Testing with Agile Strategies

Michael Gildein

Agenda

- Agile Refresher
- Agile Testing
- Devops

Agile Refresher

Agile Model

Iterate
- Iterate often and in small chunks
- Iterations last 2-4 weeks

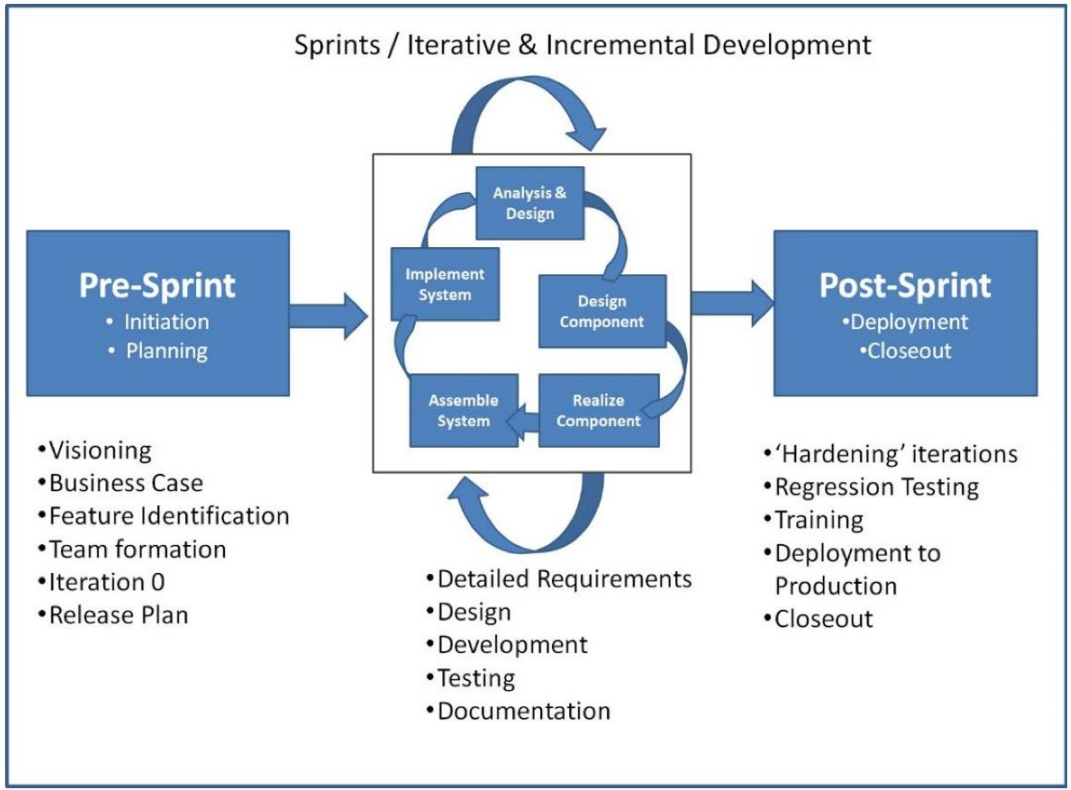
Teams
- Focused cross-functional teams
  - 2 pizza box sized (4-10)
- Dev and test together

Value
- Collaboration w/ customer
- Value working code over doc
- Adaptation over planning
- Automation is key

Pros
- Short time to market
- Constant feedback
- Good for small teams
- Projects with change
- Less doc

Cons
- Increased test efforts
- Need seasoned dev
- Focused teams

Agile Cycle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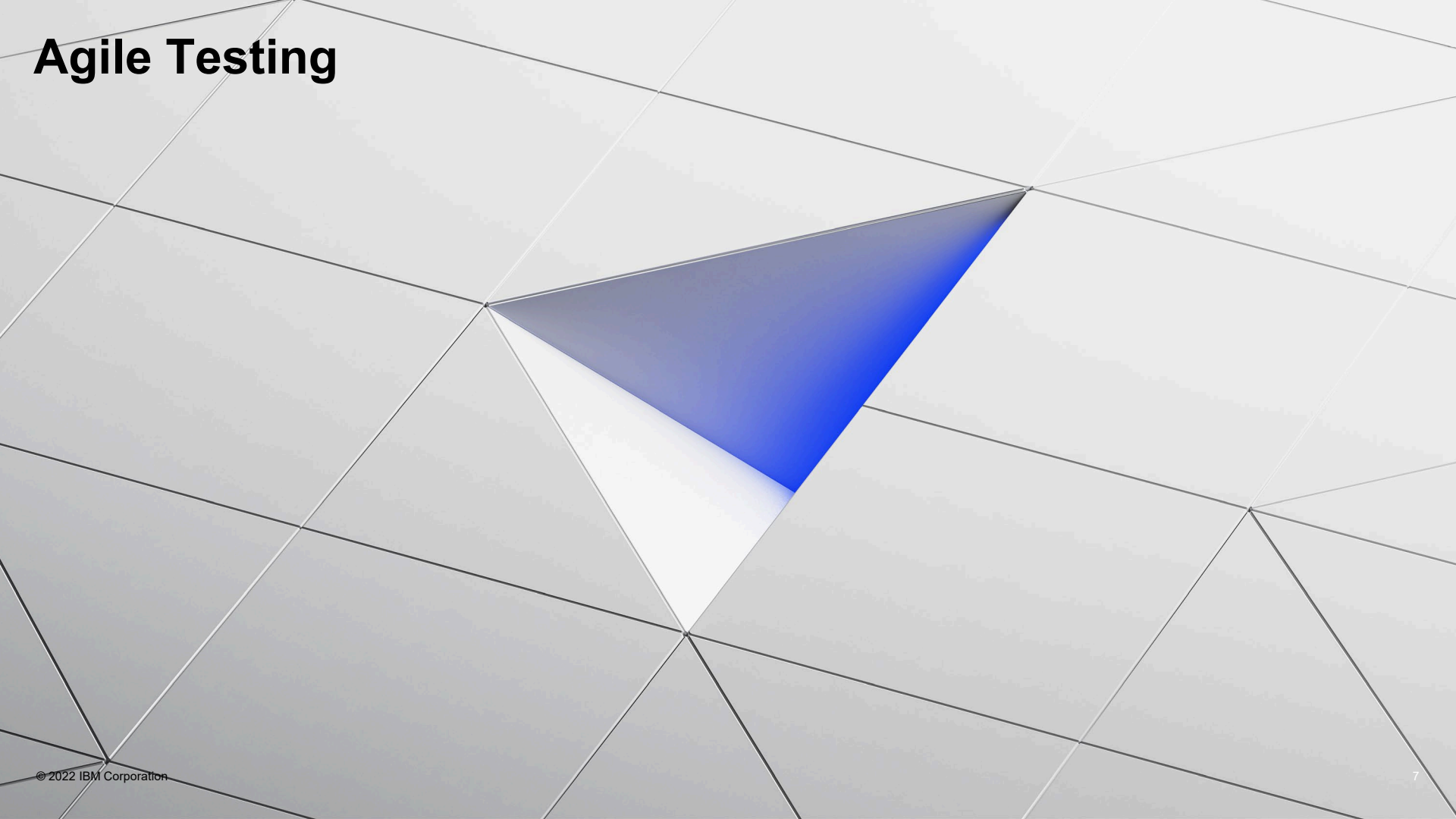
Agile Model

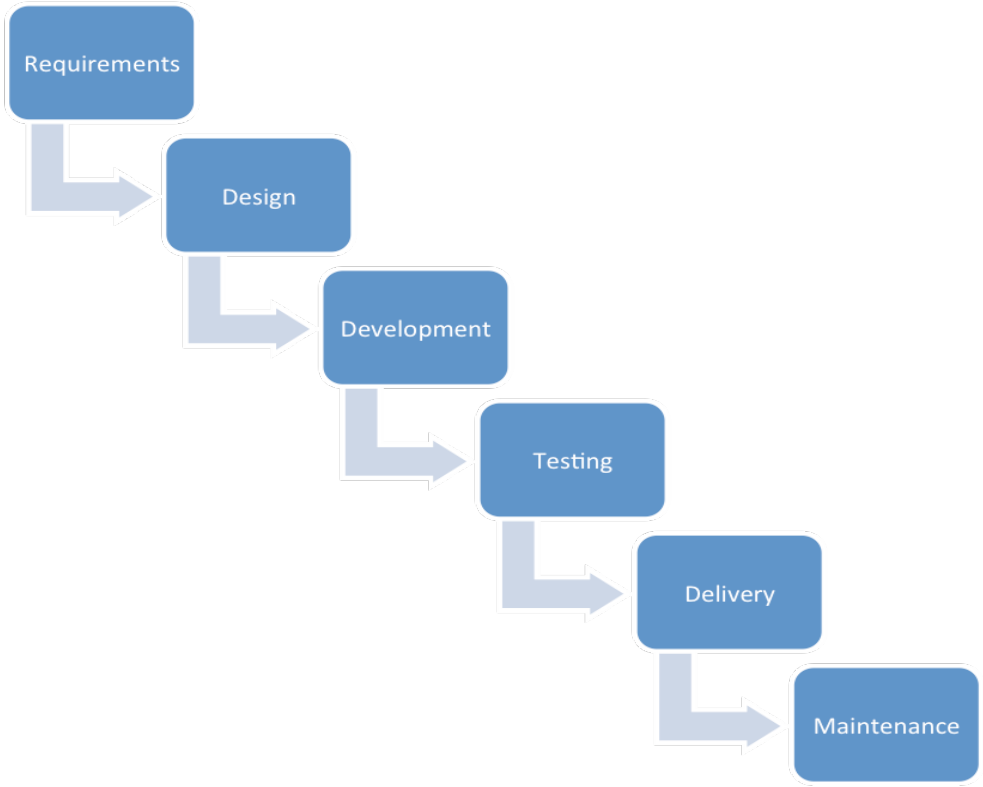
Agile Manifesto Principles:

1. **Customer satisfaction** by early and continuous delivery of valuable software
2. Welcome **changing requirements**, even in late development
3. Working software is **delivered frequently** (weeks rather than months)
4. **Close, daily cooperation** between business people and developers
5. Projects are built around **motivated individuals**, who should be trusted
6. **Face-to-face** conversation is the best form of communication (co-location)
7. **Working software** is the principal measure of progress
8. **Sustainable development**, able to maintain a constant pace
9. Continuous attention to technical excellence and **good design**
10. **Simplicity**—the art of maximizing the amount of work not done—is essential
11. Best architectures, requirements, and designs emerge from **self-organizing teams**
12. Regularly, the team **reflects** on how to become more effective, and adjusts accordingly

