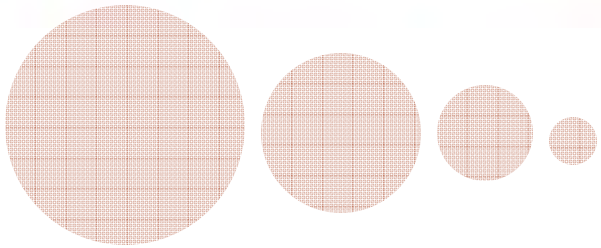
Refactoring to Patterns

A practical look into the Agile approach on Evolutionary Design



Paulo Caroli

ThoughtWorks

About Paulo Caroli

- A technologist at ThoughtWorks US
- Master's Degree in Software Engineering
- Sun Certified J2EE Architect
- More than 13 years in SW Development.
- Agile Techniques, such as XP, TDD, Continuous Integration
- Object Oriented development practices
- More at www.caroli.org

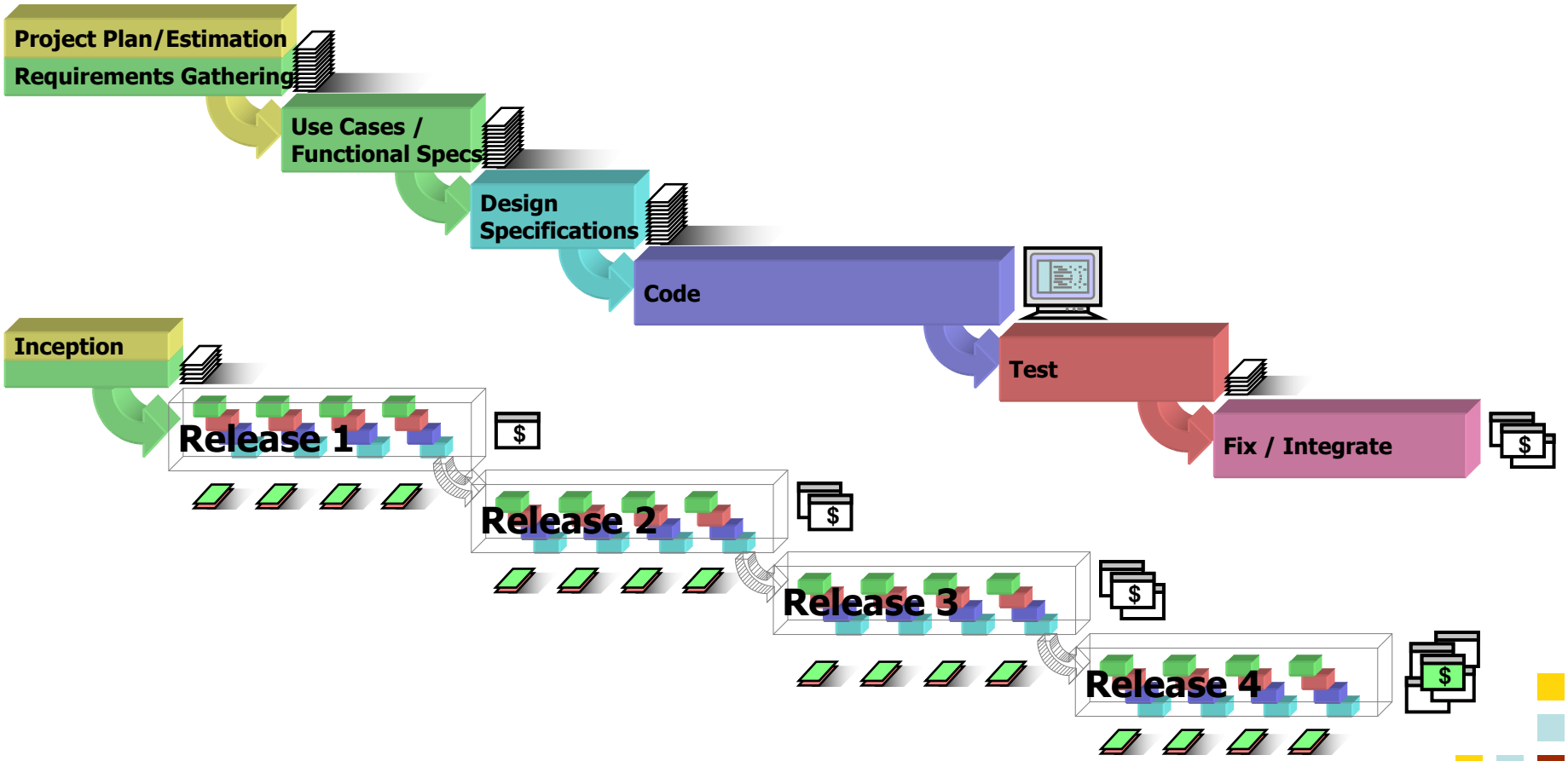
Agenda

- Refactoring and Agile Techniques
- Refactoring and Functional Requirements
- Refactoring and TDD
- Simple Design and Code Smells
- Refactoring to Patterns
- Case Study
- Conclusion
- Q & A

