



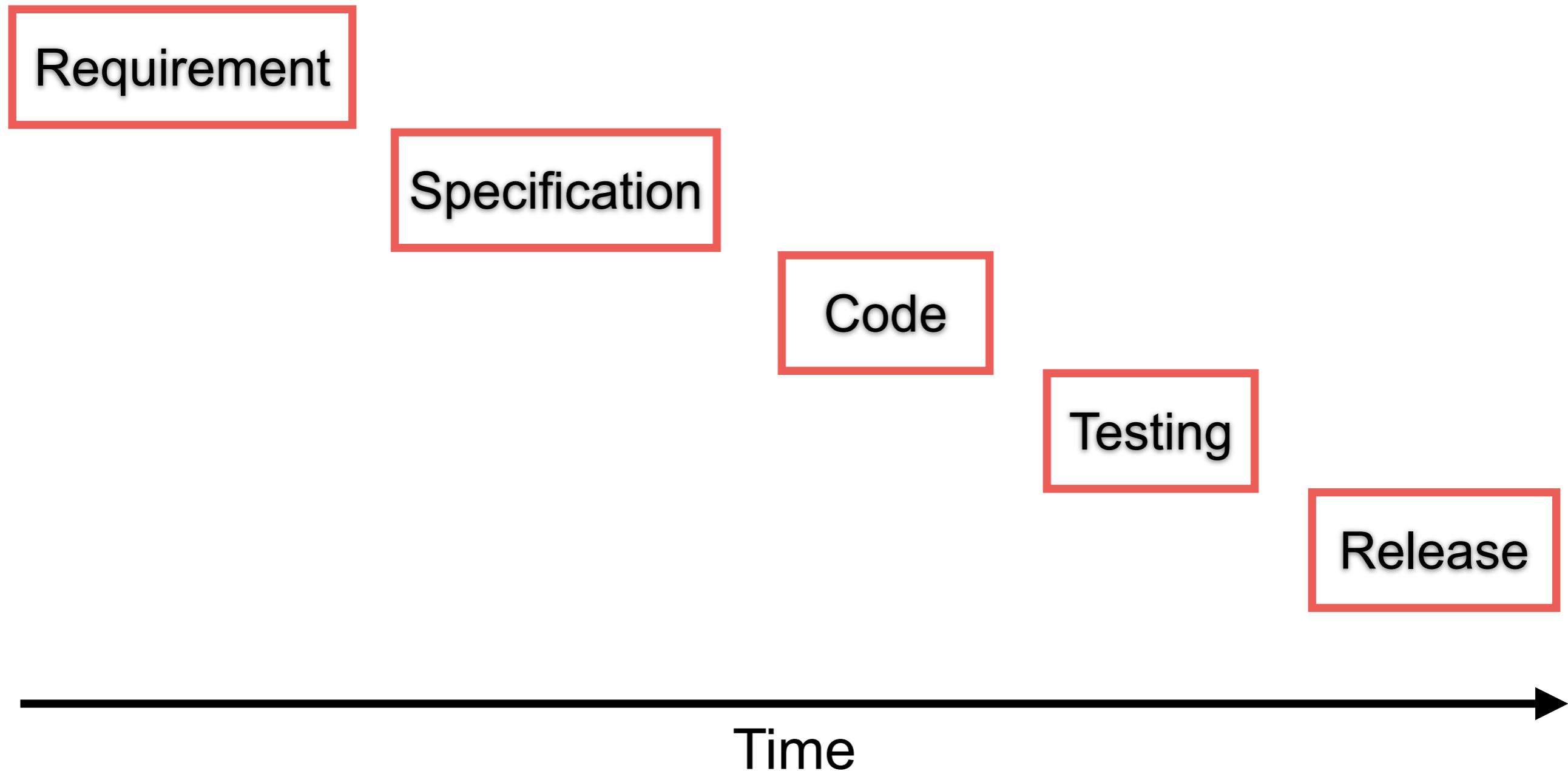
Software Testing



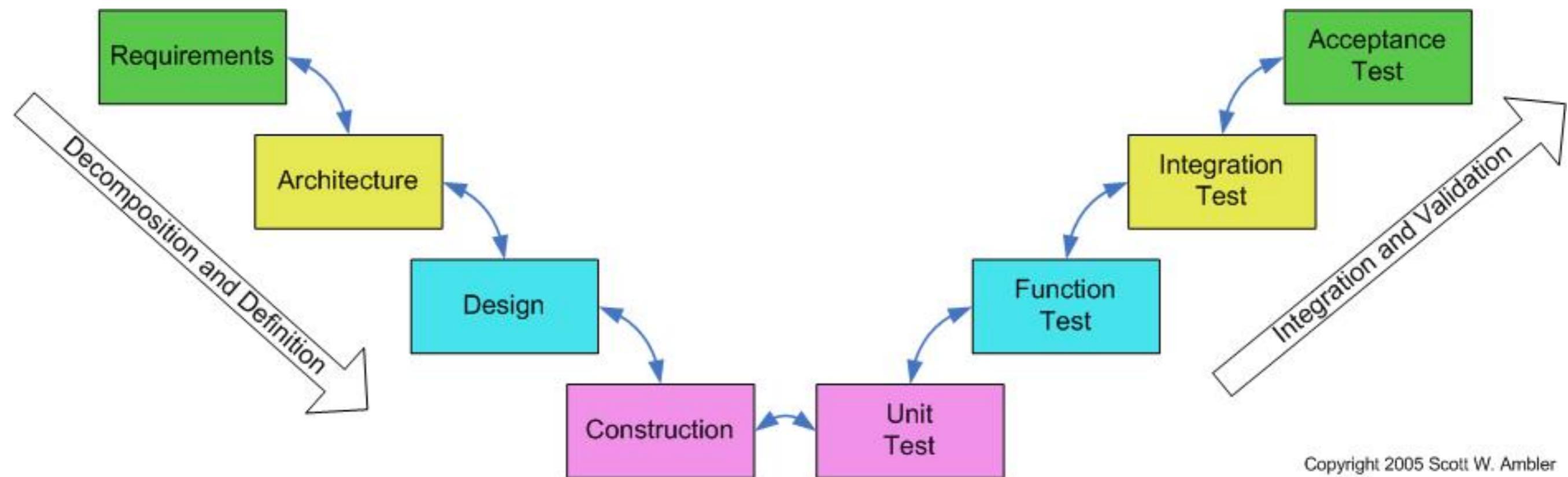
Software Testing



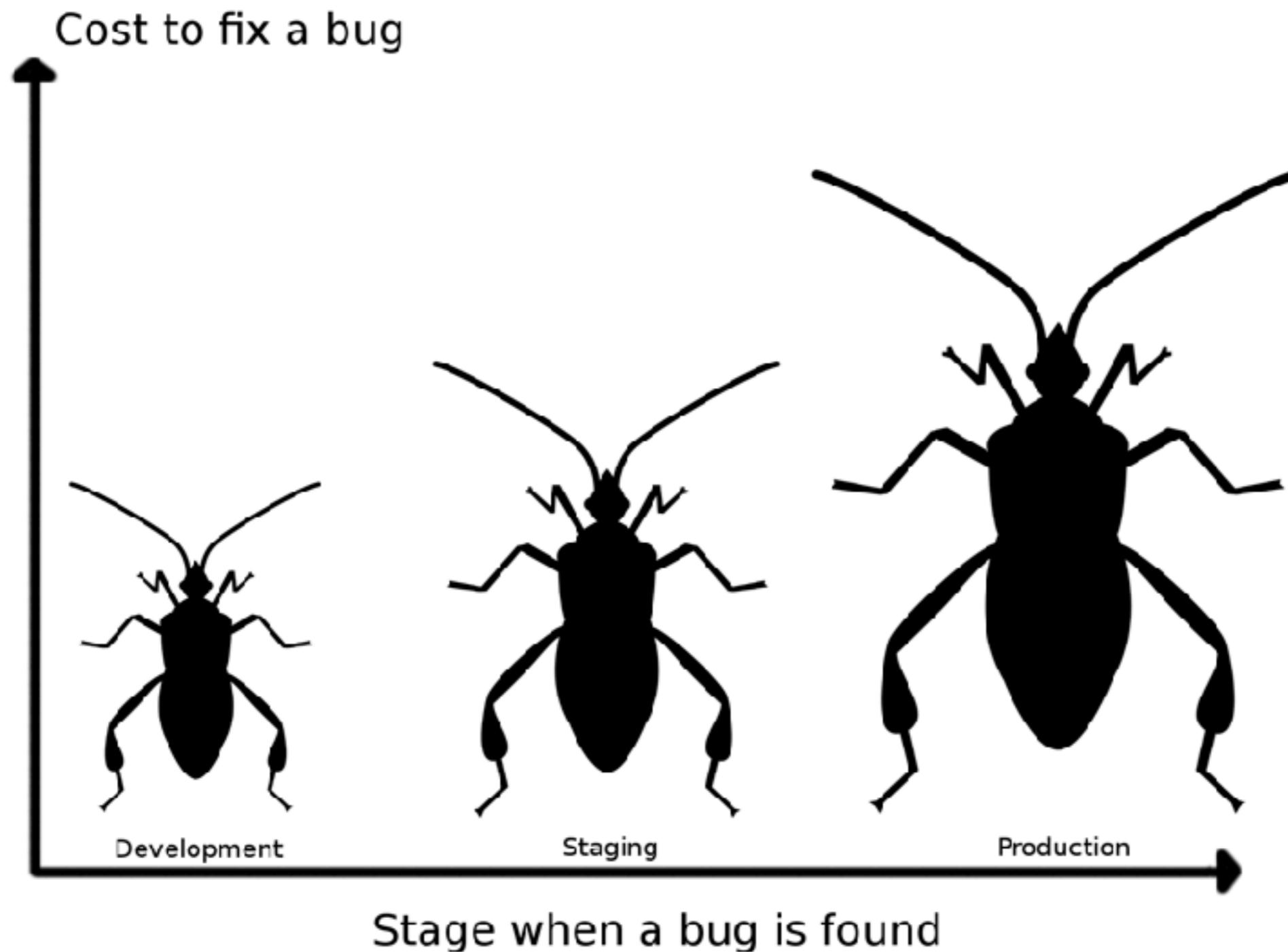
Software Delivery Process



V Model



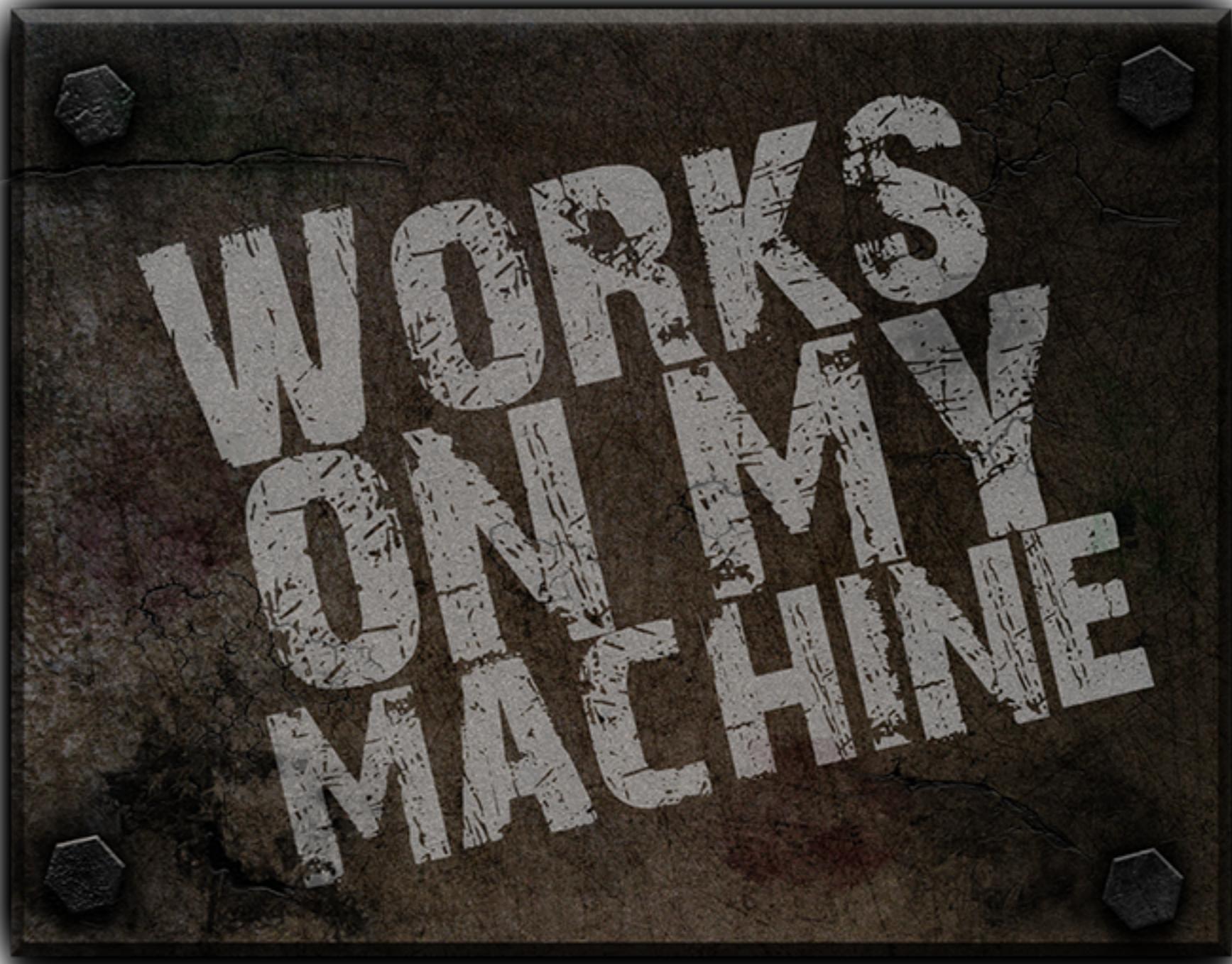
Cost of Change !!



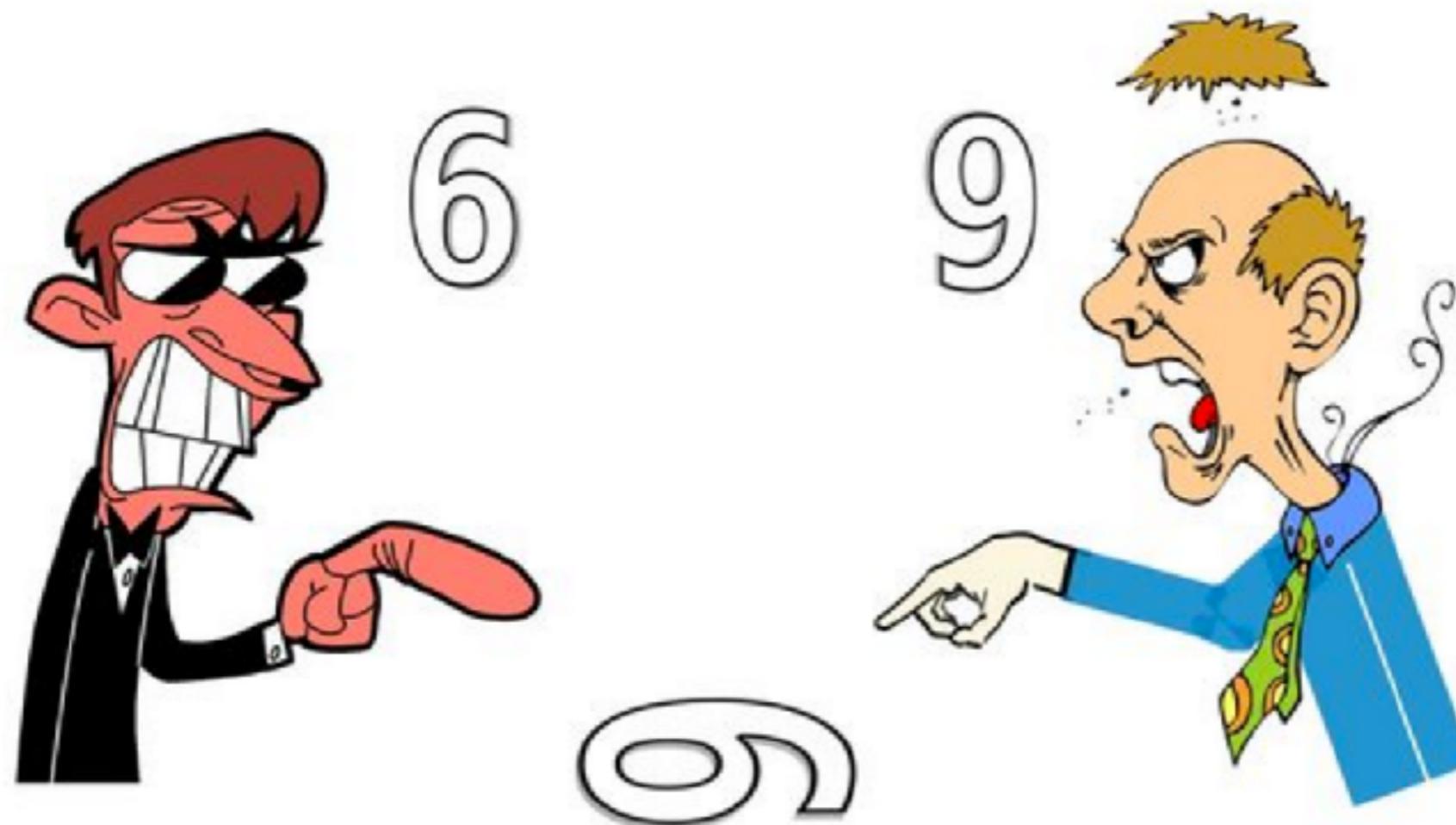
Cost of Change !!

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





Developer vs Tester







Who ?





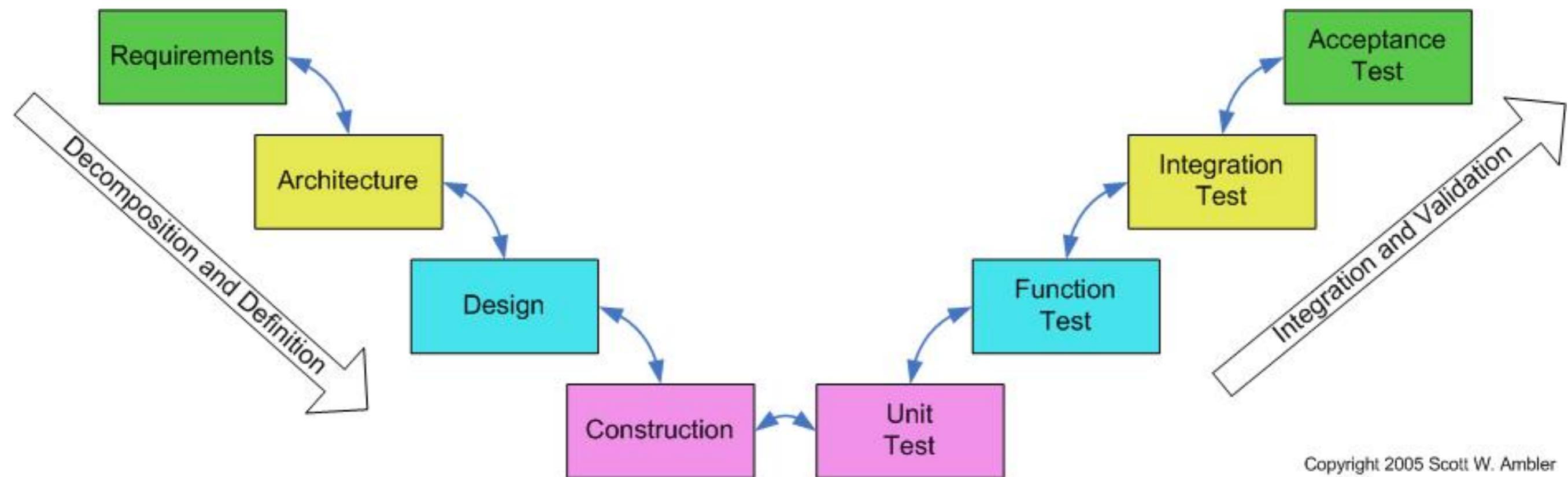
TONIGHT WE TEST

IN PRODUCTION!!!