Agile Testing



Traditional Software Development



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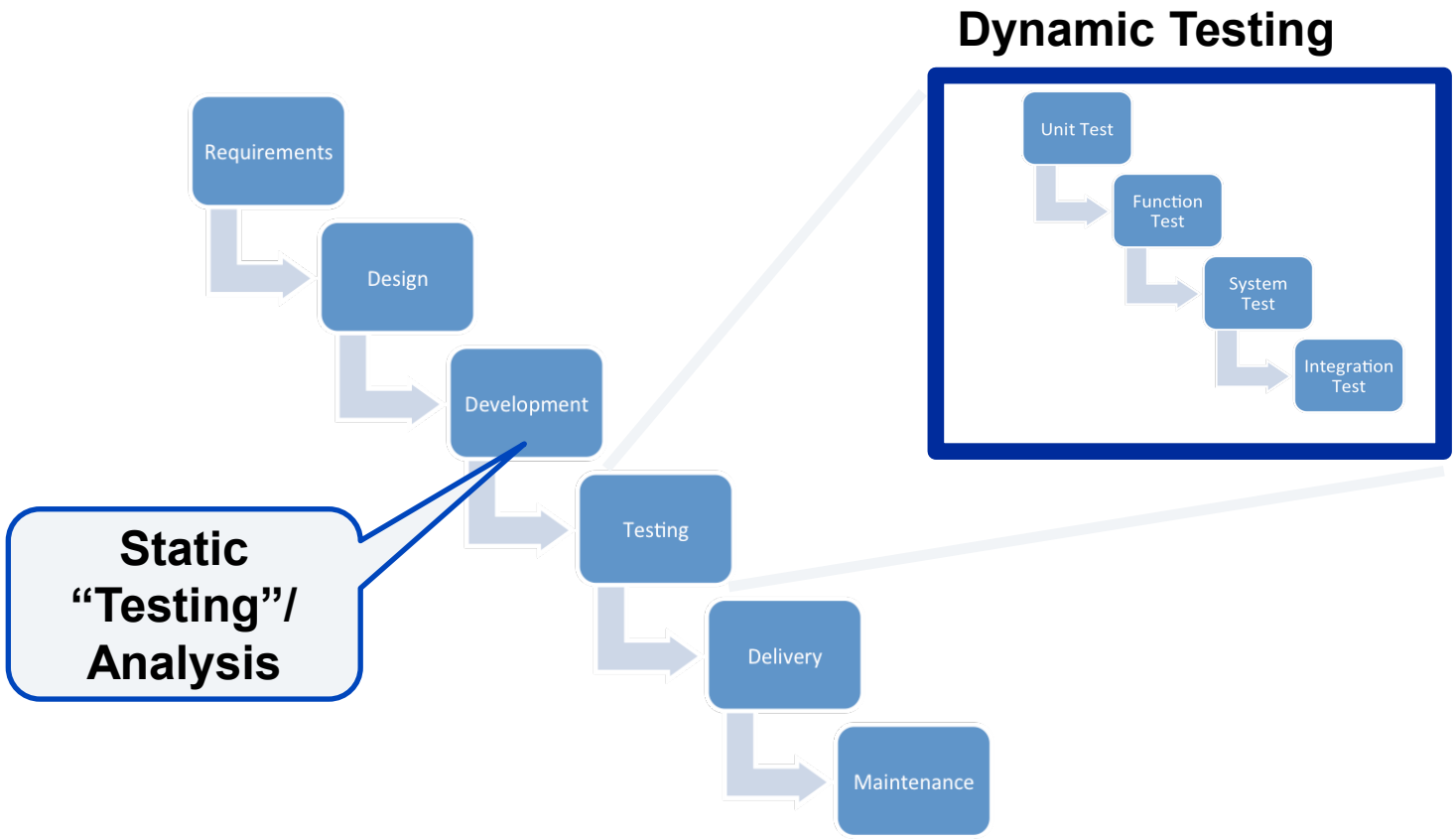


Static vs Dynamic Technique

Static

- Program/System not executed
- Inexpensive

Examples

- Code inspection/reviews
- Document review
- Intellectual Property (IP) scans
- Complexity analysis
- Security scans
- Coding standards & patterns

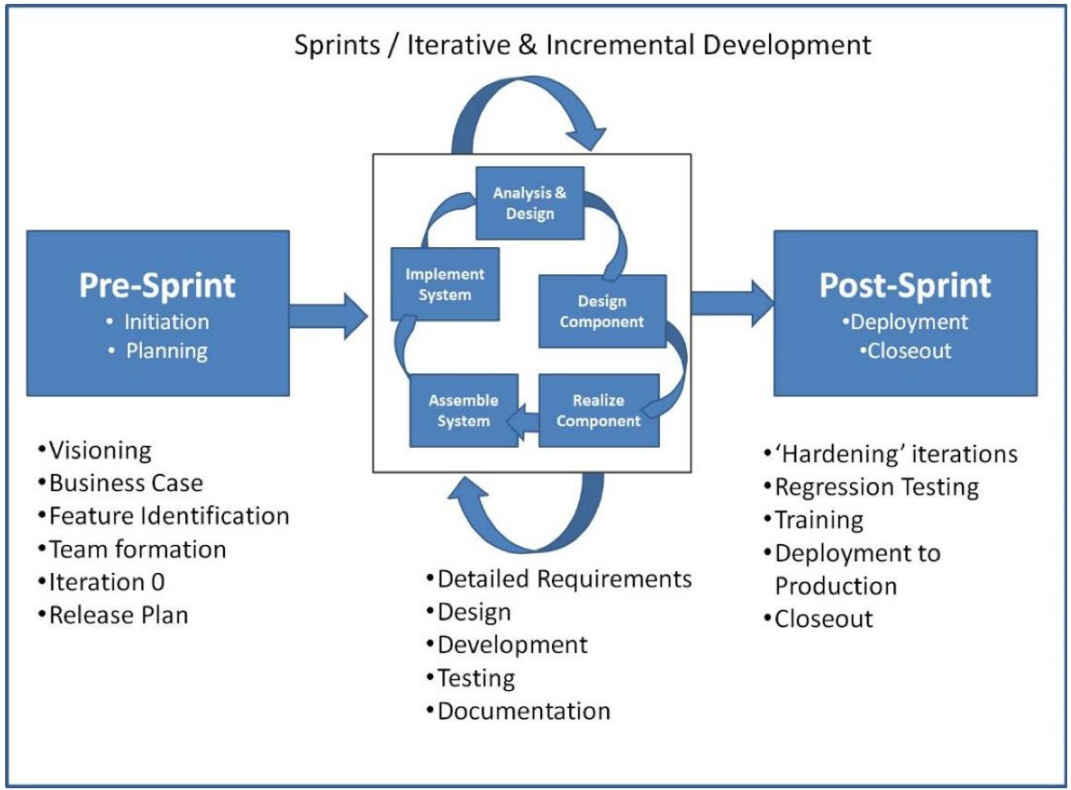
Dynamic

- Program/system is executed
- Expensive

Examples

- Classic testing
  - Regression
  - Load/Stress
  - Phases

Agile Cycle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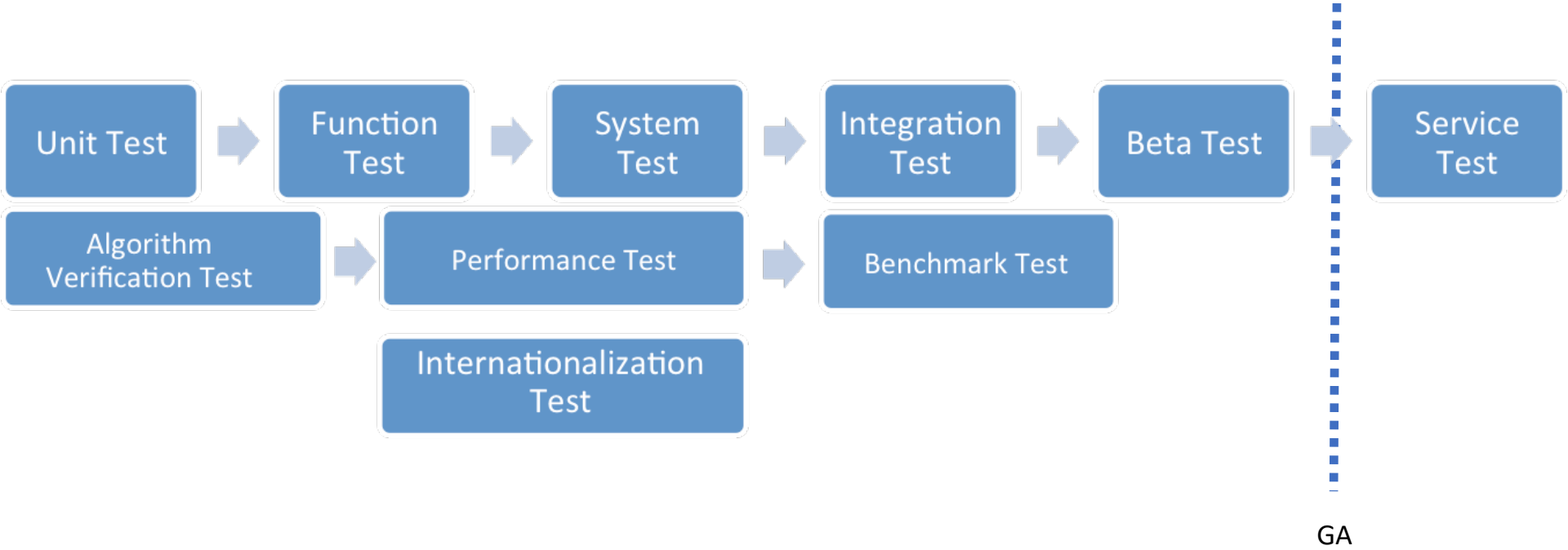
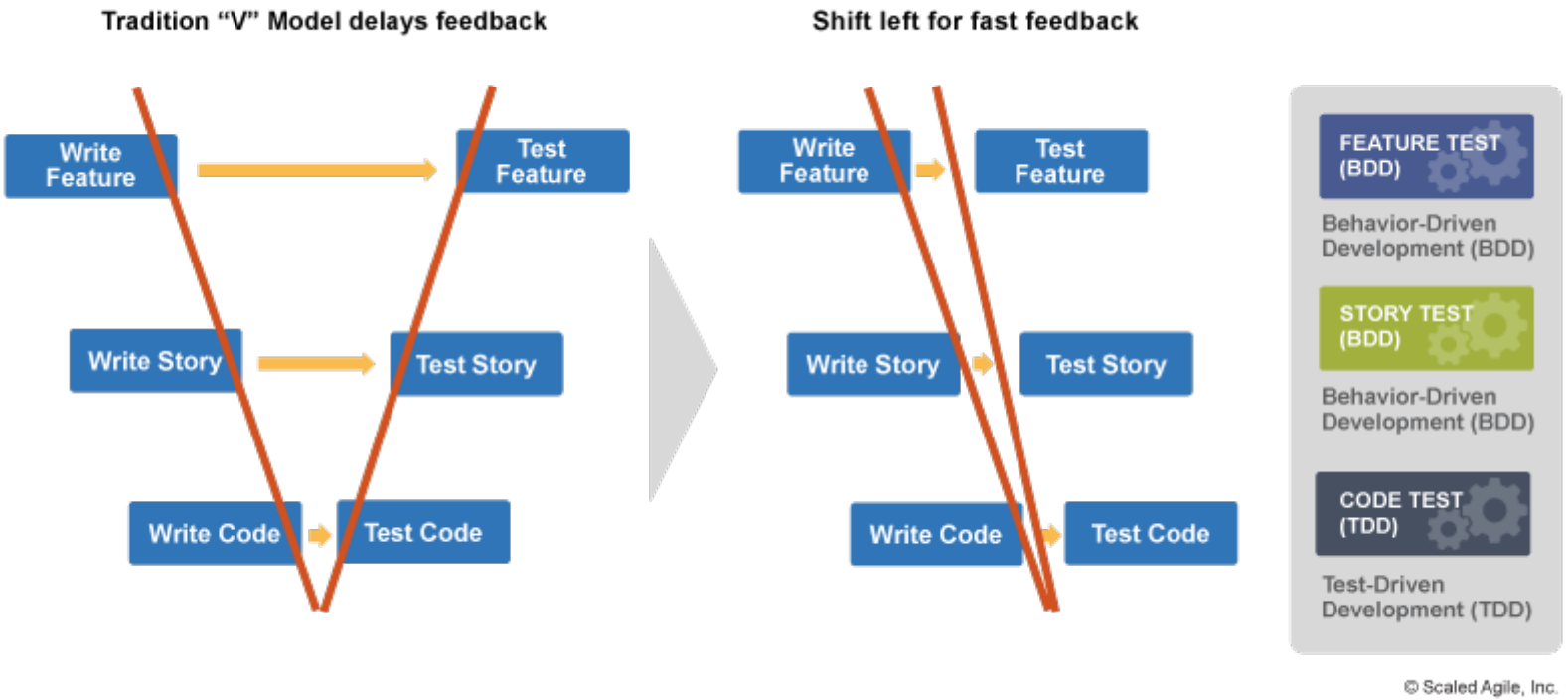
Traditional Enterprise Software Test Phases