Refactoring and Agile Techniques

Development Styles

Development Styles



Agile History

2000

XP | Extreme Programming (Kent Beck)

DSDM | Dynamic System Development Method (Dane Faulkner)

FDD | Feature Driven Development (Jeff DeLuca)

SCRUM (Ken Schwaber)

Crystal (Alistair Cockburn)

Adaptive Software Development (Jim Highsmith)

Lean Software Development (Mary Poppendieck)

Agile manifesto

"We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

- ***Individuals and interactions*** *over processes and tools.*
- ***Working software*** *over comprehensive documentation.*
- ***Customer collaboration*** *over contract negotiation.*
- ***Responding to change*** *over following a plan.*

Agile Design Principles

Agile Design principles

- Do the **simplest** thing that could possibly **work**
  - A simple design **takes less time** to finish than a complex one
- Never add functionality **before** it is scheduled
  - Concentrate on what is **scheduled** for today only
- Agile designs are **emergent**, they're not defined up front

Agile Design principles

- The **whole team** is responsible of the design of the system
- Design is so important you should **do it every day**
- The **Unit Tests** form much of your detailed design **documentation**
- Document complicated things
  - If it is complicated, then document it thoroughly.
  - Better yet, invest the time to **refactor** it so it is simple

Agile Umbrella

Agile Umbrella

Just the right amount of documentation

Collective Code Ownership Pair Programming

Test Driven Development

Refactoring Automated testing

Continuous Integration

Simple and Evolutionary Design

Iterative Development

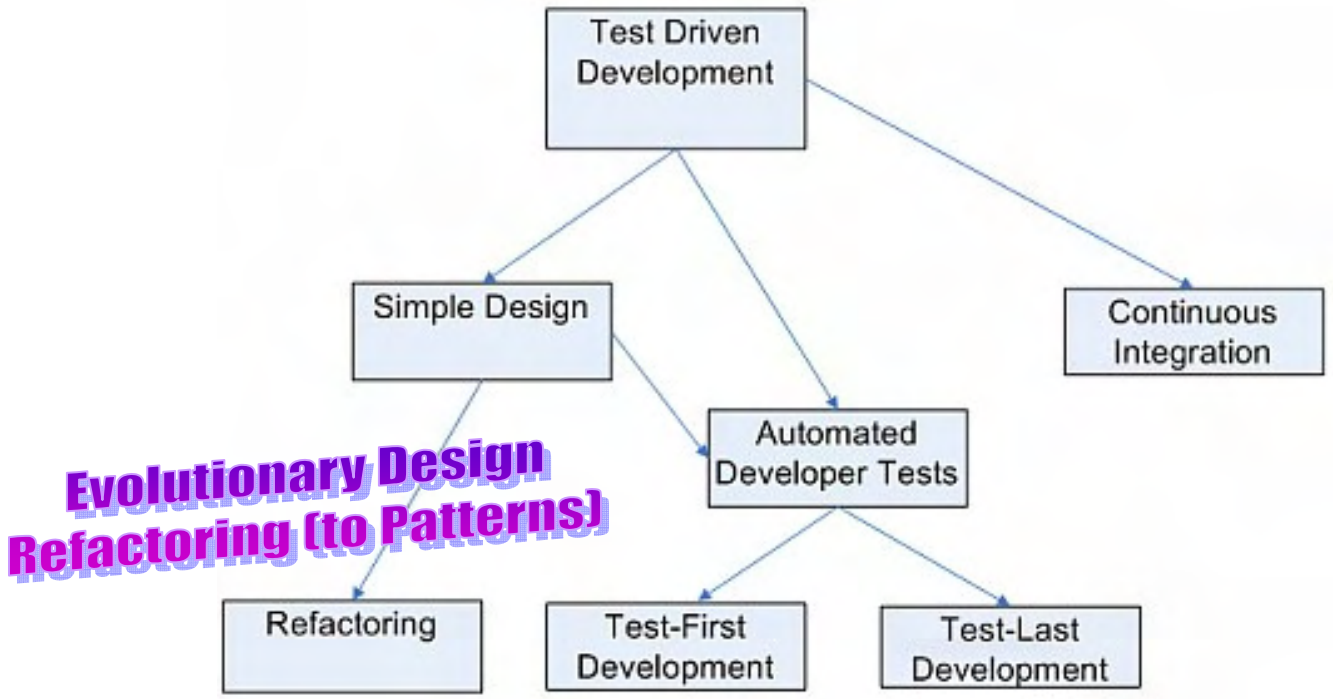
Frequent Short Releases

Collocation Stand ups

Sustainable Pace Spikes

Refactoring (to Patterns)

Refactoring (to Patterns)



Refactoring

Refactoring

- Refactoring is a development practice for **restructuring** an existing code, altering its internal structure without changing its external behavior.

Refactoring

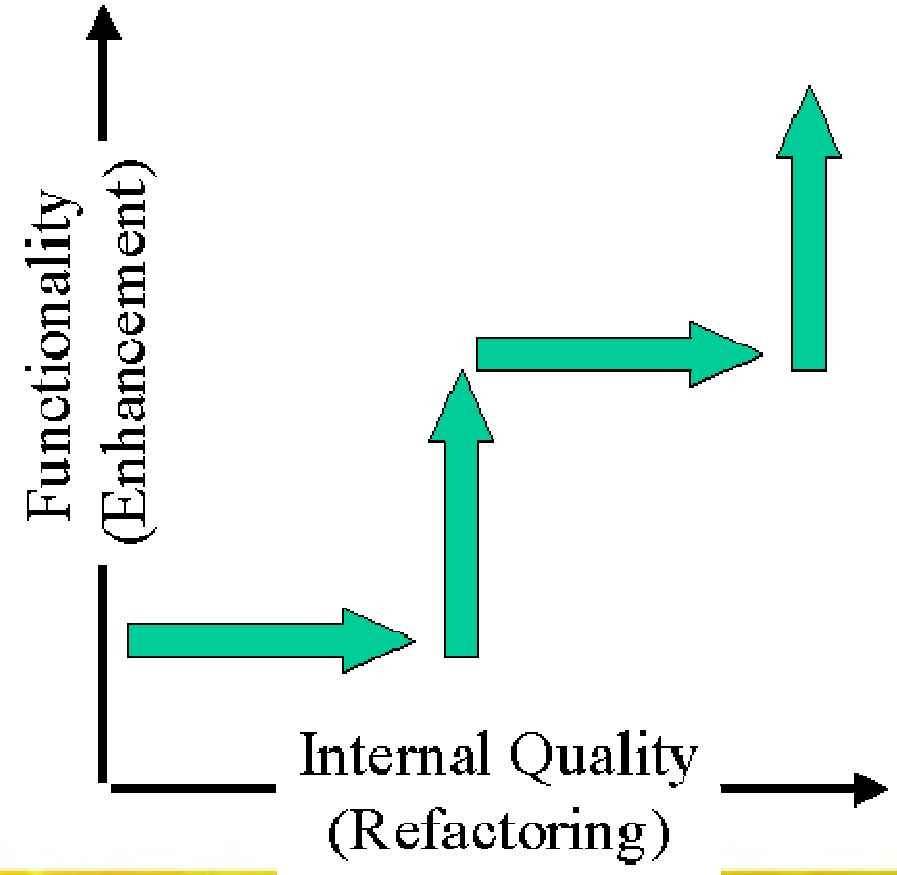
- Refactoring is a process of improvement to an existing software artifact.

Refactoring

- New requirement, bug fix, behavior change and architecture change are **NOT** Refactoring.

