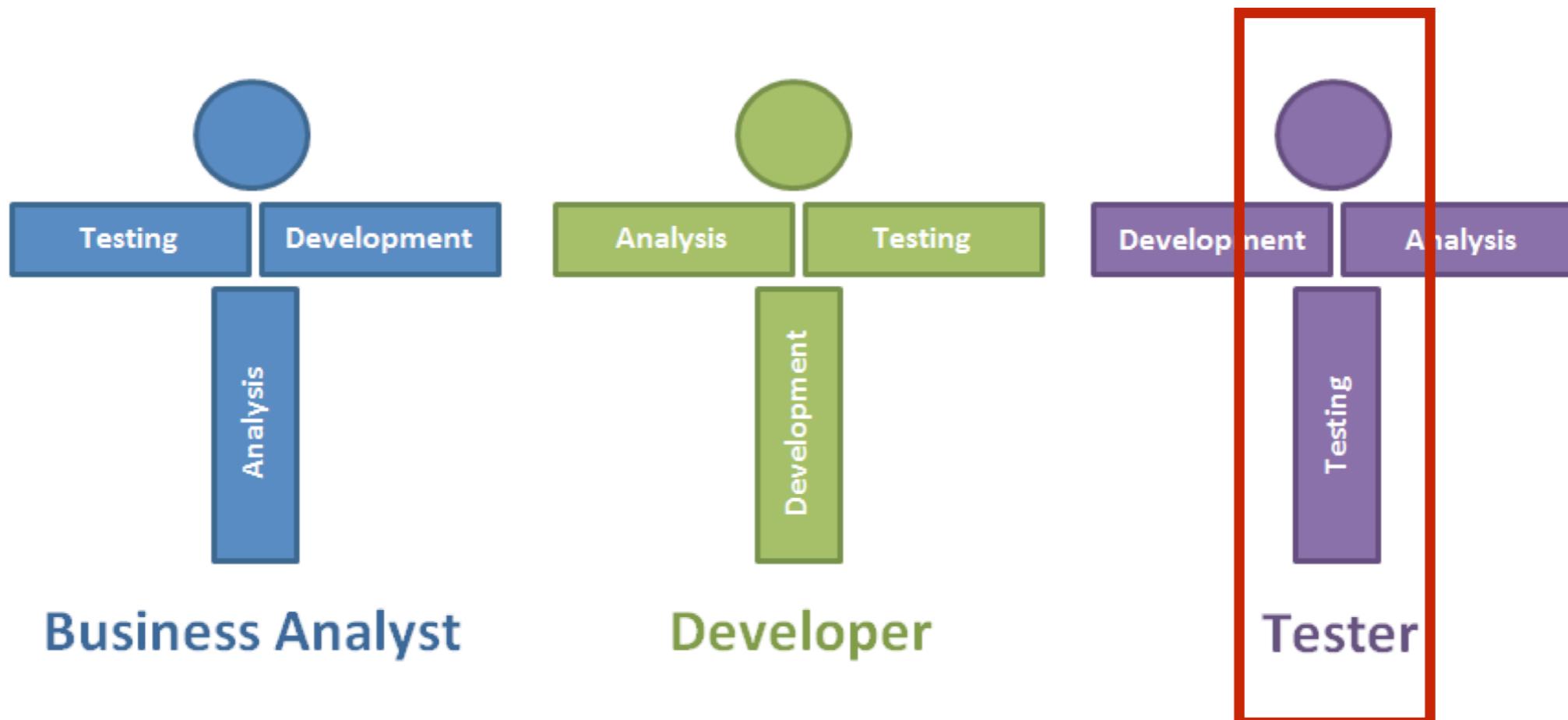
Business Analyst

Developer

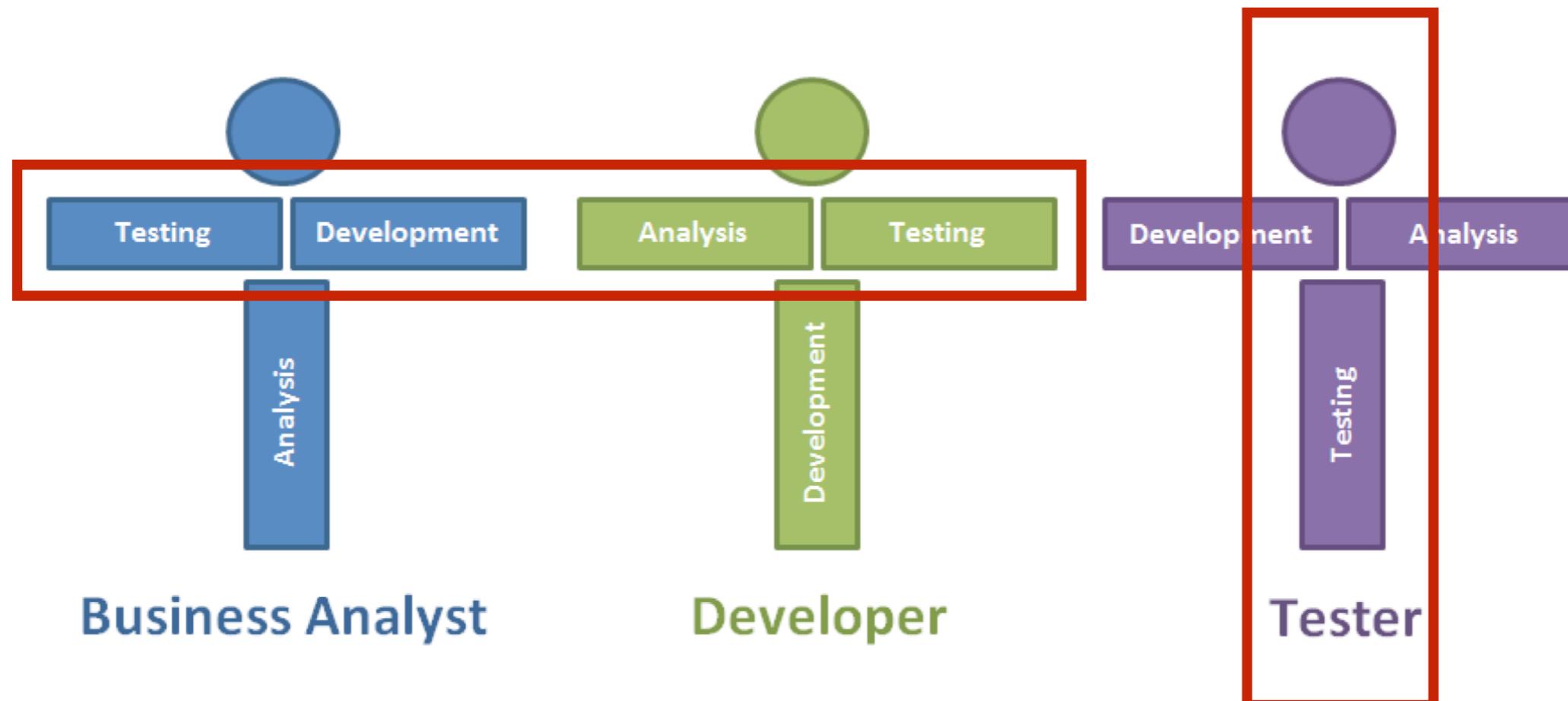
Tester



# Quality assistance



# Quality assistance



# Test is activity

~~Test phase~~

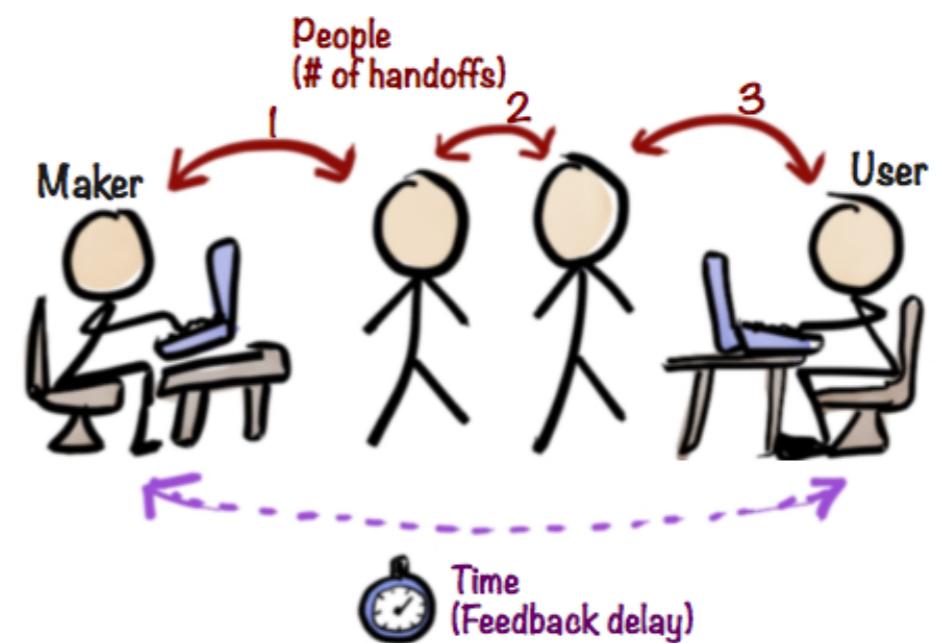
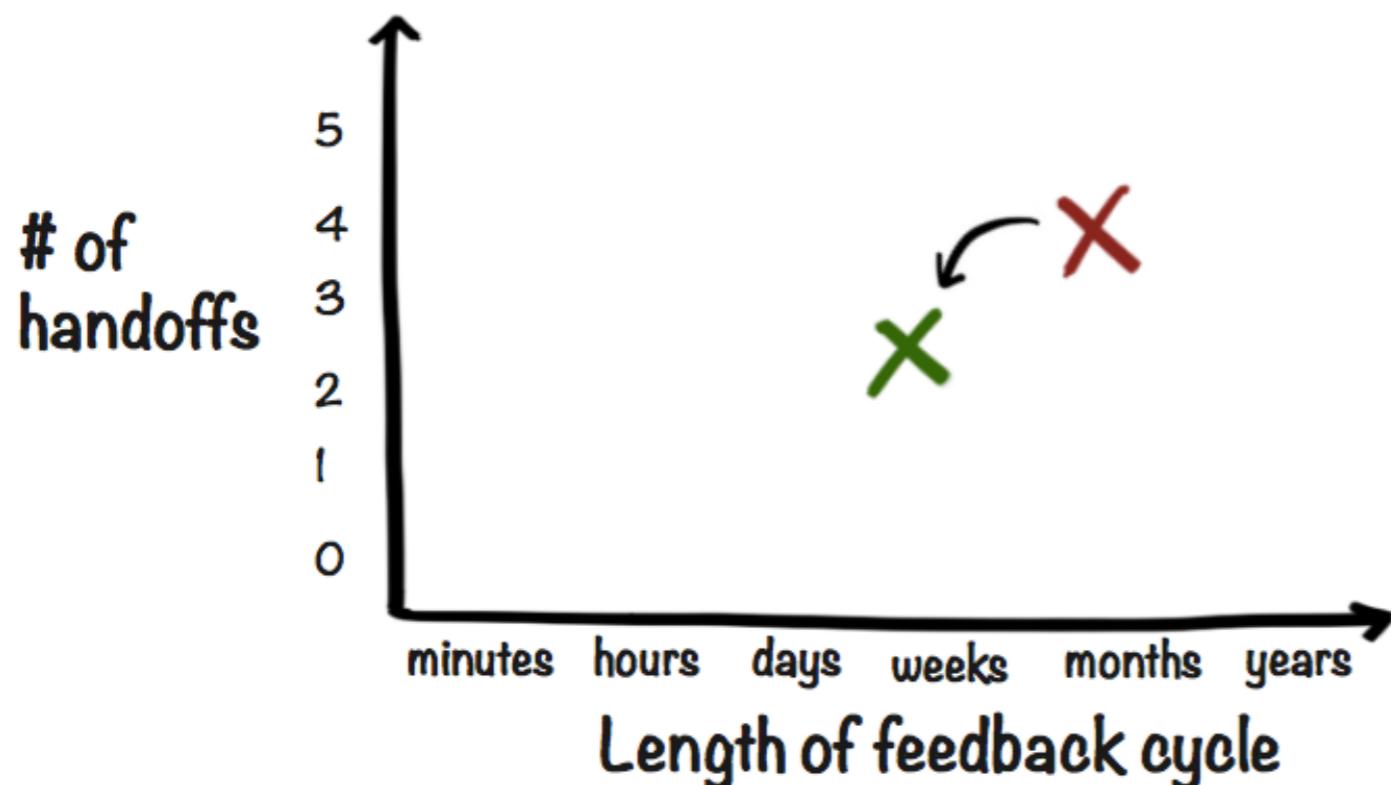
~~Test team~~