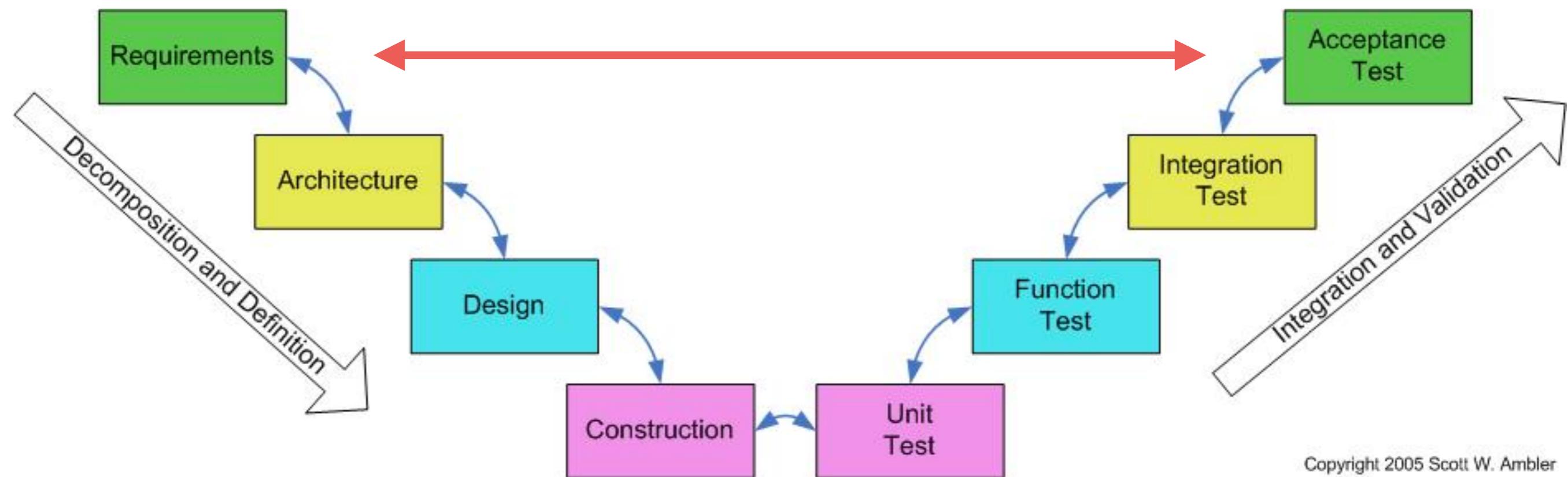
memegenerator.net



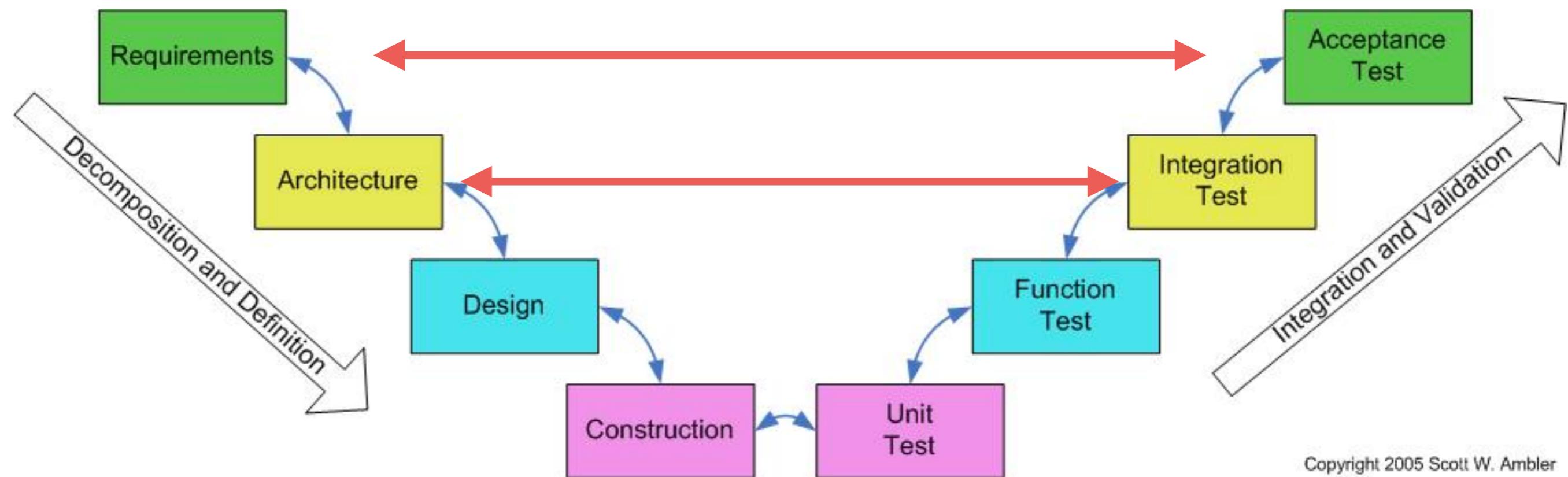
V Model



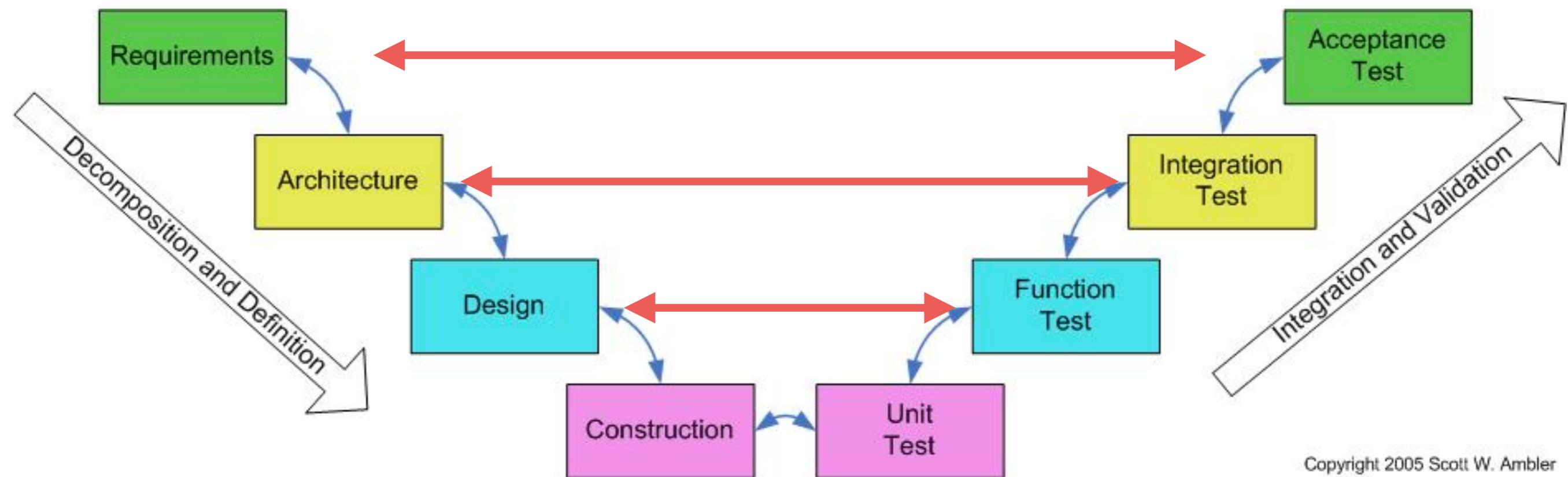
V Model



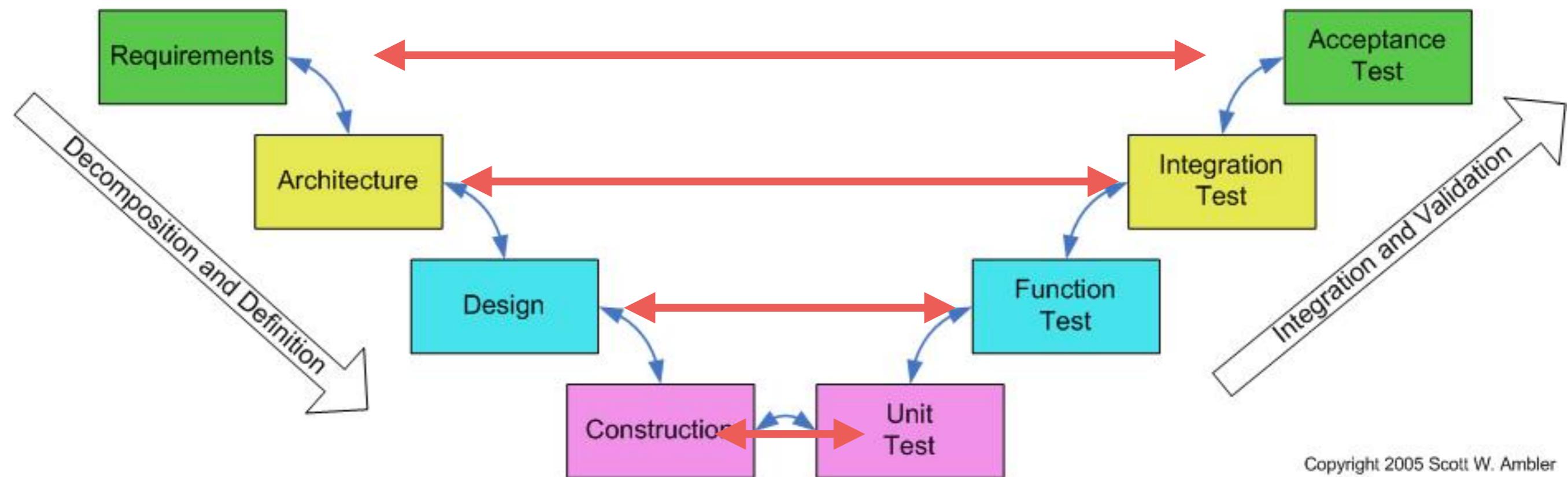
V Model



V Model



V Model



Acceptance Tests

=

Business Criteria

+

Examples (data)



Acceptance Test Driven Development

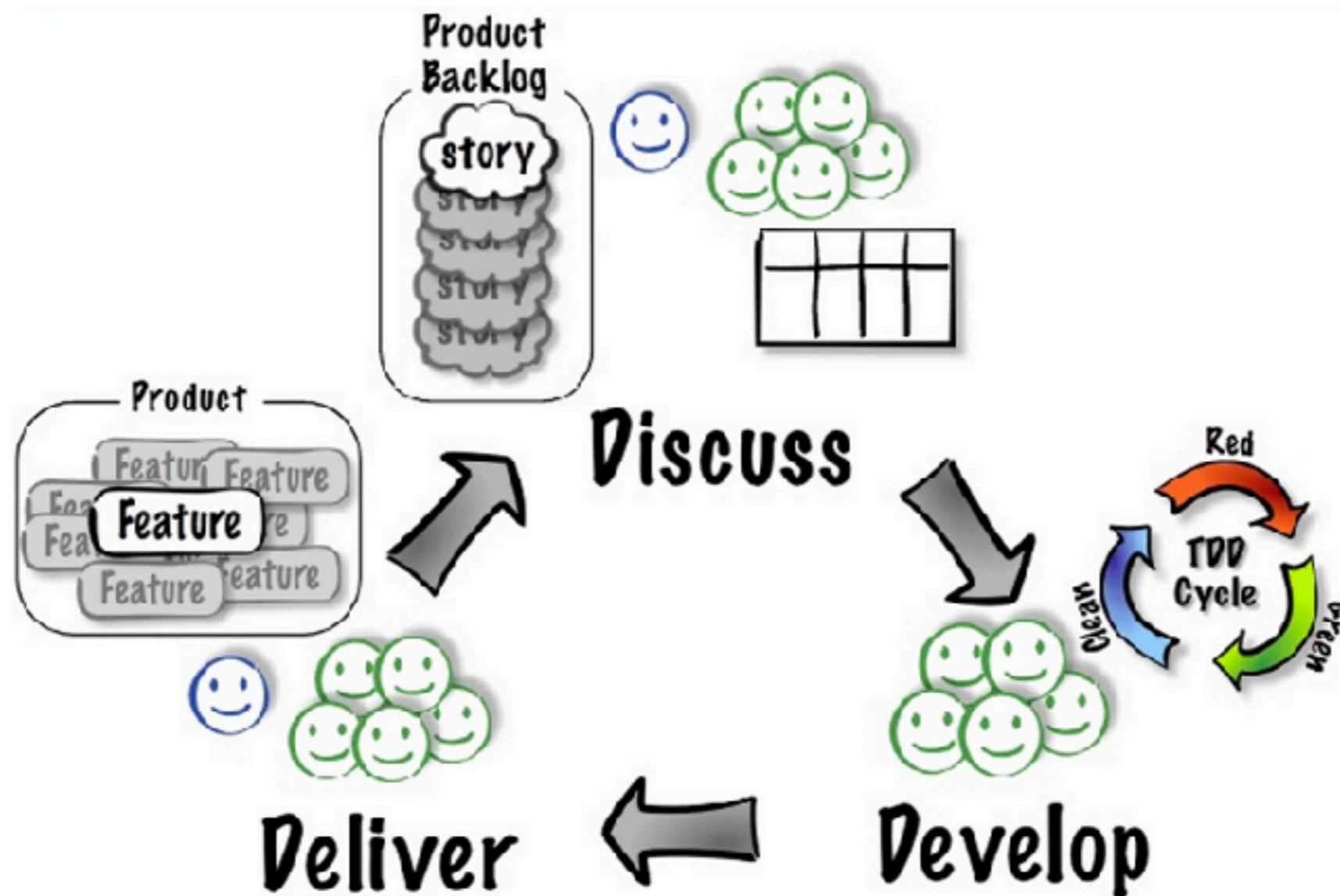


ATDD

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



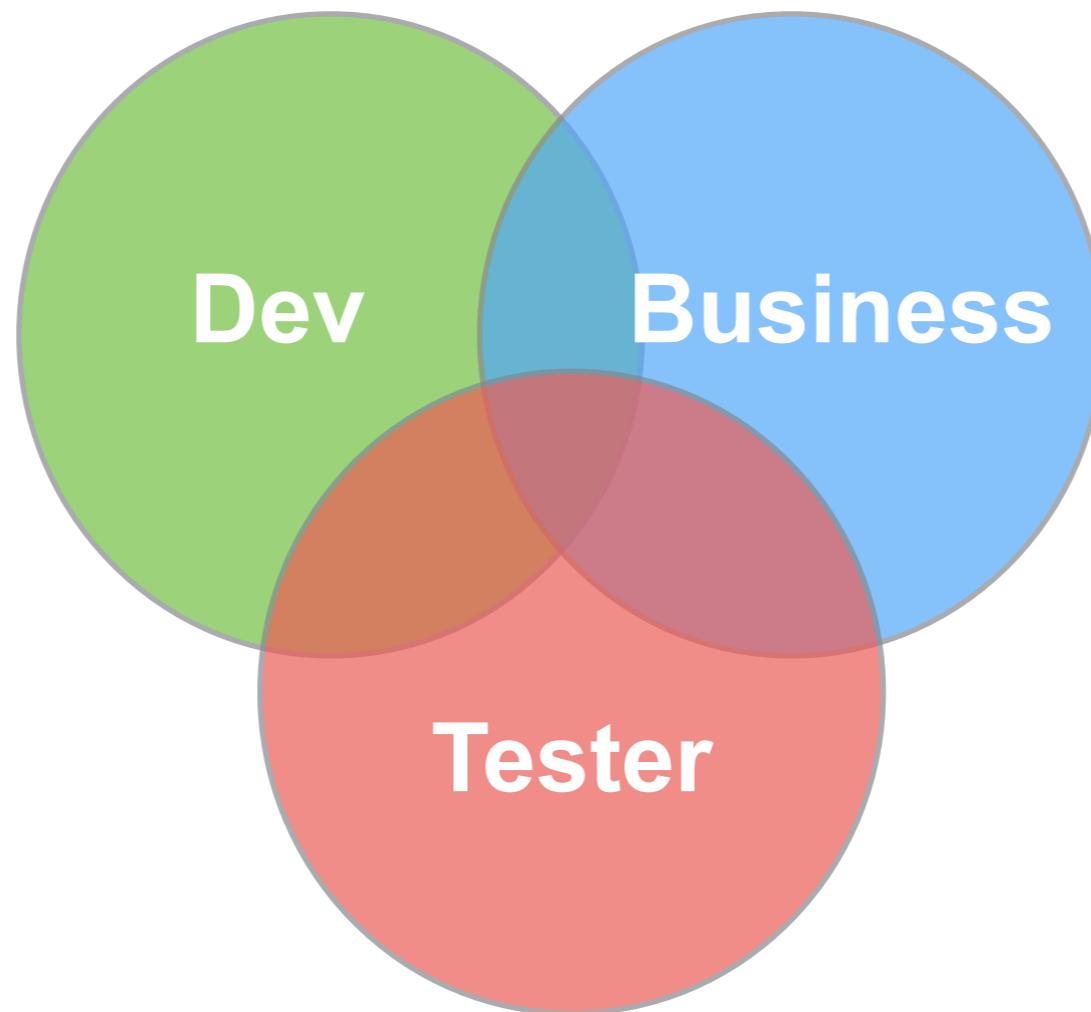
ATDD



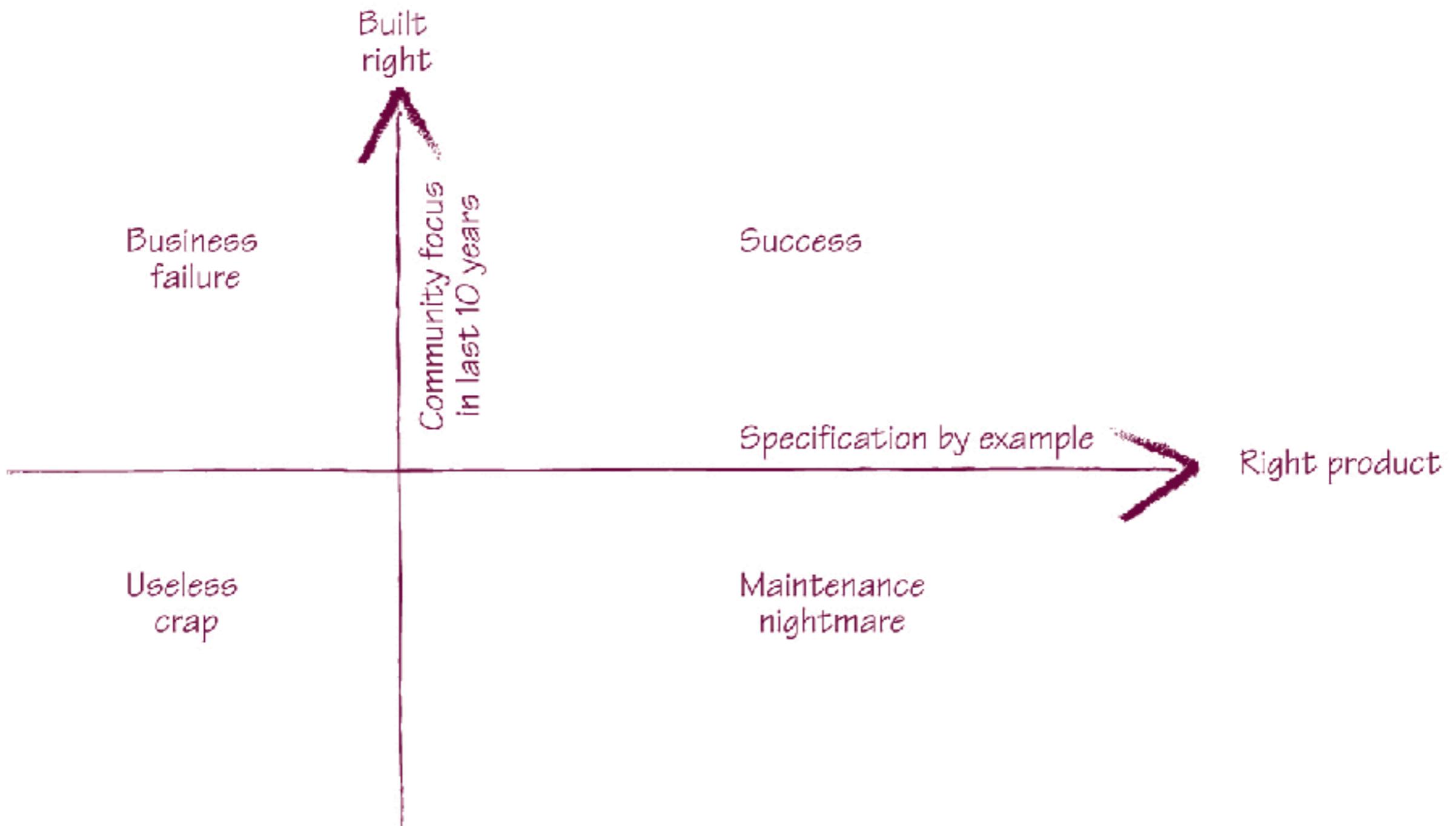
(Model developed with Pekka Klärck, Bas Vodde, and Craig Larman.)



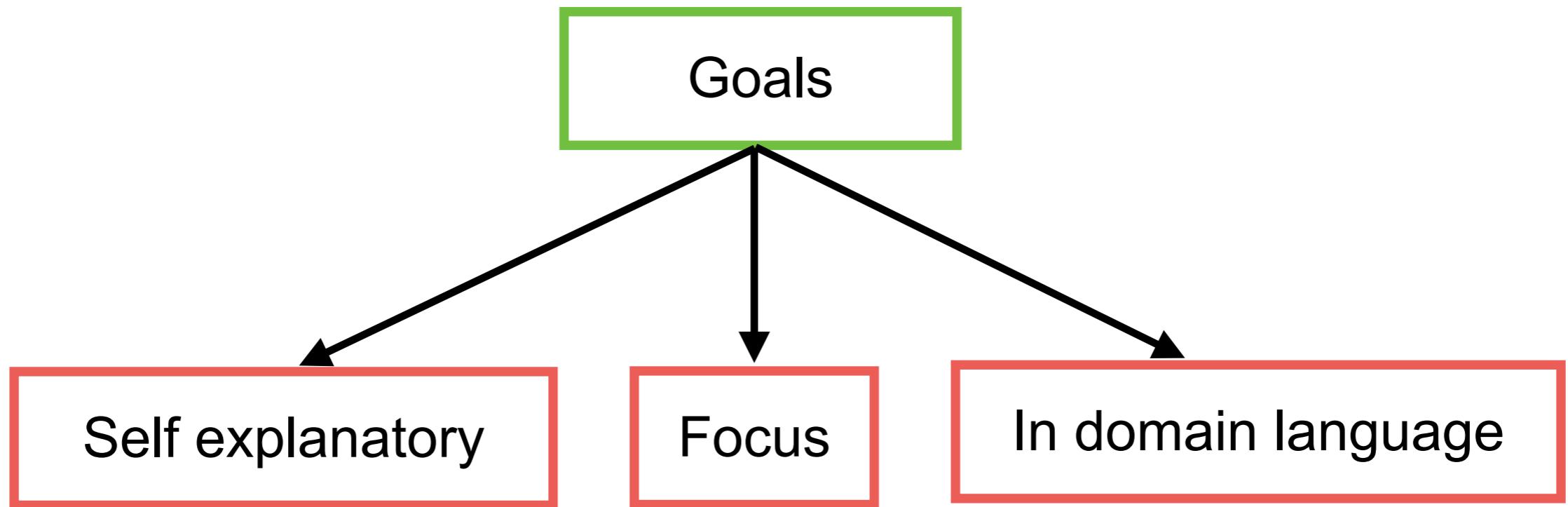
Acceptance testing



Acceptance testing



Workshop



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

As 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.

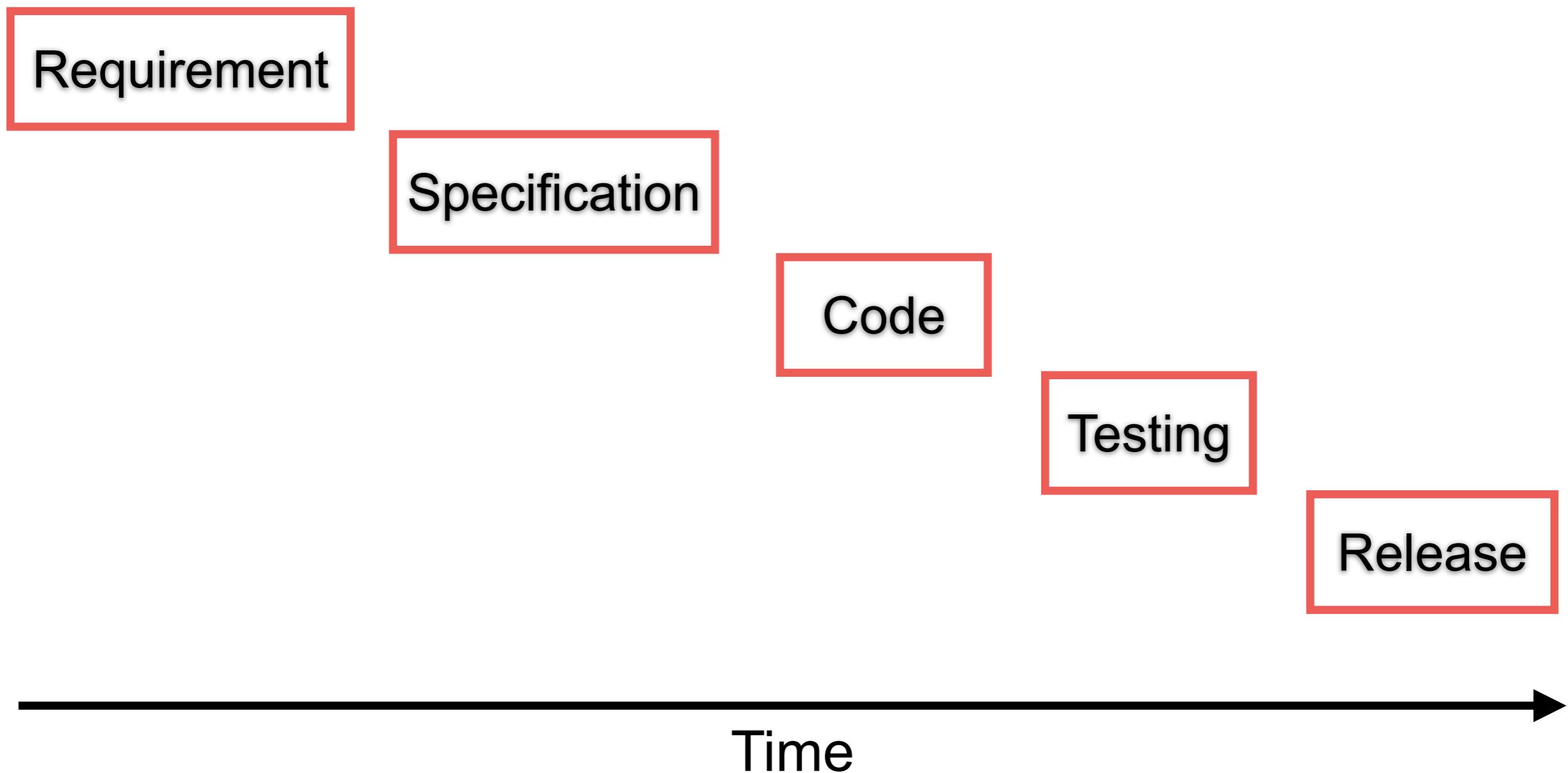
PRE-1970

IID grew from the 1930s work of Walter Shewhart,¹ 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>