EVERYONE is responsible for quality!

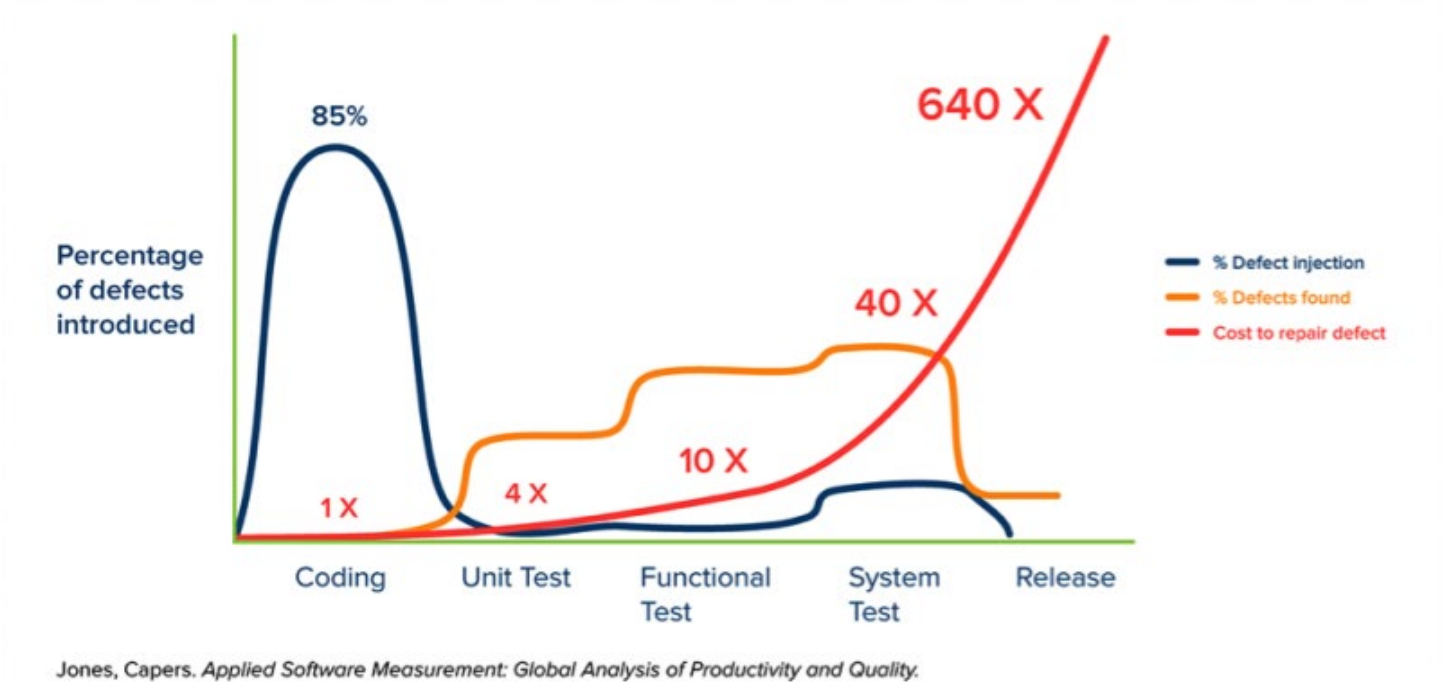
Always try to improve turnaround time



https://www.scaledagileframework.com/built-In-quality/

Shifting Left

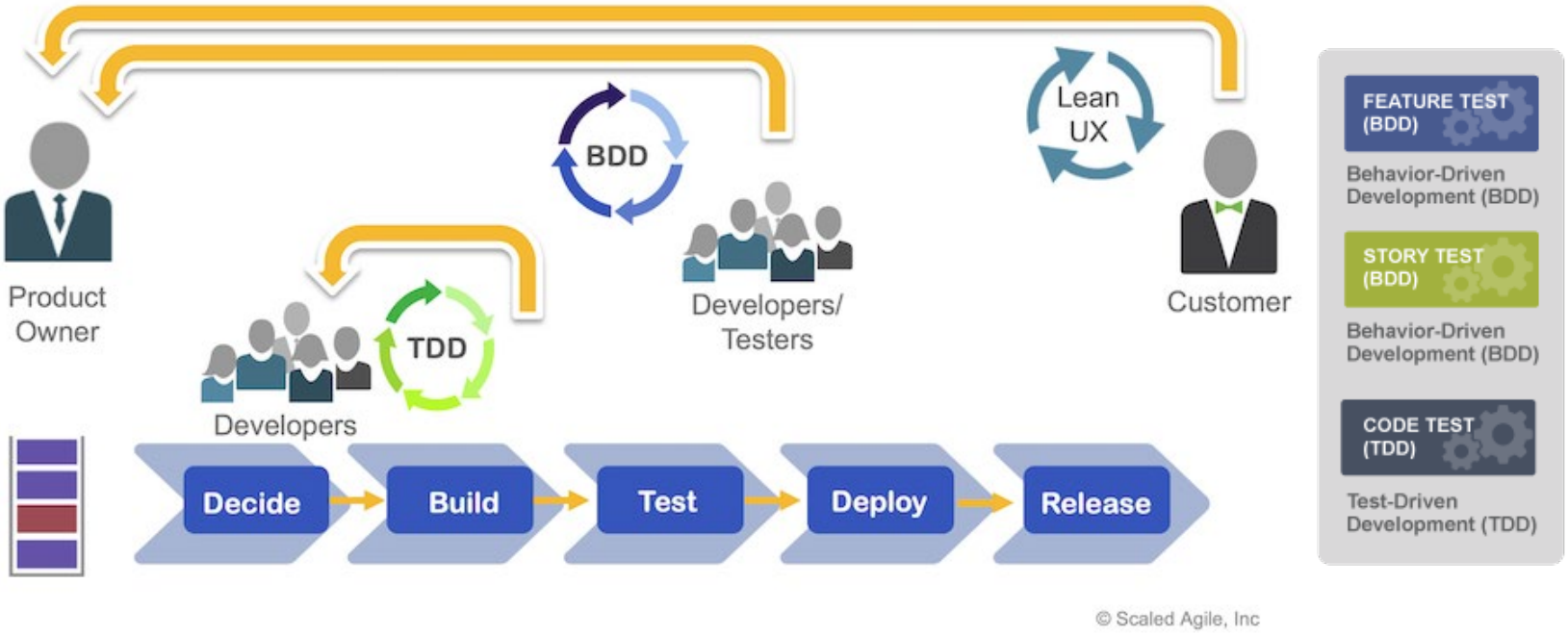
Defects have impact in terms of cost, reputation/trust, and legal issues.