~~Tester role~~

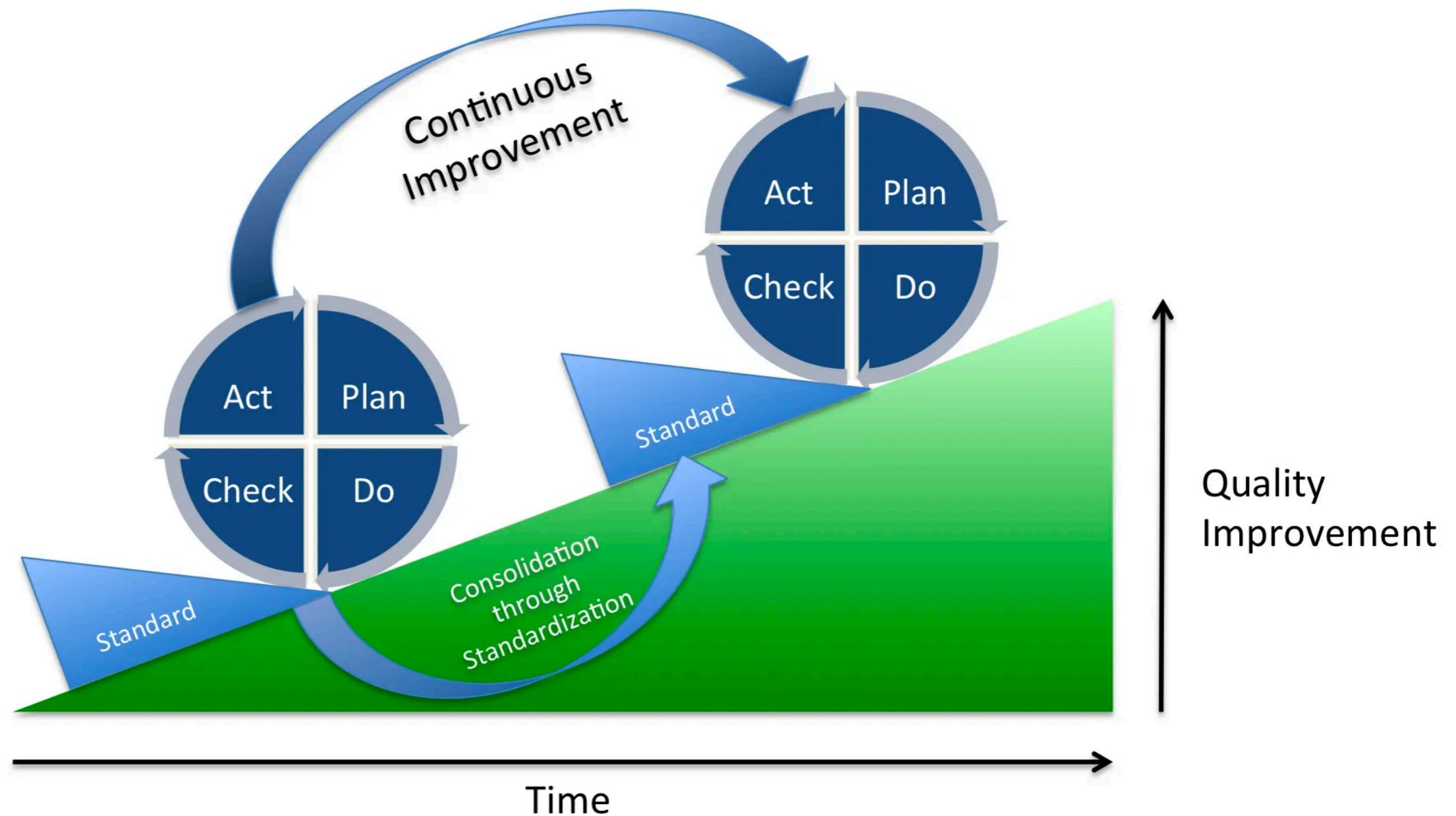


# Fast feedback loop

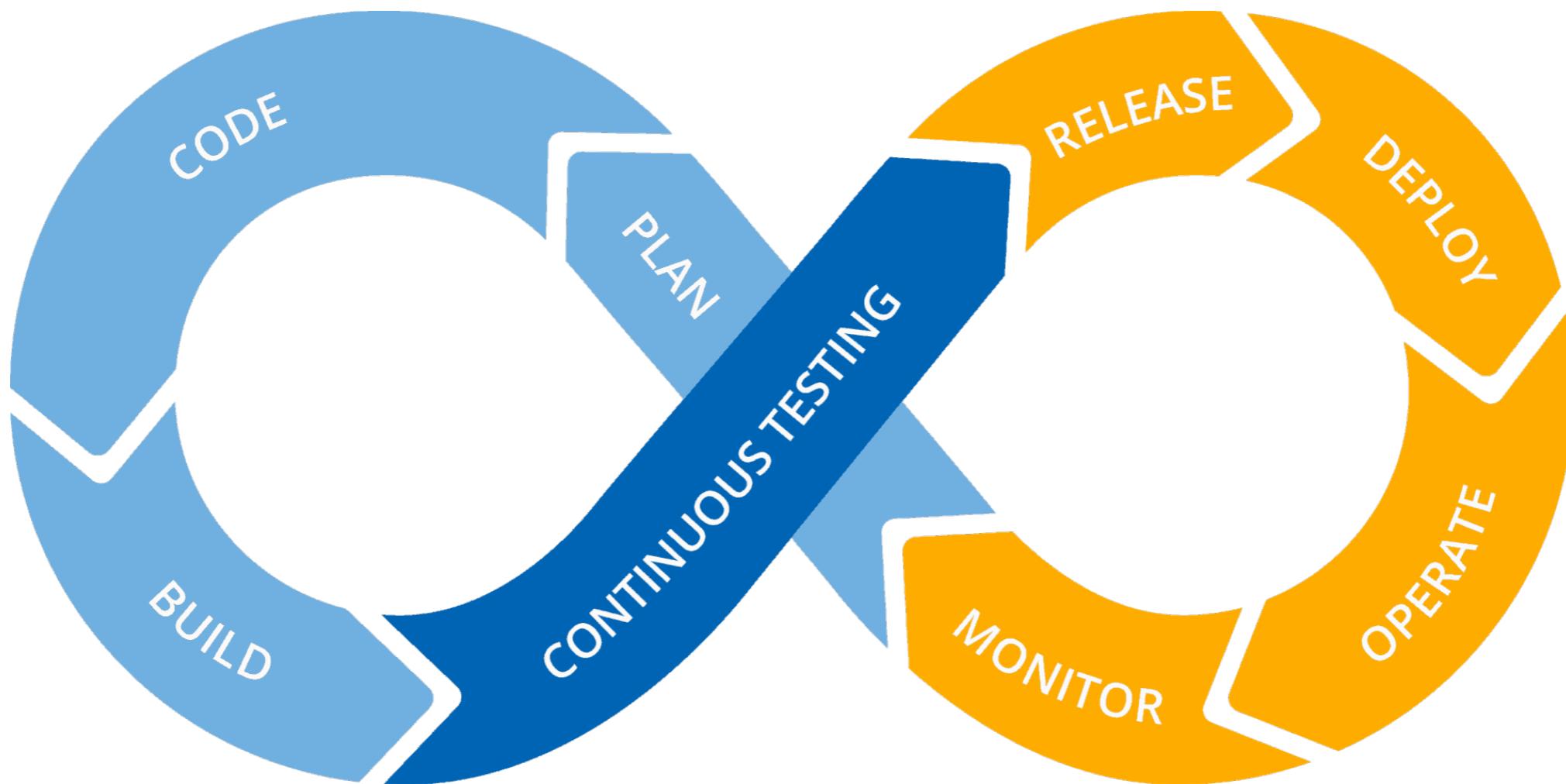
Shorten the feedback loop



# Continuous improvement



# Continuous testing



# Good Testing ?

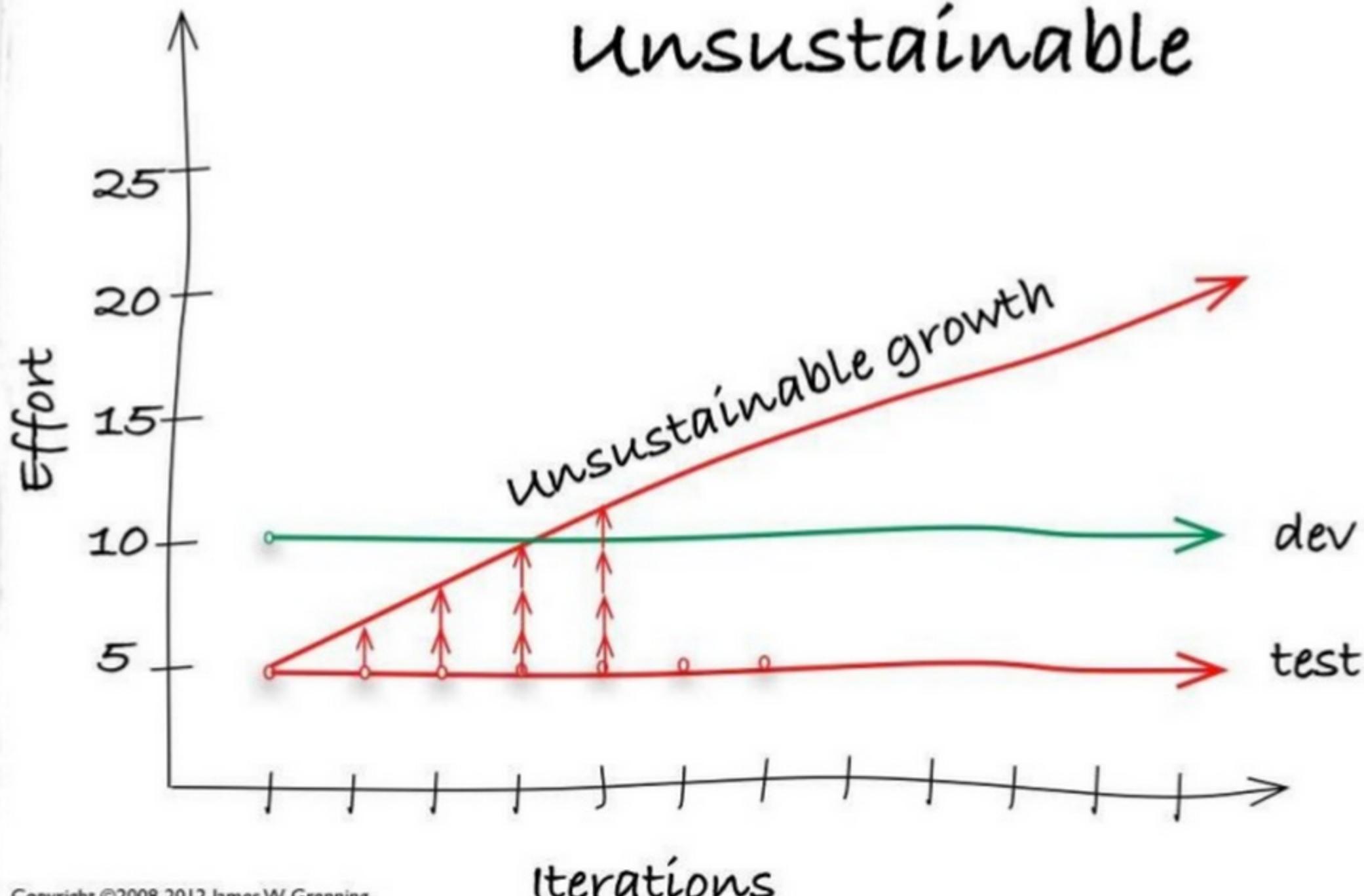
Fast  
Isolation  
Repeatable  
Self-validate  
Timely



# Manual Testing !!



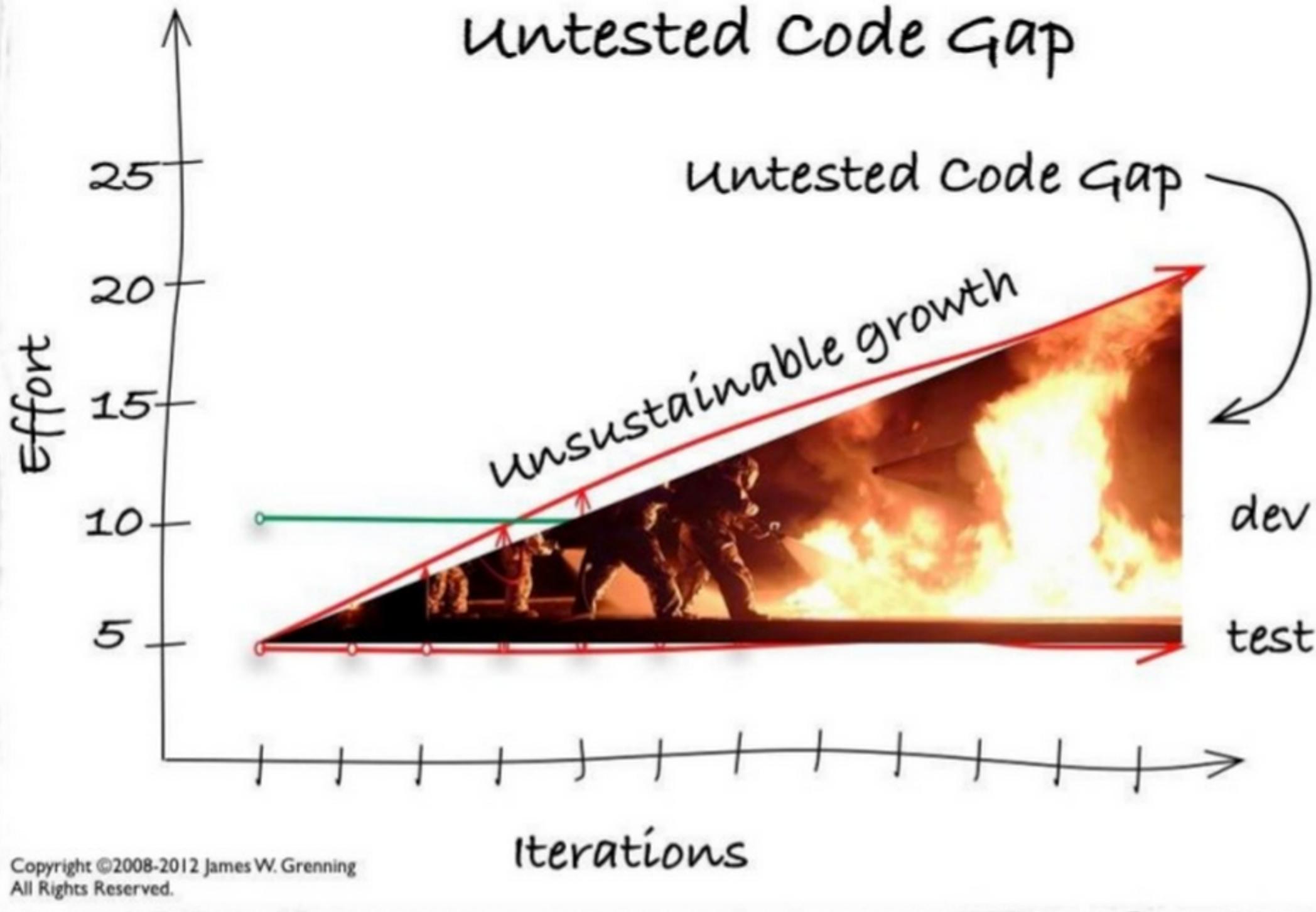
# Manual Test is unsustainable



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All Rights Reserved.



# Risk Accumulates in the Untested Code Gap



# We need automation !!



# Why we need automation ?

Manual checking take too long

Manual checks are error prone

Free people to do their best work (testing)