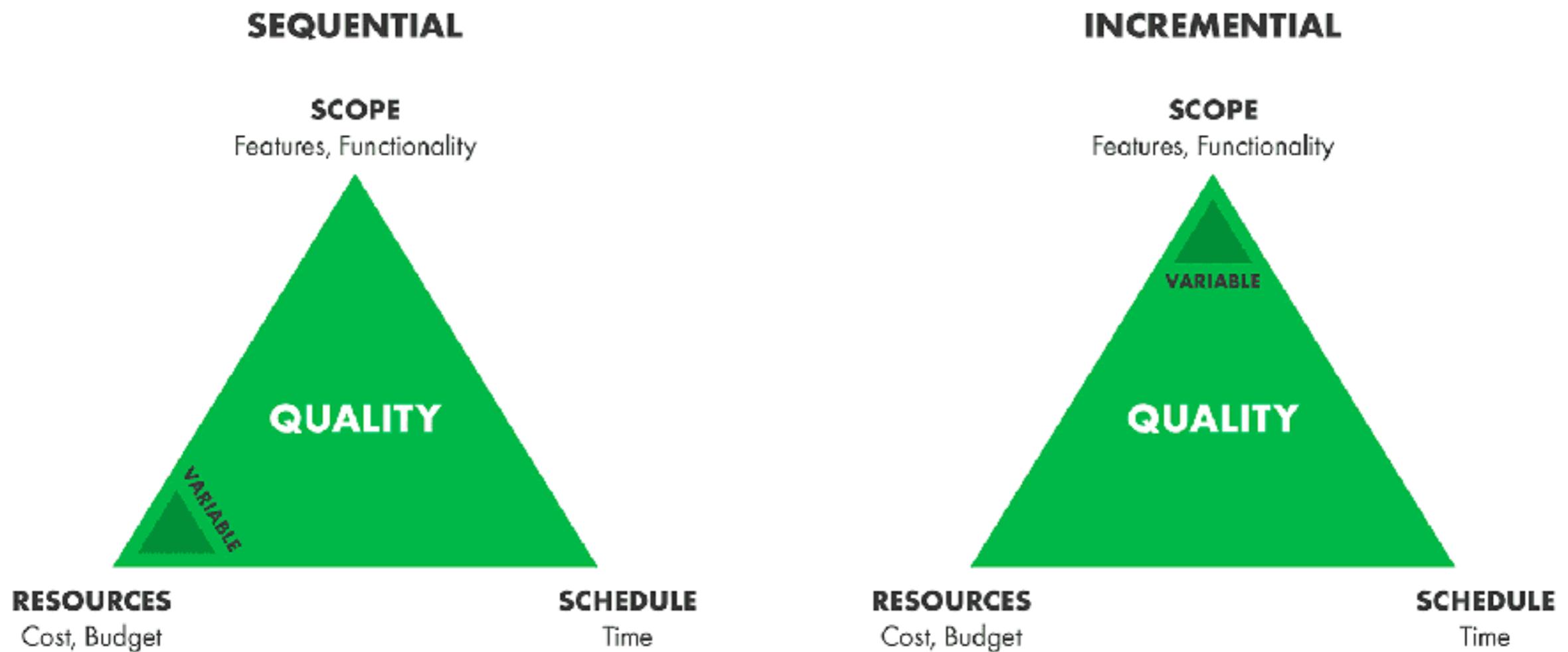


Sequential process



Iterative and incremental process

Time boxed delivery
Fix time and flexible scopes



Business Technology Standard
www.managebites.org



Iterative and incremental process

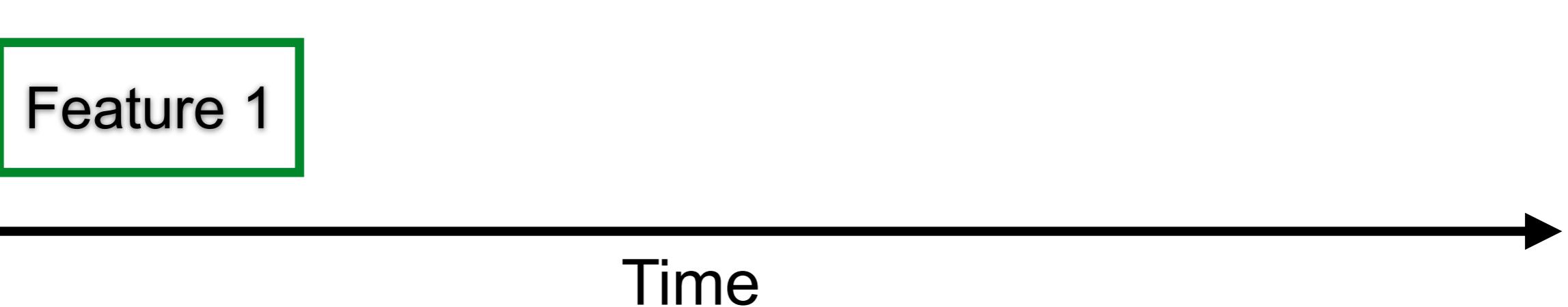
Feature 1

Time



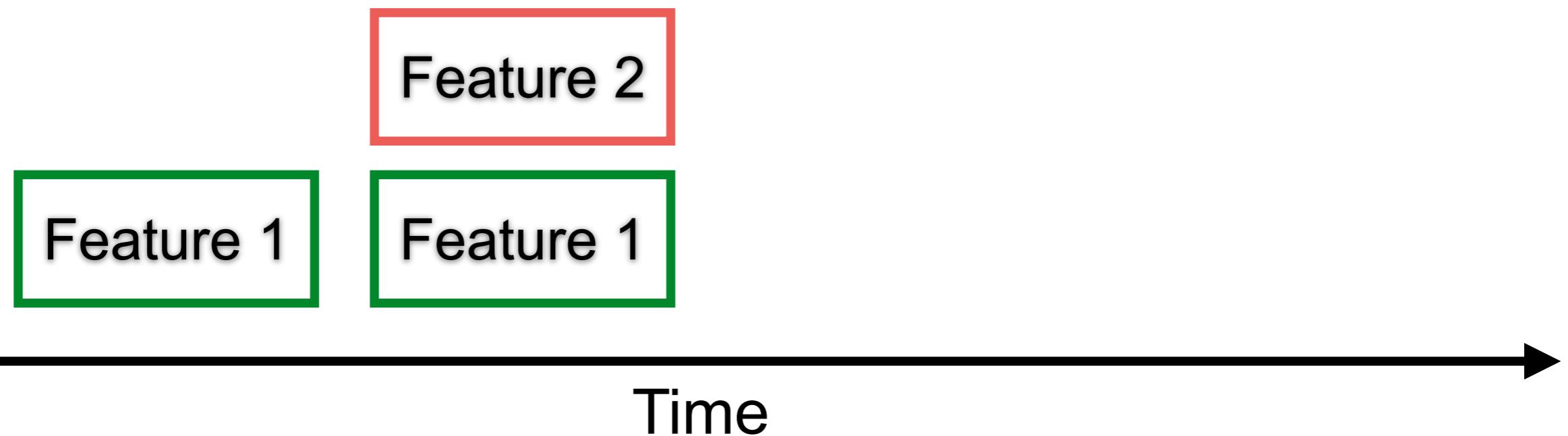
Iterative and incremental process

Done = coded and tested



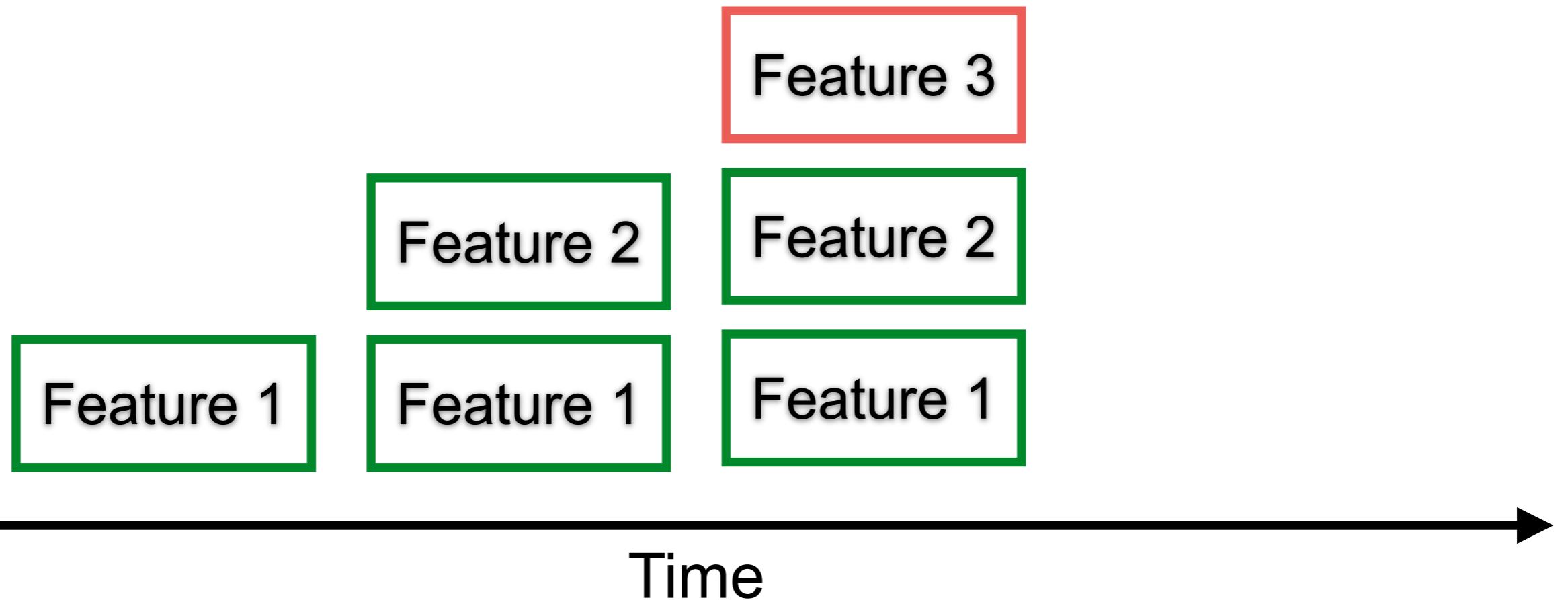
Iterative and incremental process

Done = coded and tested



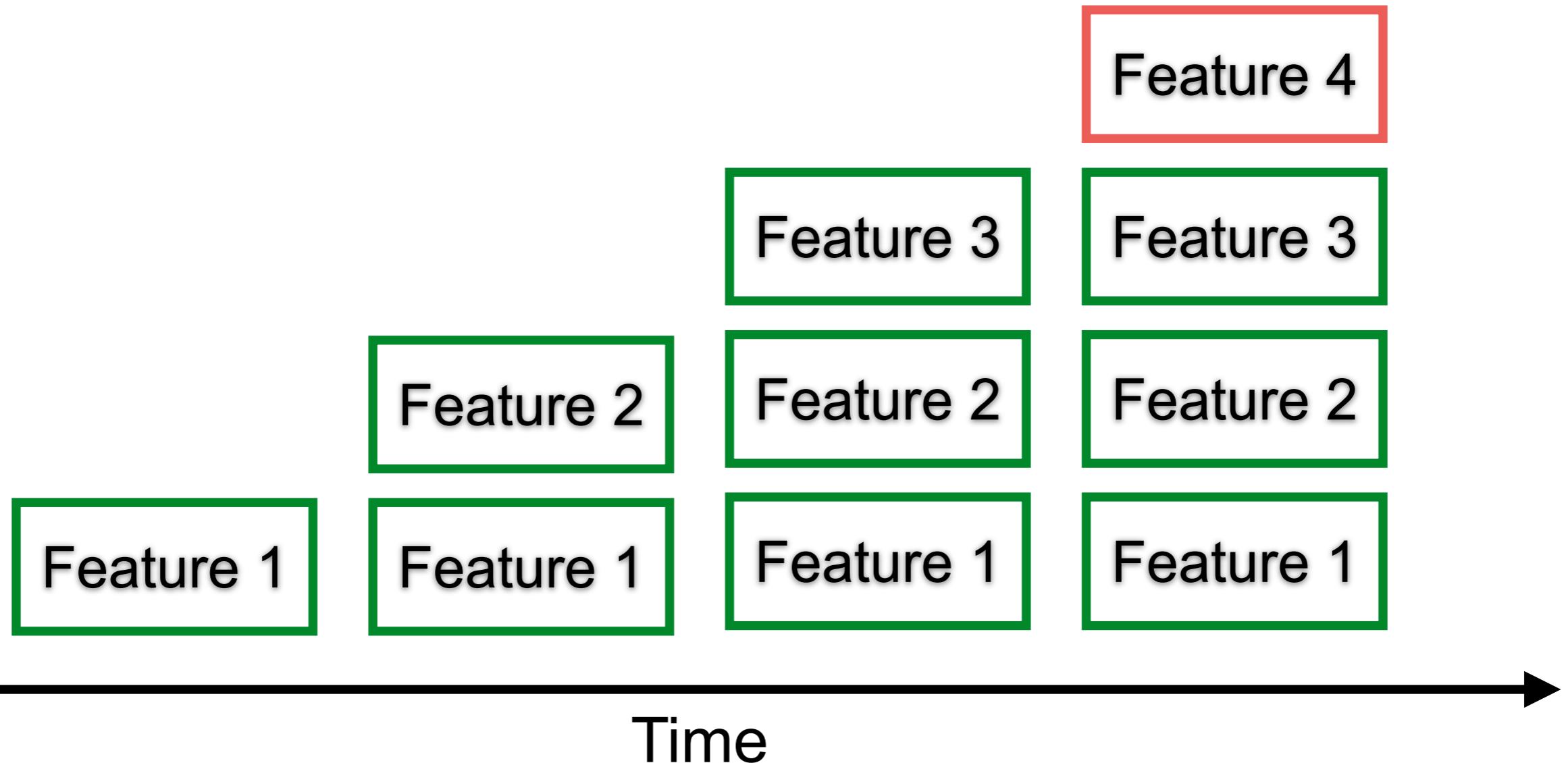
Iterative and incremental process

Done = coded and tested



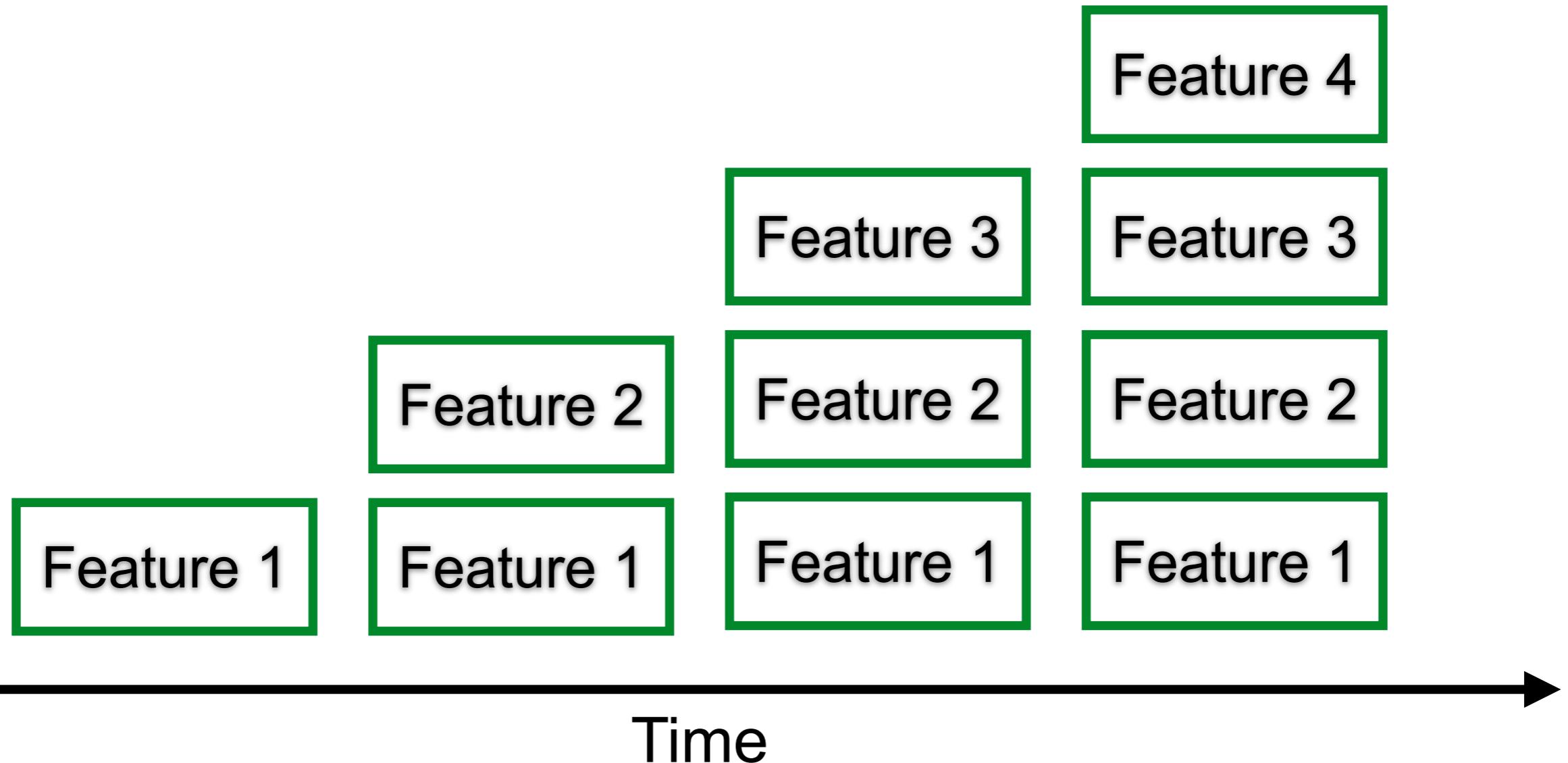
Iterative and incremental process

Done = coded and tested

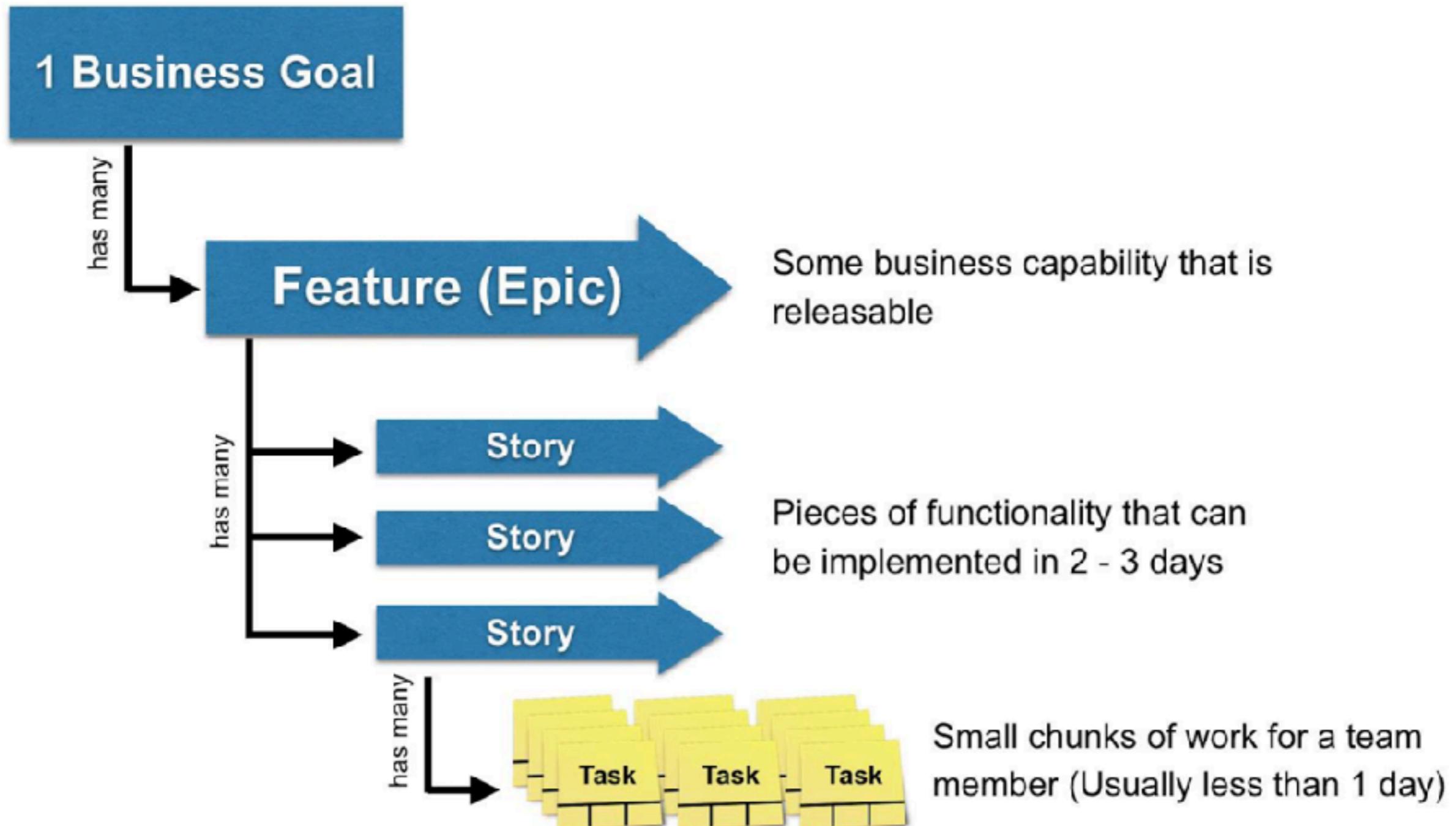


Iterative and incremental process

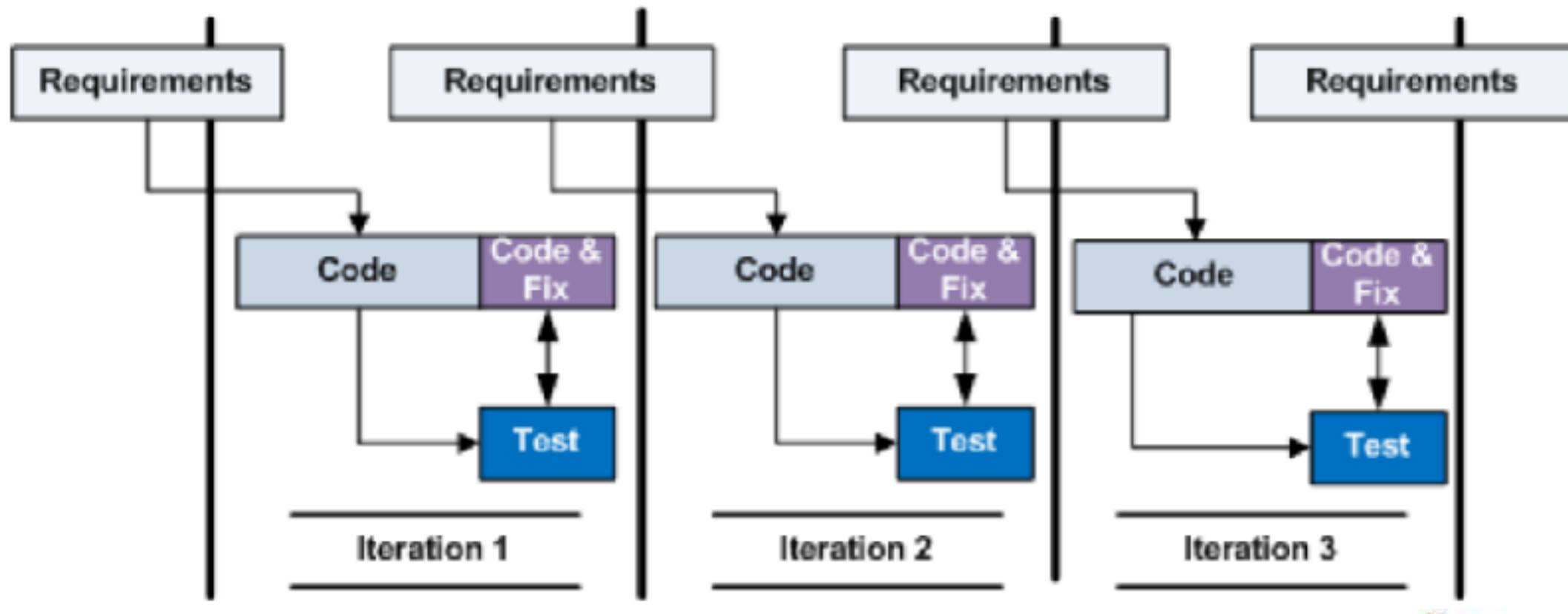
Done = coded and tested



Start with business goal to tasks



Mini Waterfall !!



Whole team approach



Whole team approach

Functional

Common functional expertise



System analysts



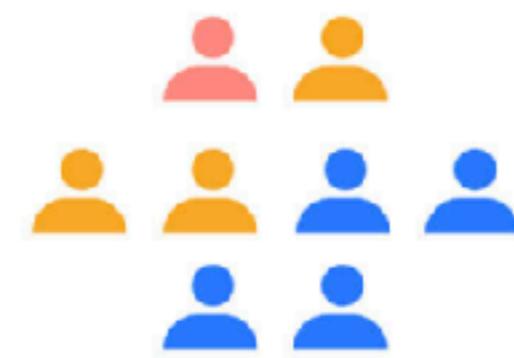
Developers



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**

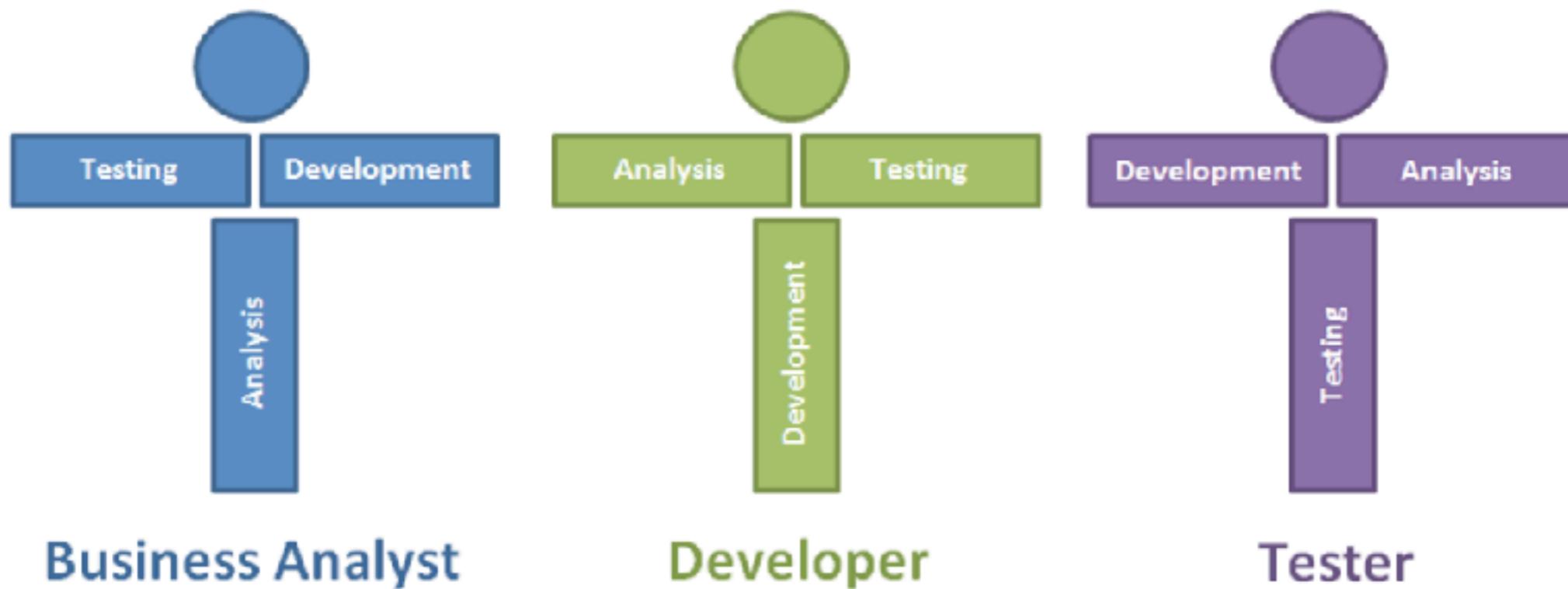


Cross-functional development team

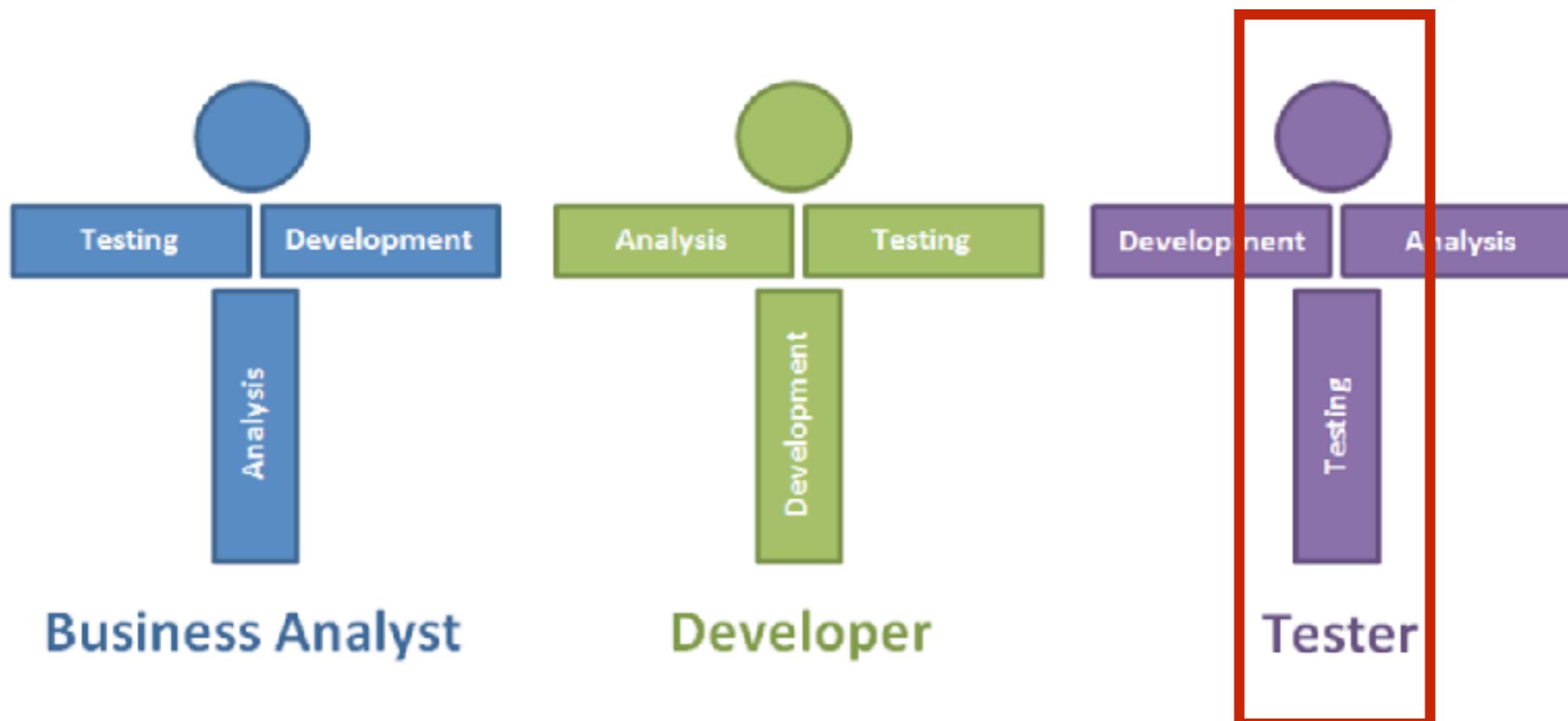
~~QA = Quality Assurance~~
= Quality Assistance