Jones, Capers. *Applied Software Measurement: Global Analysis of Productivity and Quality.*

https://www.stickyminds.com/sites/default/files/shared/2018-12-10%20ArthurHicken%20The%20Shift-Left%20Approach%20to%20Software%20Testing%20image3.png

Establish Feedback Loops



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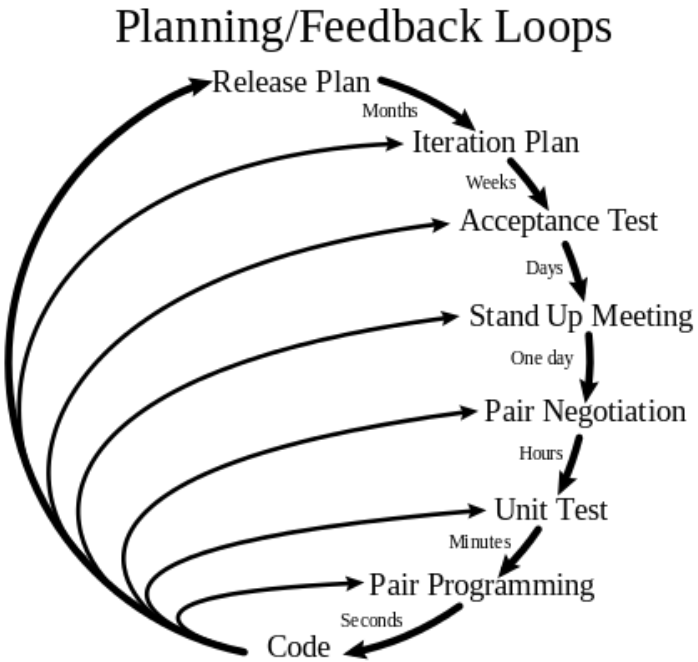
Extreme Programming (XP) Feedback Loops

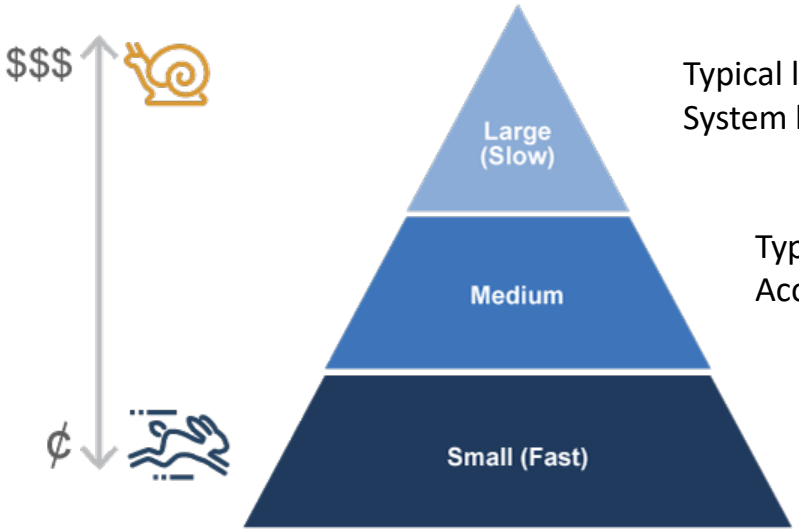


https://upload.wikimedia.org/wikipedia/commons/thumb/8/84/Extreme_Programming.svg/480px-Extreme_Programming.svg.png

Where to start?

- Think of the test pyramid idea!

- We suffer a lot from turn around times
- We need fast feedback
- We need confidence
- We need to run tests after EVERY single code change

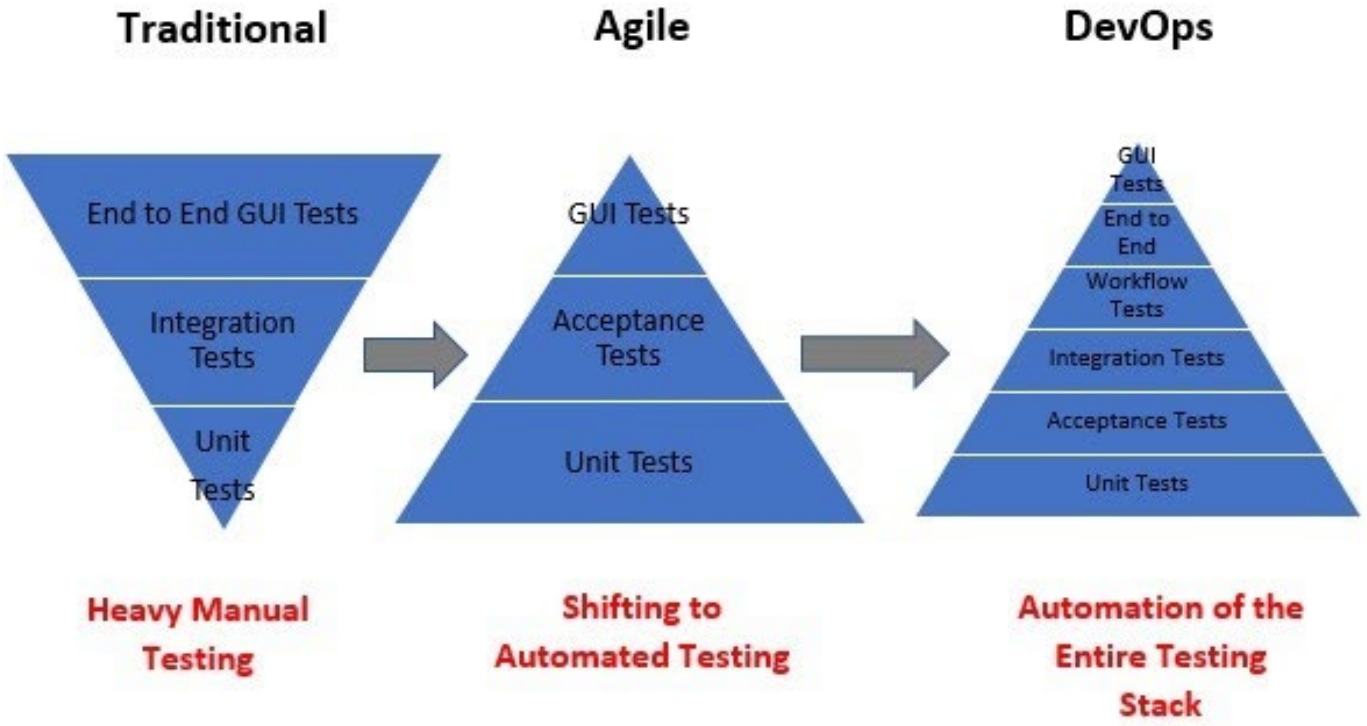


Typical large
System level scenarios

Typical medium
Acceptance tests

Typical small
Running at build time
Unit & integration tests

Inverting the Pyramid



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Test Driven Development (TDD)

- Requirements specified as tests
- Ensure test fails first
- Small dev units

Phases

1. Add a test
2. Run all and see if one fails
3. Write code
4. Run tests
5. Refactor code
6. Repeat

Pros

- Increased quality?
- Increased testability
- Everything gets tested
- Reduced debugging effort
- Revert vs debug

Cons

- Still need non-unit test phases

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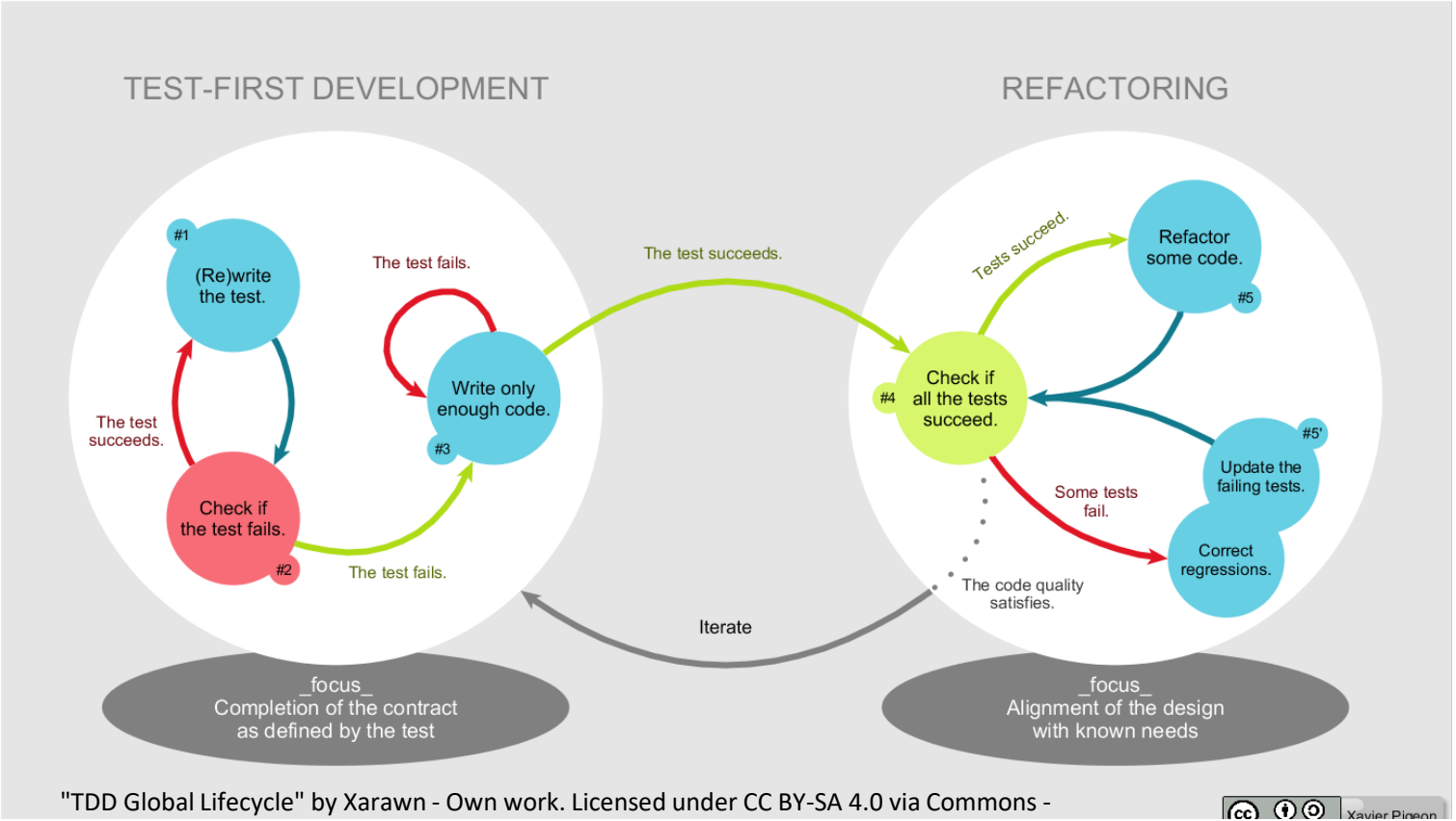