Living document

Repeatable and save time



# BUT ... why are not automating ?

Fear

Cost

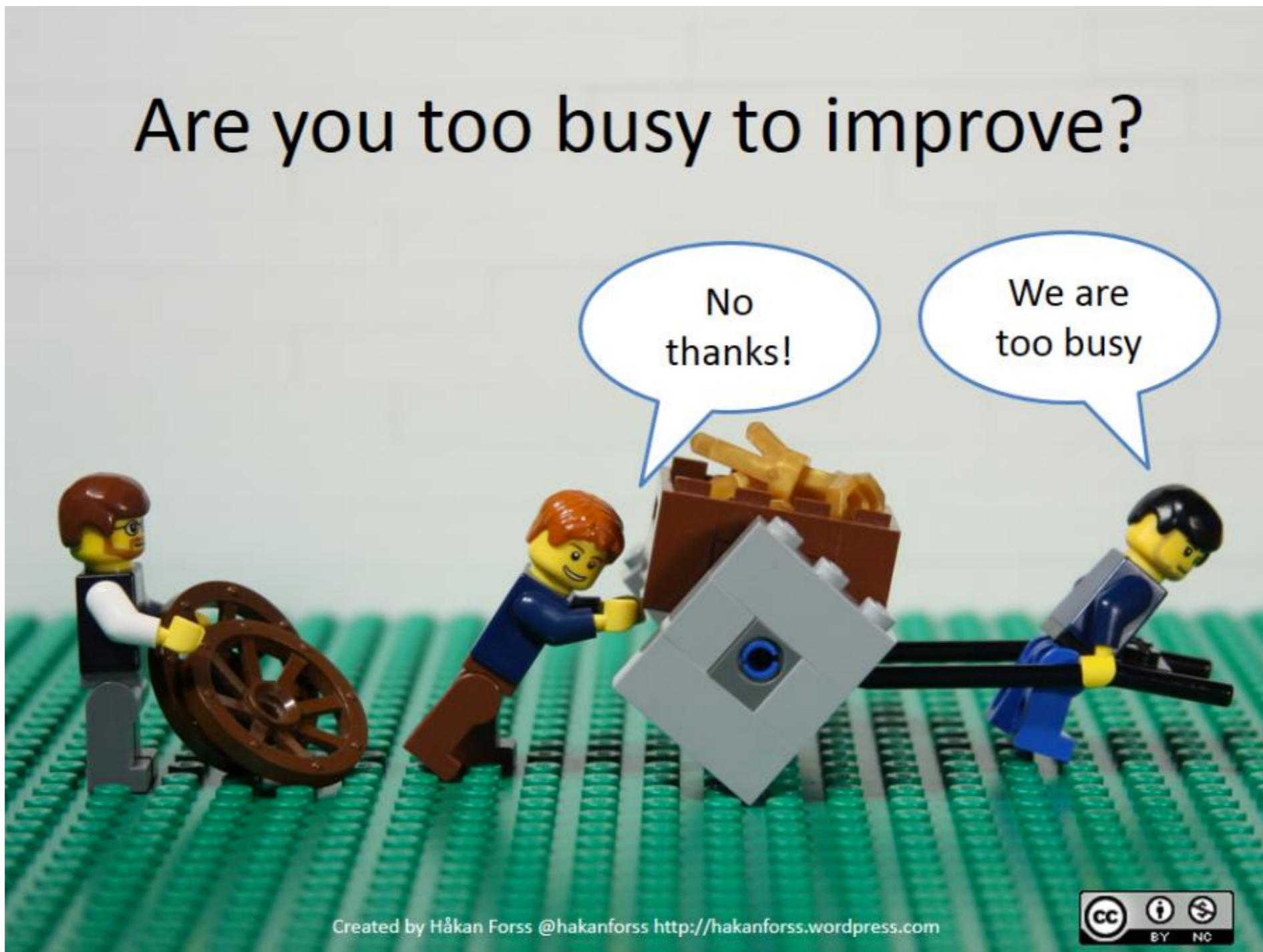
Change frequently

Deadline-Driven Development

Knowledge

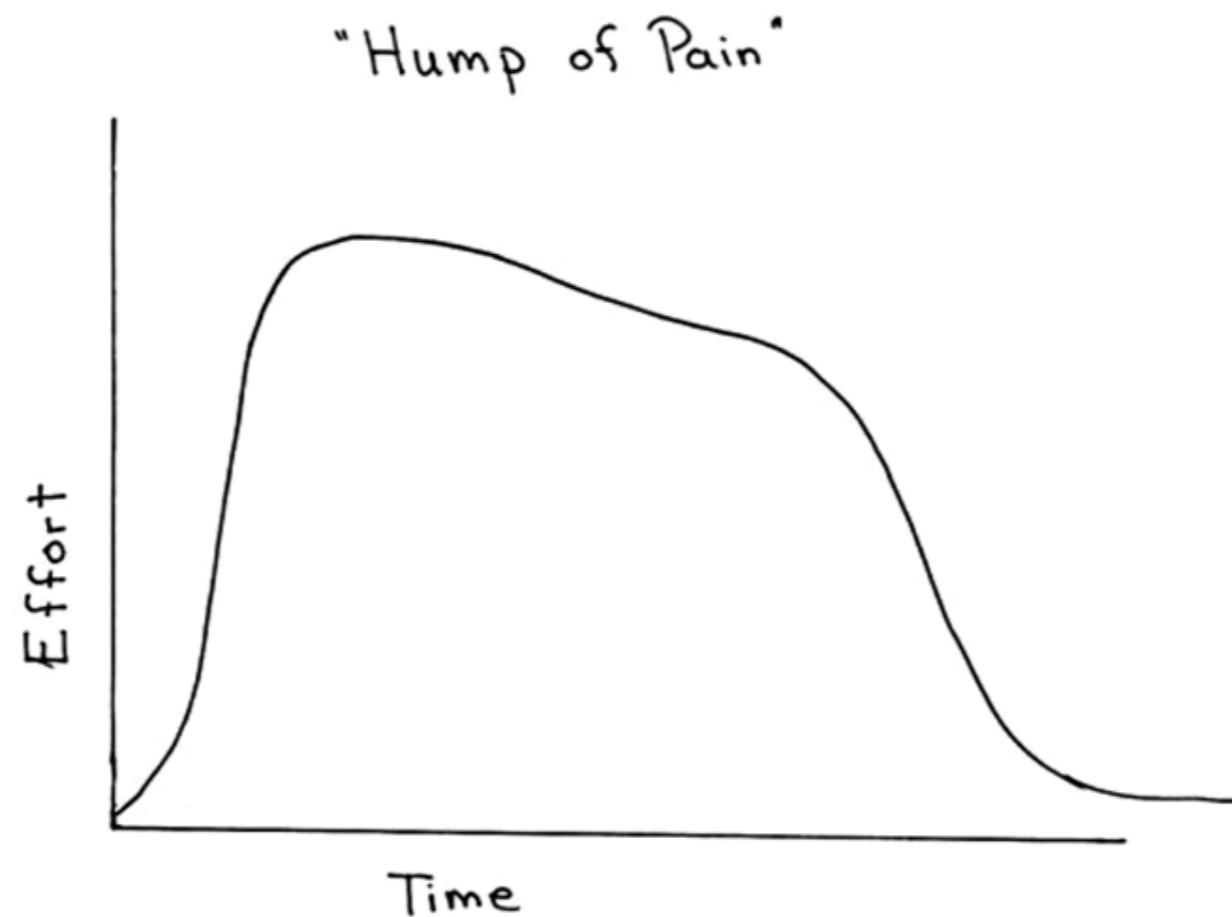


# BUT ... why are not automating ?



# Initial investment !!

Hump of pain



# Initial investment !!

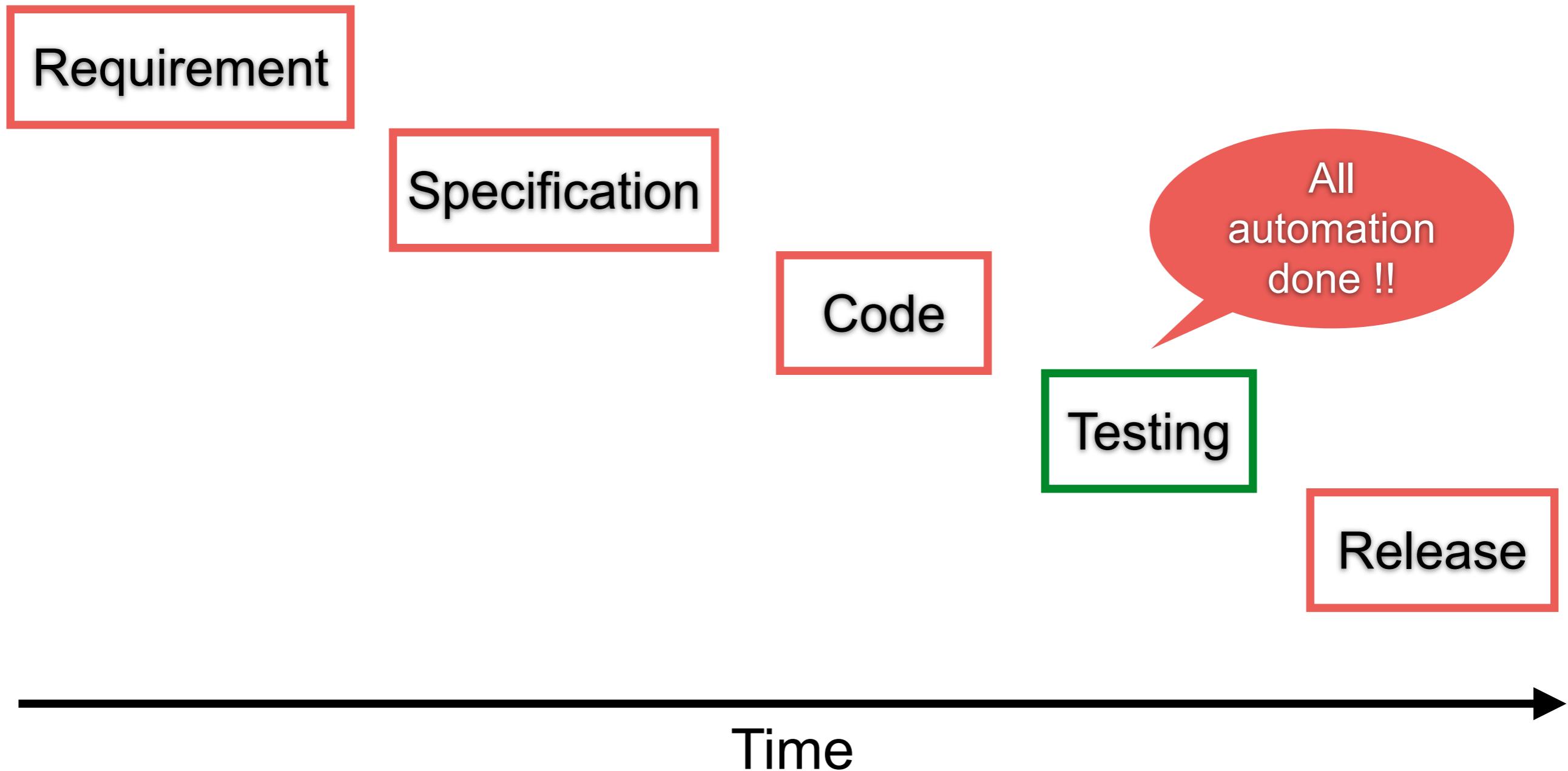
Working with legacy system  
Side-effect after changed code  
Need new tools, infrastructure and time