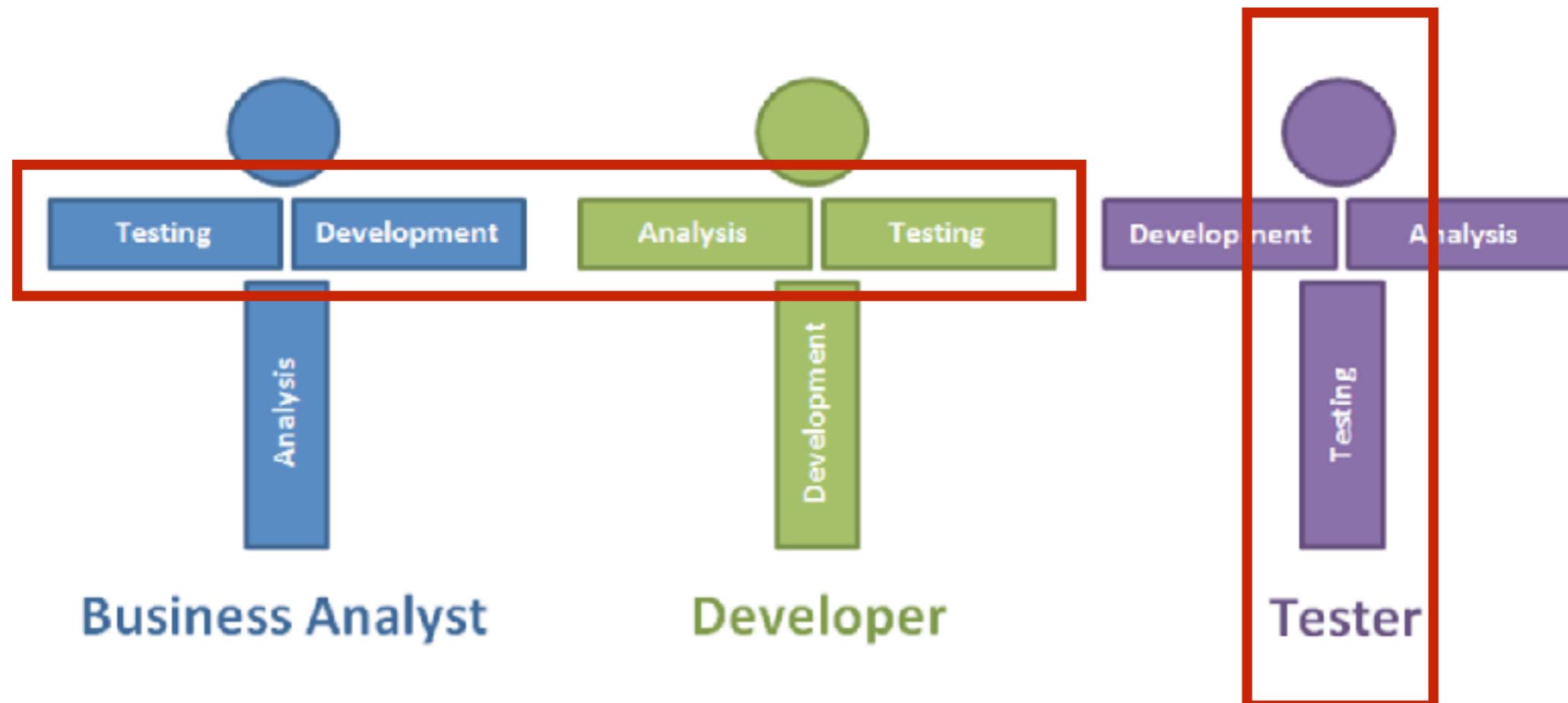
T-shaped skills



Quality assistance



Quality assistance



Test is activity

~~Test phase~~

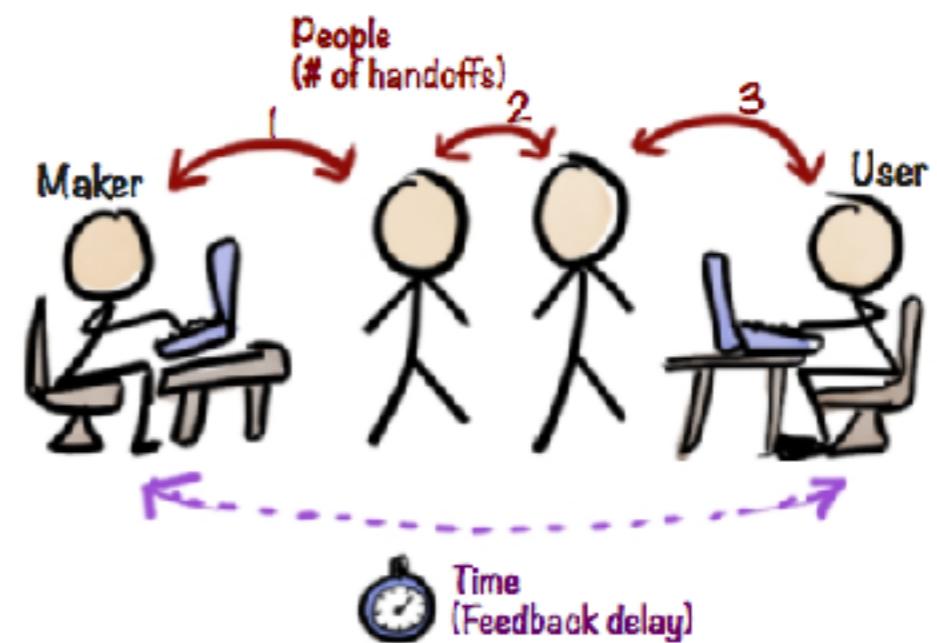
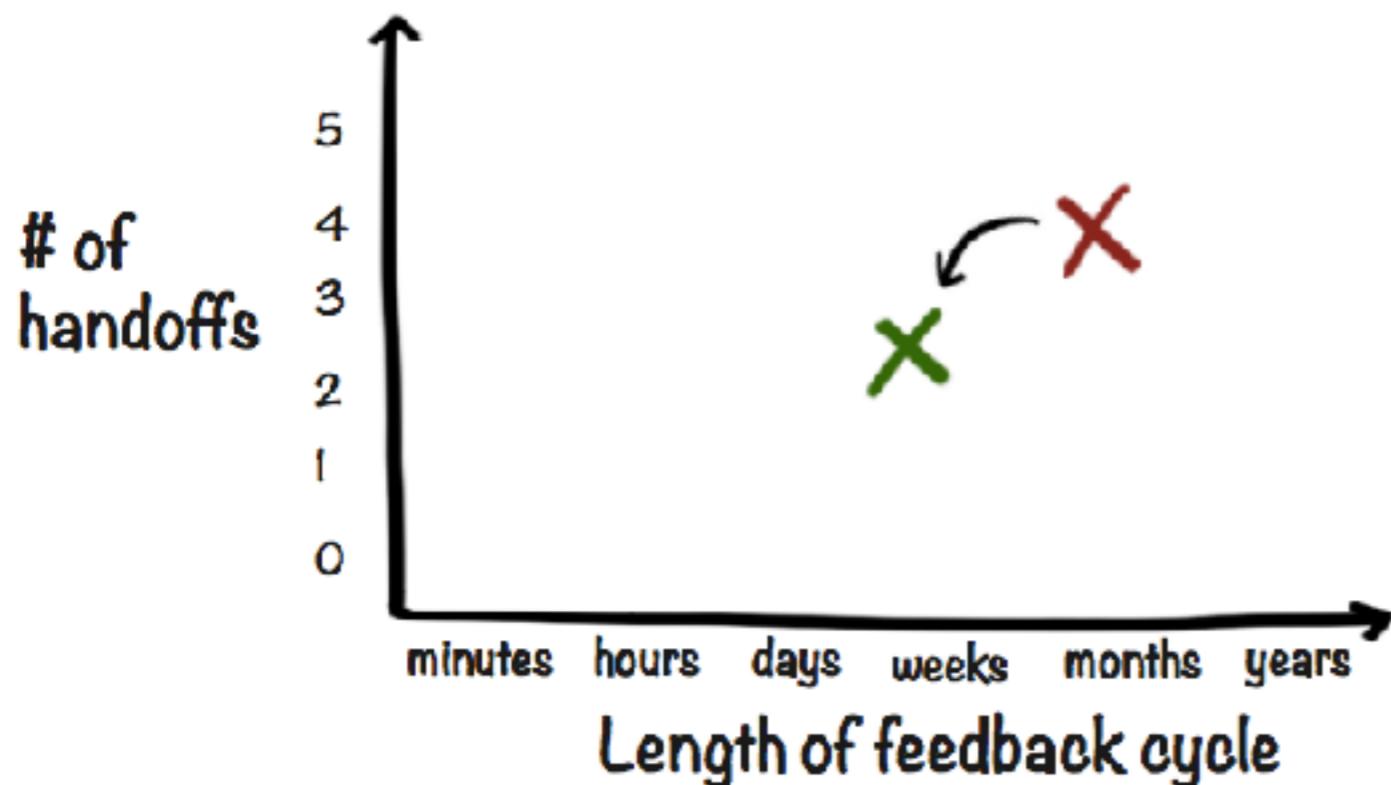
~~Test team~~

~~Tester role~~

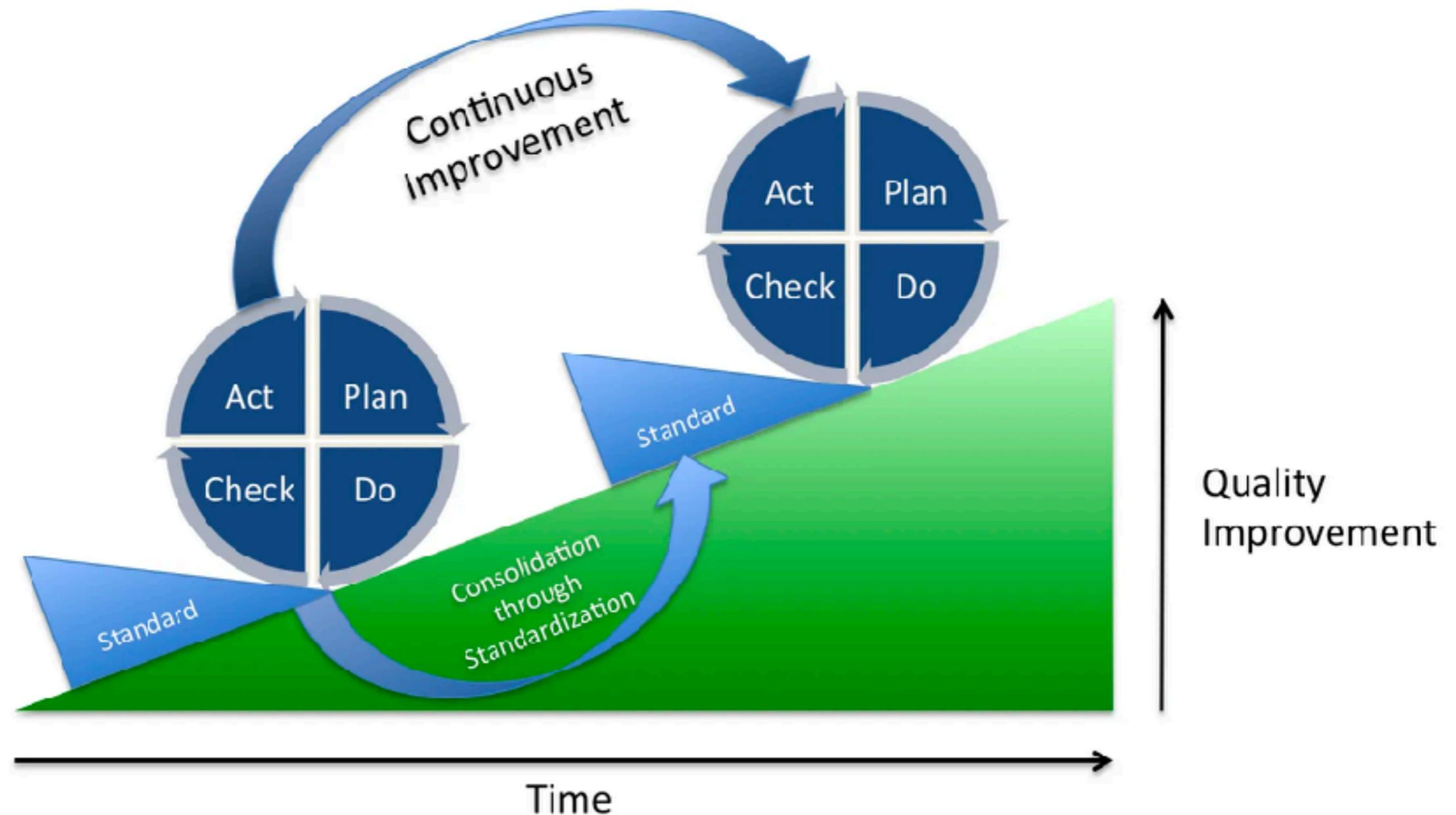


Fast feedback loop

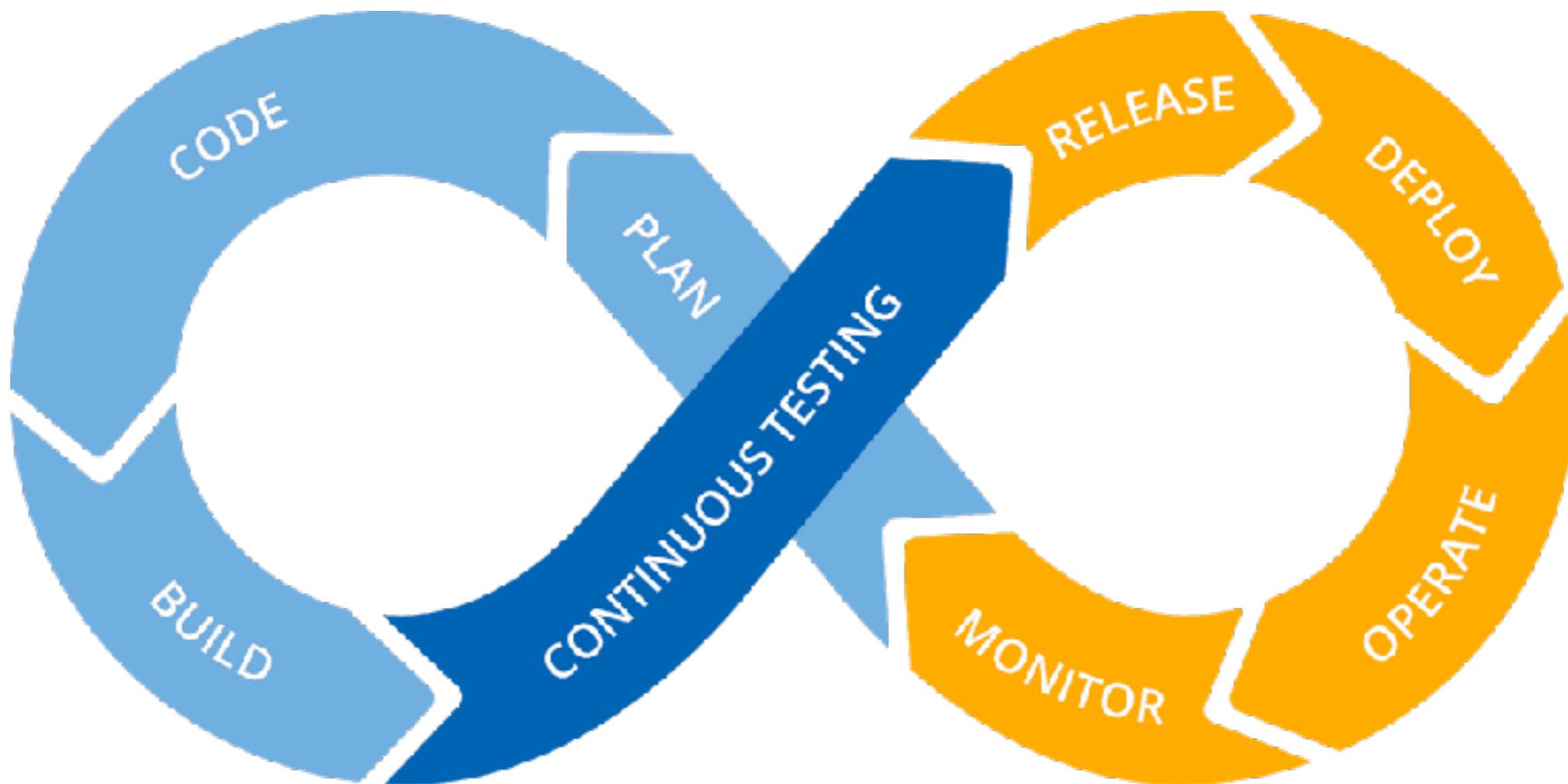
Shorten the feedback loop



Continuous improvement



Continuous testing



Good Testing ?

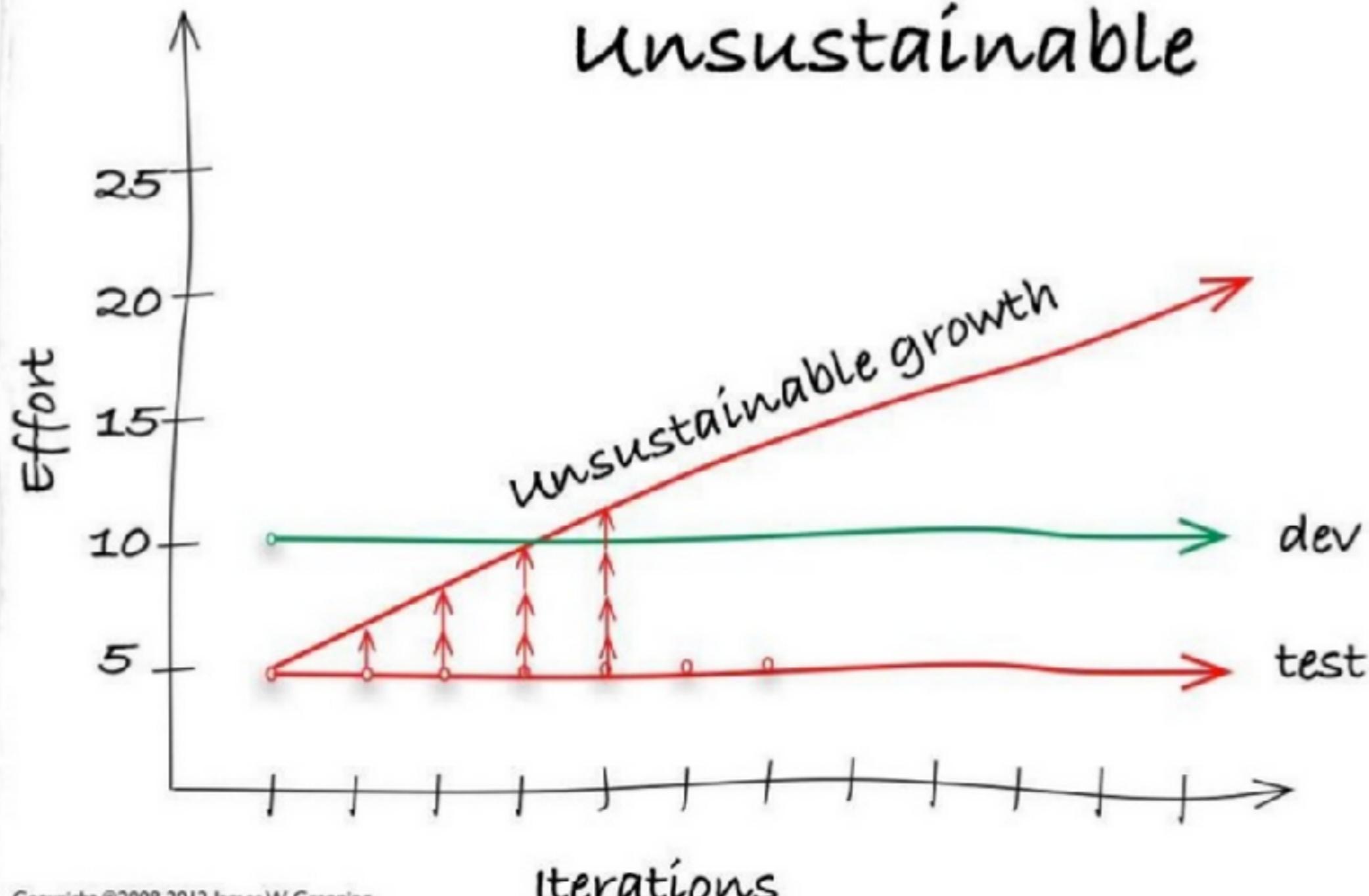
Fast
Isolation
Repeatable
Self-validate
Timely



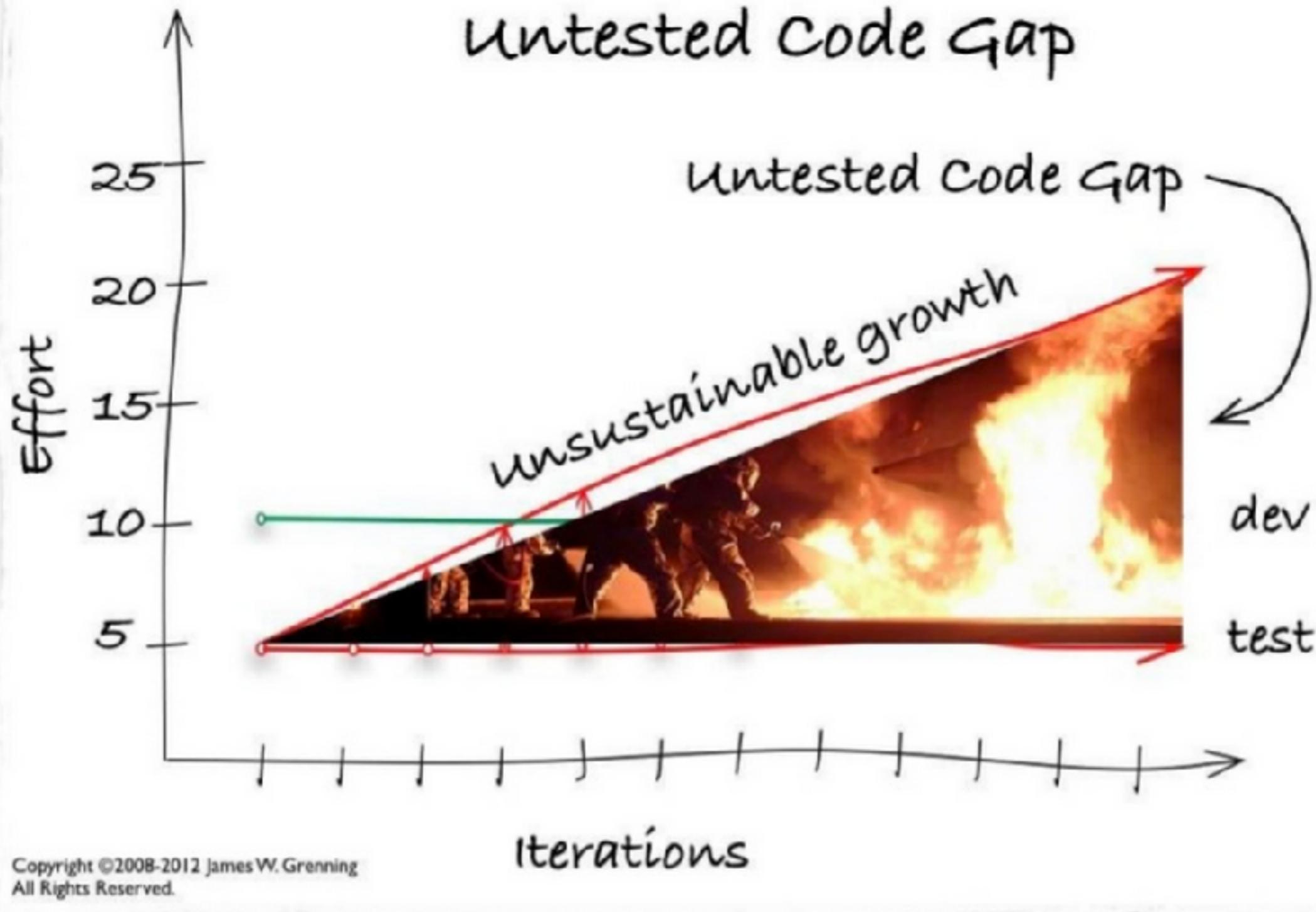
Manual Testing !!