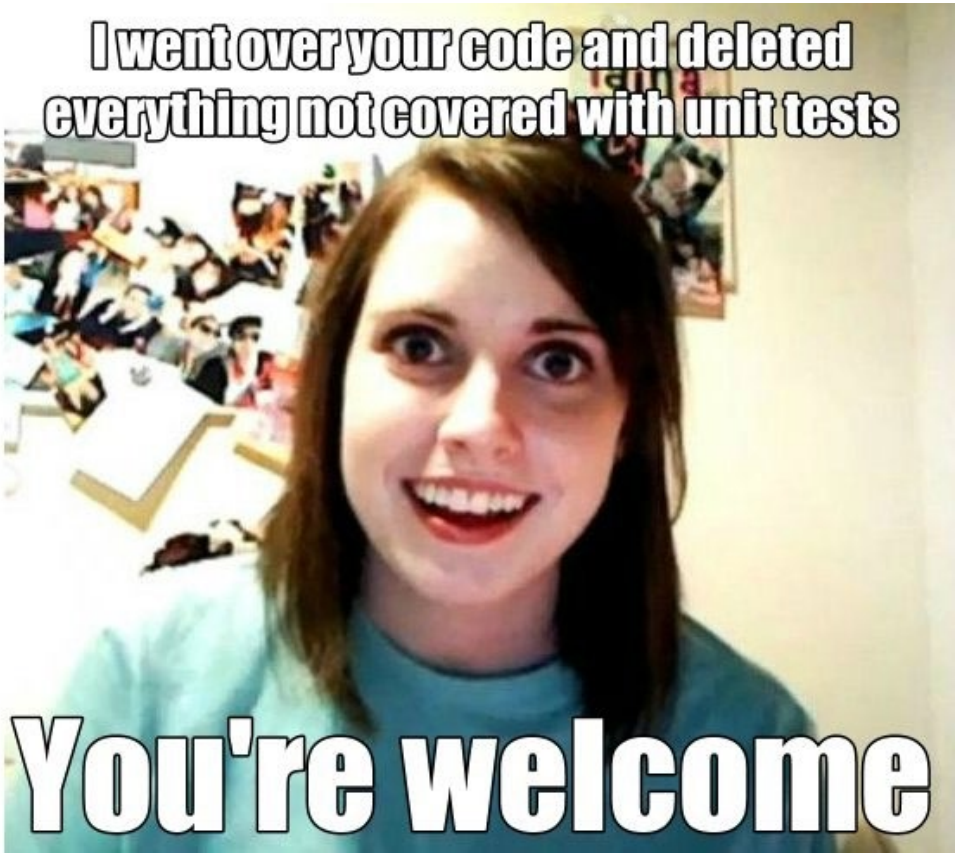
"TDD Global Lifecycle" by Xarawn - Own work. Licensed under CC BY-SA 4.0 via Commons - https://commons.wikimedia.org/wiki/File:TDD_Global_Lifecycle.png#/media/File:TDD_Global_Lifecycle.png

TDD

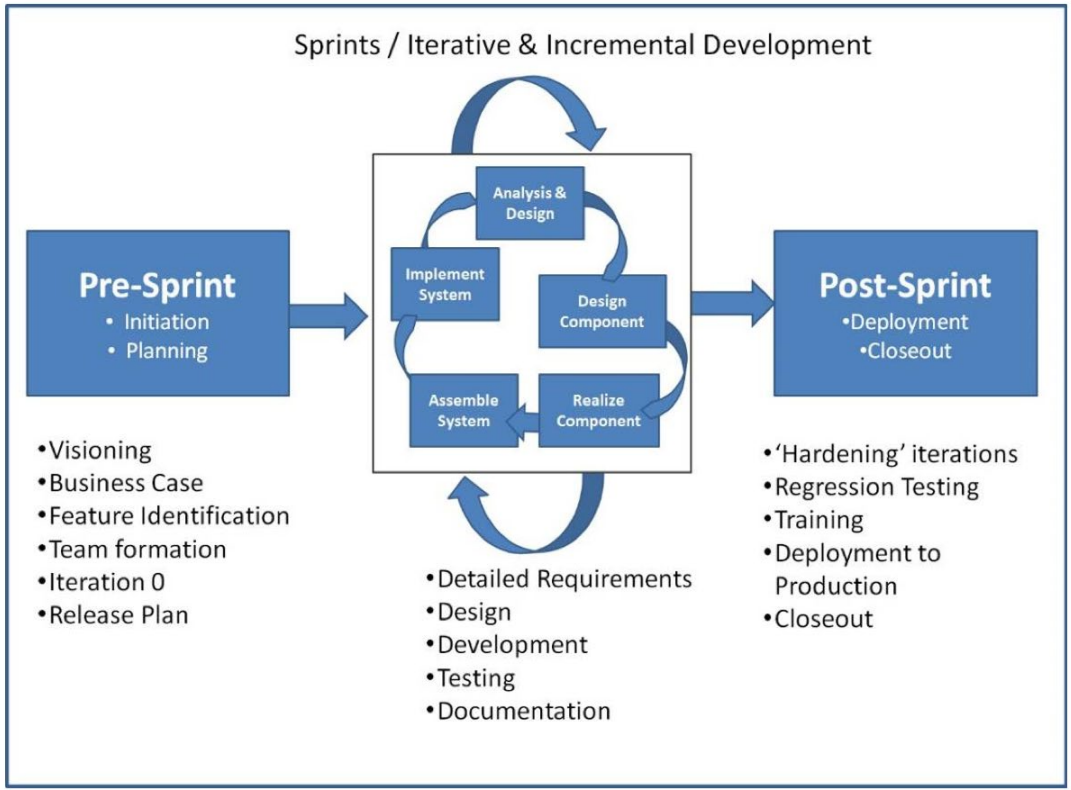
- Incremental dev aid
- Write the small tests first
- Provides testability
- Steep learning curve

Code Coverage

- Code coverage is the percentage of code which is covered by automated tests
- Use it, it really helps!
- Increase in coverage yields confidence not reliability/quality
- Small Advice:
  Never measure developers or testers by code coverage!
- Goal should be 100% coverage of at least new or changed code



Agile Cycle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Pre-Sprint

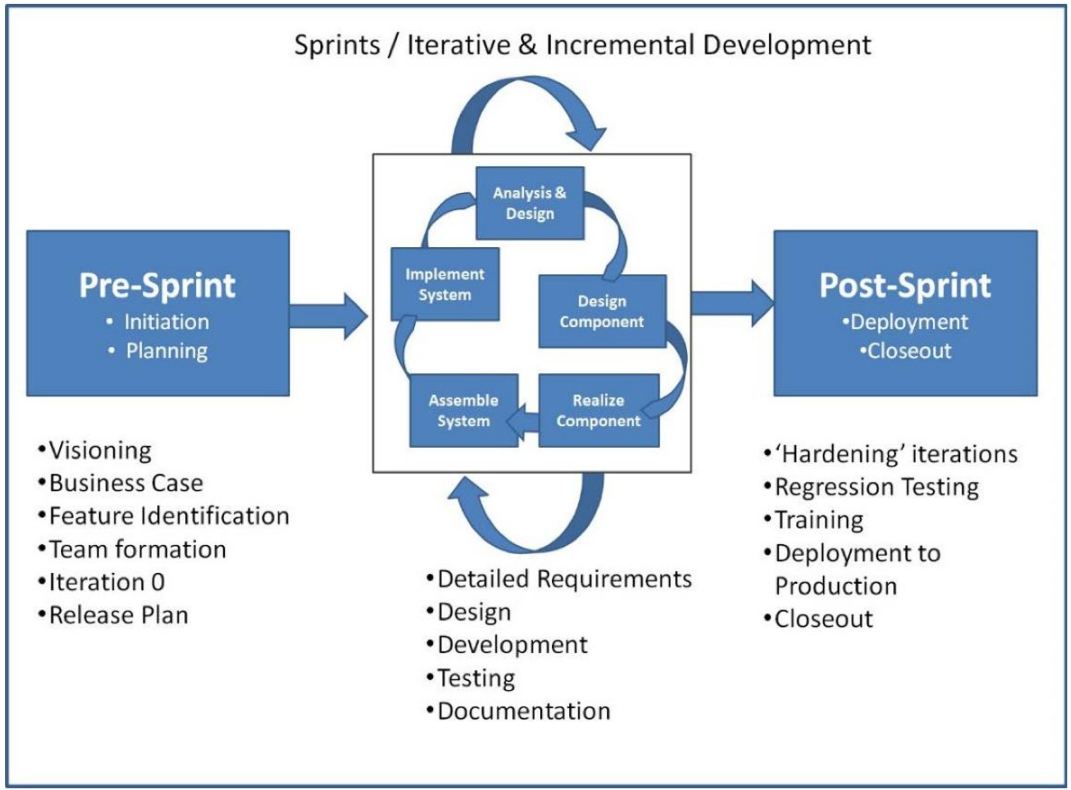
Before starting any project, it is good practice to complete an "iteration 0" to document design decisions and test considerations.

A **test brief** is a living, breathing document that serves as a place to document test strategies, acceptance and exit criteria, stakeholders and requirements to consider testing "complete" for a project.

Also a good time to acquire and arrange **dependencies**, develop **workloads**, and work on **automation**.

Identify a solution level test architect or **focal to oversee the end-to-end** solution.

Agile Cycle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Test Tasks within an Iteration

- Iteration Planning
- Attend Design Reviews
- Put in tool requirements for test
- Attend Code Reviews
- Write Variations / Scenarios
- Review Variations / Scenarios
- Write/Update test infrastructure
- Write Test Programs (test cases)
- Develop Workloads
- Review Test Programs

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- Execute Test programs / Workloads
- Debug Test programs or problems found
- Document problems found
- Re-run to validate fixes
- Execute Regression Tests
- Review Publications/Service Transfer Education
- Hold Iteration Reflections/Retrospectives
- Misc Meetings: standup/status/education
- Reference/Update Test Brief
- COMMUNICATE w/ Project/Release Managers and TestOps

Why do testers attend Code Reviews?

- Find errors in code
- Education on work item
- Ask questions to clarify code
- Get ideas for test strategy / variations

What are we looking for in Code reviews?