# Automation Test Strategy

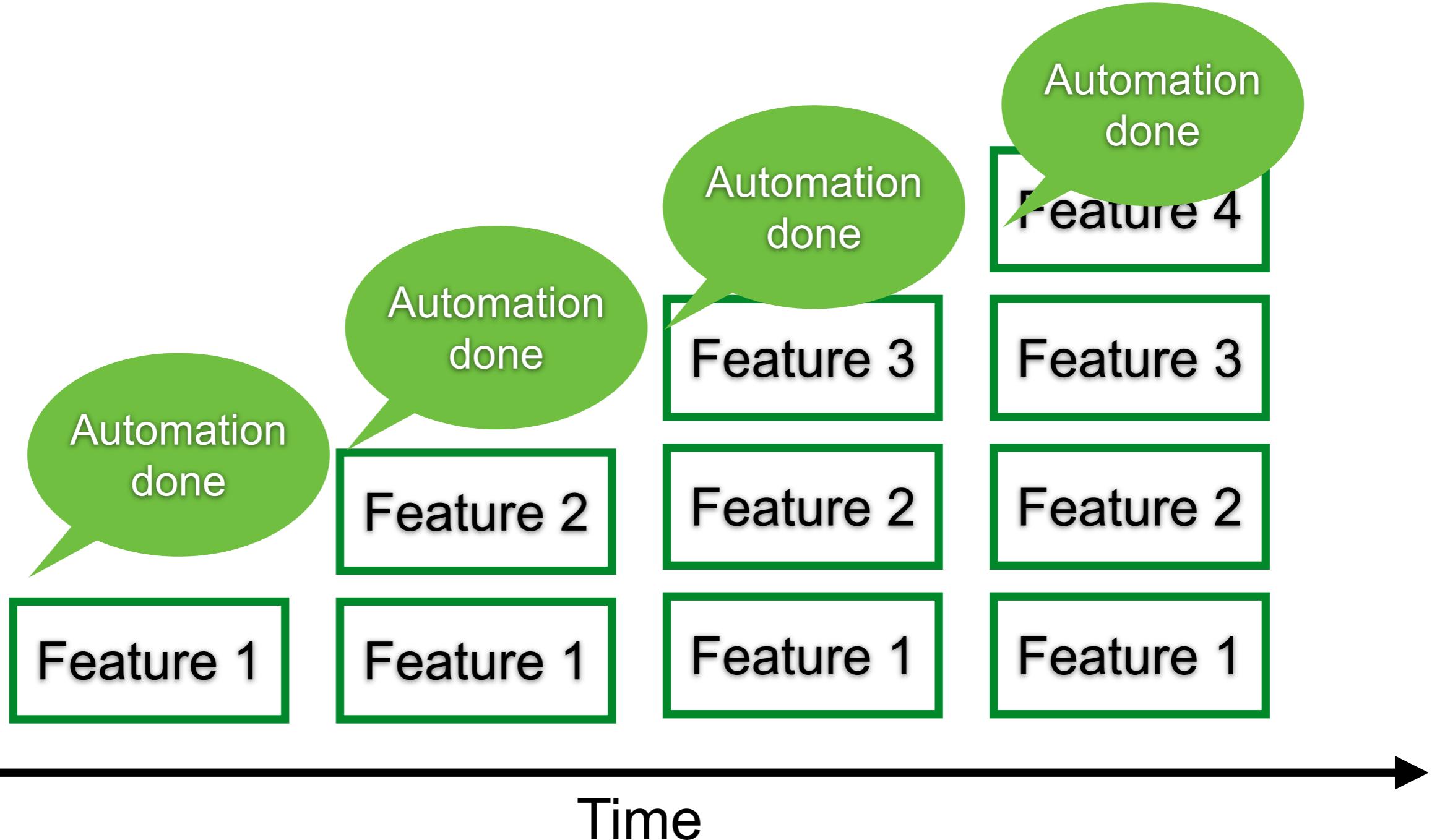


# Sequential process

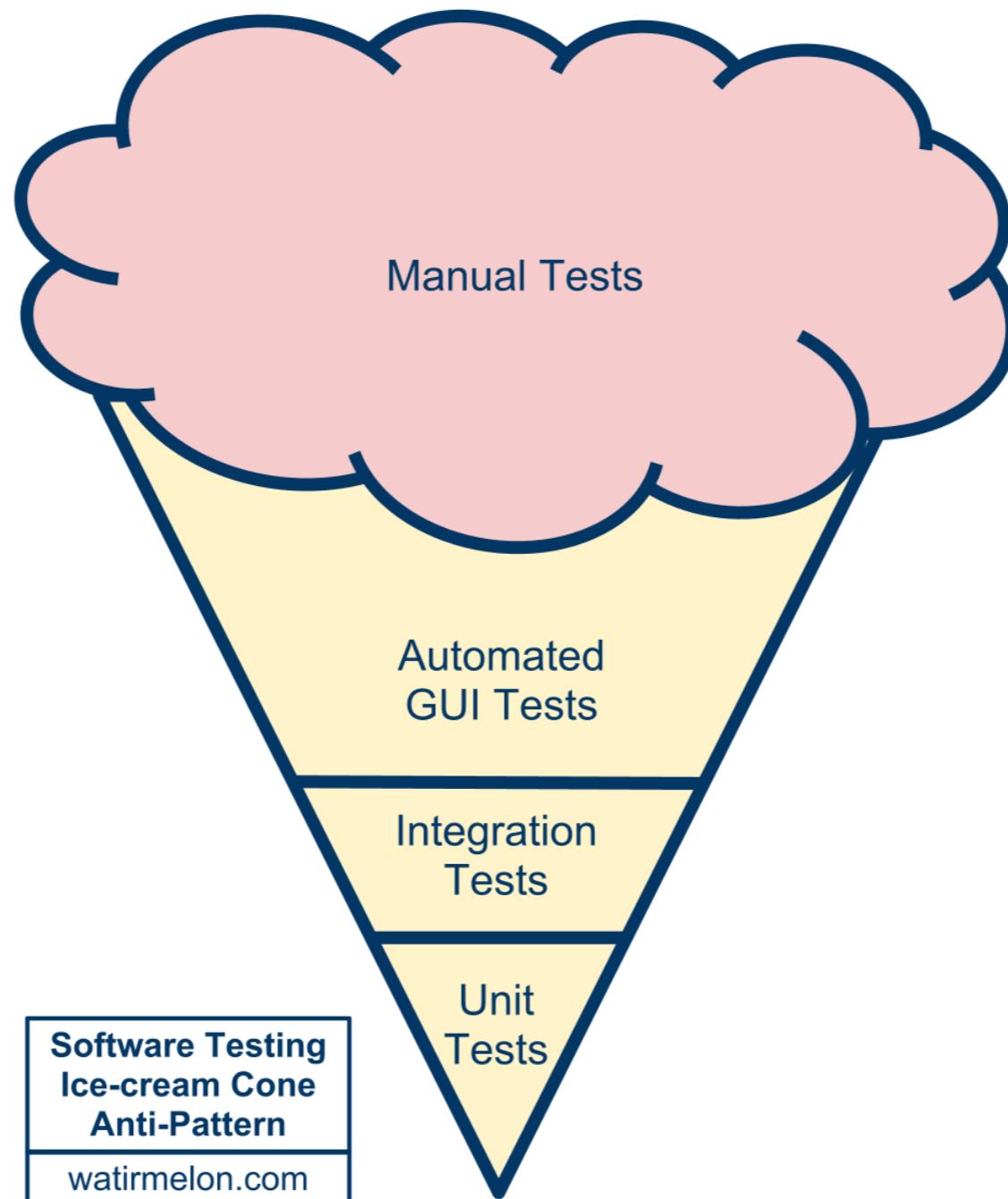


# Iterative and incremental process

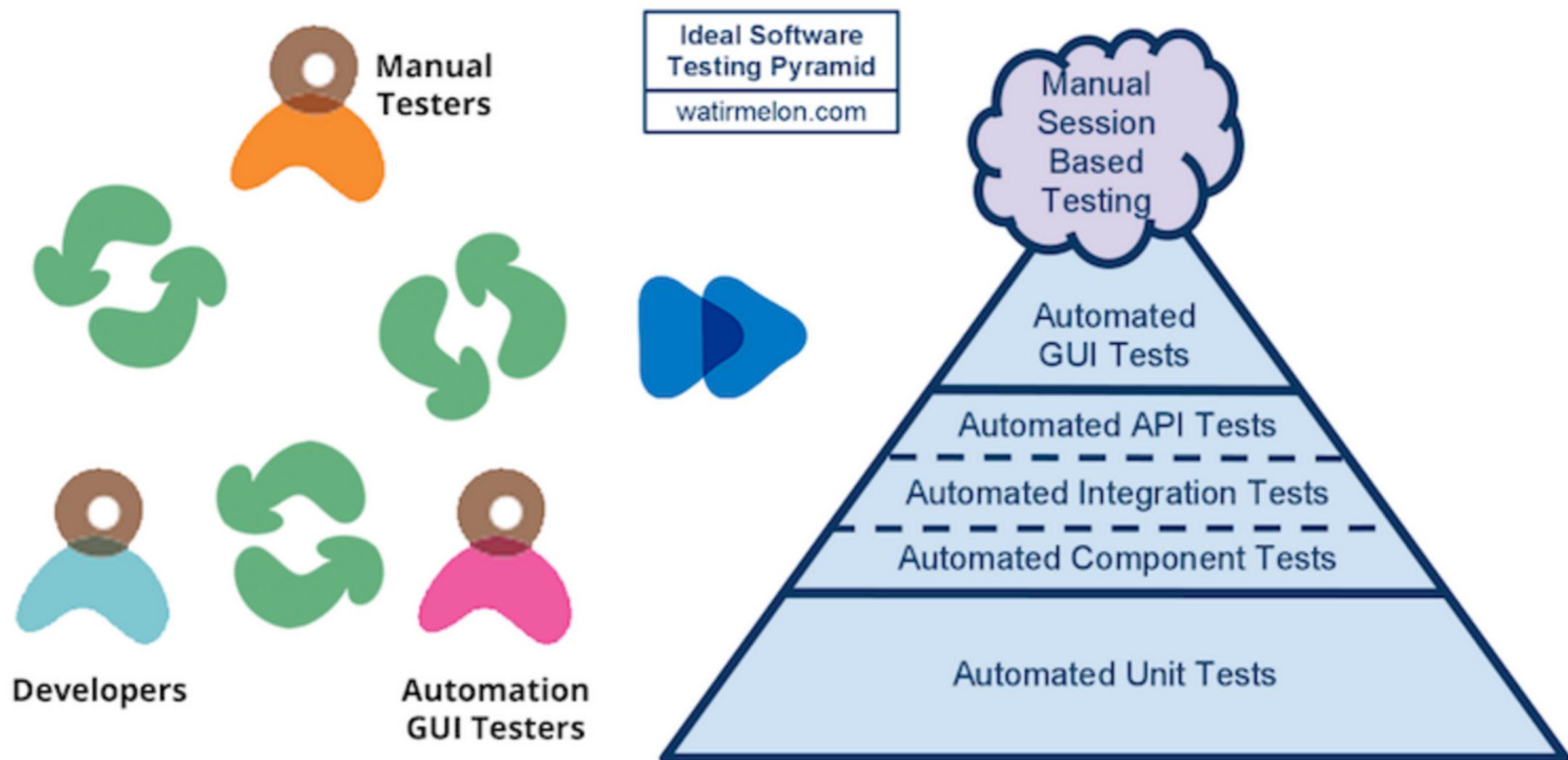
Done = coded and tested



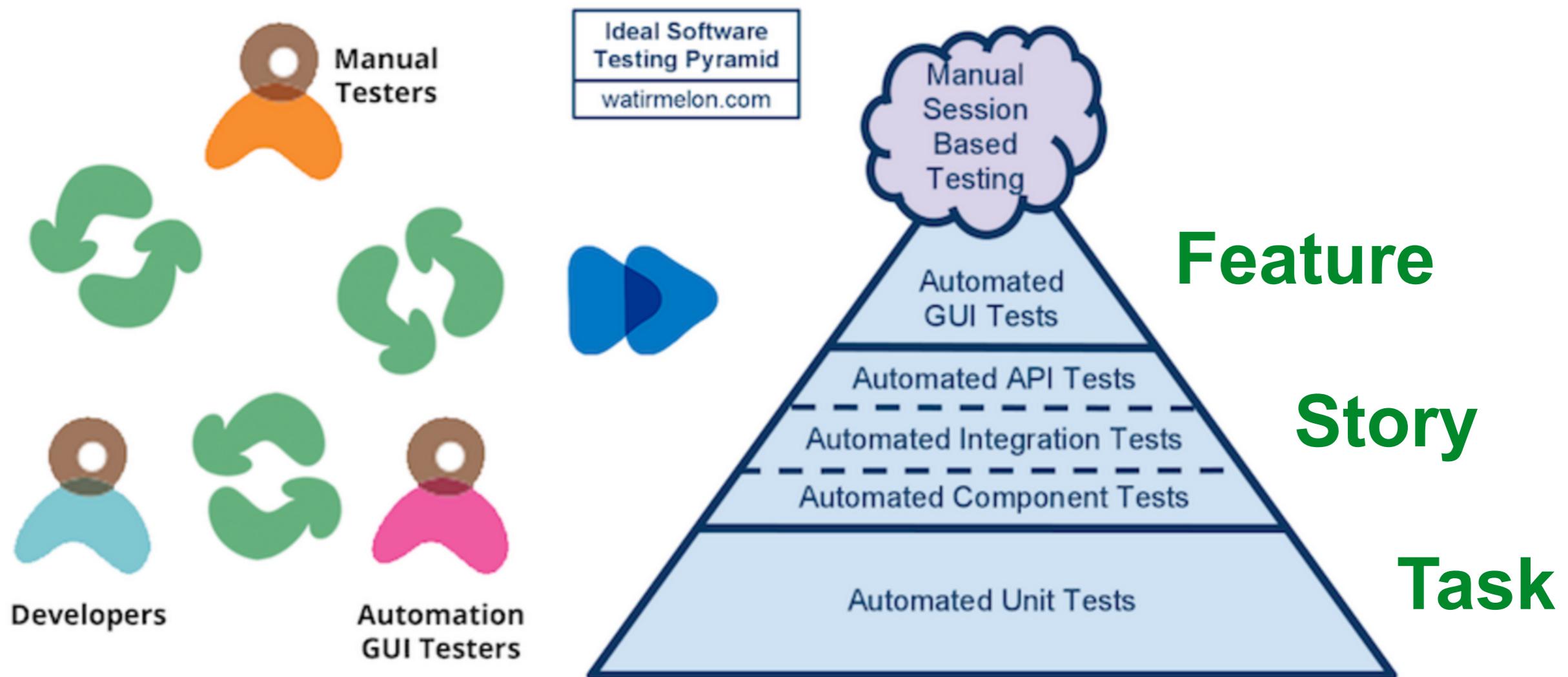
# Ice cream testing



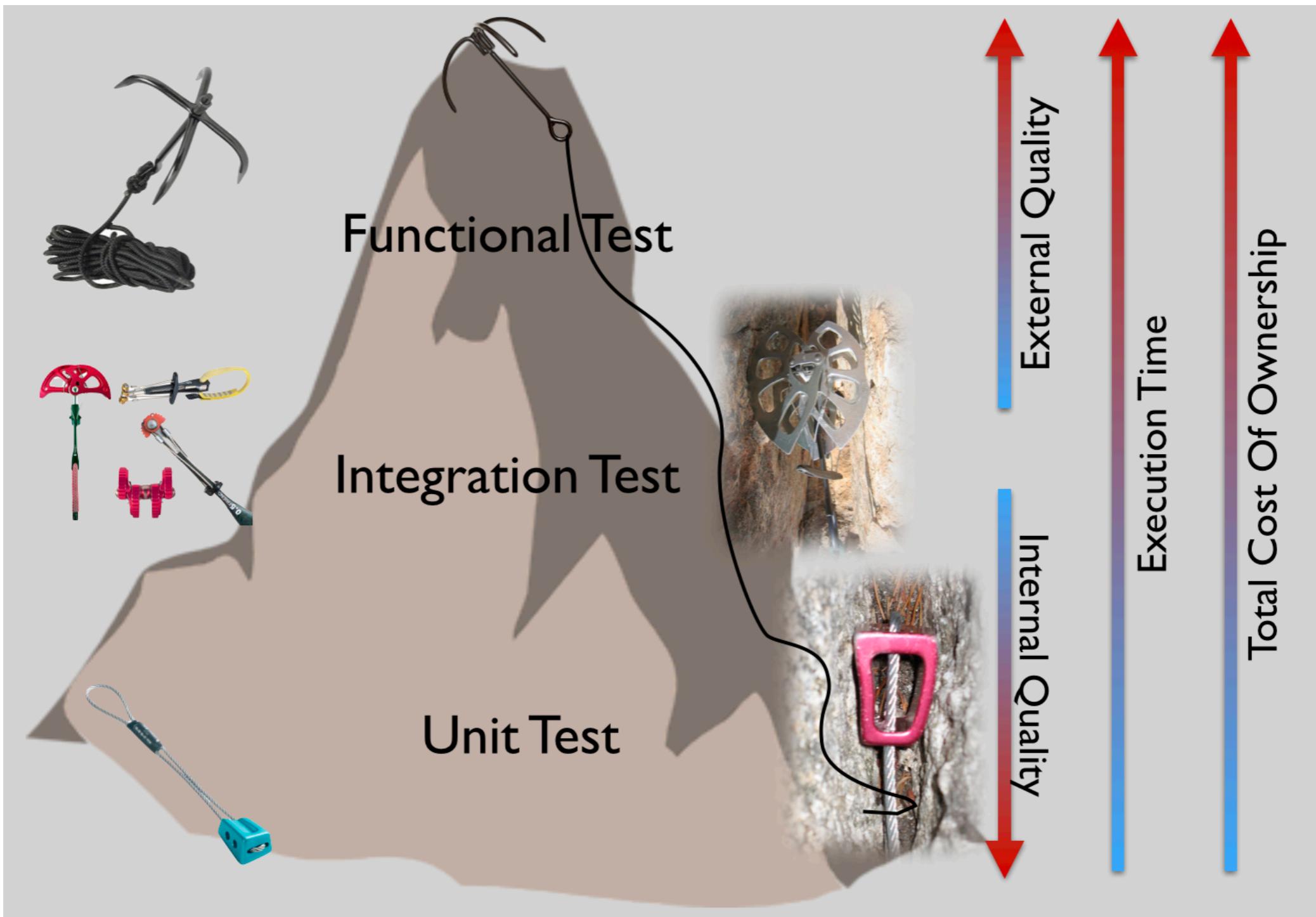
# Pyramid testing



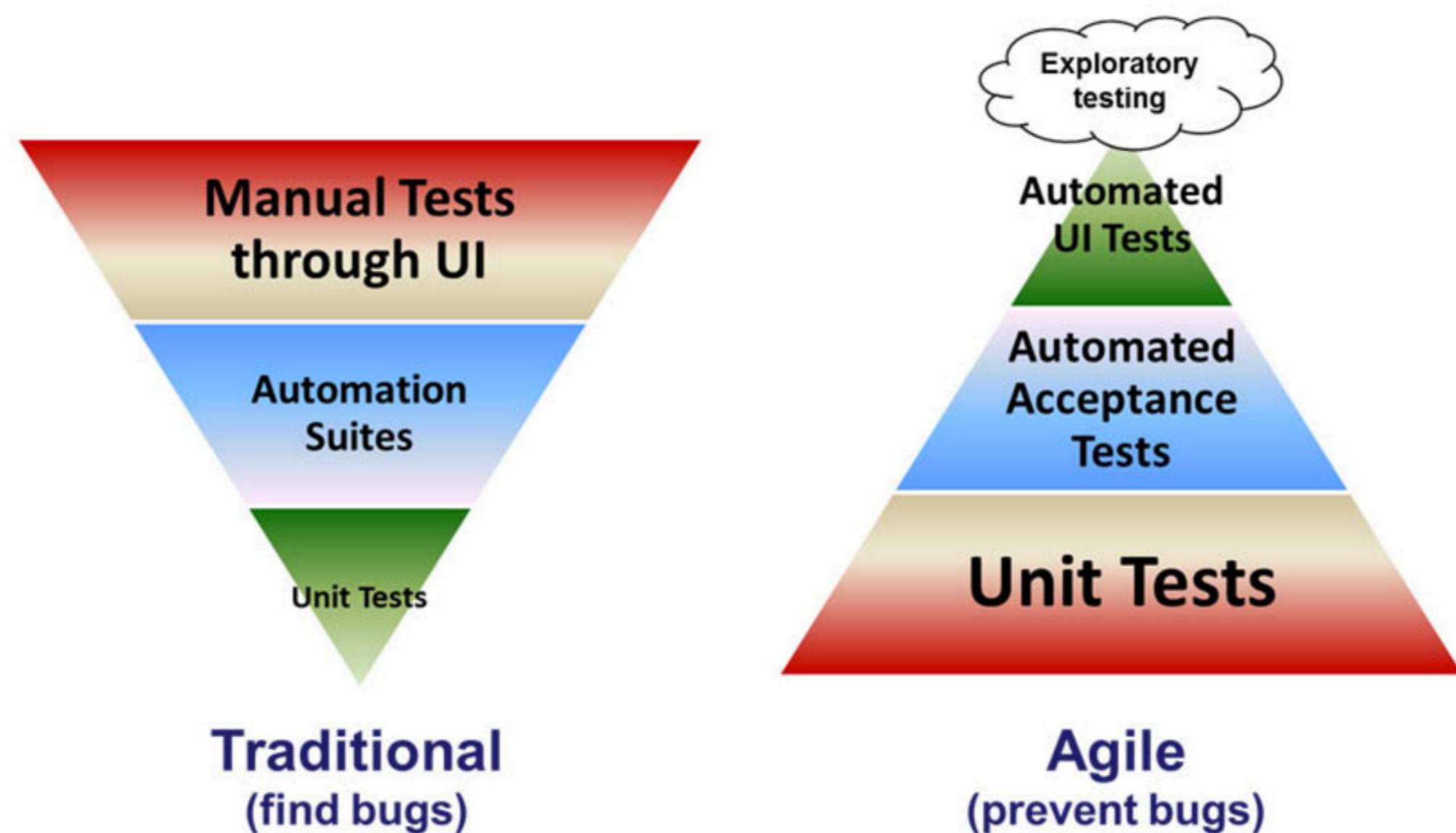
# Pyramid testing



# Pyramid testing



# Prevention over find bugs



# 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**

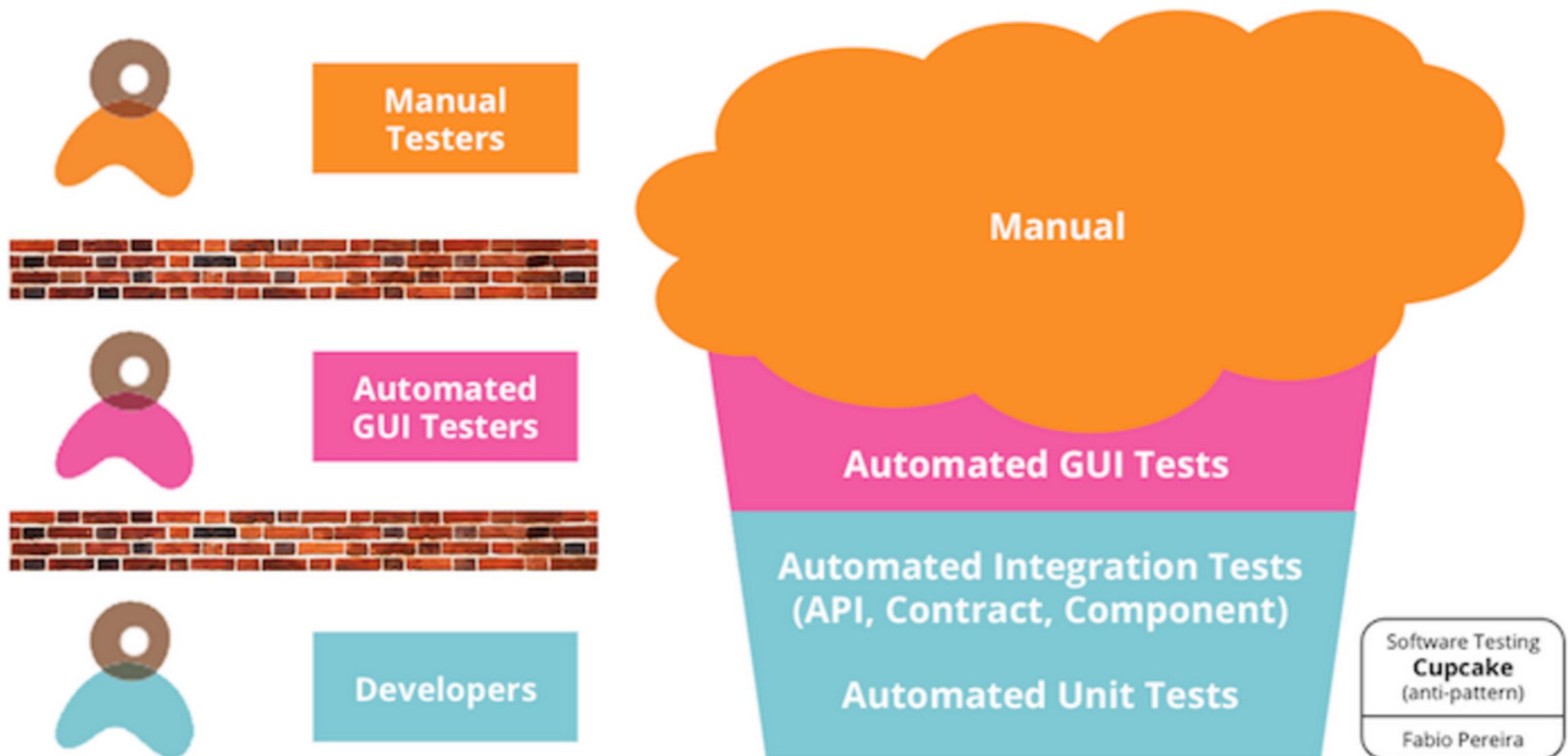
We are here to **break the software**

**Think**

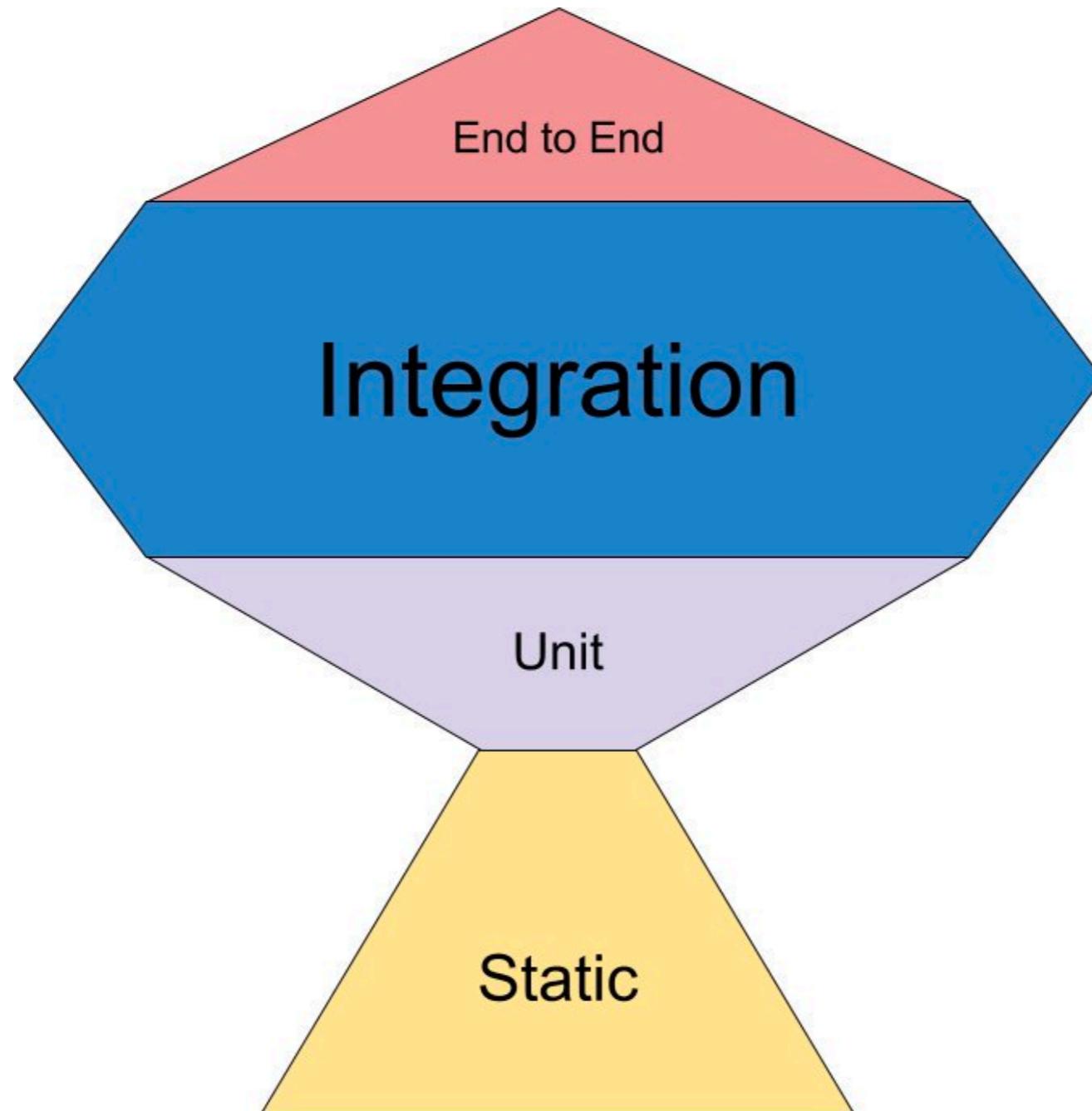
What can I do to help deliver the software  
successfully !!