Manual Test is unsustainable



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

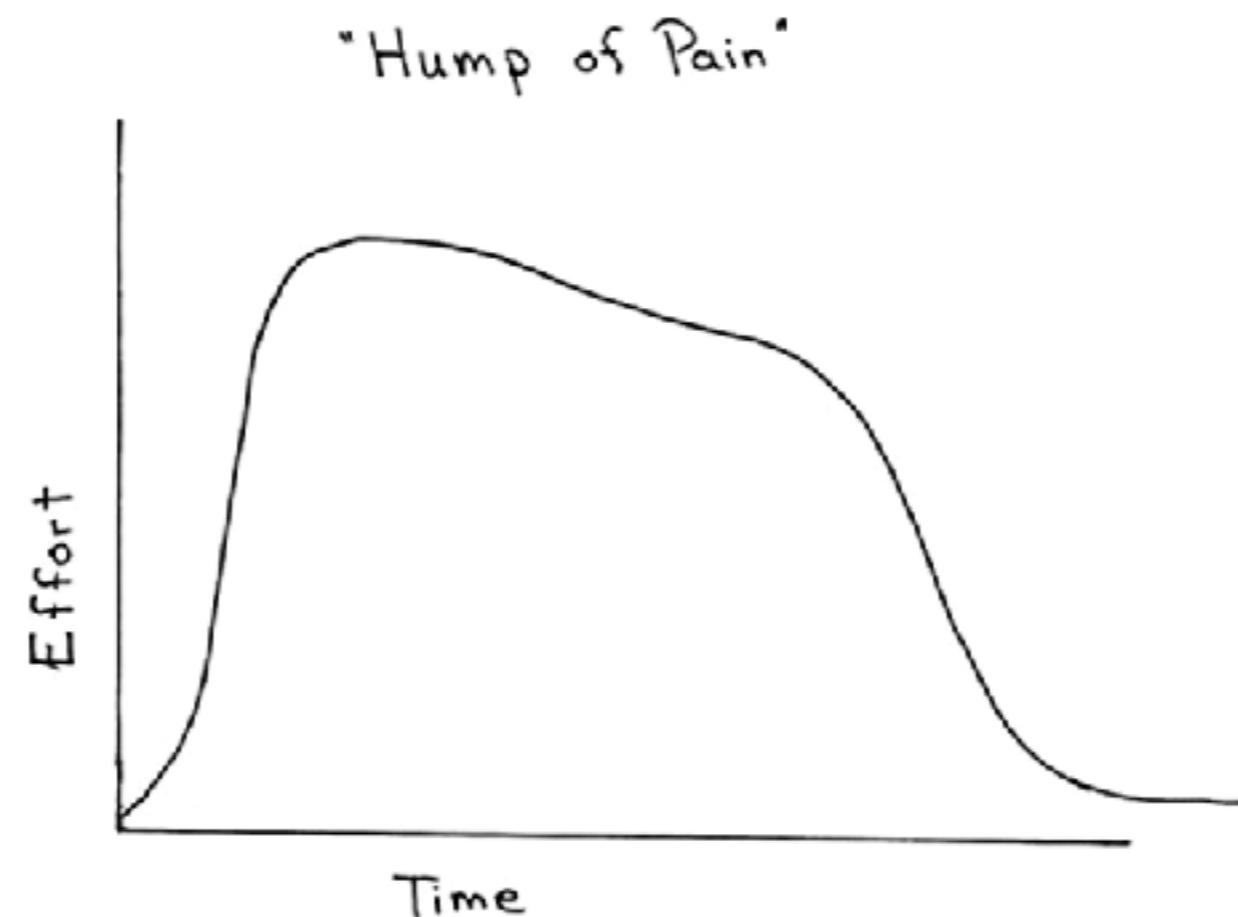


BUT ... why are not automating ?



Initial investment !!

Hump of pain



Initial investment !!

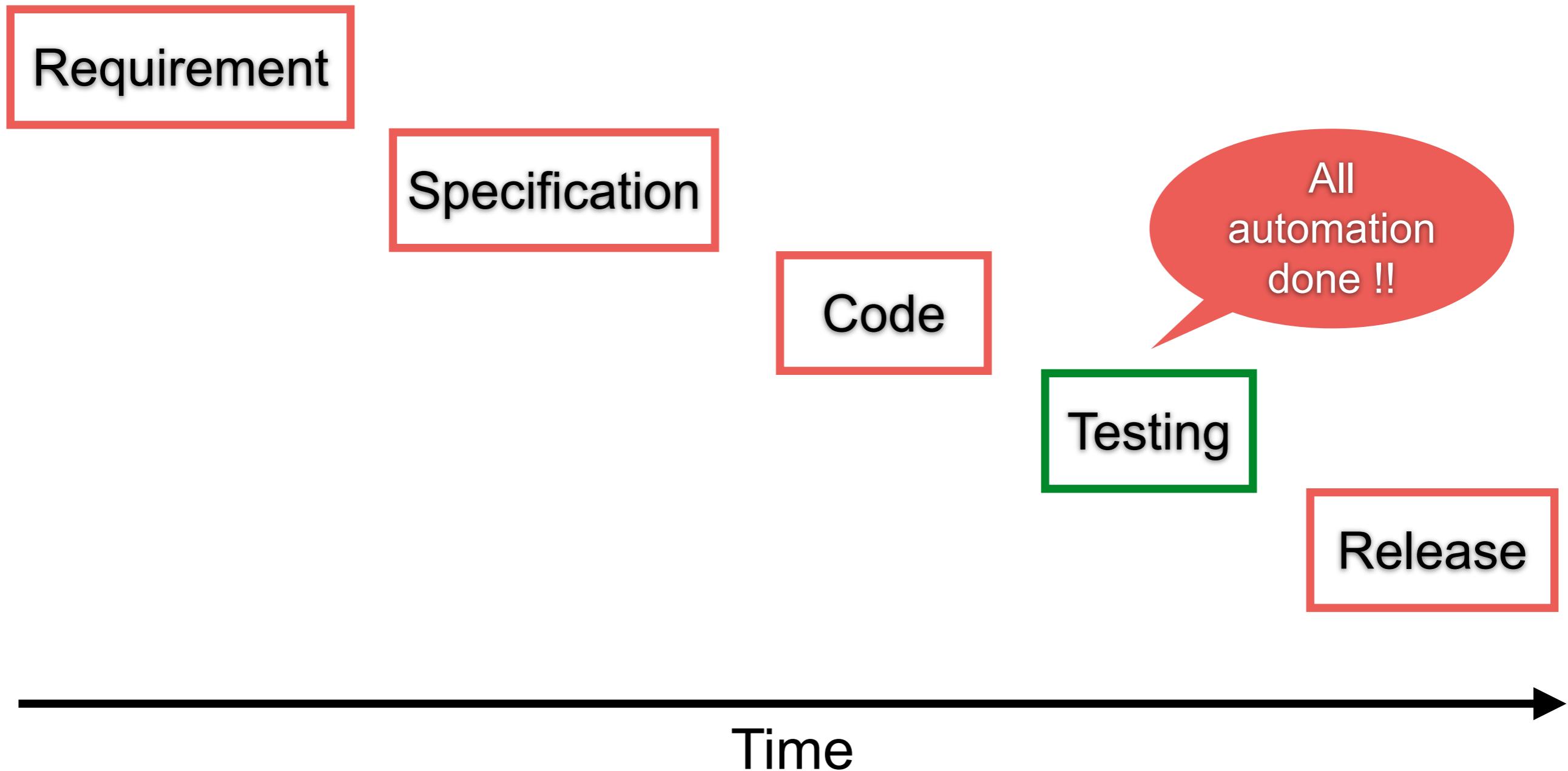
Working with legacy system
Side-effect after changed code
Need new tools, infrastructure and time