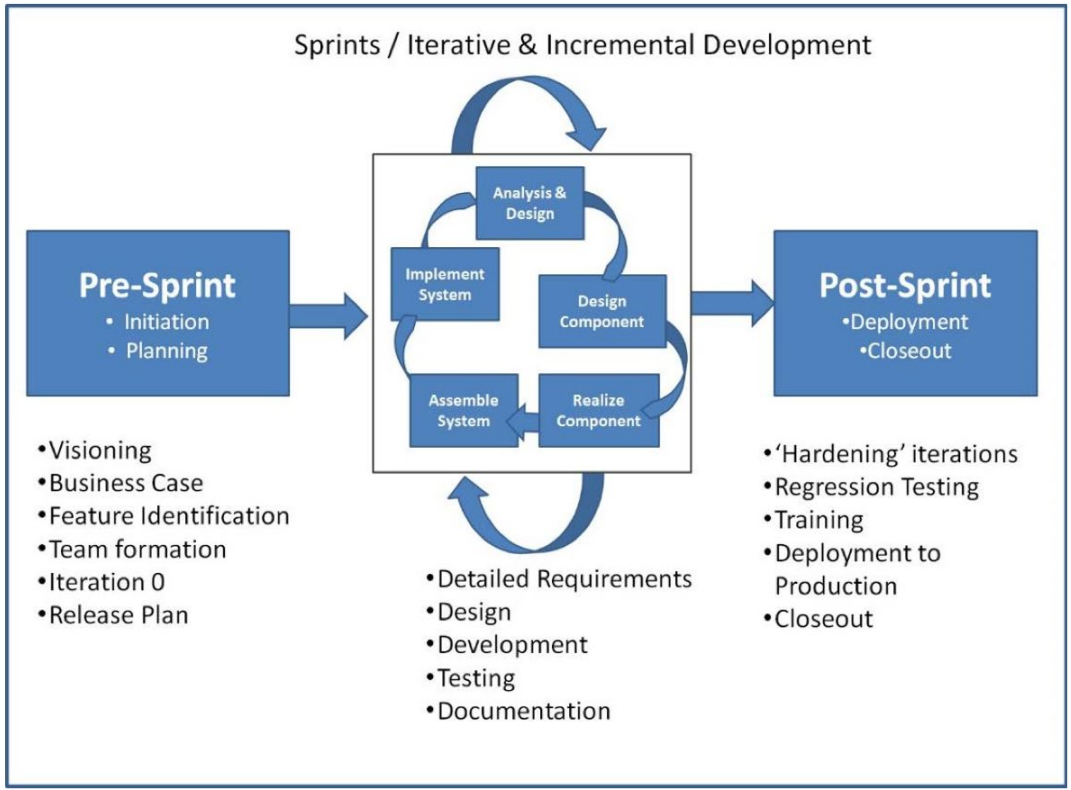
- **Complicated parts of the code** – more chance of mistakes
- **Resources used** – make sure that they are released
- **Serialization** – are resources being used properly
- **Authorization** – are we manipulating user storage and system storage correctly
- **Recovery/Retry/percolation**
- **Boundary conditions** (external and internal)

What are we looking for in Code reviews? (cont)

- **Interactions** between different functions/code modules/components
- **Environmental** requirements/restrictions
- Validate that code **implements the design**

  (return/reason codes, abend codes, trace records)
- **Break points** – testability (traces)
- **Serviceability** – comments, explanations, readability, variable names, etc.
- Gather variation ideas

Agile Cycle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Iteration Planning

- Why do iteration planning?
- What questions need to be answered to help with the planning?
- How do we answer these iteration planning questions?

Why do Iteration Planning?

- To map out the work for the iteration.
- To understand how long it will take to do the work
- To understand what is needed to do the work within the iteration

What questions need to be answered to help with the planning?

- Are there any Hardware/Software dependencies?
- What is the experience level of the team? (in test; component; test tools)
- How large is the work item? (lines of code)
- How complex is the work item?
- What tools are required to test this work item?
- What problem areas exist from previous releases?

What questions need to be answered to help with the planning? (cont)

- Does the team need any education on work item?
- How many testers will be needed?
- Does the regression bucket need to be updated/created?
- How many variations will it take to test the work item?
- What are the high level test objectives for this epic?
- What is being implemented by this story?
- How is this story being validated?

How do we answer these iteration planning questions?

- Look at design documents for dependencies
- Understand experience level of team
- Talk with developers to get a sizing of the work item
- Talk with developers to get understand the complexity of the work item
- Talk with developers and other testers to understand what tools are needed
- Talk with service team to understand problem areas in component

FVT considerations for Iteration Planning

- Talk with the team about the work item to determine what education is needed
- Understand the regression bucket for your component/area
- Use Gross estimate for number of function test variations
  - General Rule: 1 variation per 10-20 lines of code
  - More variations if testing is external; Less if testing is internal
  - Execution time:
    - Complex – 1-3vars/day
    - Medium – 4-7vars/day
    - Trivial – 8-10vars/day

SVT considerations for Iteration Planning

Planning involves defining what will be done and then how it will be done

Is a system test required?

- Explicit – Specific targeted testing or regression
- Implicit – Function is verified simply by having an active system
- Implement Only – Function/feature must be turned on explicitly

How many machine shots are required?

- Do I need consecutive machine shifts/shots?
- Do I need specific hardware or a specific configuration?
- Do I need to perform non-disruptive vs disruptive testing?

Are additional testing teams required?

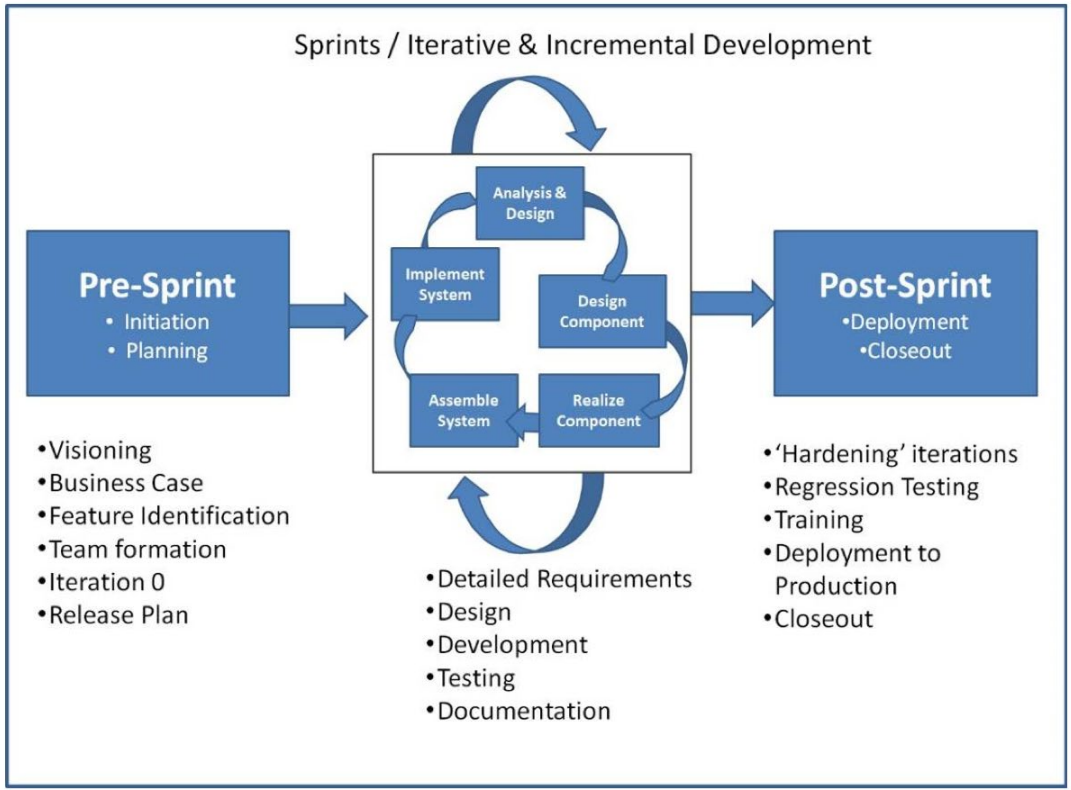
SVT considerations for Iteration Planning (cont)

Contingency plans

- Finding defects may gate or delay progress while waiting for fix
  e.g. ~1 week?...What if the developer is on vacation?
- Time needed to verify fixes
- Machine availability – usually only 1-2 usable machine shots available per week
- Experience of testers
- Unknown unknowns
  Machine failures, unable to boot, firmware updates, environment issues

Total time required to test may be double what was anticipated

Agile Cycle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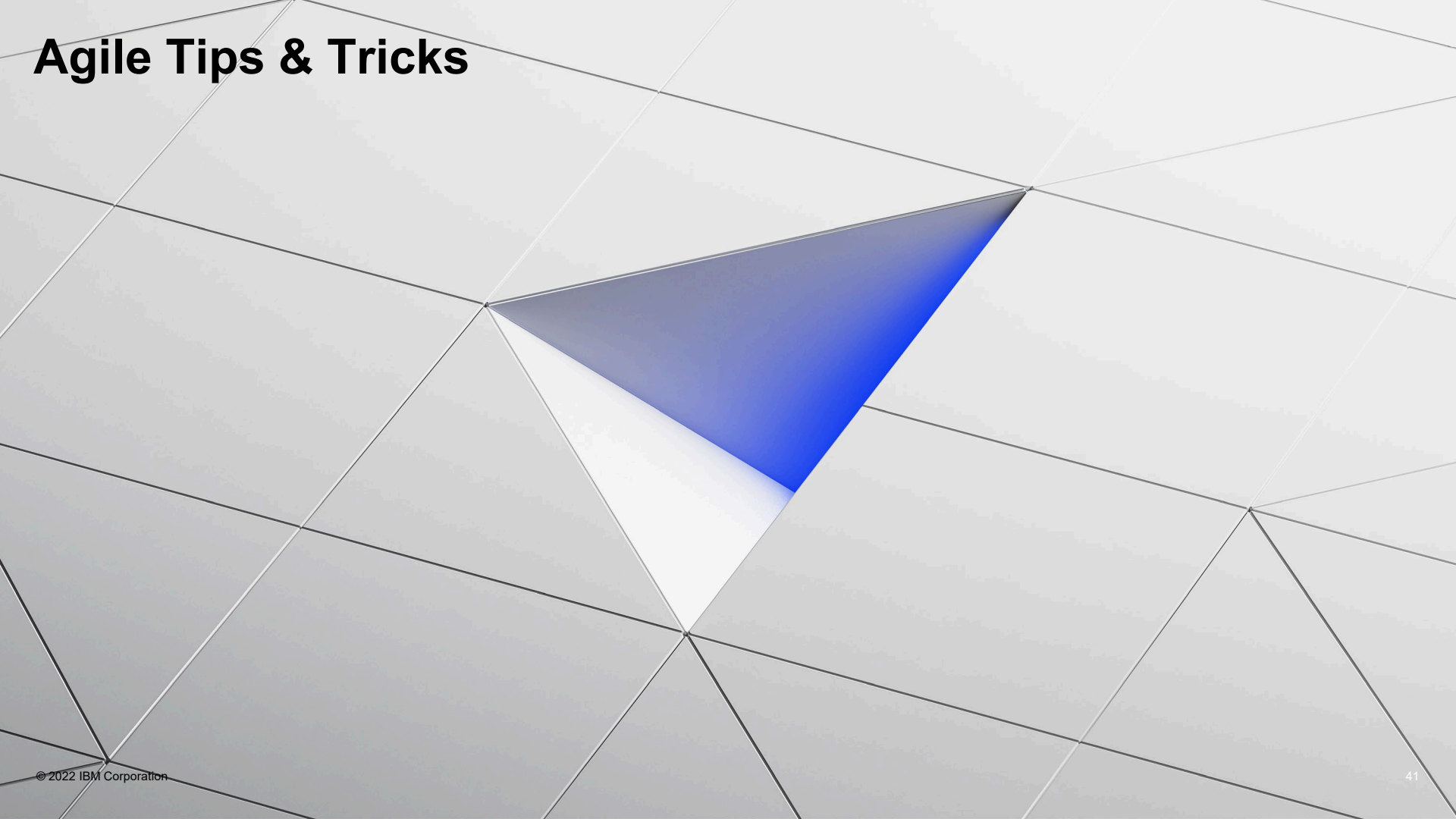
Post-Sprint/Iteration