# Cup cake testing



# Trophy testing



# Important to remember



# Important to remember

The automation pyramid is a **tool**  
To talk about **automation tasks**,  
**How to prioritize them and who will help**

Way to make automation **visible** to the whole  
team



# Where to start ?



What are the **trade-offs** between automating and manual testing ?

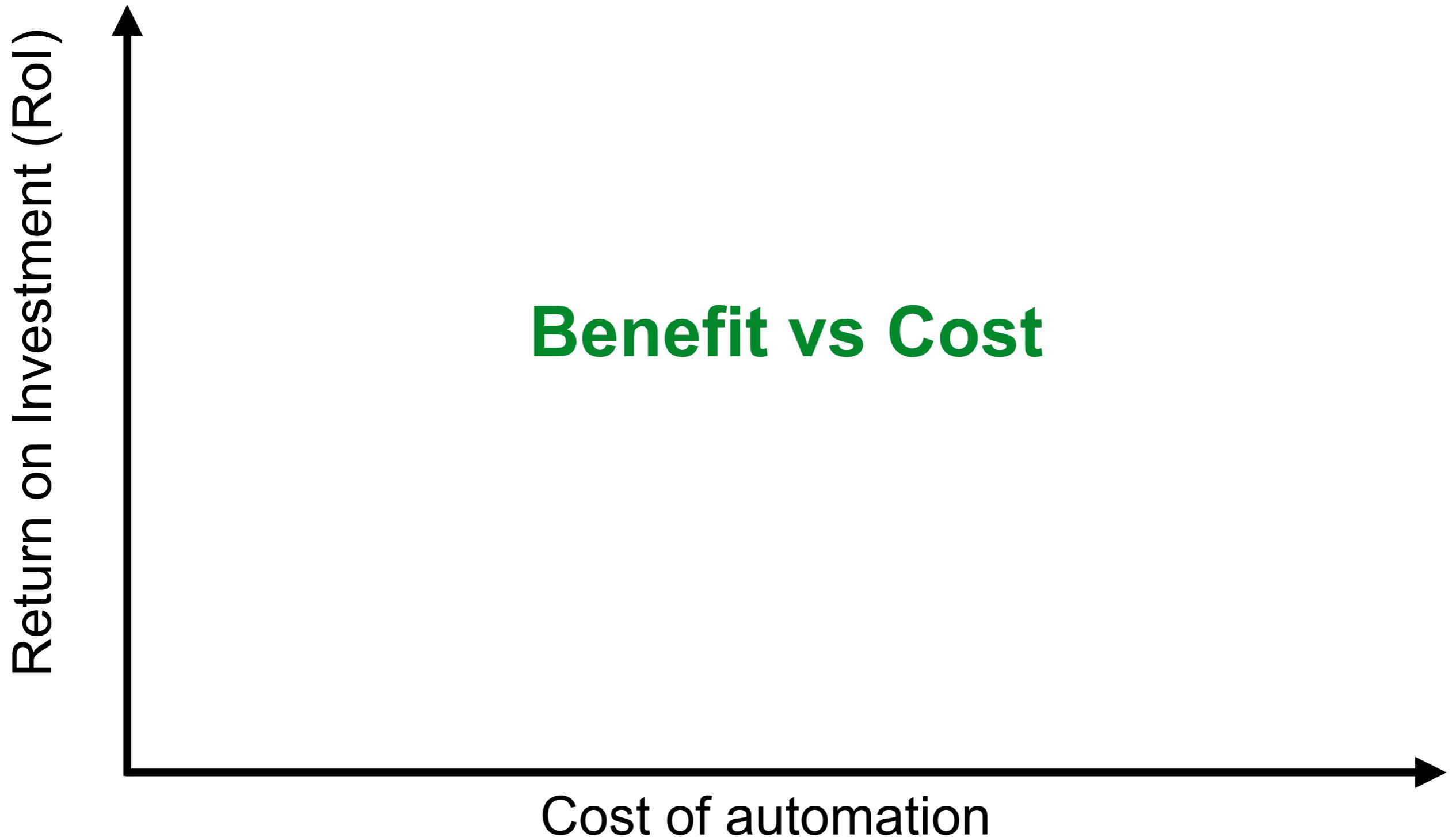


What are the **biggest**  
**obstacles ?**

Time/Tools/System/People



# Automation decision guideline



# What should not try to automate ?

Tests are really expensive  
One-off tests  
Usability tests (look and feel)



# What should be careful ?

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



# Testing Quadrants

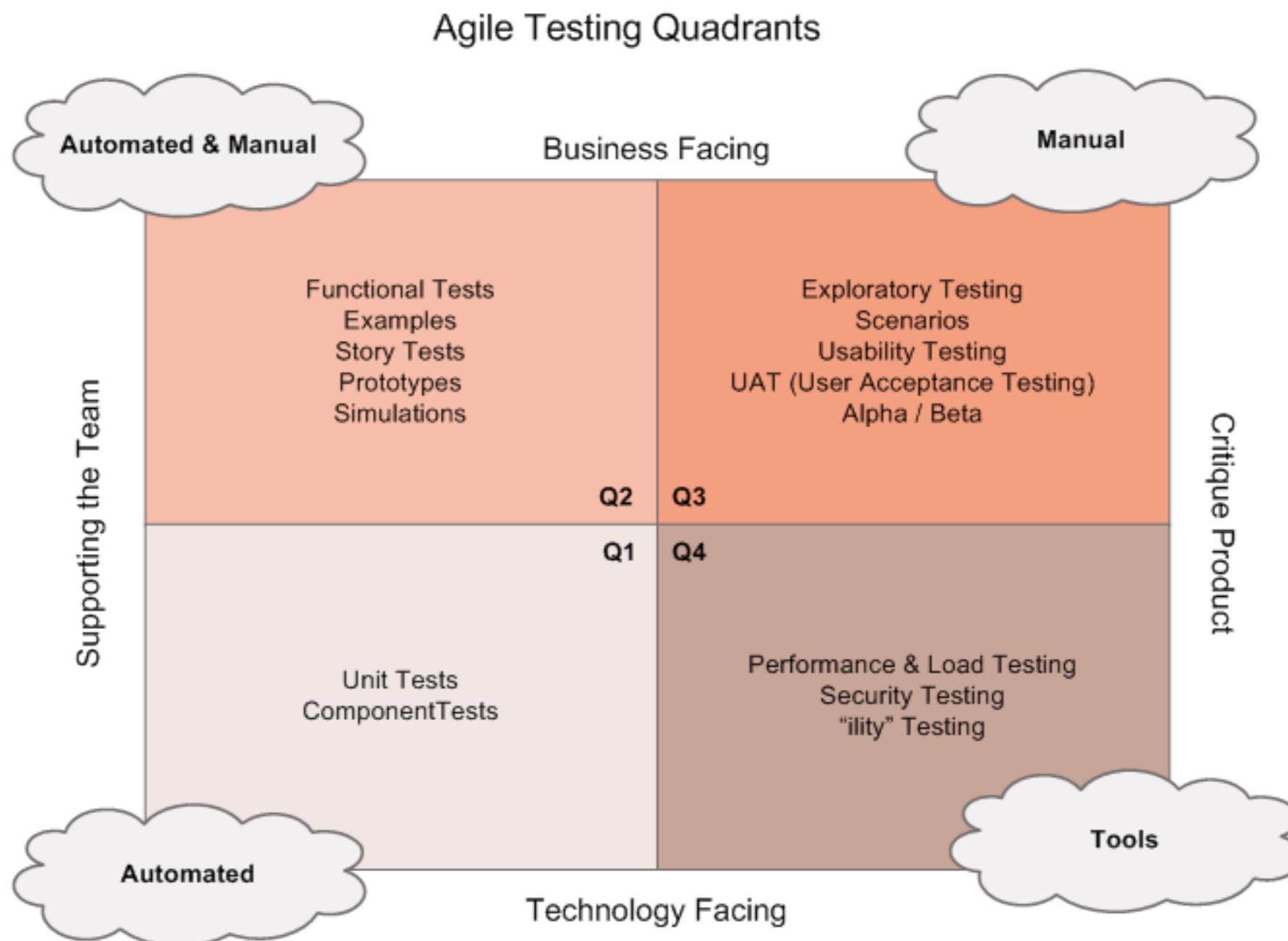


# Agile Testing Quadrants

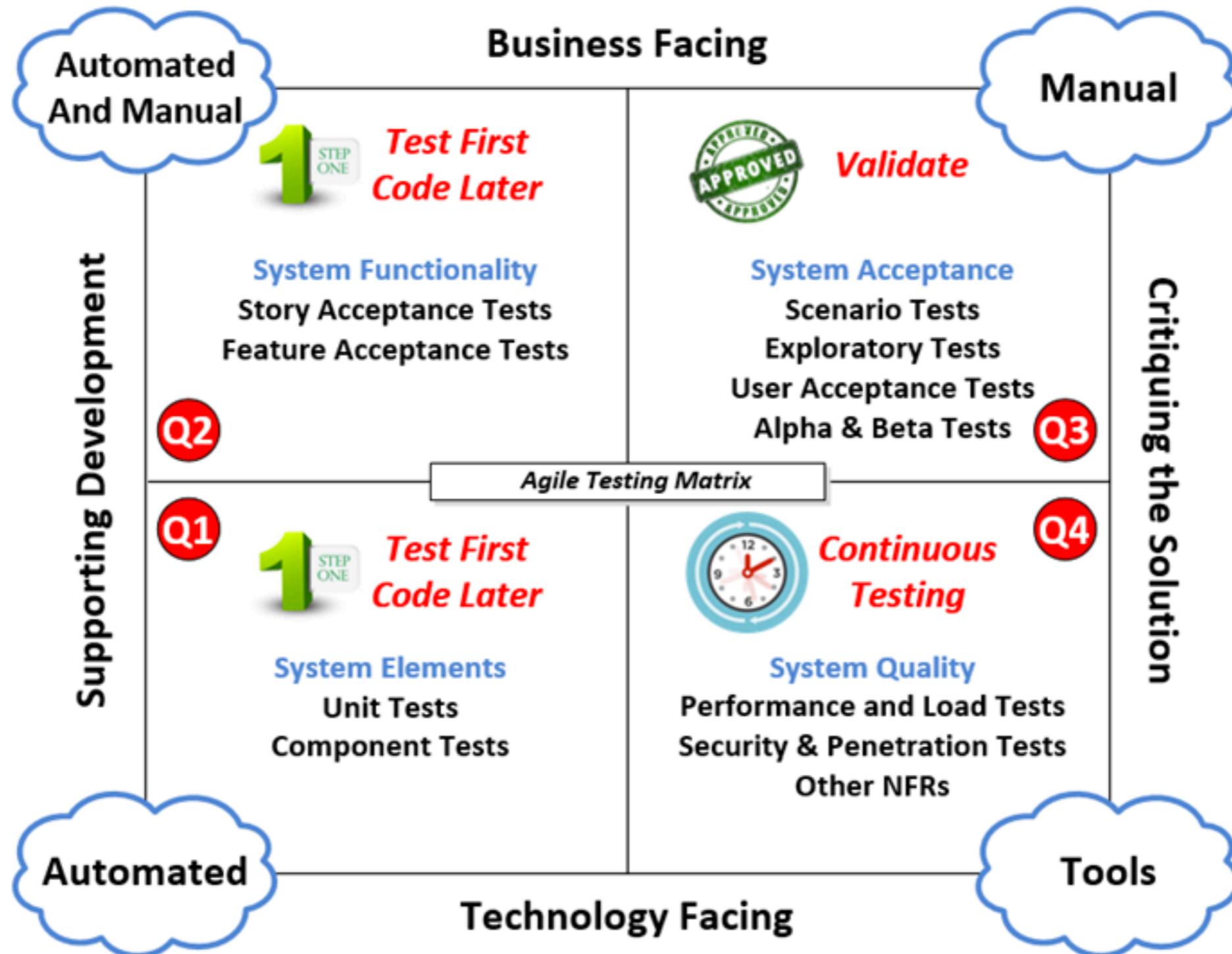
Scope of tests  
Classify your tests  
Visible your tests