Automation Test Strategy

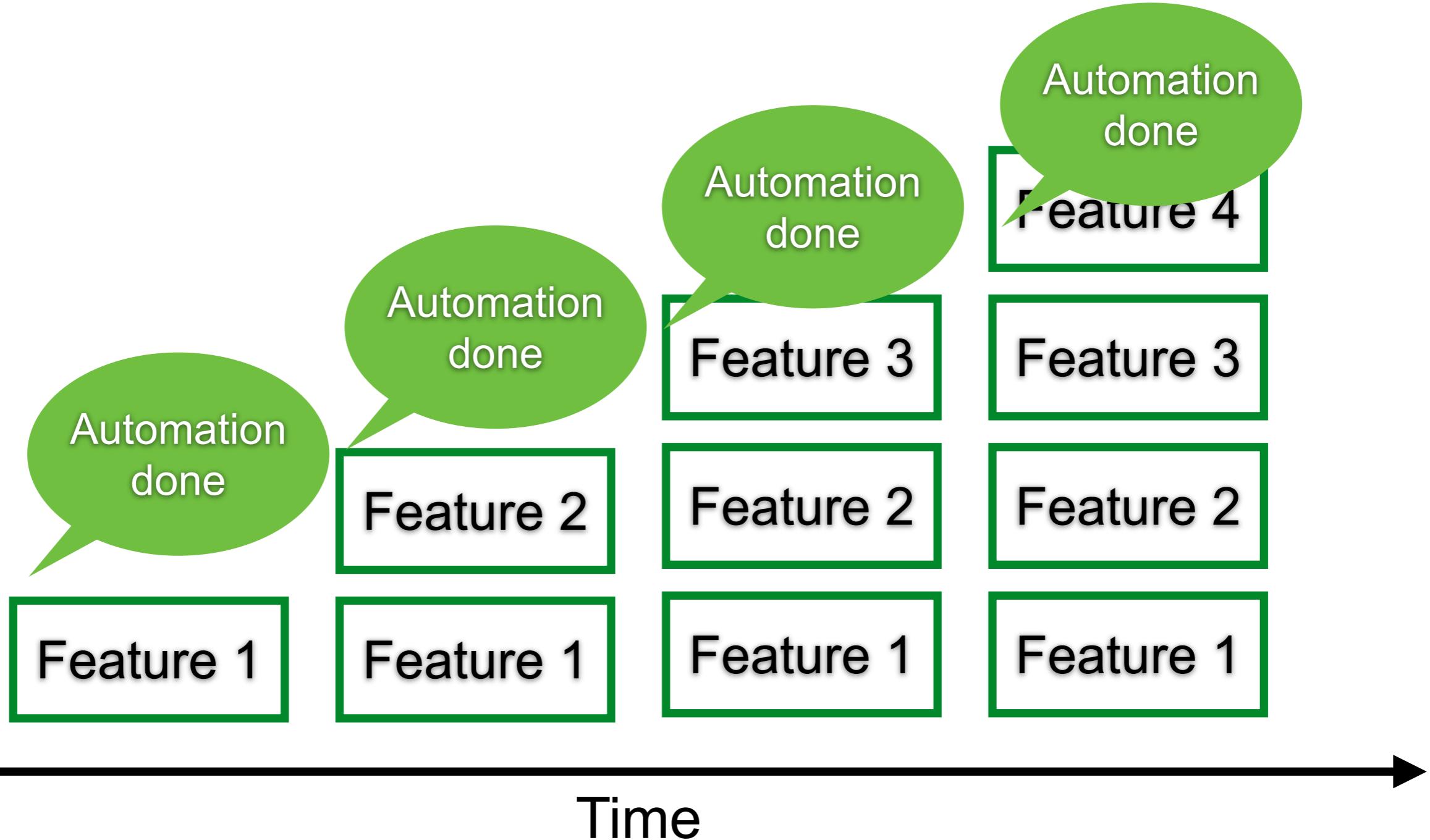


Sequential process

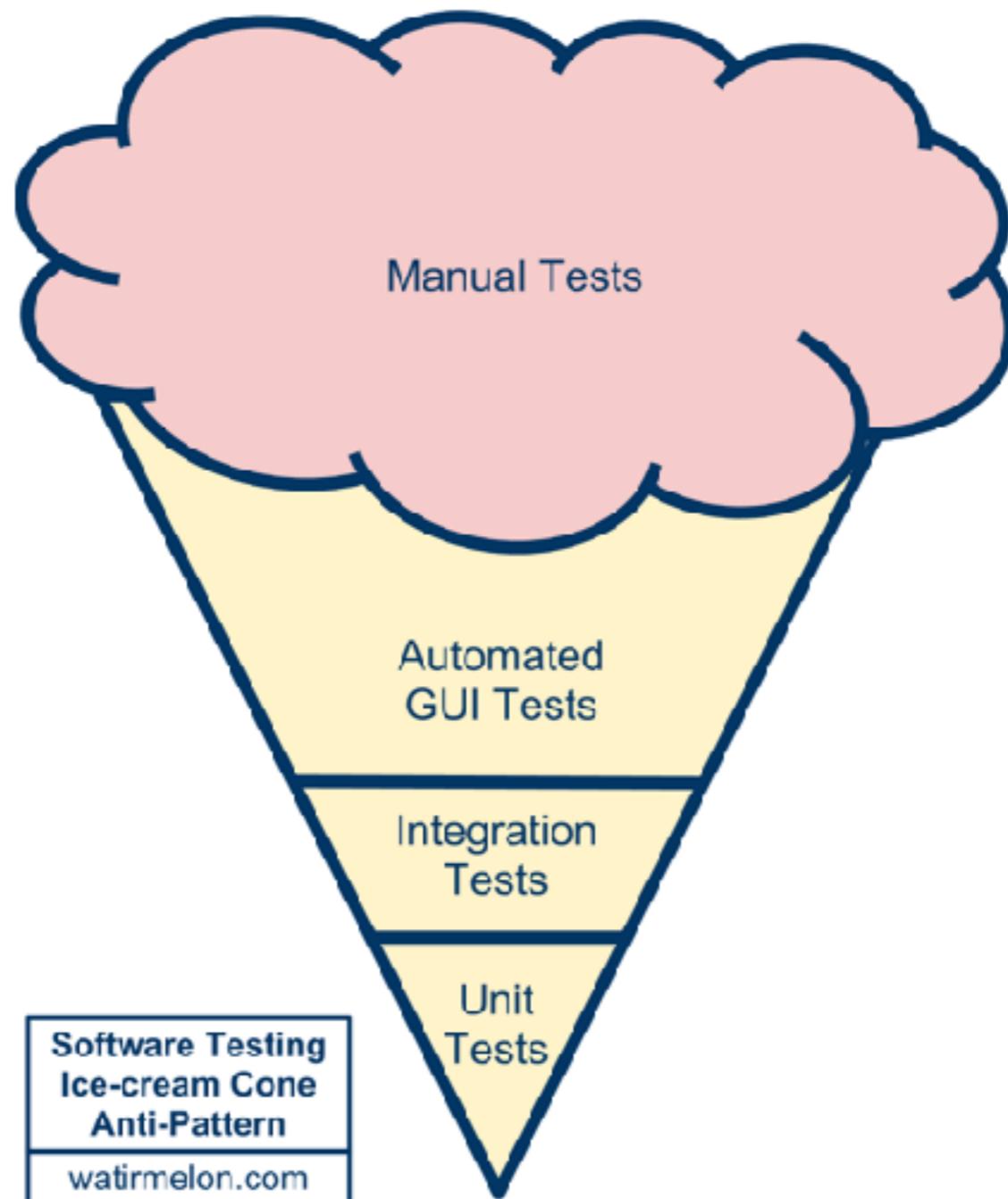


Iterative and incremental process

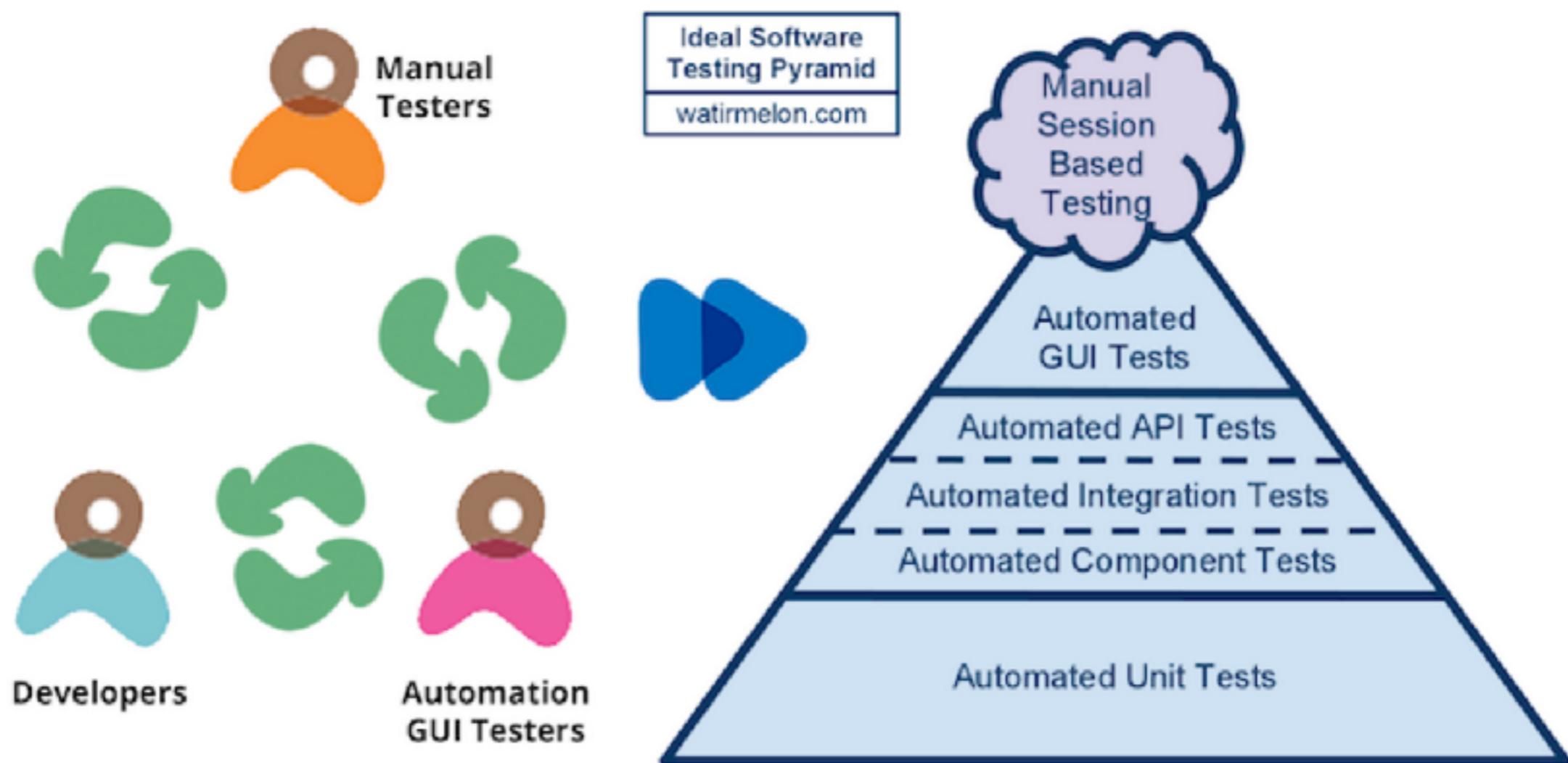
Done = coded and tested



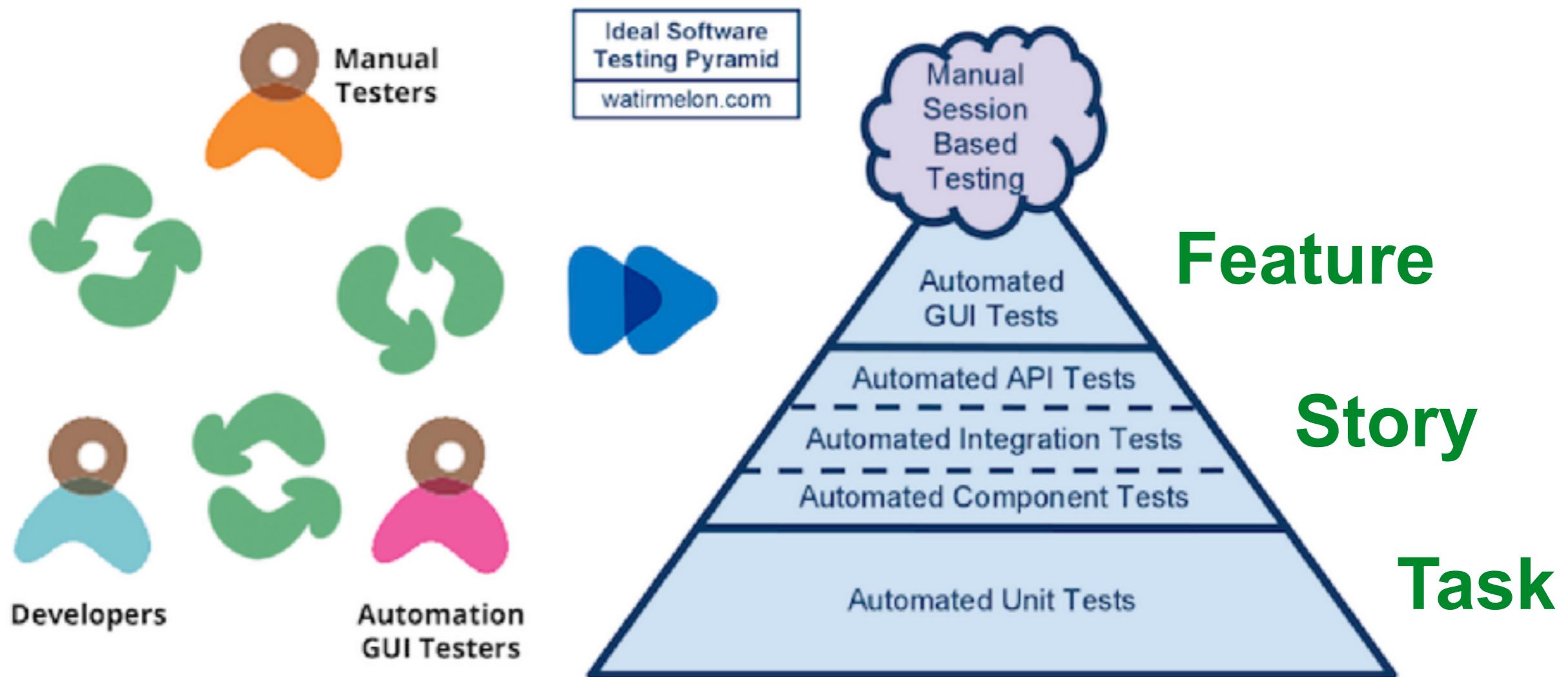
Ice cream testing



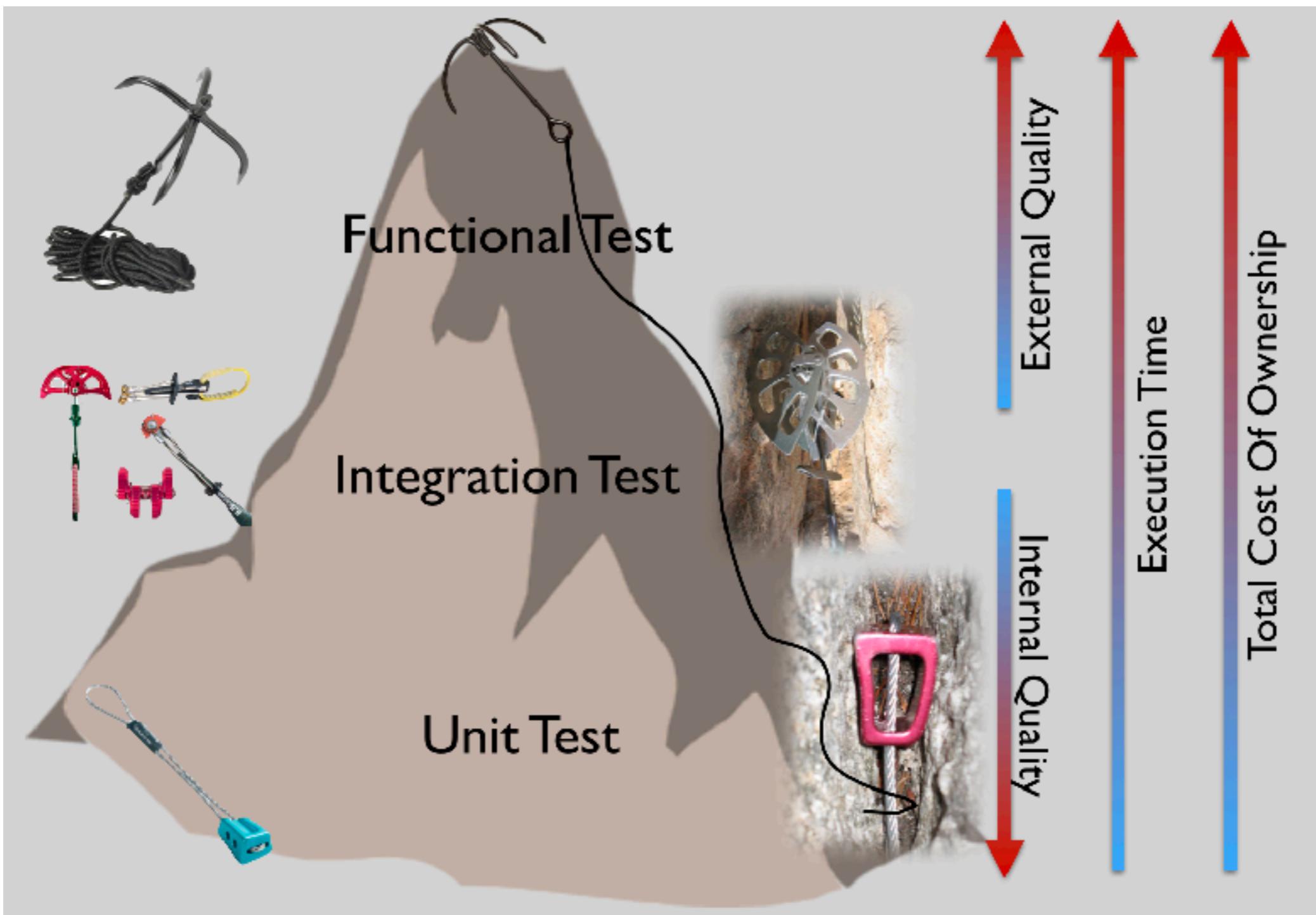
Pyramid testing



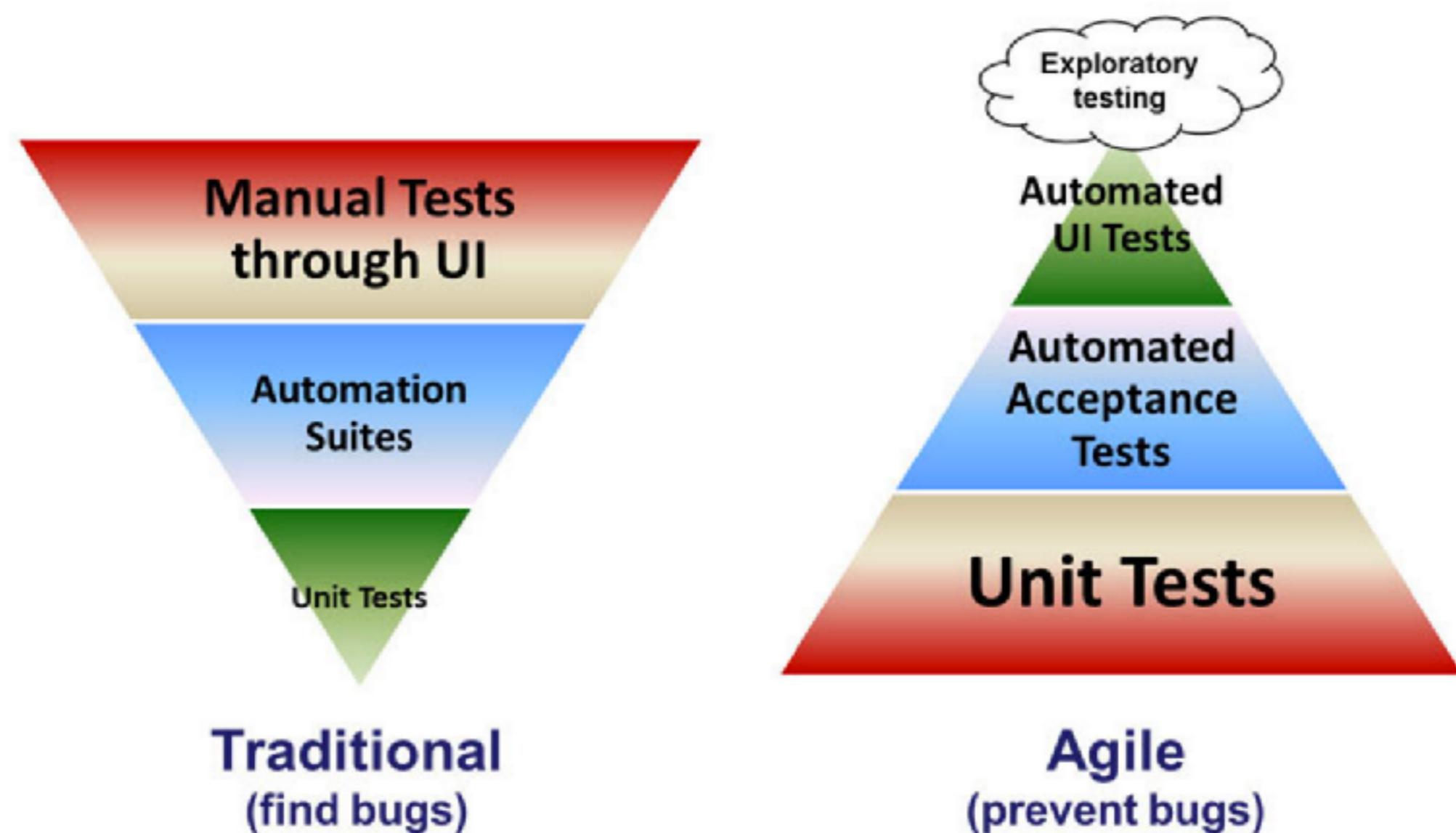
Pyramid testing



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**

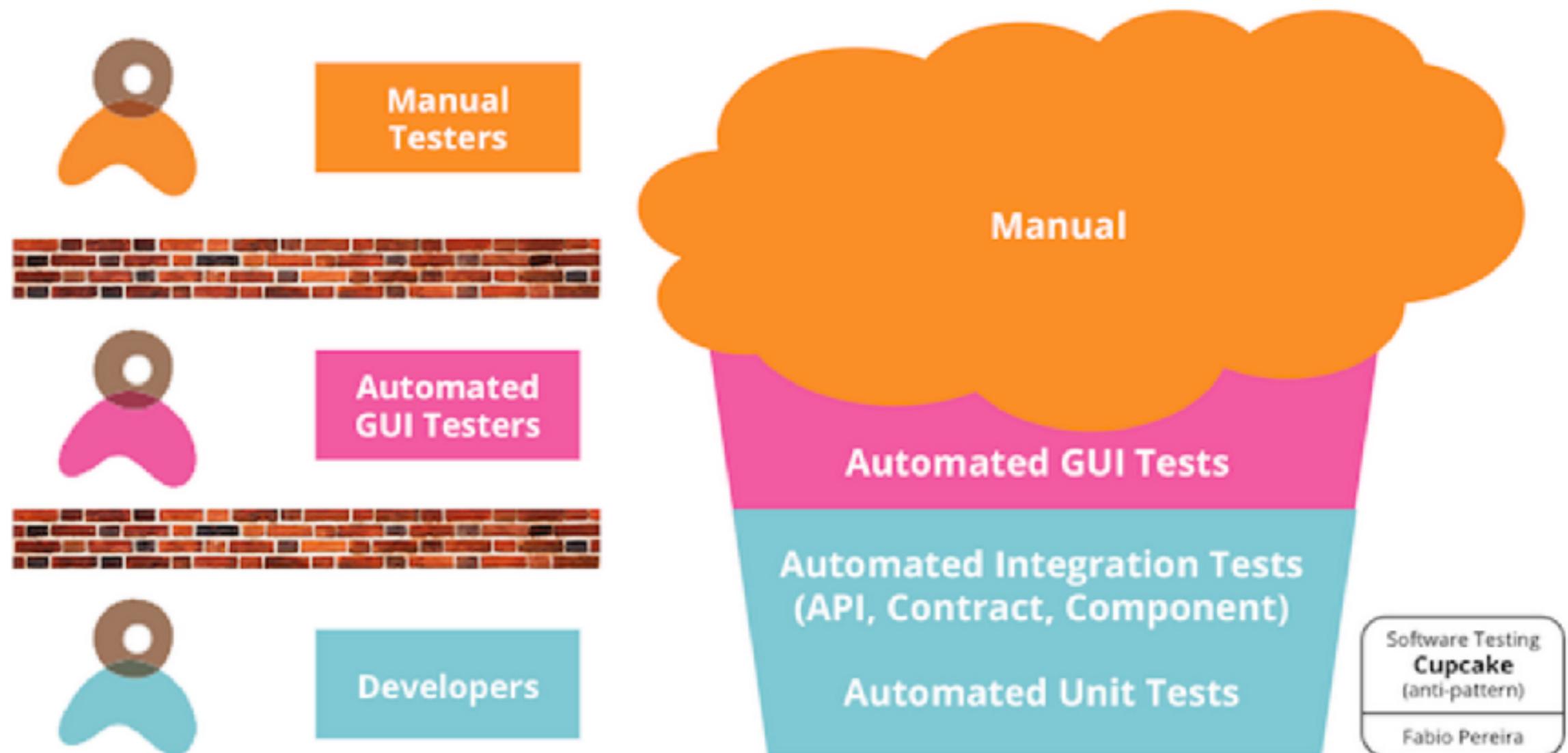
We are here to **break the software**

Think

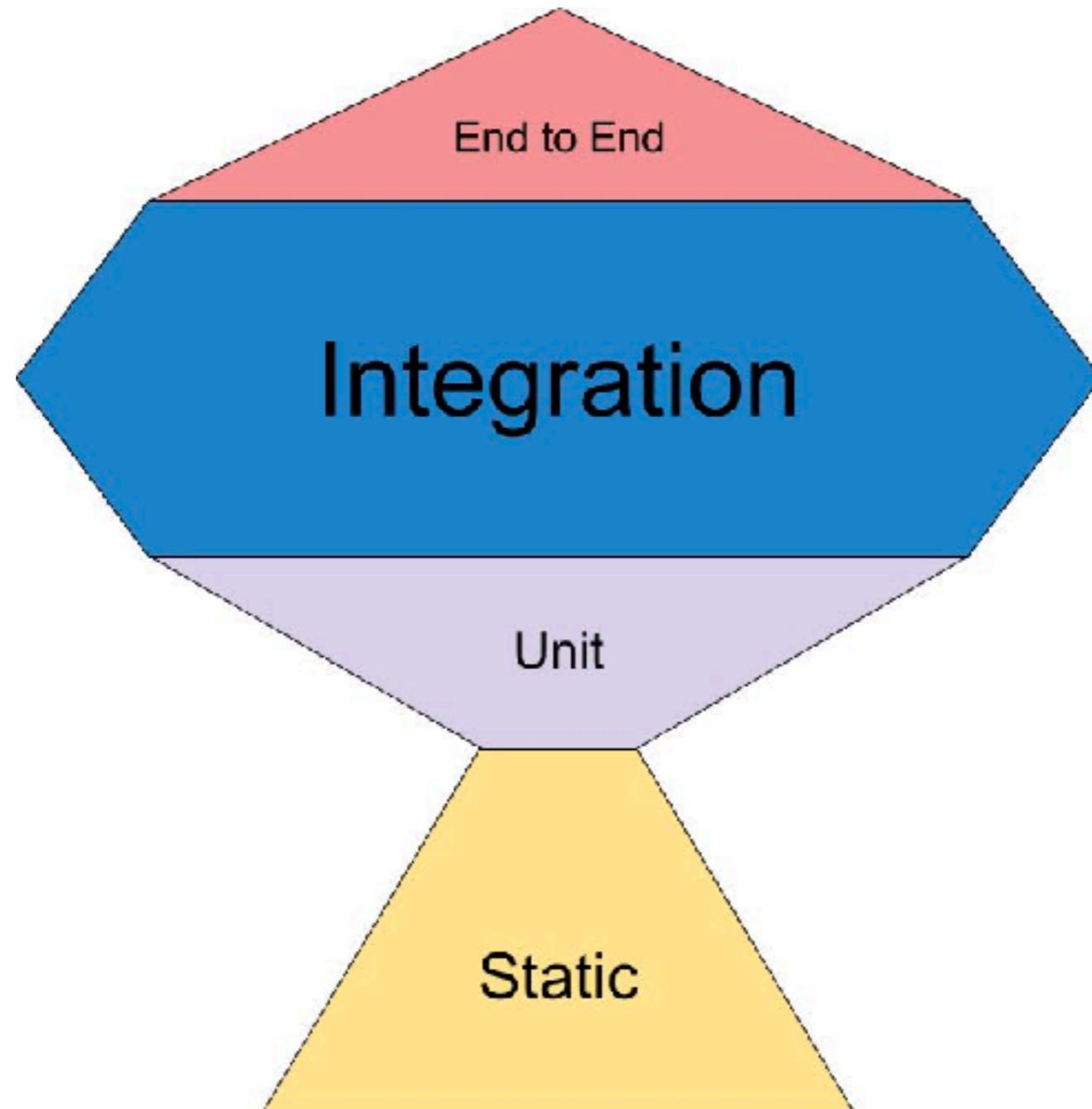
What can I do to help deliver the software
successfully !!



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 ?

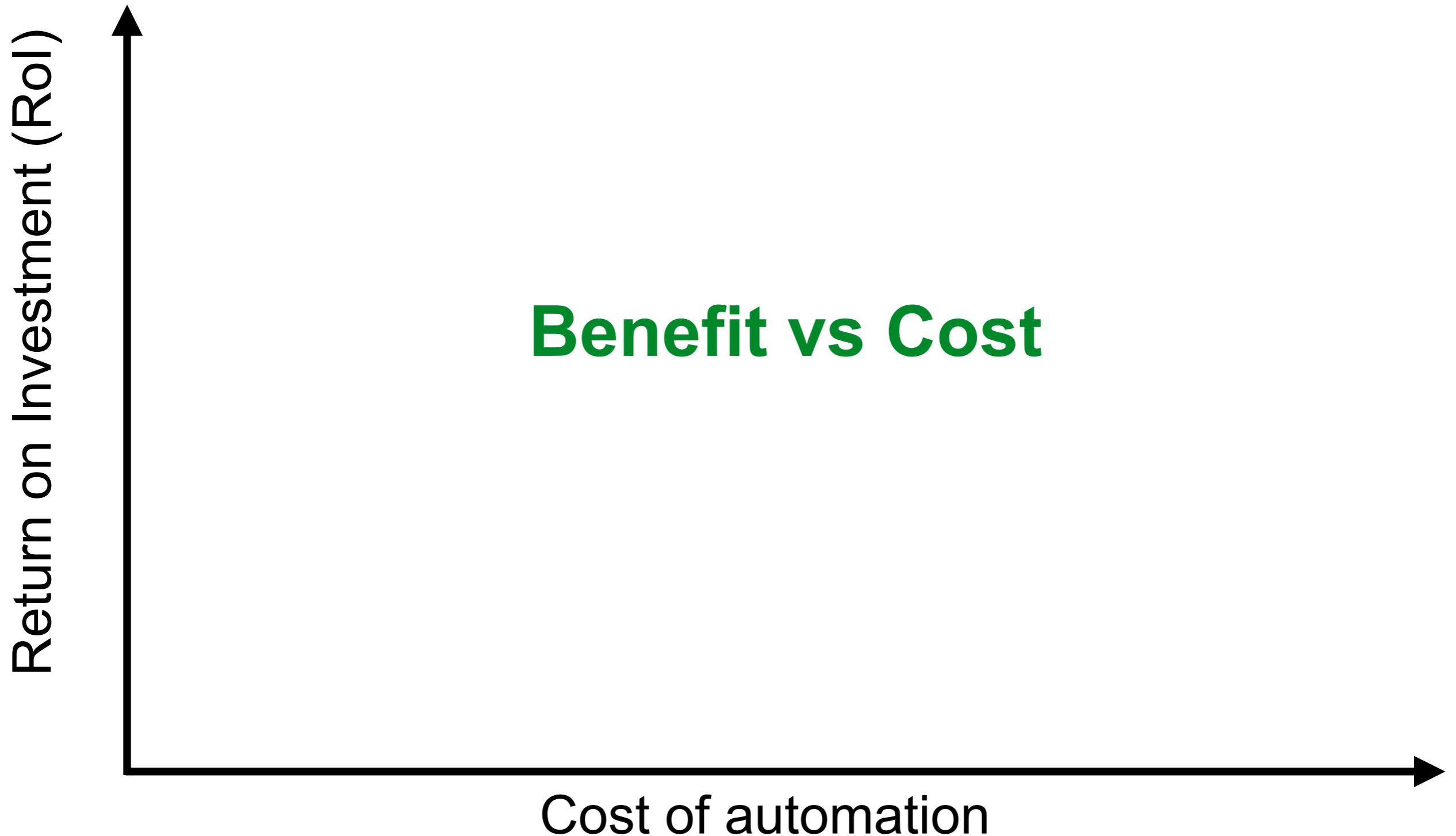


What are the **bigest**
obstacles ?

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

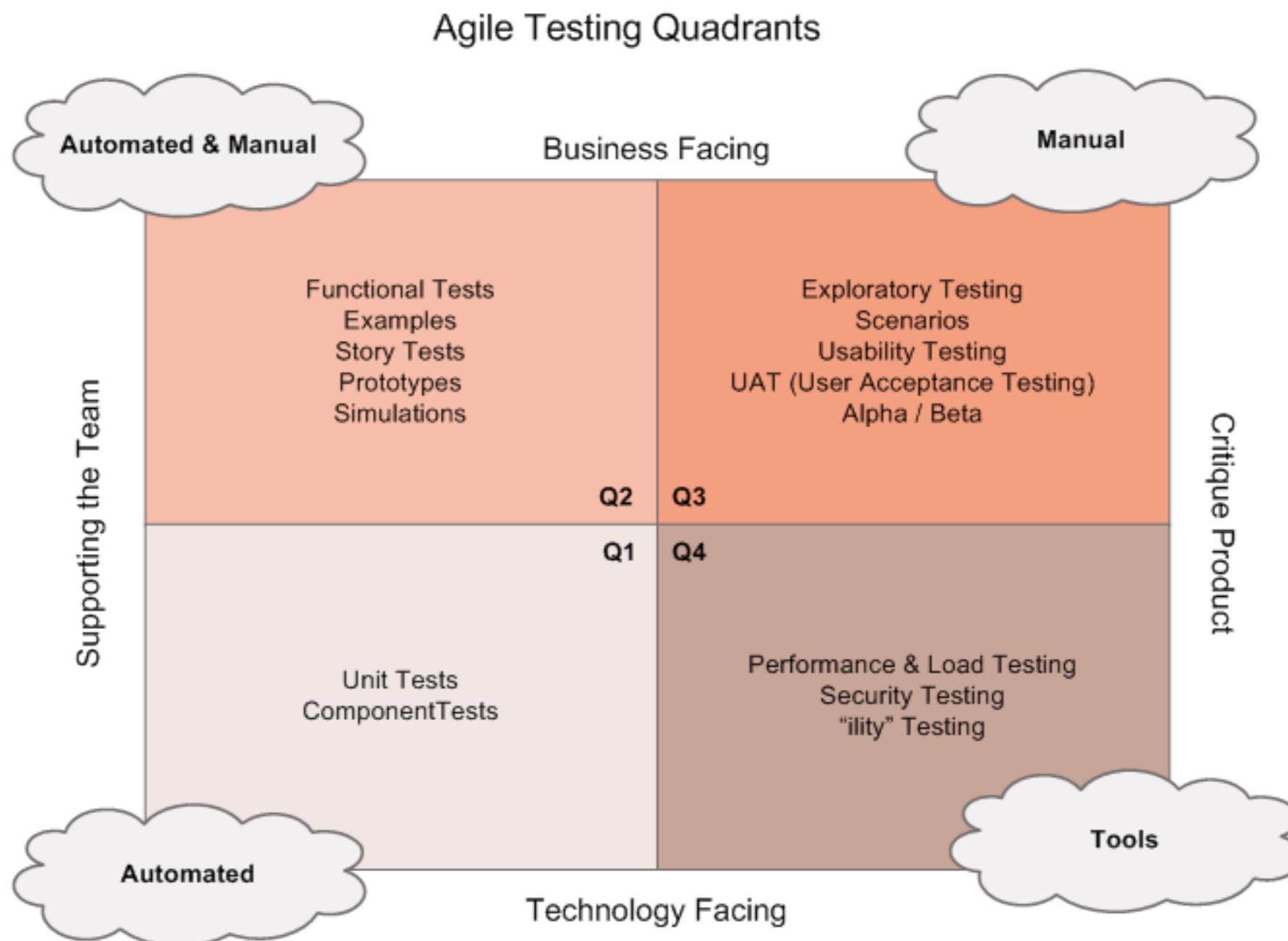


Agile Testing Quadrants

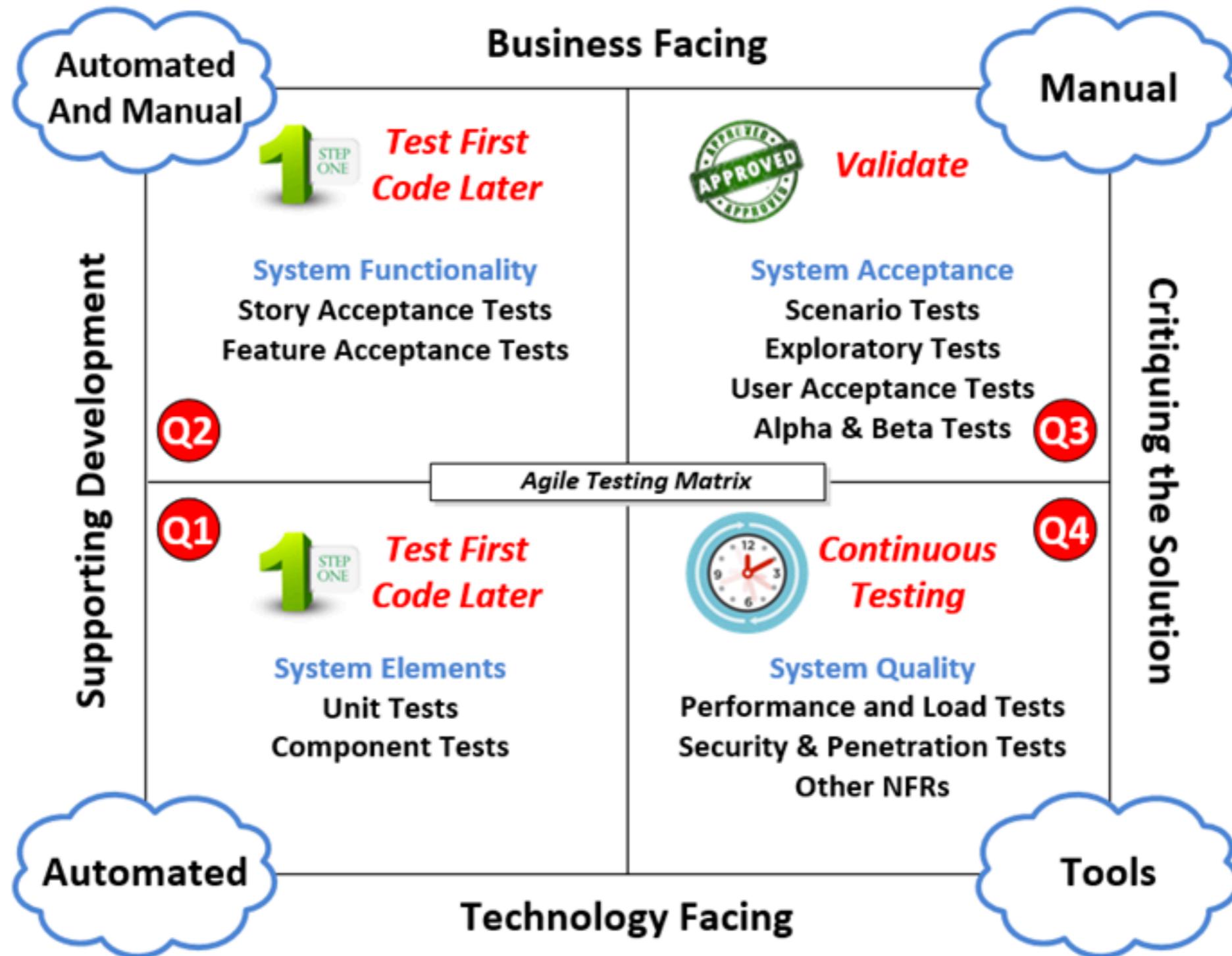
Scope of tests
Classify your tests
Visible your tests