- Full regression testing
- Promote new tests into regression buckets/suites
- Verify documentation and examples
- Verify any outstanding fixes
- Final packaging test
- Higher level retrospectives/reflections
- Defect trend analysis
- Finalize intellectual property (e.g. patents)
- Hand off to external test teams (e.g. TestOps, Service Test)

Agile Tips & Tricks



Guilds

- Community of like minded people with a common interest
- Common education
- Un-conferences (Conferences but less rigorous)
- Hack days
- Mentoring

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Test Guild

- Larger community of testers
- Learning and trying new ideas together
- All phases/kinds of testers
- May have chapters (smaller groups) in guild with more specific common goals
    - By test discipline or automation framework/tool

Agile Testing Priorities

- Create a 1 to N list of prioritized tests across test phases and goals
- Needs to be approved by whole squad, brand, test lead, and PO
- Utilize various defect tagging
- During iteration
  - Mainline function
  - Security
  - Regression
  - Main client environments
  - Stress test
- Post-sprint or hardening iteration
  - Recovery
  - Edge cases
  - Full regression
  - Narrow environments
  - Limits testing

Agile Testing Tips/Tricks

- Use Test Driven Development (TDD), it helps improve testability and reduce “gold plating”
- Constantly reevaluate testing inclusion/coverage

  always be automating and "shifting left" (aka speedup iteration feedback)
- Test Code Quality must be equal to Production Code Quality
- Don’t get hung up on formalism or sharp definitions, primarily try to focus on constantly improve confidence, quality and turnaround times
- All testers included from project initiation (e.g. TestOps, multiple component areas, …)
- Test and acceptance or complete criteria need to be defined at multiple levels
  - Stories – Test and regression based on new/changed feature
  - Epics – Full end to end test w/ full regression runs

DevOps

Software Development Lifecycle (SDLC)

Development

- Design
- Code
- Build
- Test
- Release

Operations

- Staging
- Deploy
- Operate & Monitor

Done, throw it over the wall!

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https://www.ibm.com/cloud/learn/devops-a-complete-guide

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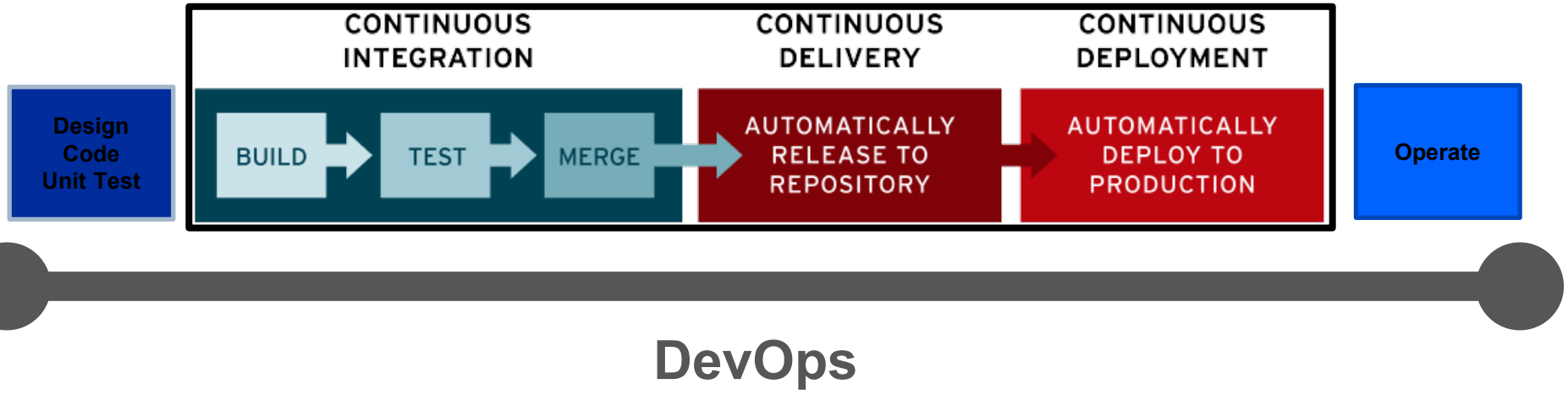
CI/CD

https://www.redhat.com/en/topics/devops/what-is-ci-cd

DevOps


CONTINUOUS INTEGRATION
CONTINUOUS DELIVERY
CONTINUOUS DEPLOYMENT
Design Code Unit Test
BUILD
TEST
MERGE
AUTOMATICALLY RELEASE TO REPOSITORY
AUTOMATICALLY DEPLOY TO PRODUCTION
Operate
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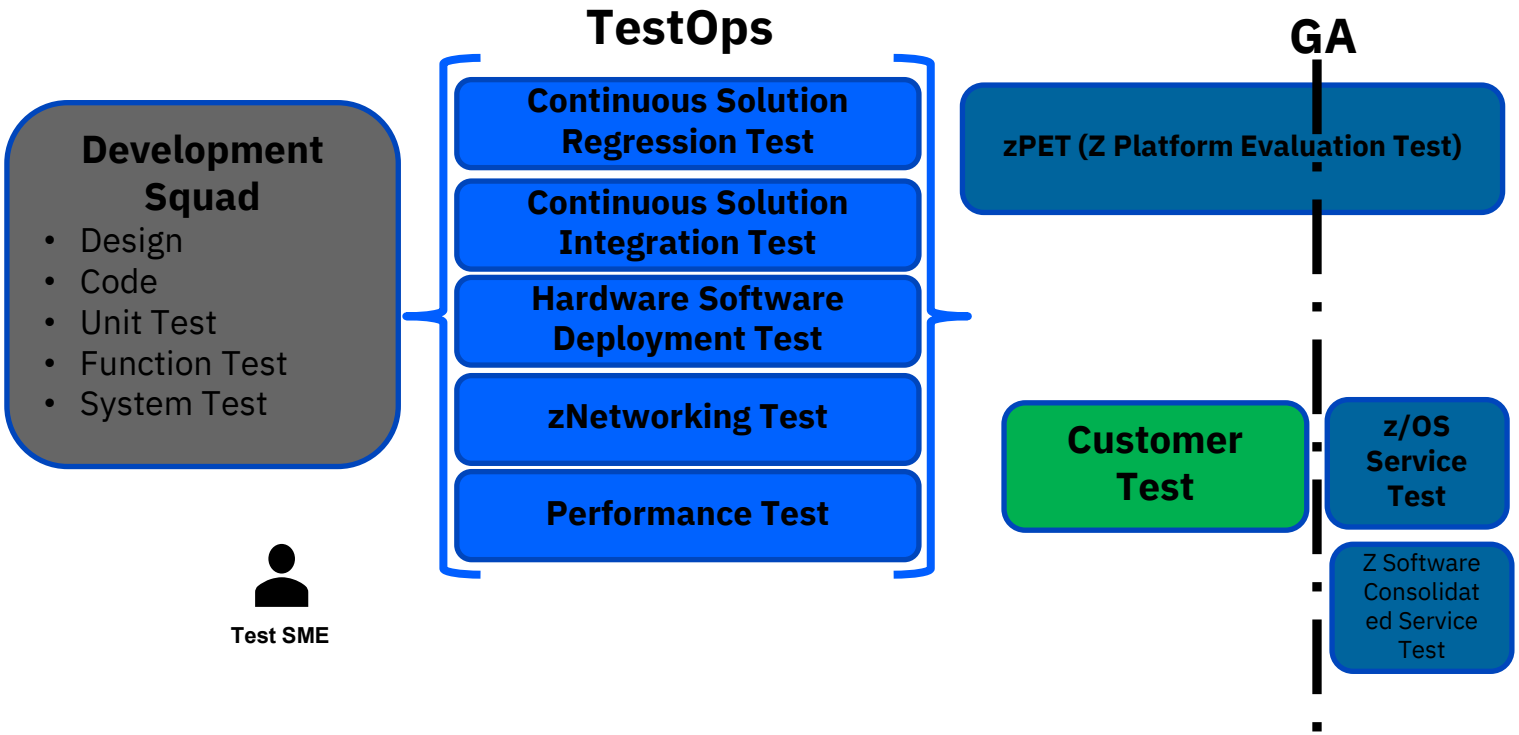
z/OS Test Ops Squads



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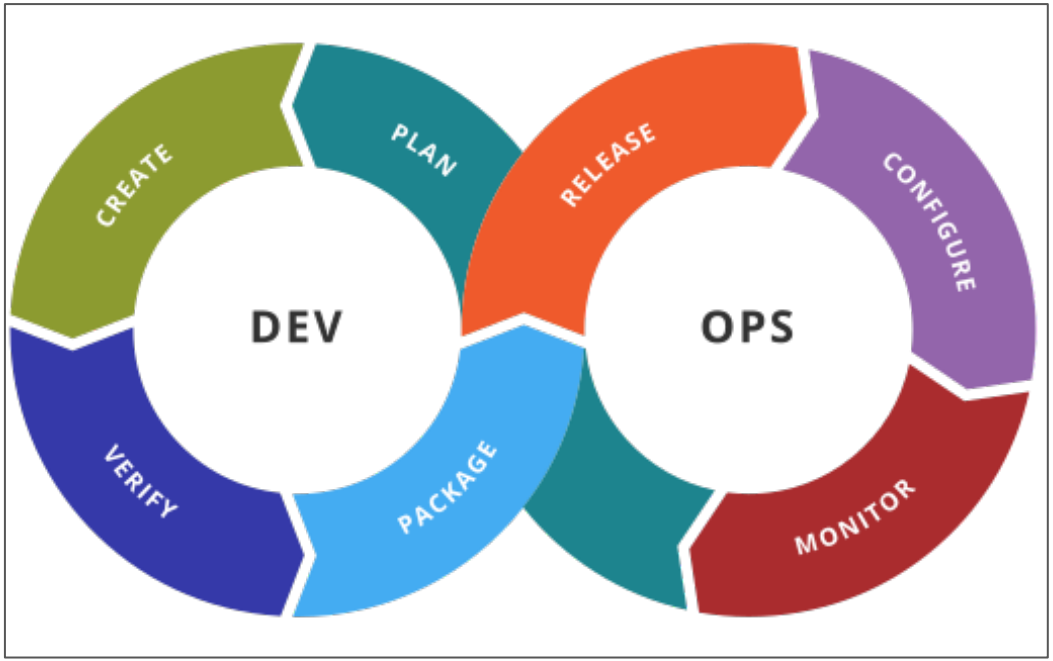