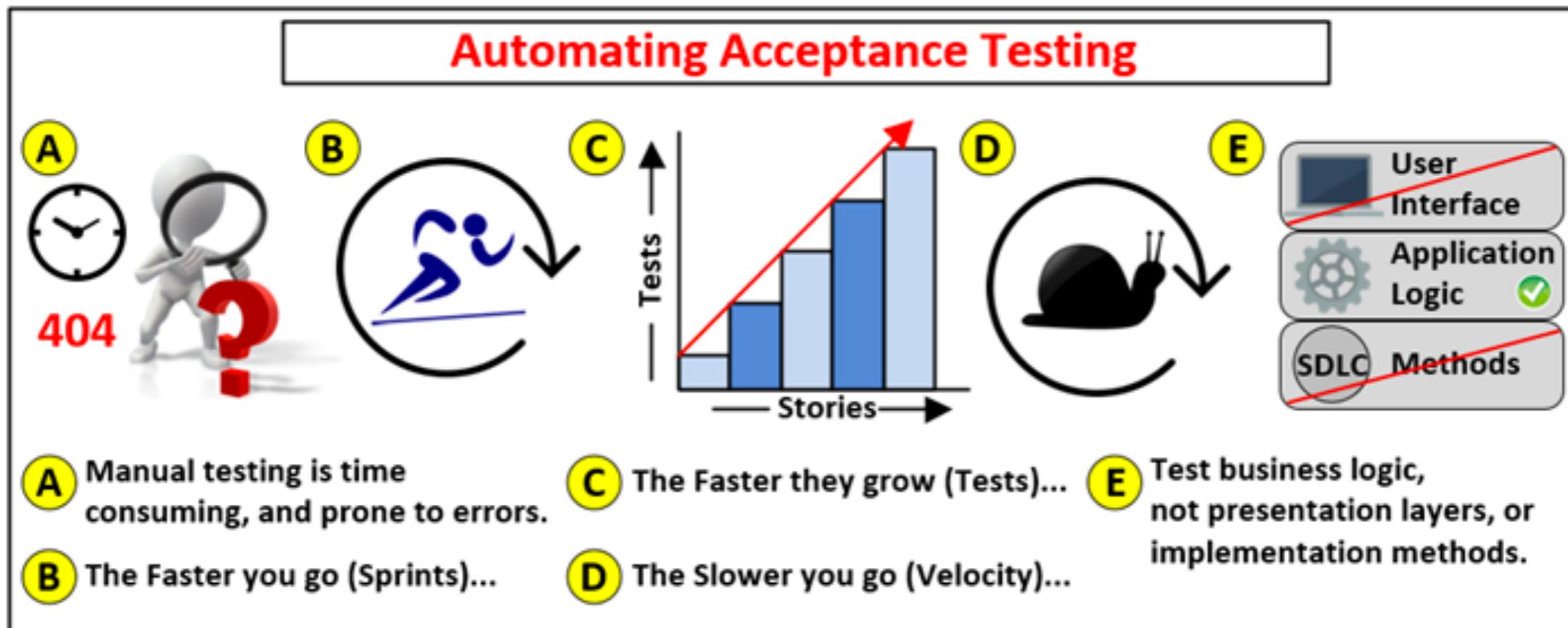
# Agile Testing Quadrants



# Agile Testing Quadrant



# Test automation is essential

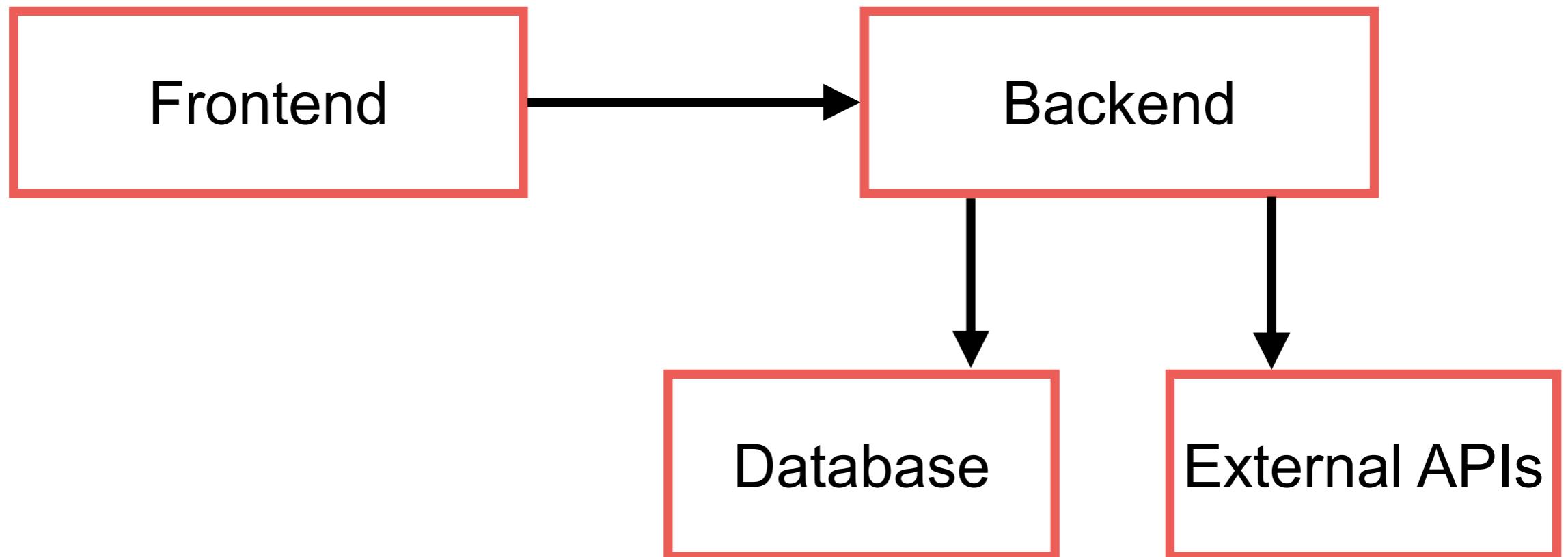


# Test Strategy

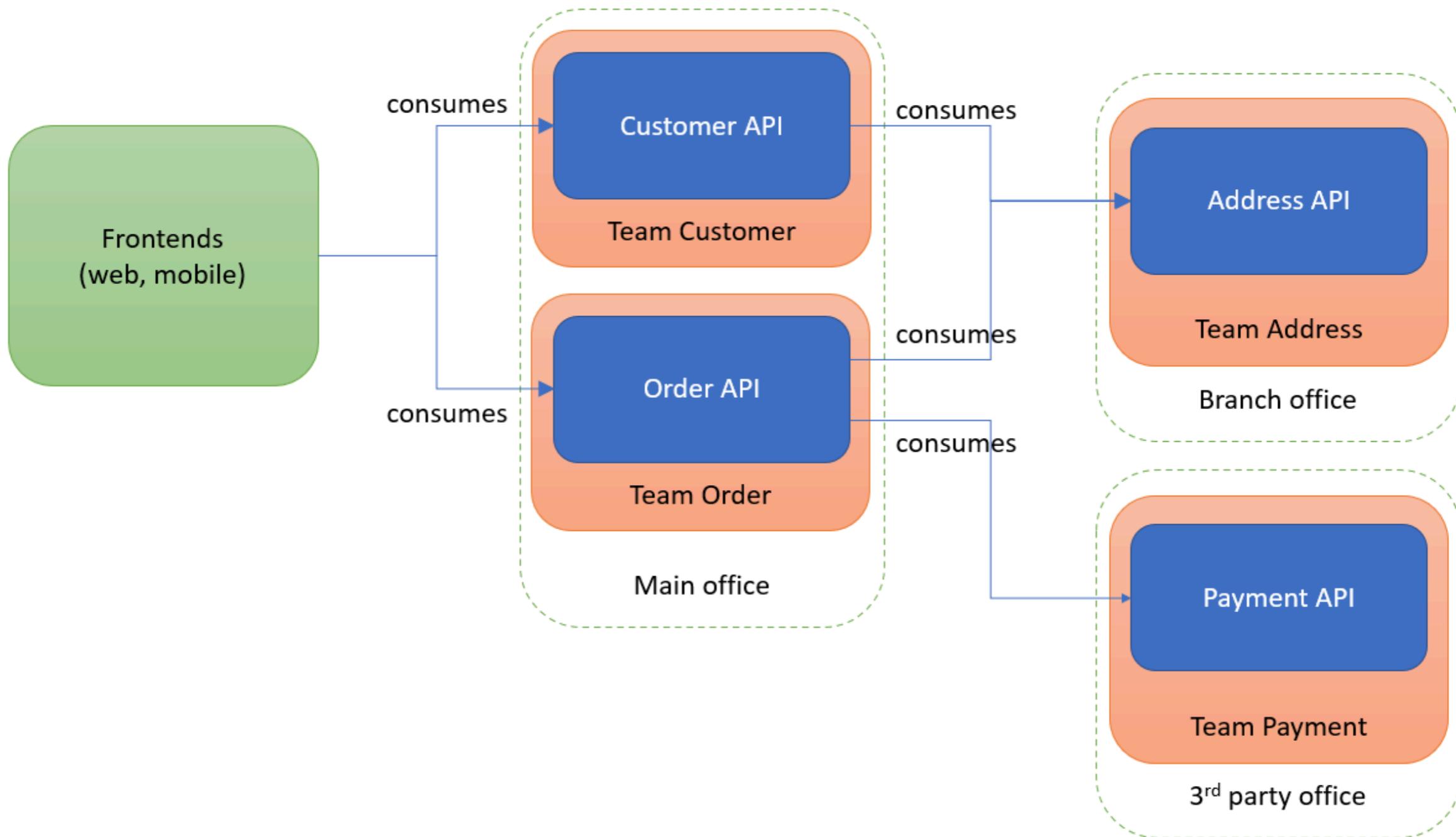
<https://martinfowler.com/articles/microservice-testing/>



# Simple Architecture



# Complex Architecture

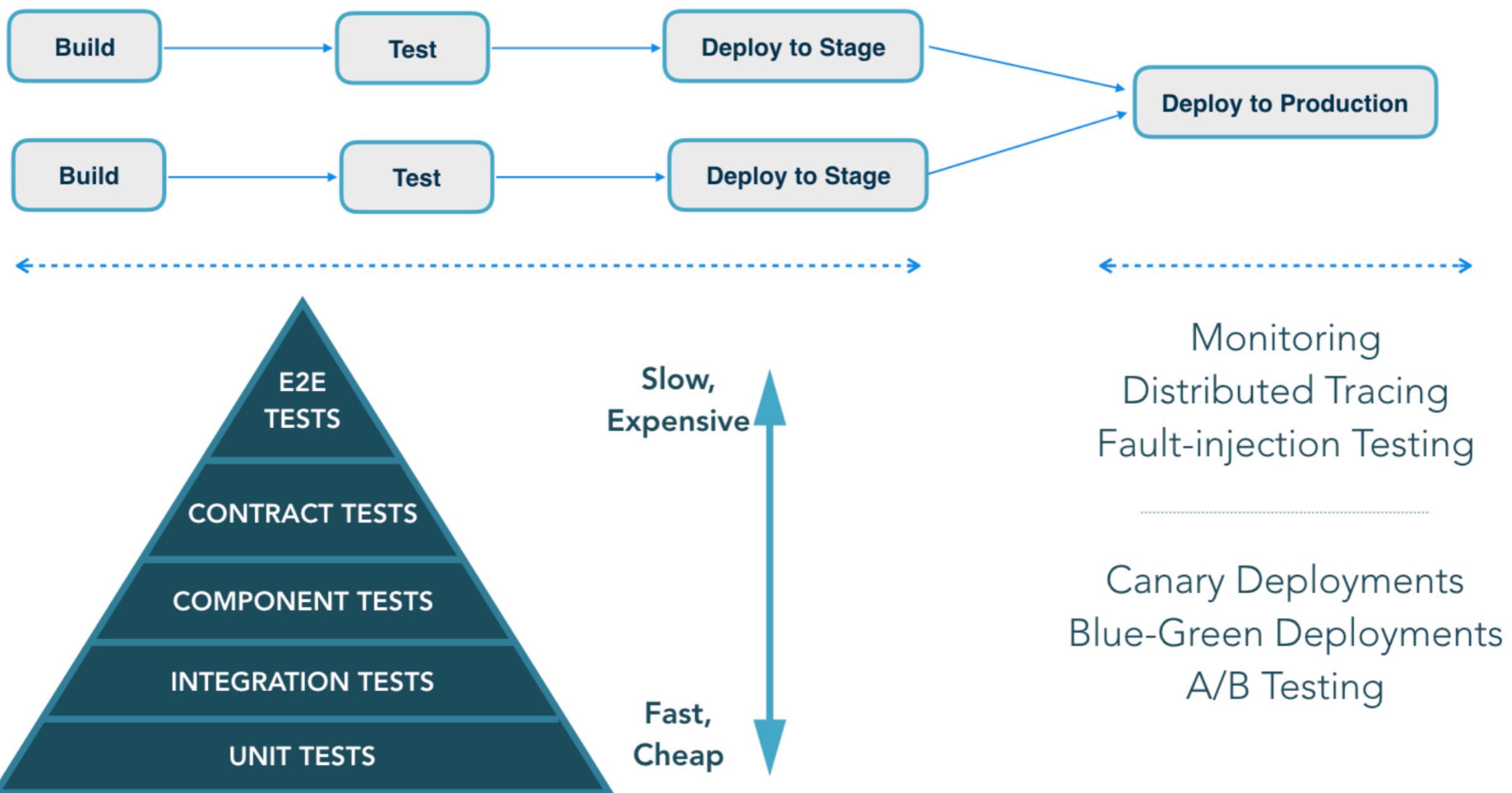


# Test Strategy ?

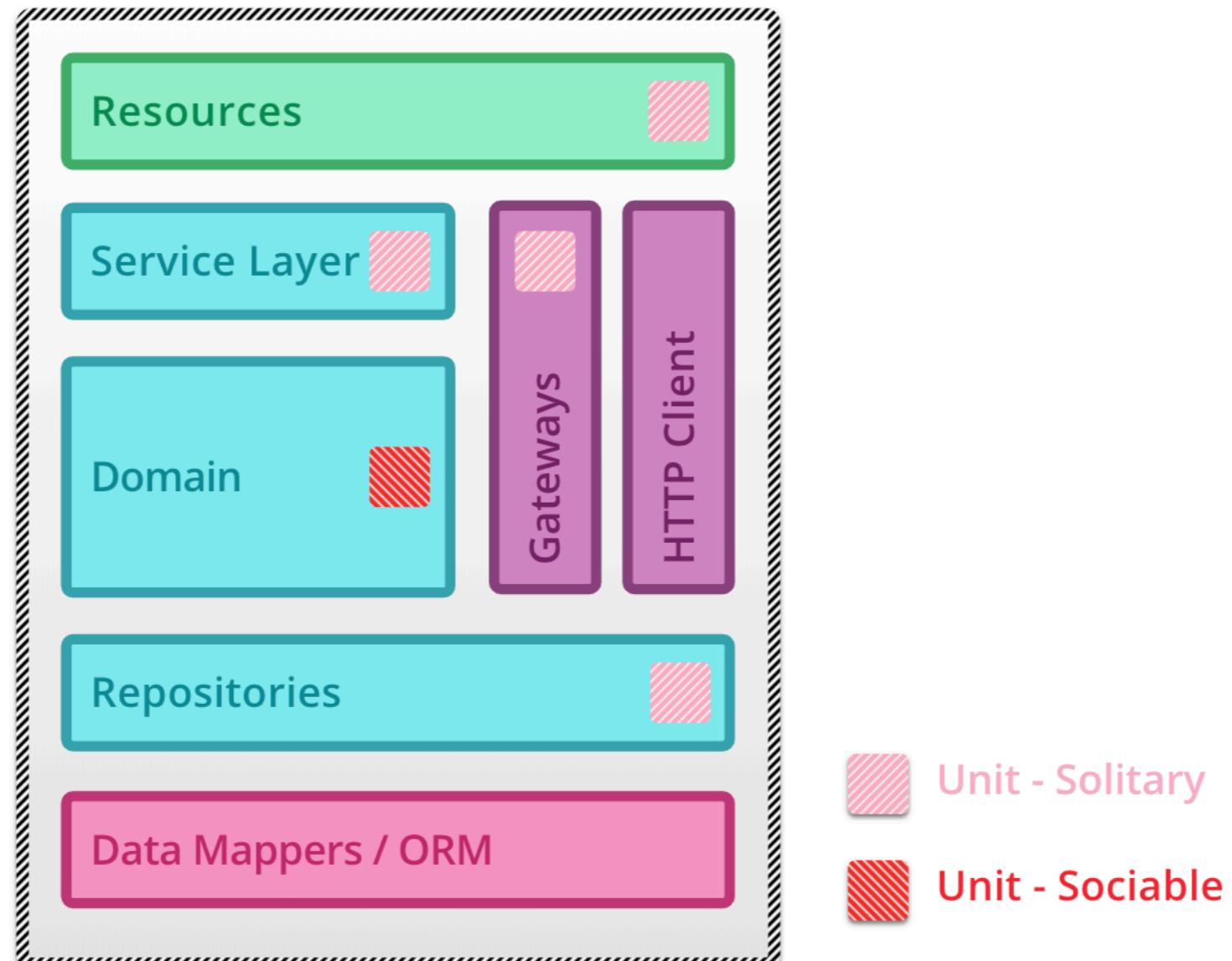
Unit  
Integration  
Component  
Contract  
End-to-end