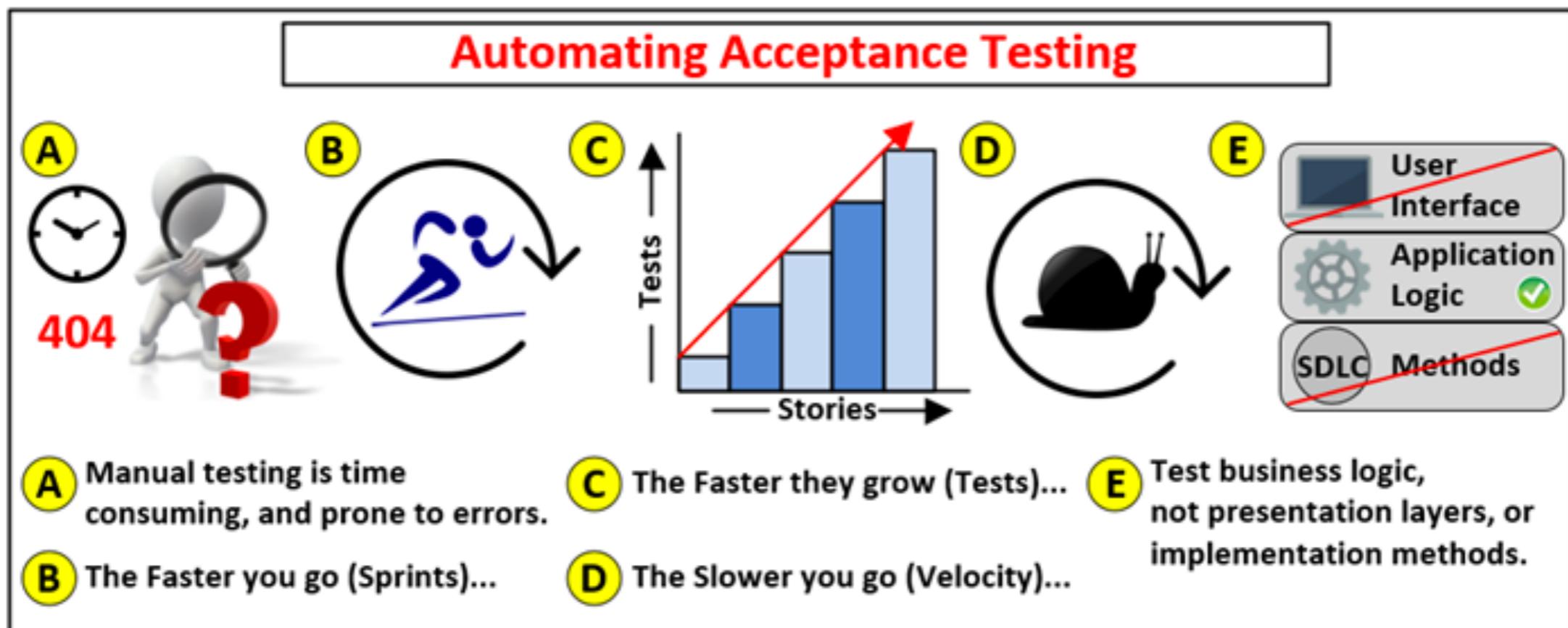
Agile Testing Quadrants



Agile Testing Quadrant



Test automation is essential

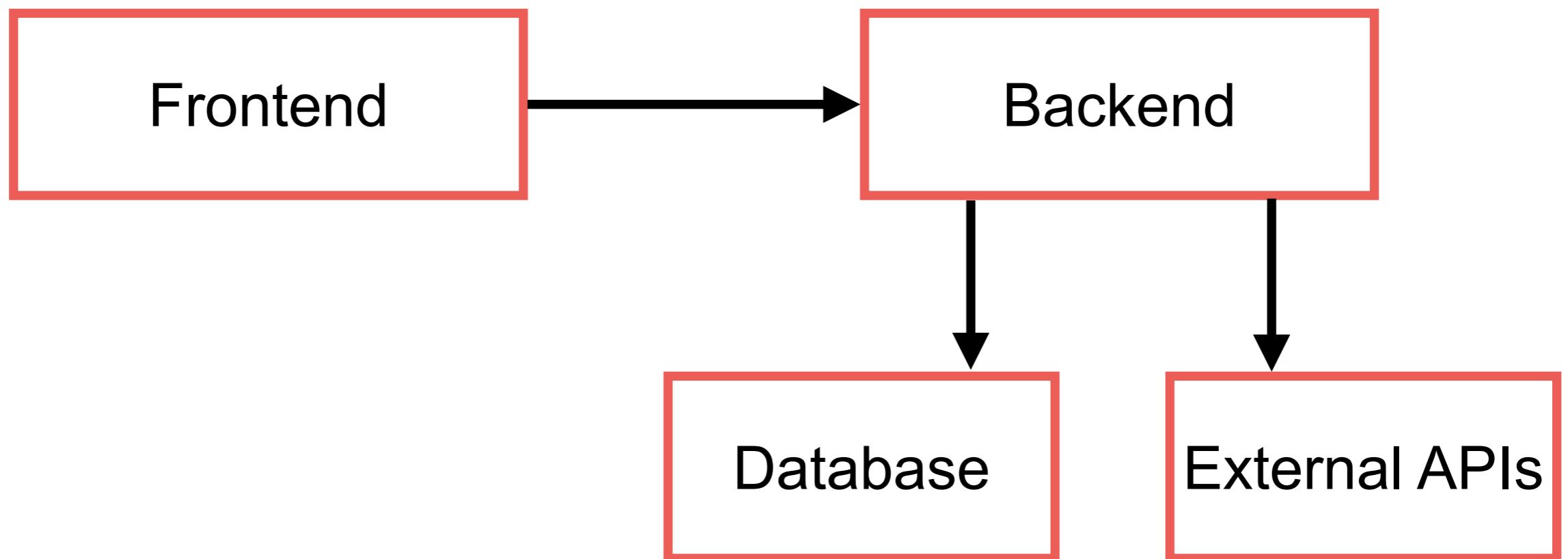


Test Strategy

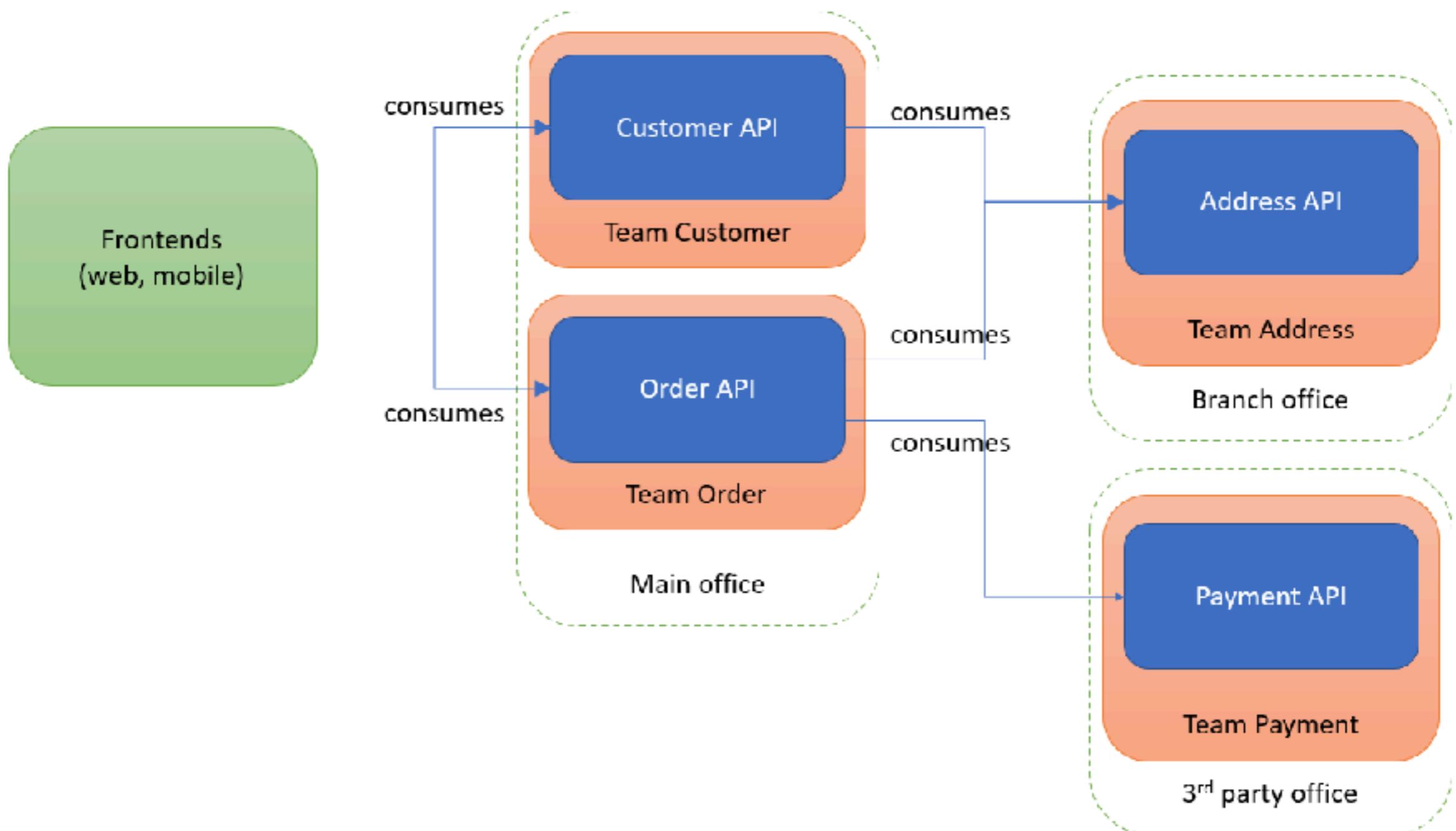
<https://martinfowler.com/articles/microservice-testing/>



Simple Architecture



Complex Architecture

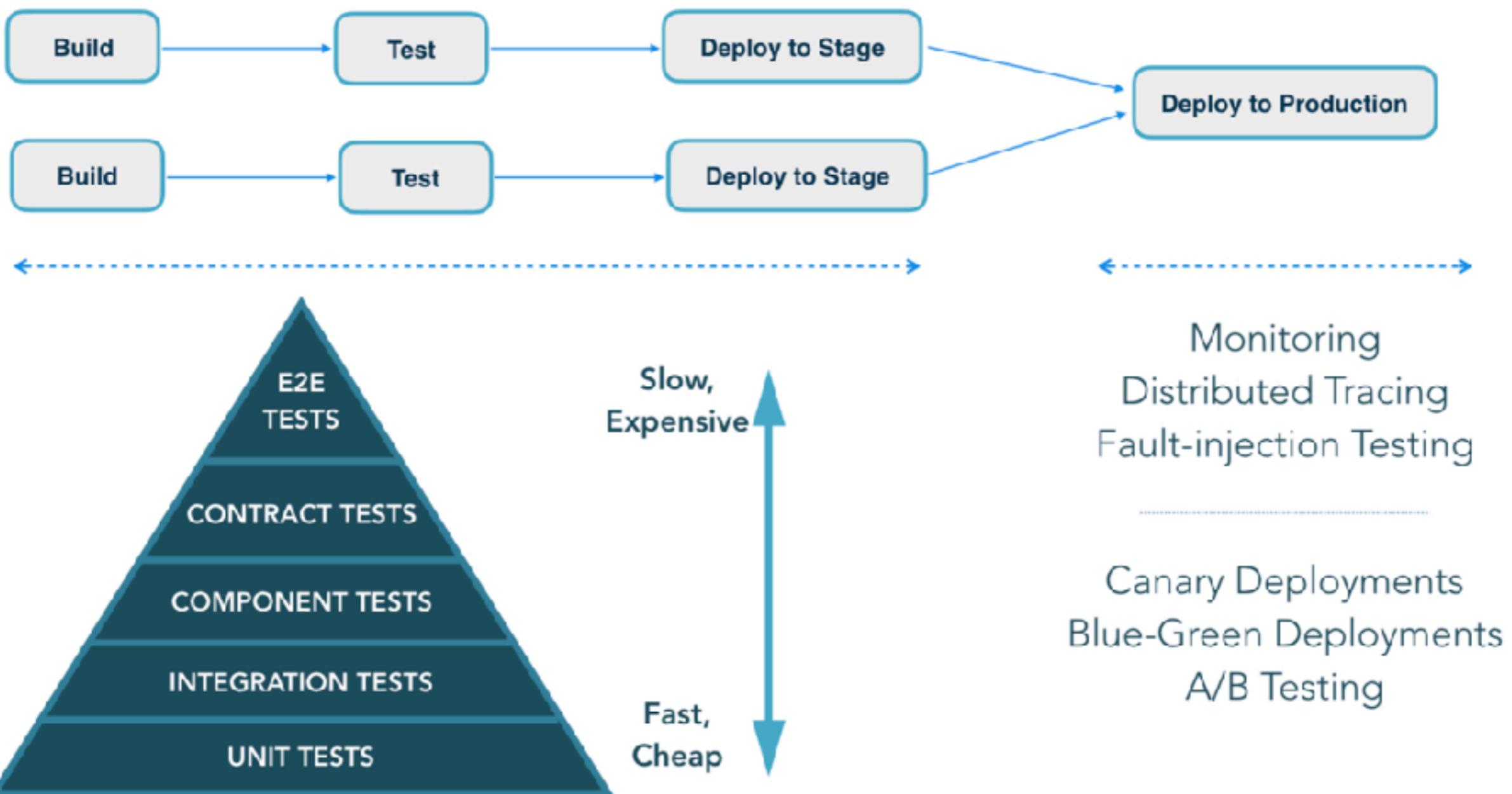


Test Strategy ?

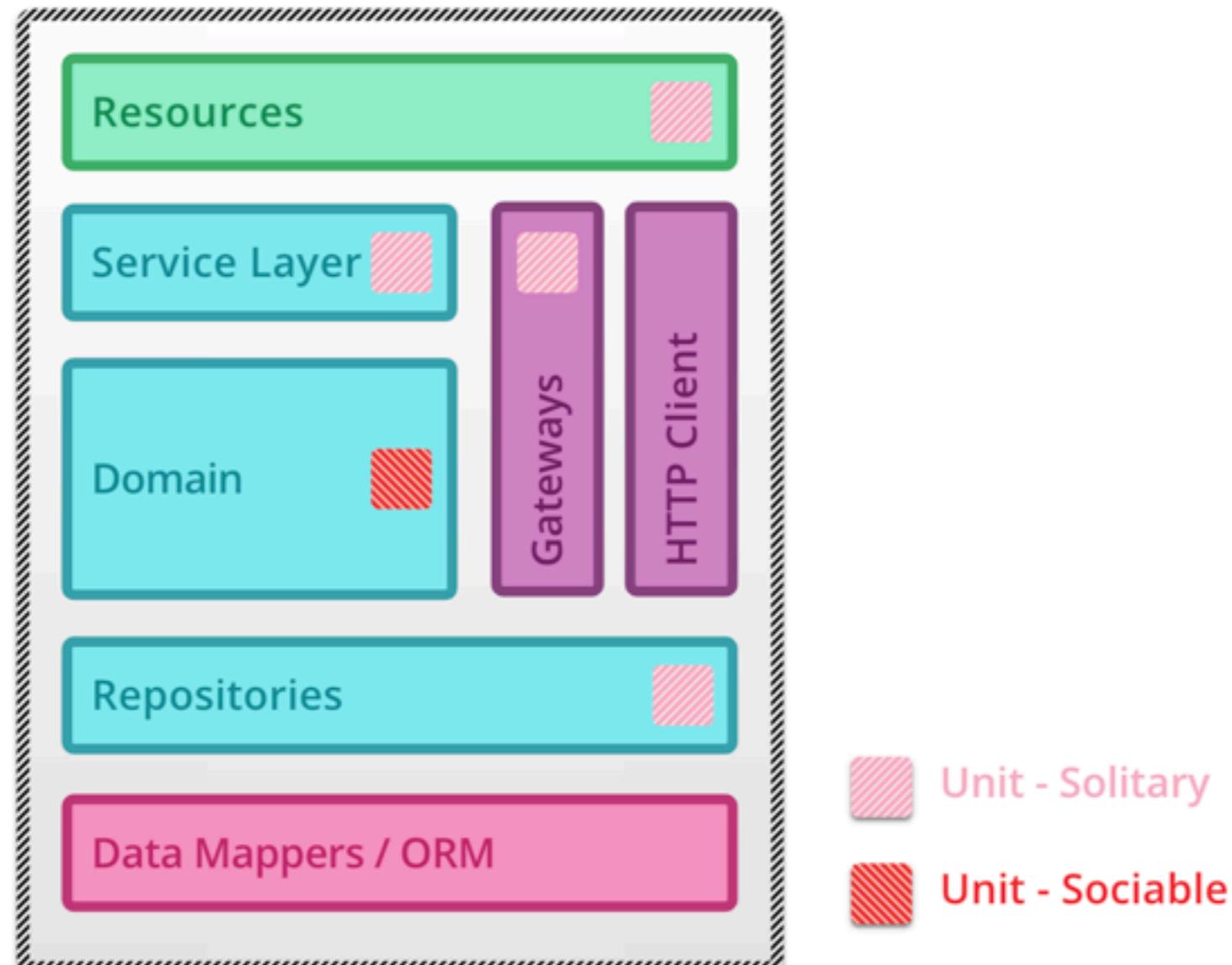
Unit
Integration
Component
Contract
End-to-end



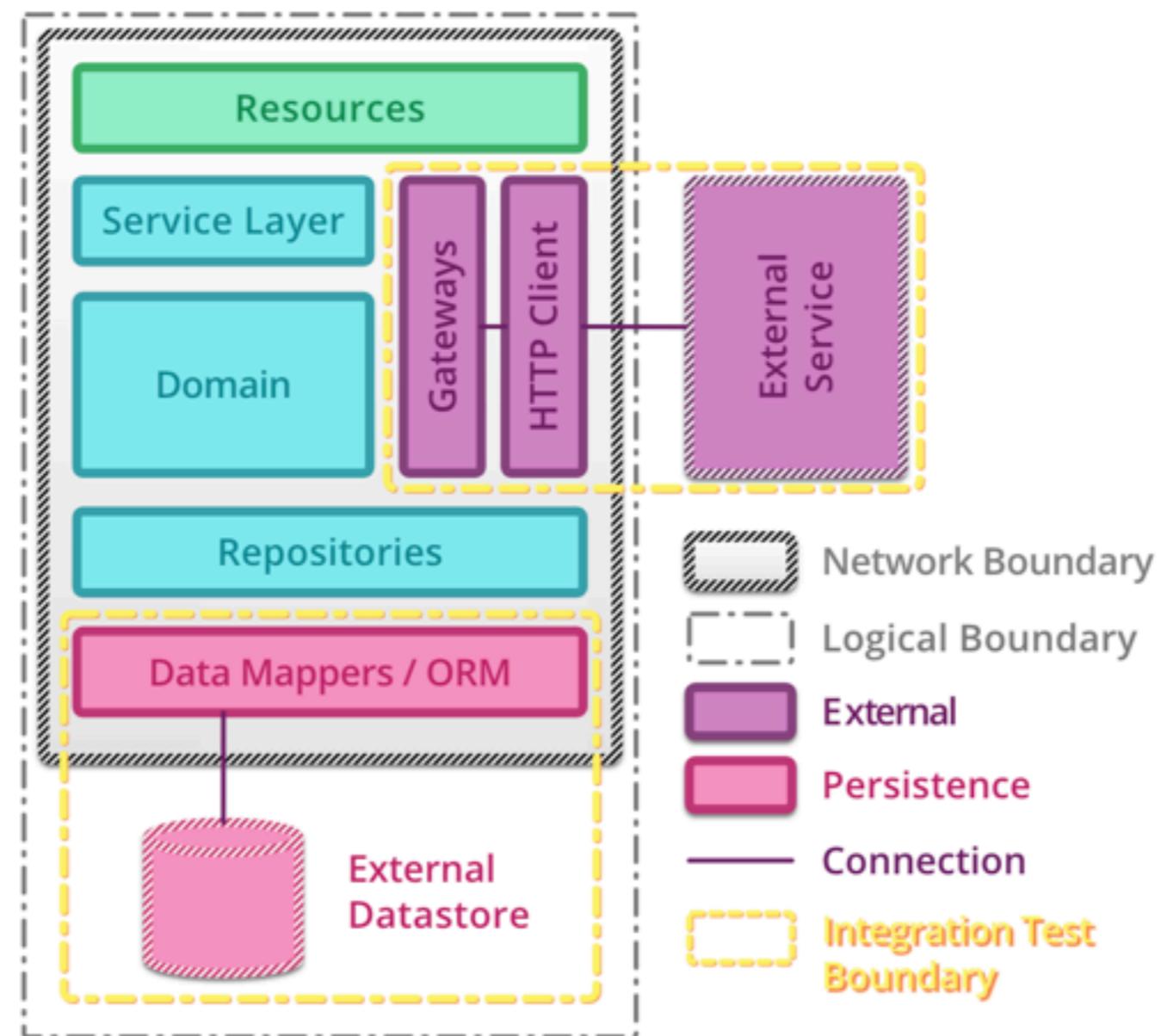
Test Strategy



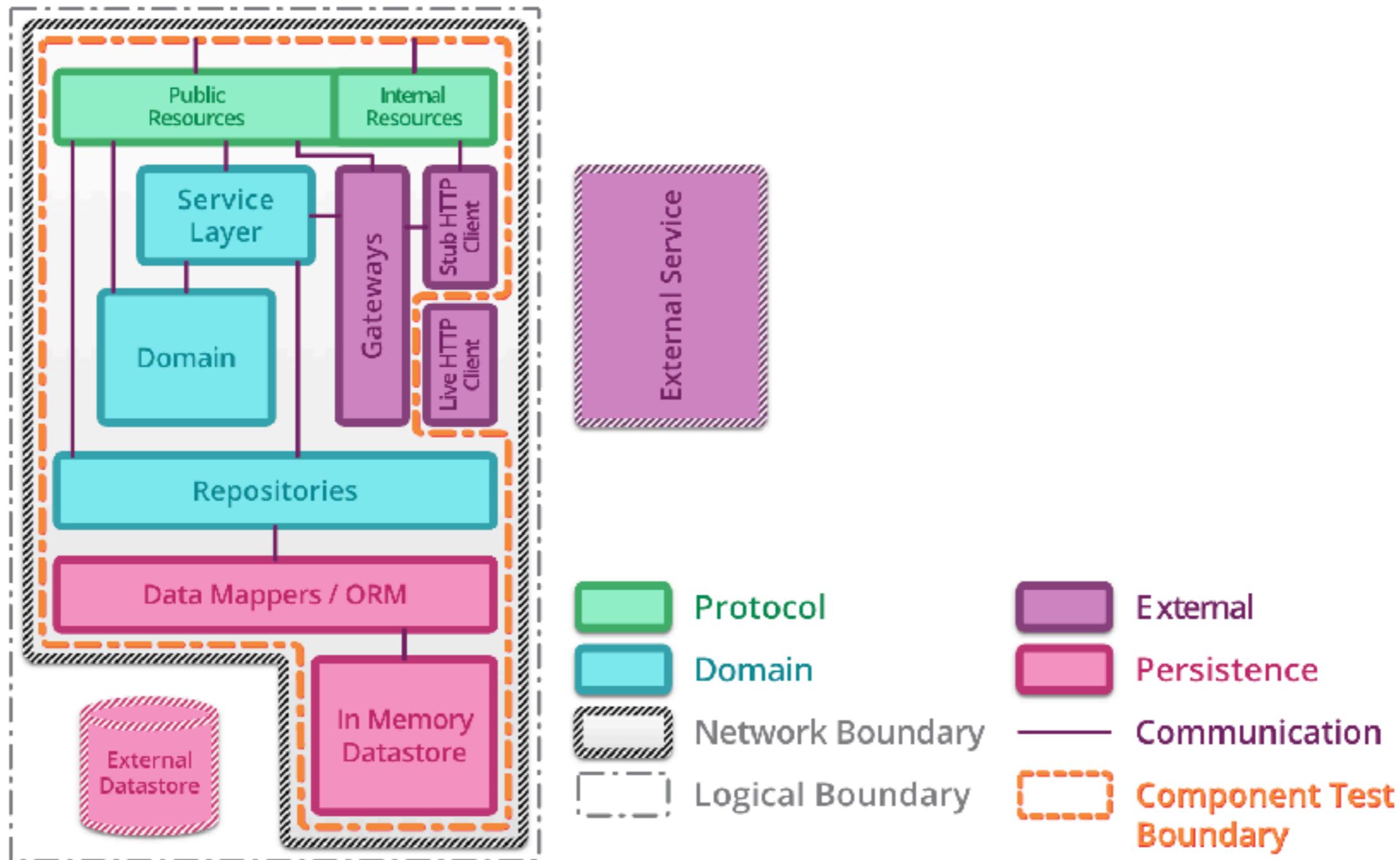
Unit testing



Integration testing



Component testing



Good test ?



Good Test ?