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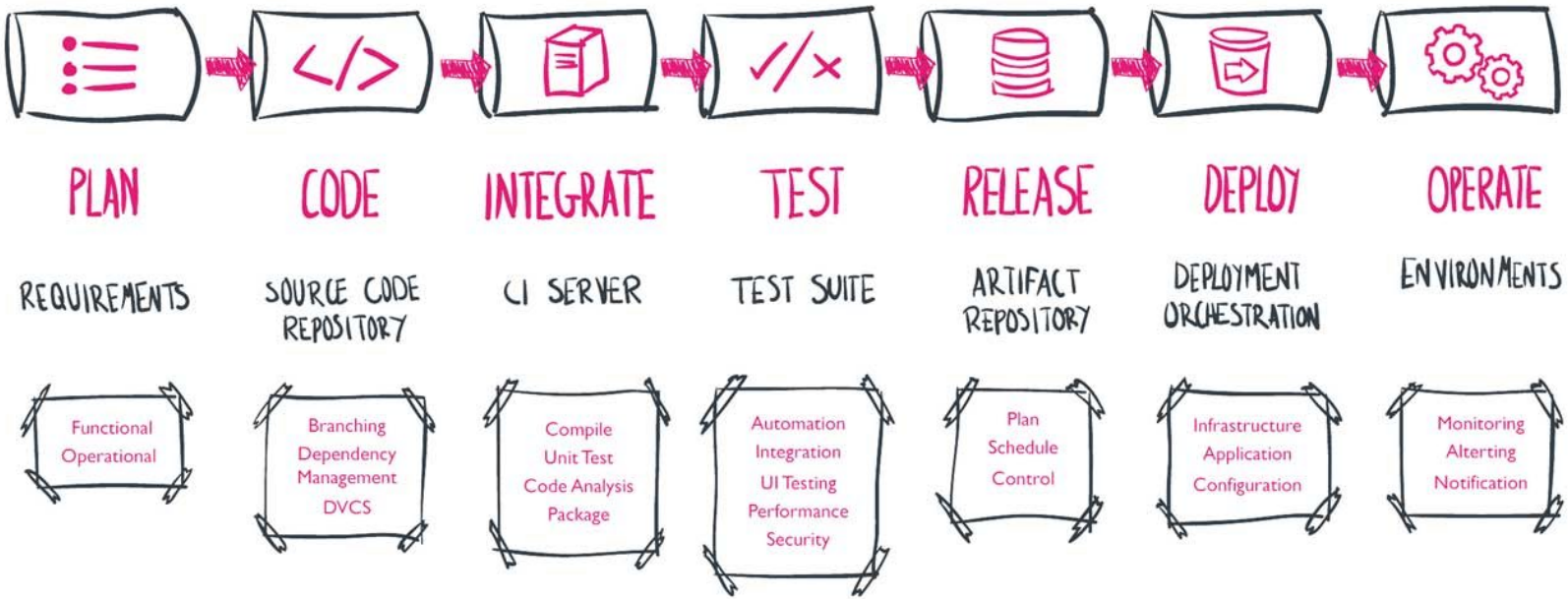

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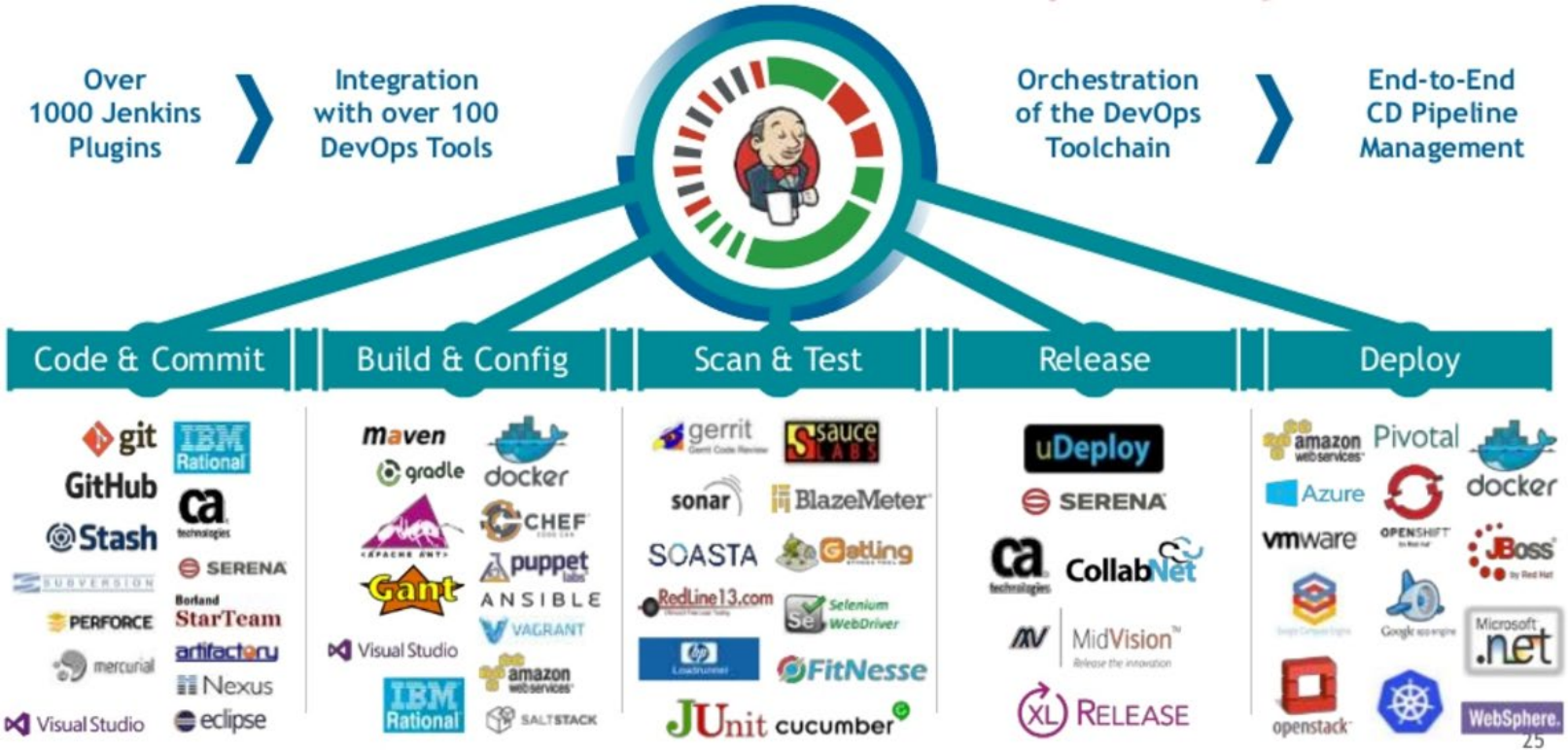
DevOps Pipeline



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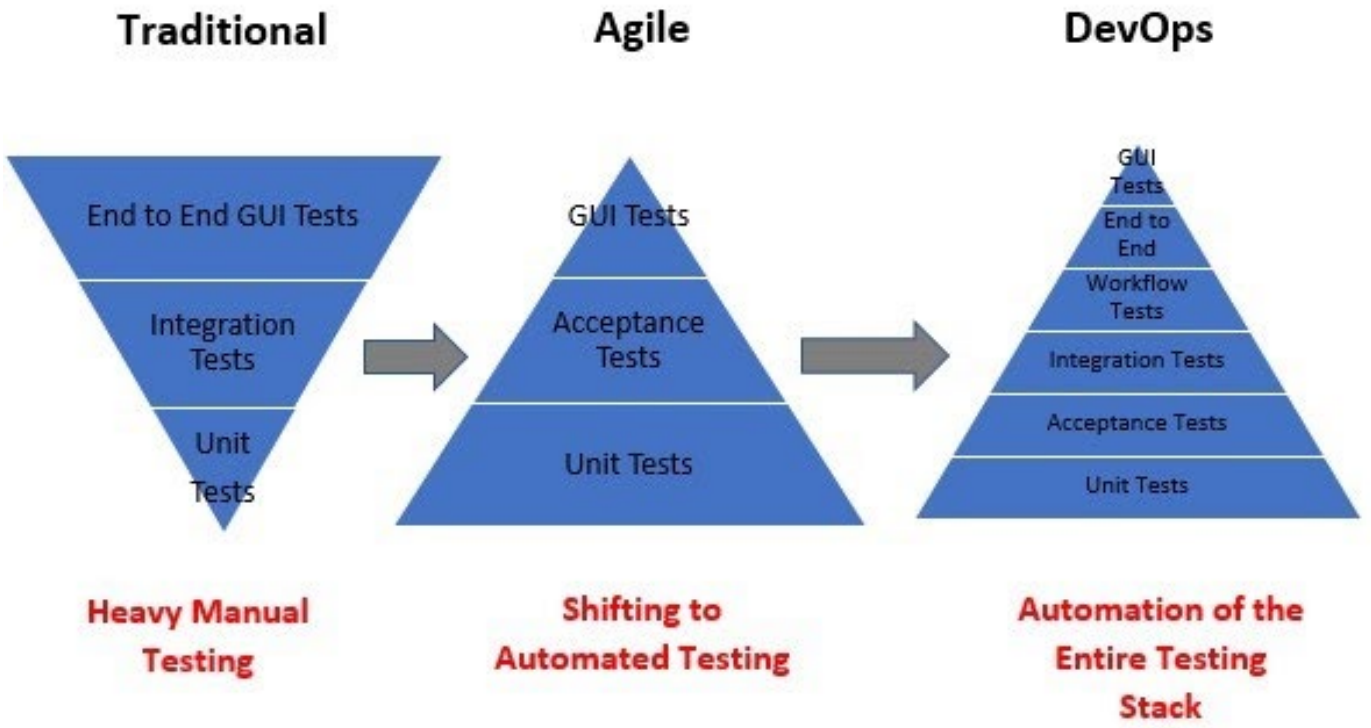

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Questions?