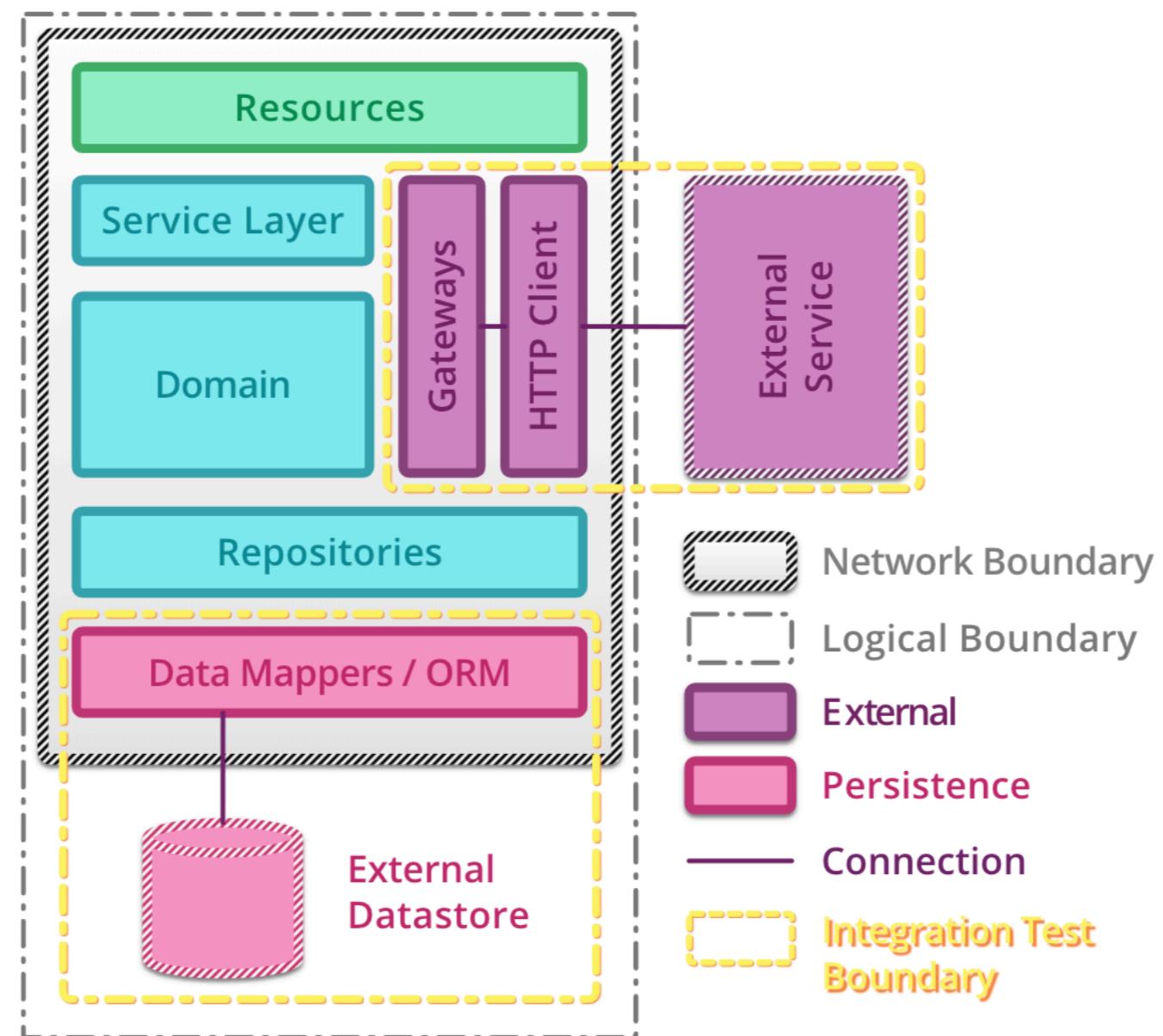
# Test Strategy



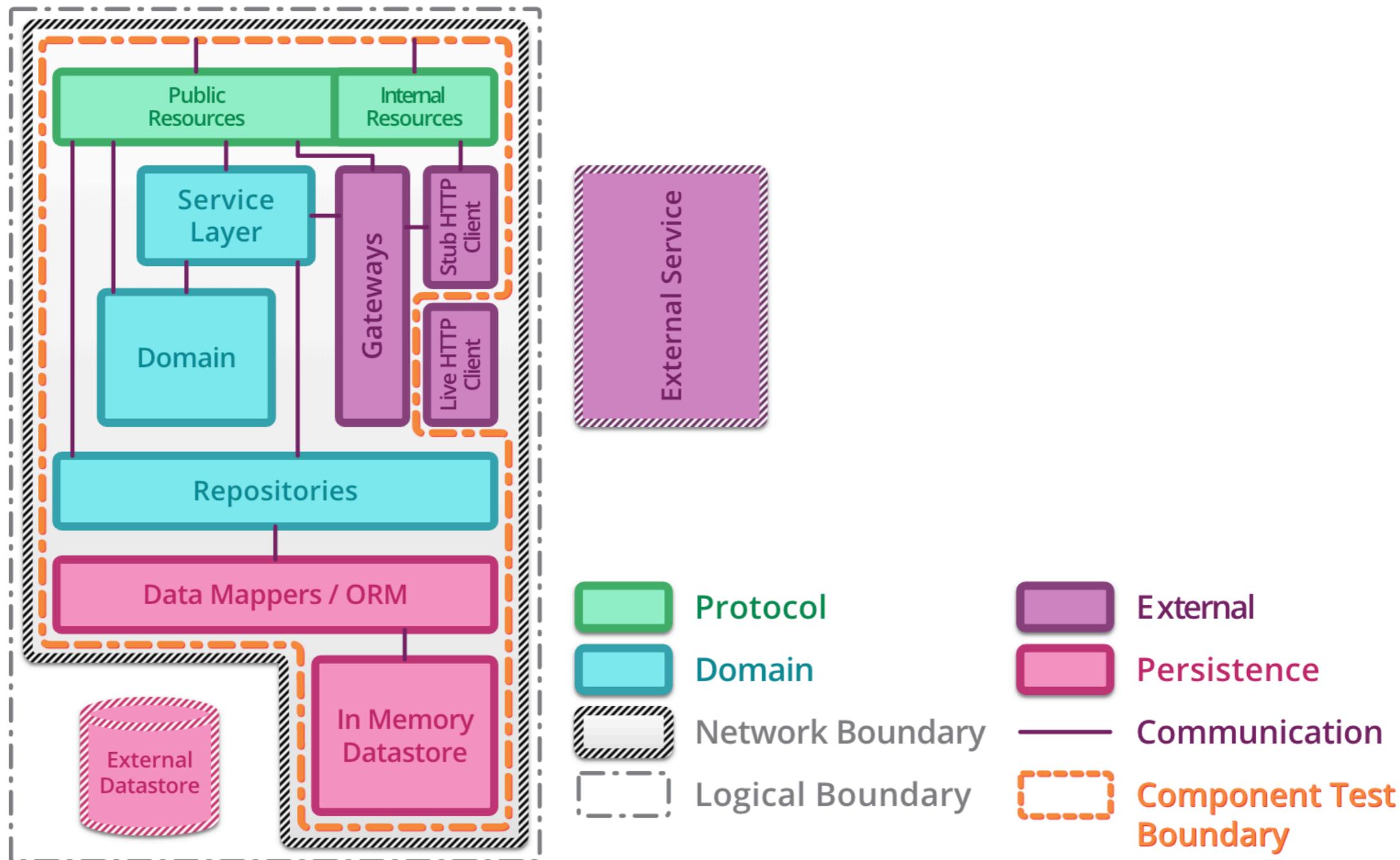
# Unit testing



# 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

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

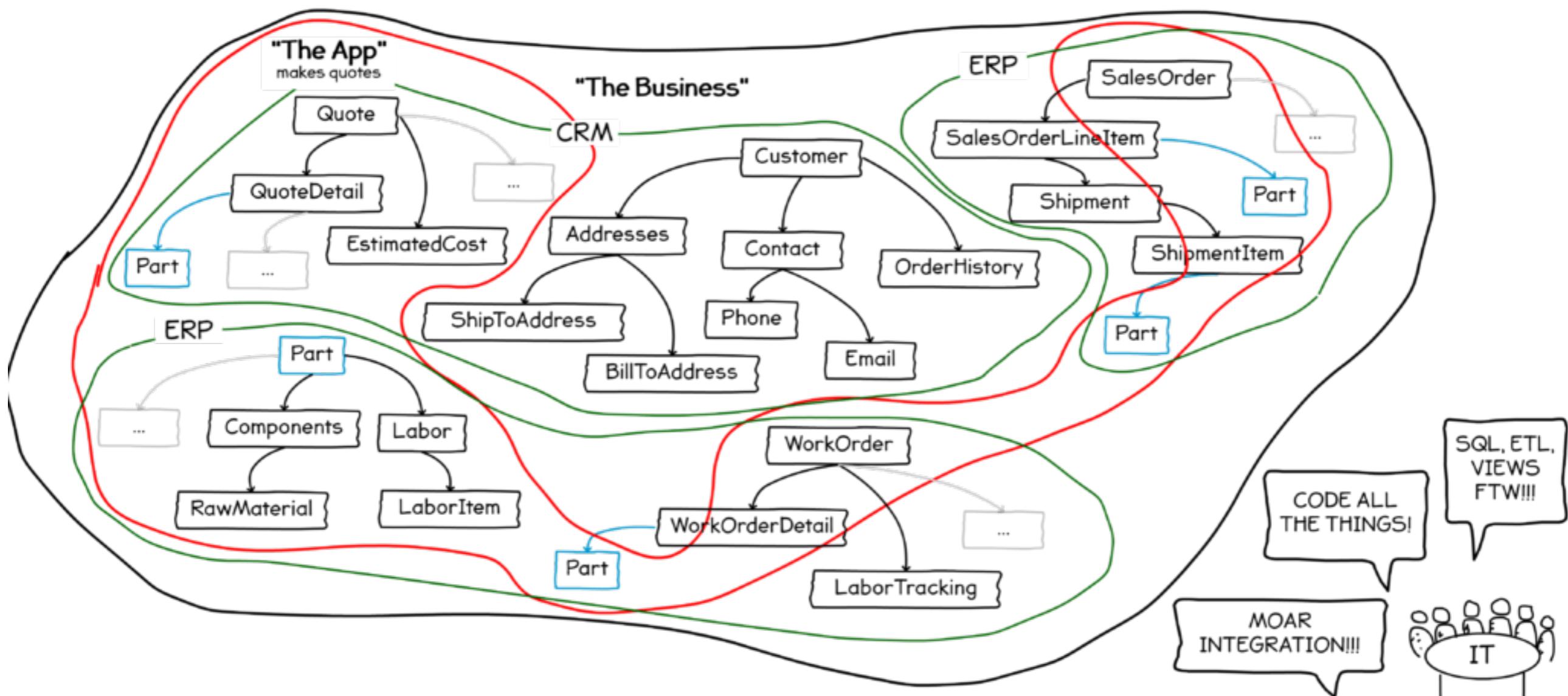
**Use production-like data**

Need to control your data test



# Systems impacts

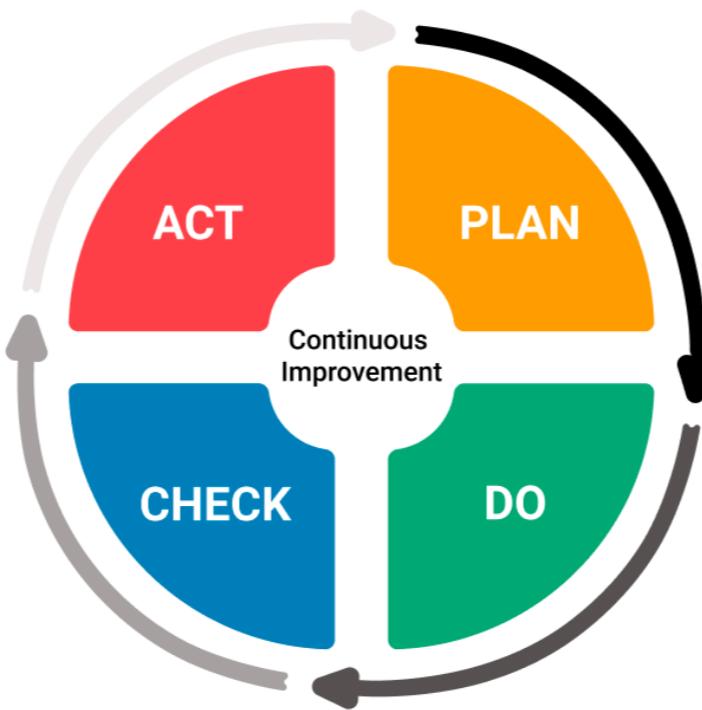
## Know your systems



# Automation feedback !!

Easier over time ?

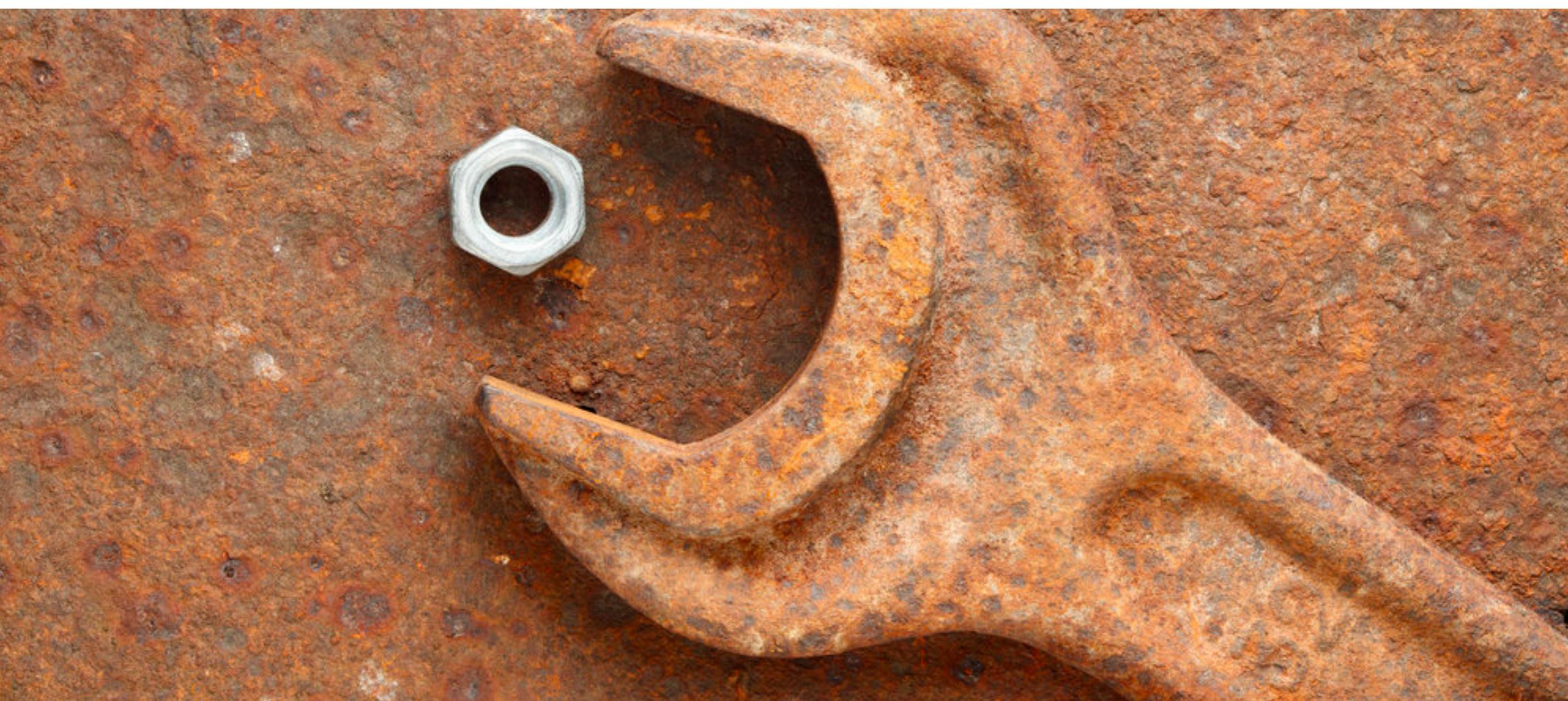
Time spent on maintenance ?  
Test find regression bugs ?



# Choosing your tools



# No one size fit all



# Find time for evaluating

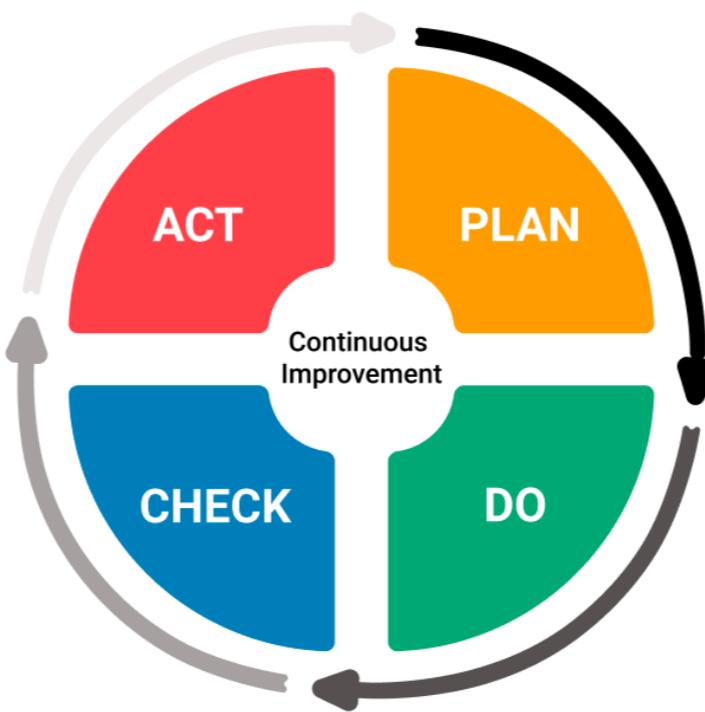


# Right tool for the job



# Determine your need and purpose

What ?  
Constraints ?  
Who ?