Fast
Isolated/ Independent
Repeatable
Self-validation
Timely

Human understand



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

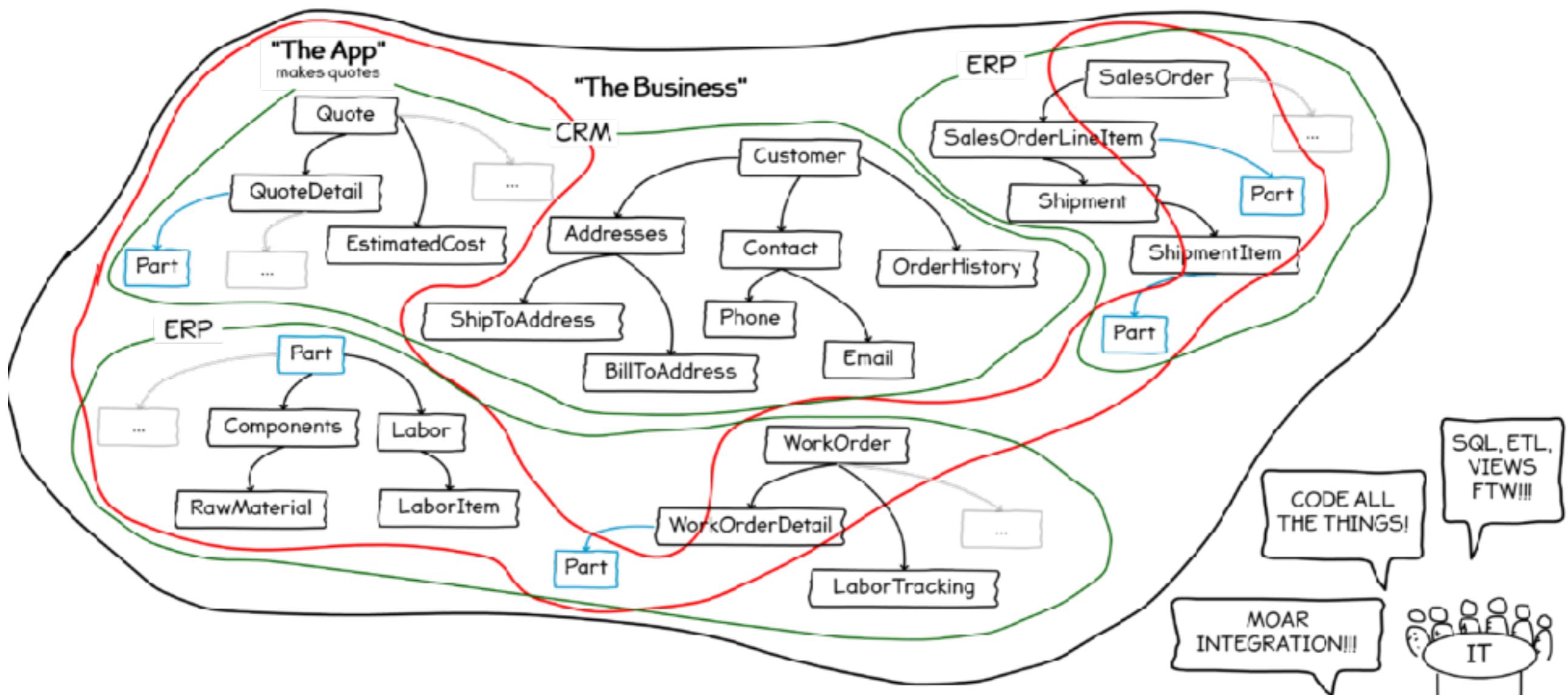
Use production-like data

Need to control your data test



Systems impacts

Know your systems



Automation feedback !!

Easier over time ?

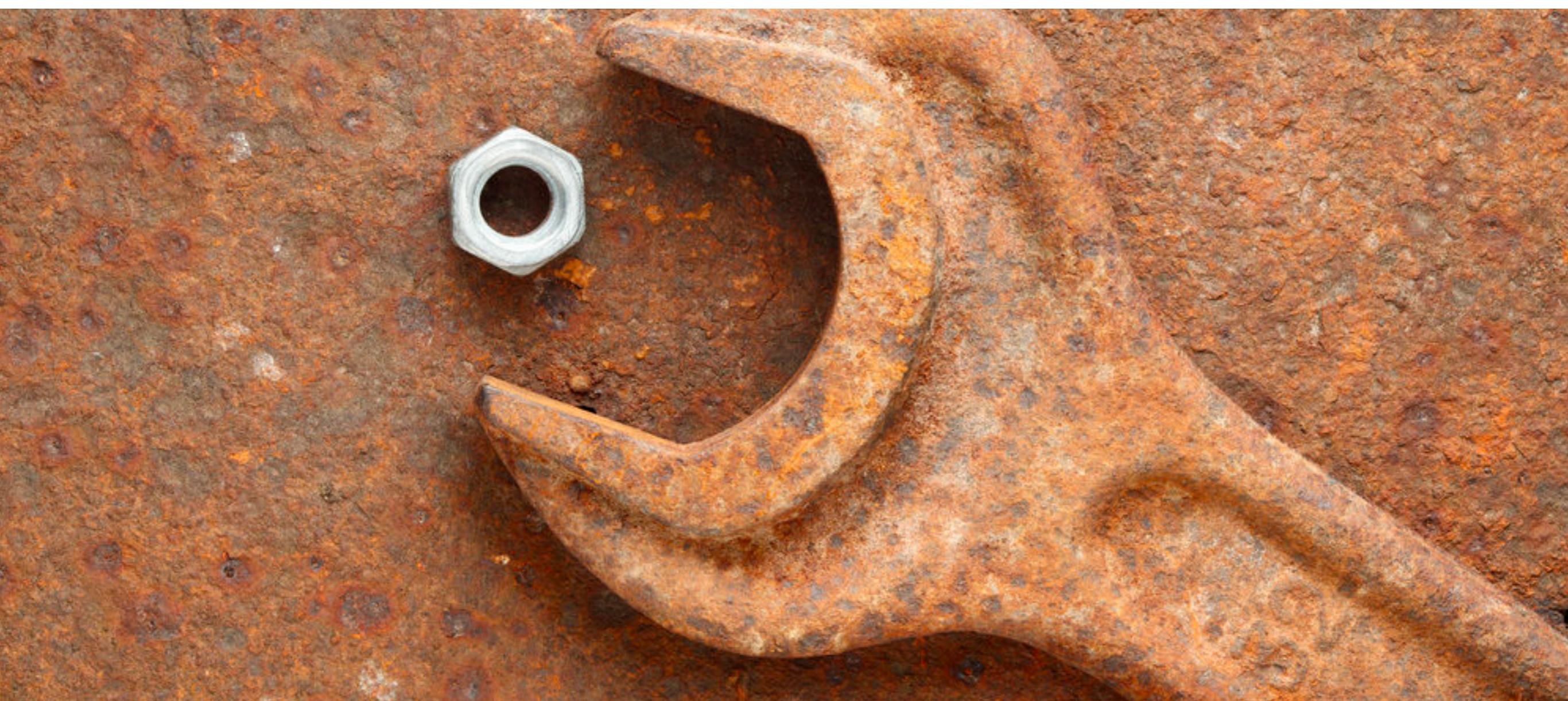
Time spent on maintenance ?
Test find regression bugs ?



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

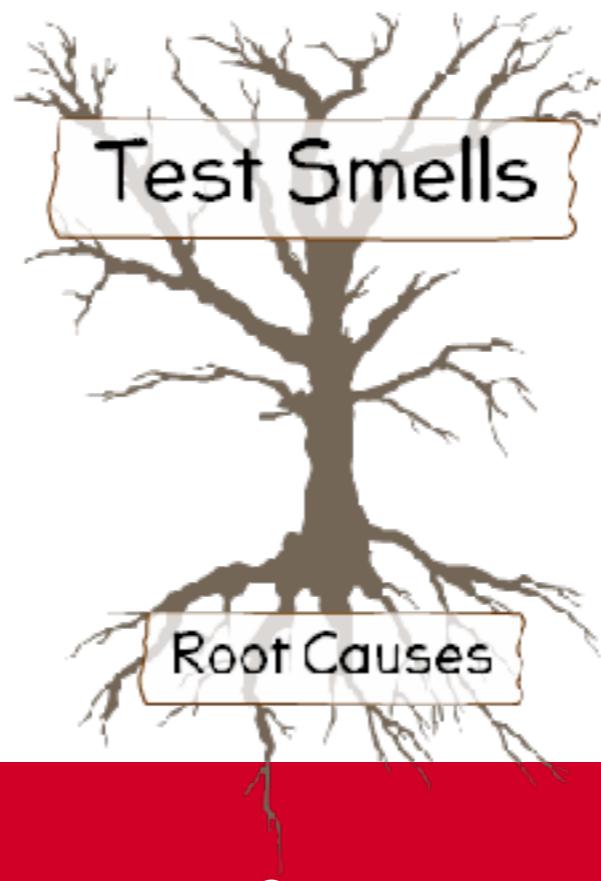
Use source control

Continuous integration to run tests on every change

Keep all tests passed

Analyse failures tests

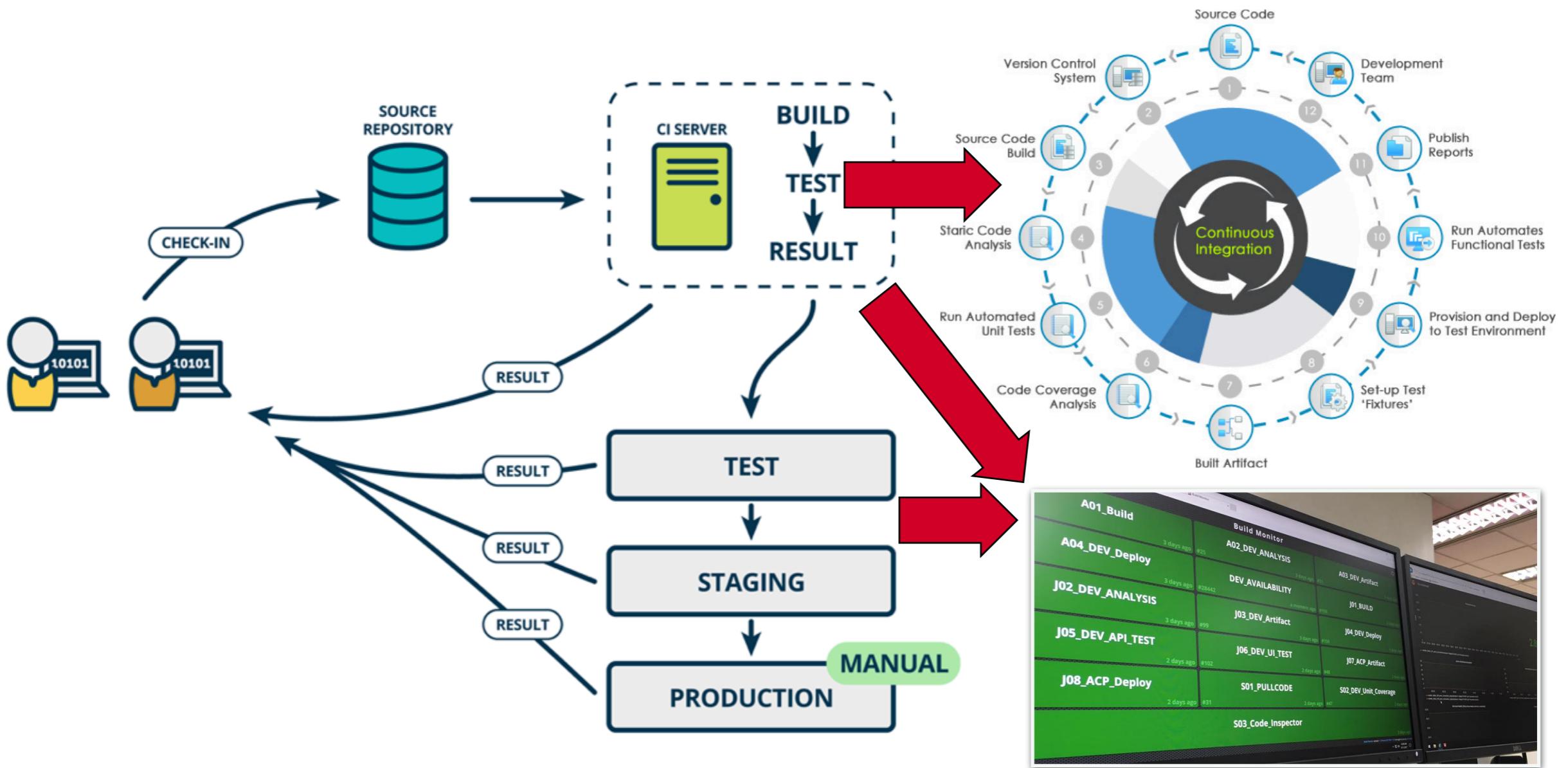
Create test standard



Continuous integration



Continuous integration



Build & Test Results Dashboard



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 ?

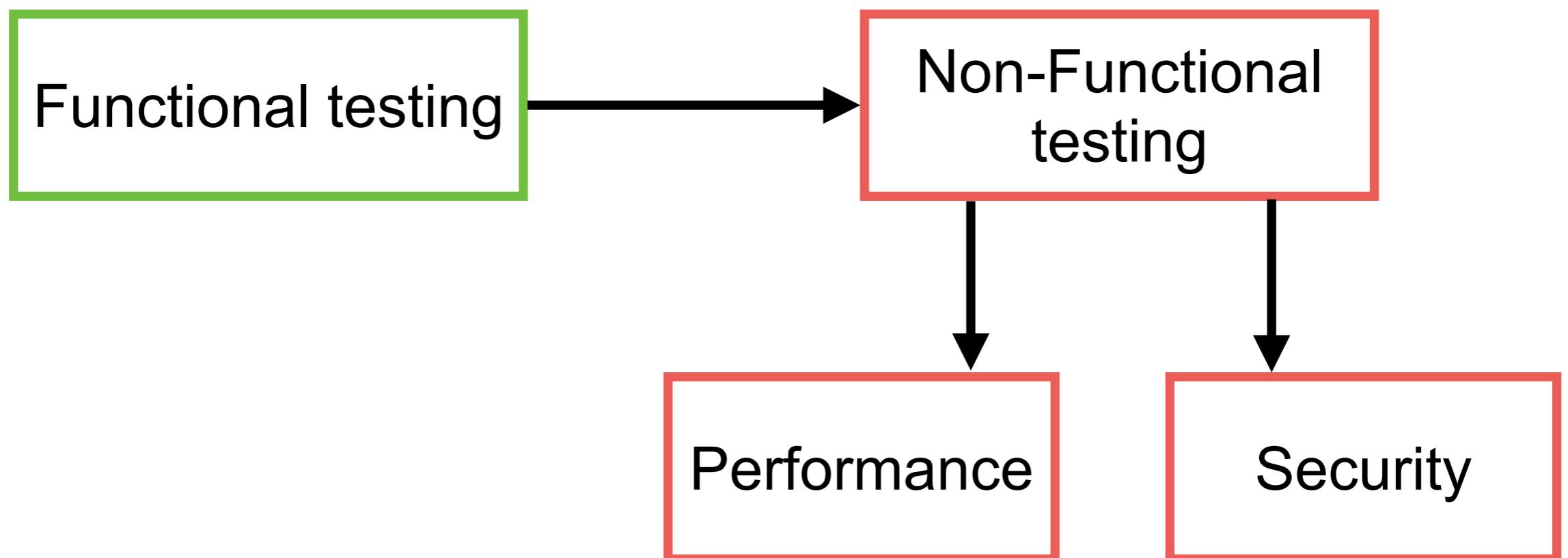
Not necessary if you have zero
Necessary for distributed teams
Necessary for legacy system
Look for trends



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

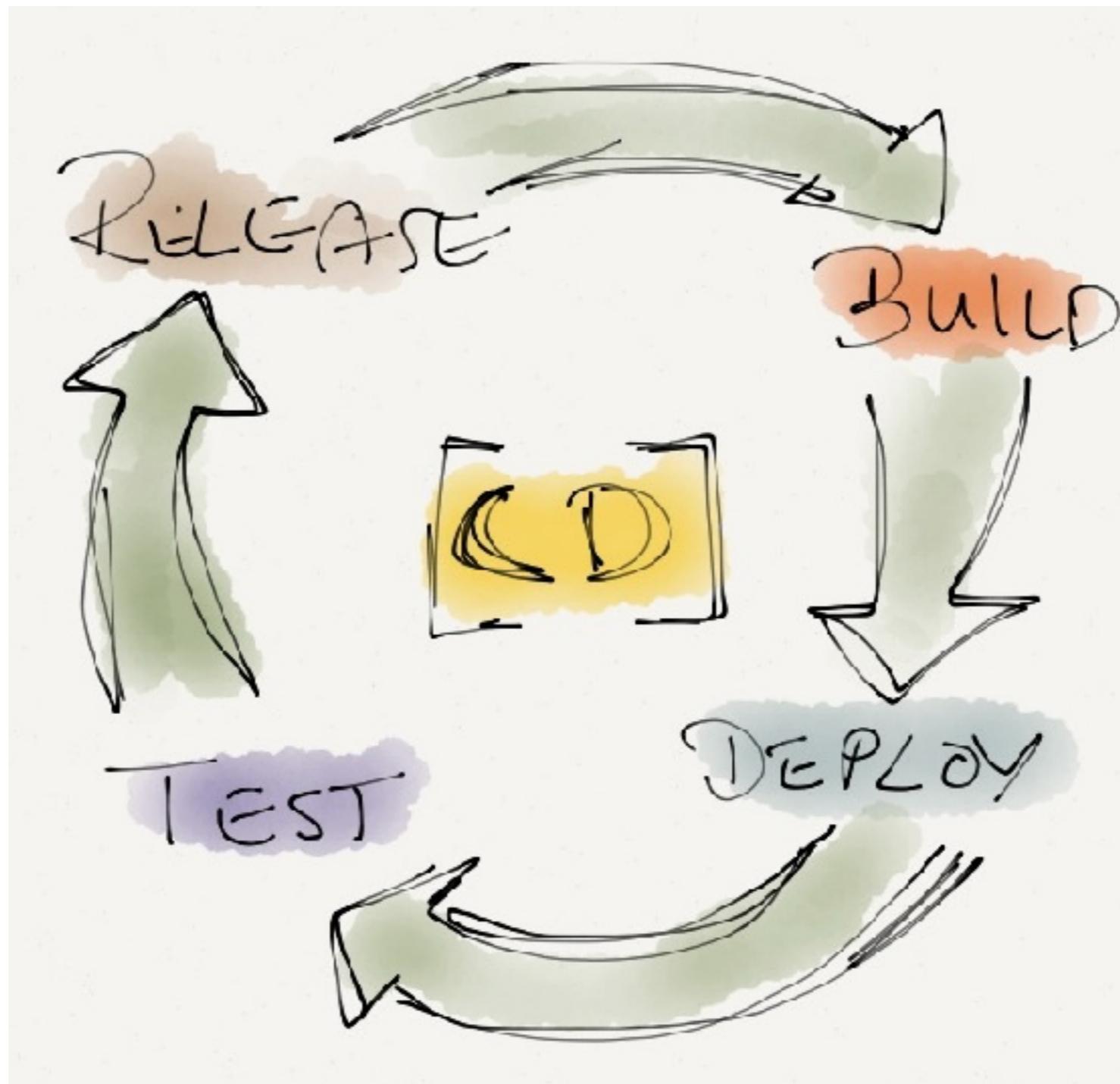
Test strategic
Selection

Continuous
training

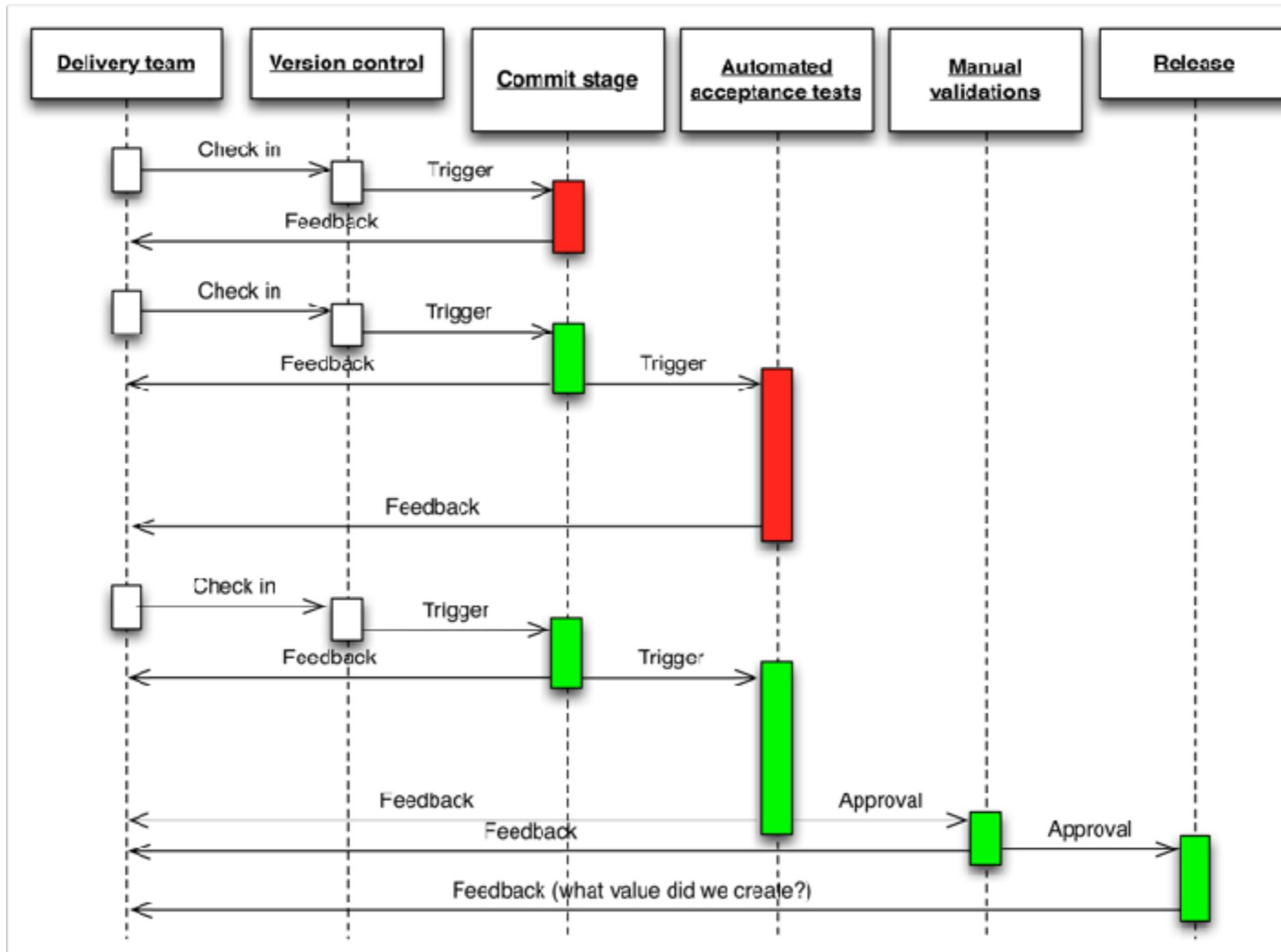
Review



Release and Deployment



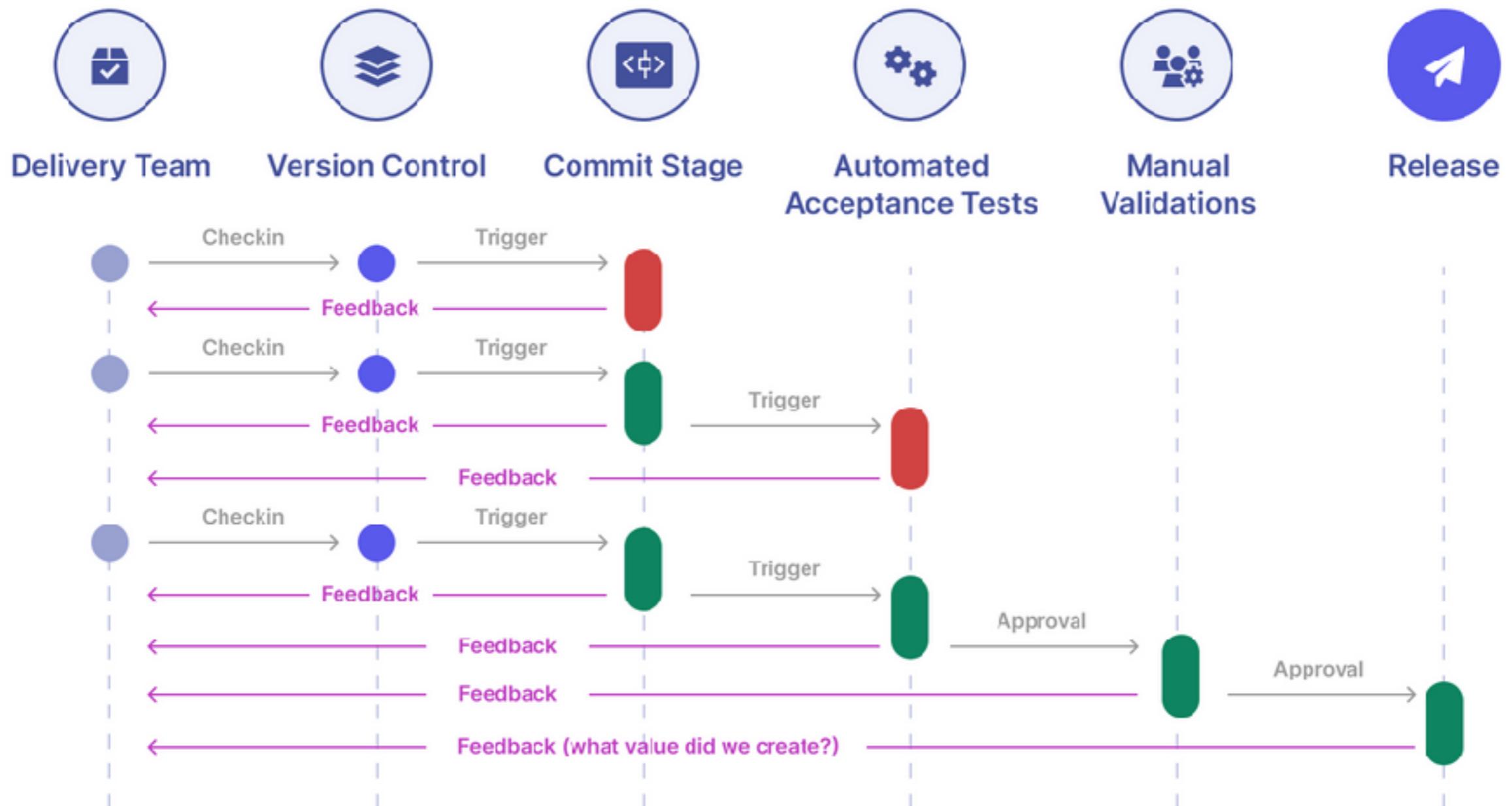
Delivery pipeline



<https://continuousdelivery.com/foundations/test-automation/>



Delivery pipeline



<https://katalon.com/resources-center/blog/ci-cd-introduction>



Q/A