# What fits your situations ?

Existing skills on the team

Language/technology off application under test

Collaboration needs

Workflow/process



# Collaborative tools ?

Enable **tester** and **business** to define tests  
Test code can be in programming language  
**Programmers** can run tests as they code  
**Testers** can ask **programmers** for help



# Manage automated tests

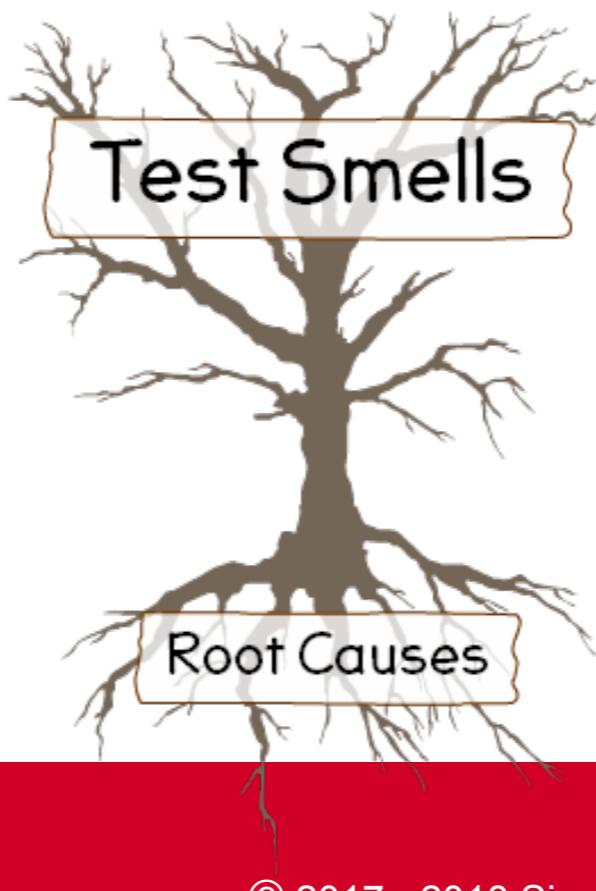
Use source control

**Continuous integration** to run tests on every change

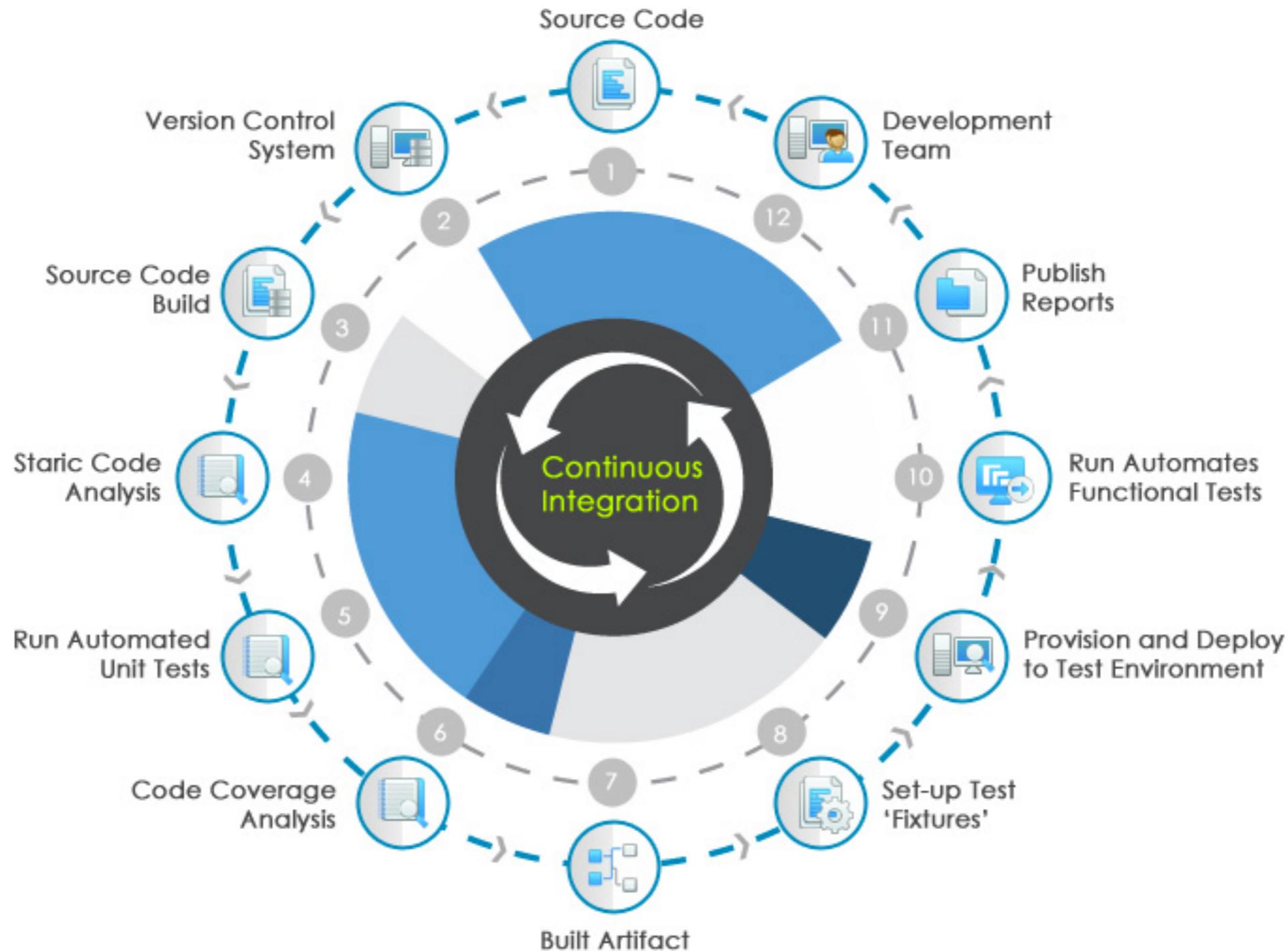
Keep all tests passed

Analyse failures tests

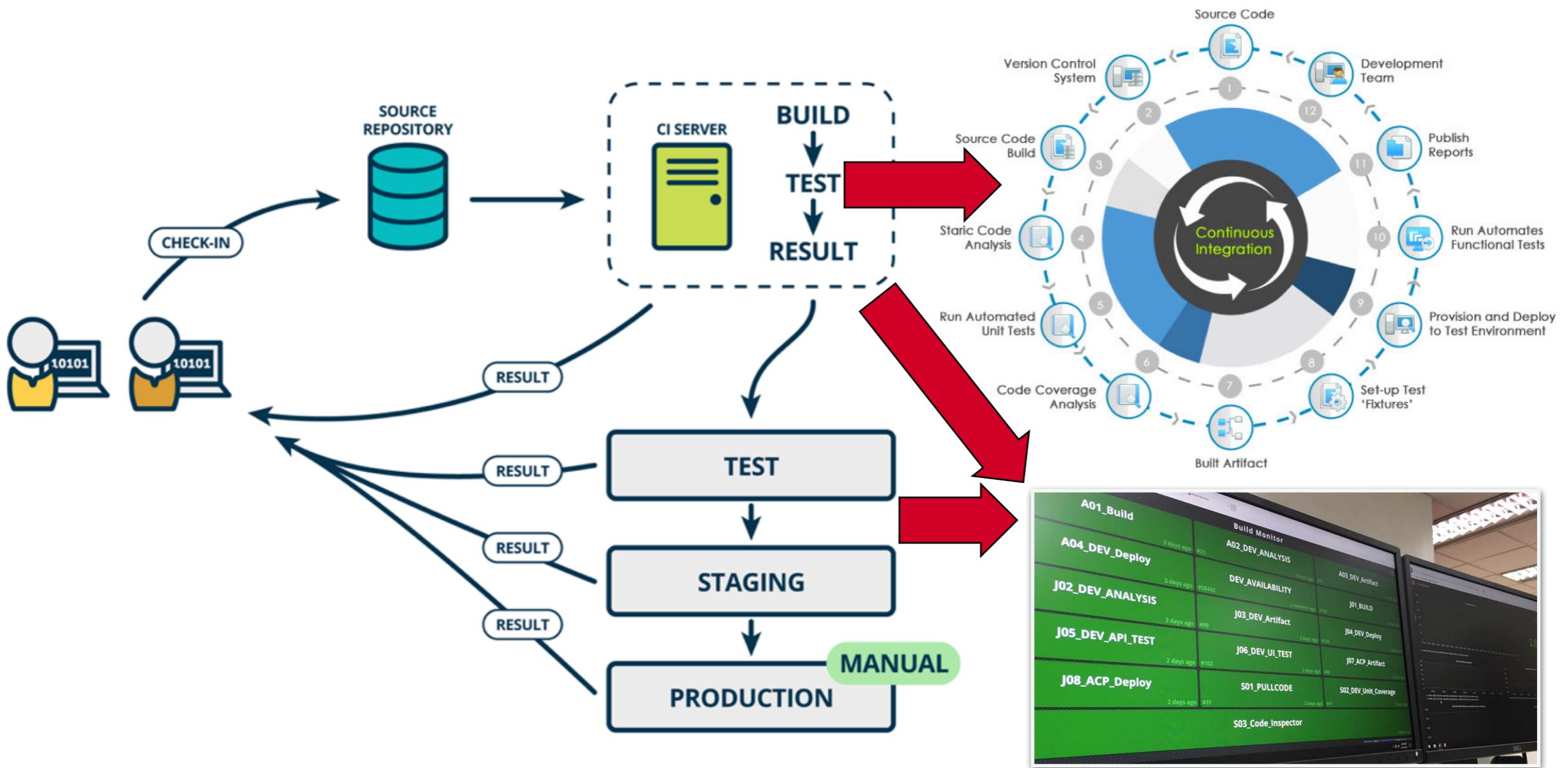
Create test standard



# Continuous integration



# Continuous integration



# Start with simple



# Use **feedback** to improve



# Welcome to new world !!



# Discussion



# Defect tracking (story of bugs)

How does your teams deal with defects ?



# Defect tracking

Focus on prevention, not tracking

Defects are queues of rework (waste)

Zero (find, test-first, fix and forgot)

Alternative of Tracking tool !!



# When to fix bugs ?



# When to fix bugs ?

**Fix now**

Estimate, prioritize and fix later

Never fix



# Manage and tracking defects ?

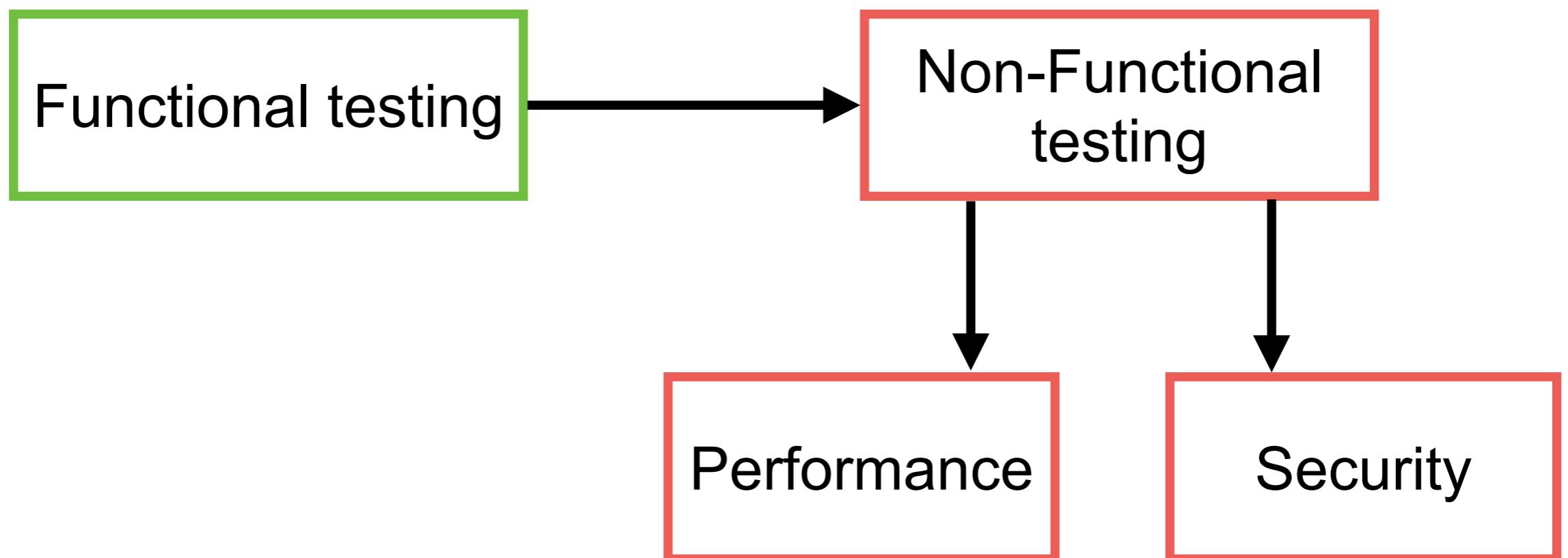
Not necessary if you have zero  
Necessary for distributed teams  
Necessary for legacy system  
Look for trends



# Non-functional Testing



# Non-functional testing



# Cost of Testing



# Cost of Automation (CA)

$$CA = I + (n * X)$$

I = Investment (learn, license, write, setup env)

X = Cost of test (execute, analysis, maintain)

n = number of test



# Compare Manual and Automation

Tester Cost

Test case  
maintain

Testing  
frequency

Test  
coverage

Regression  
testing

Human error

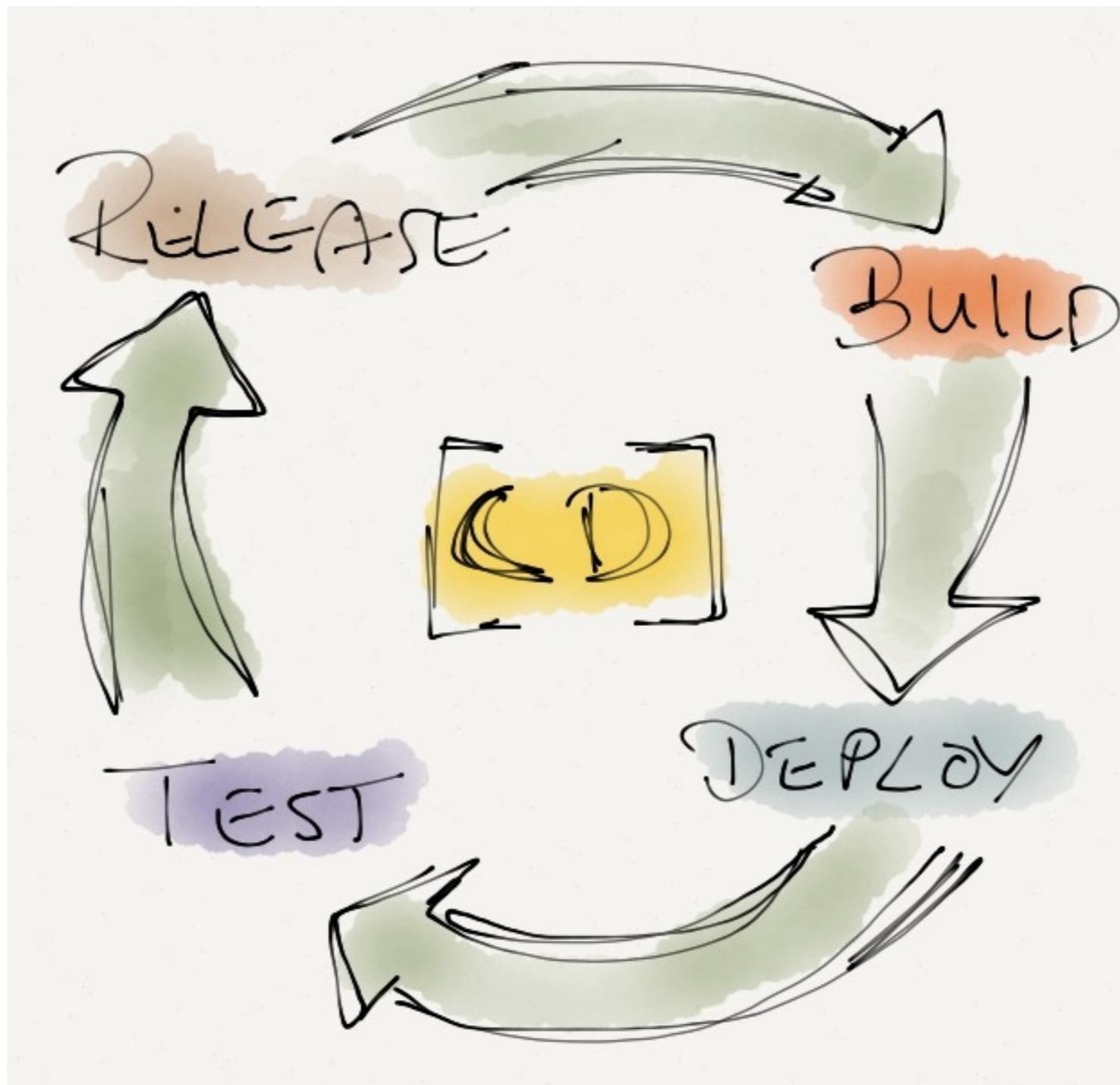
Test strategic  
Selection

Continuous  
training

Review



# Release and Deployment



# Q/A