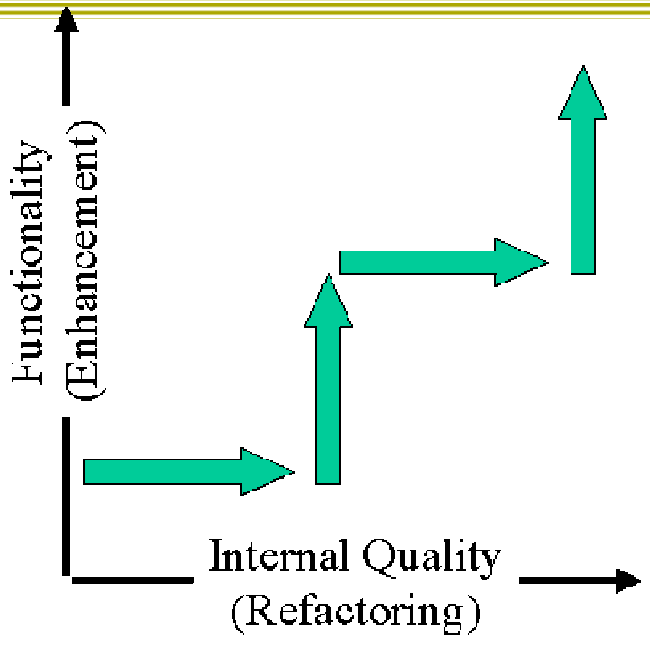
Refactoring and Functional Requirements

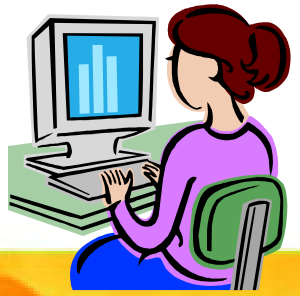
Refactoring and Functional Requirements



Refactoring and Functional Requirements

- Business
- Project manager
- QA





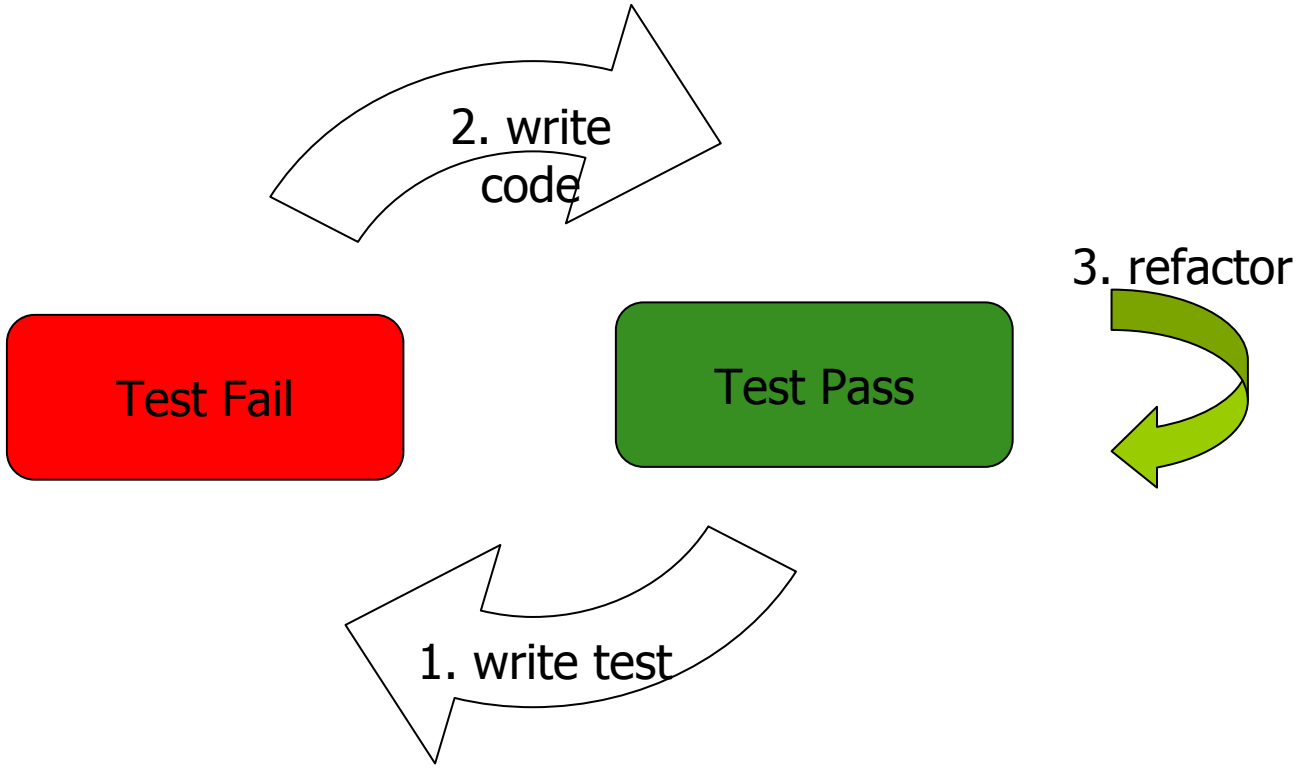
- Developer
- Performance Engineer
- Build Engineer

Refactoring and Test Driven Development

Test Driven Development

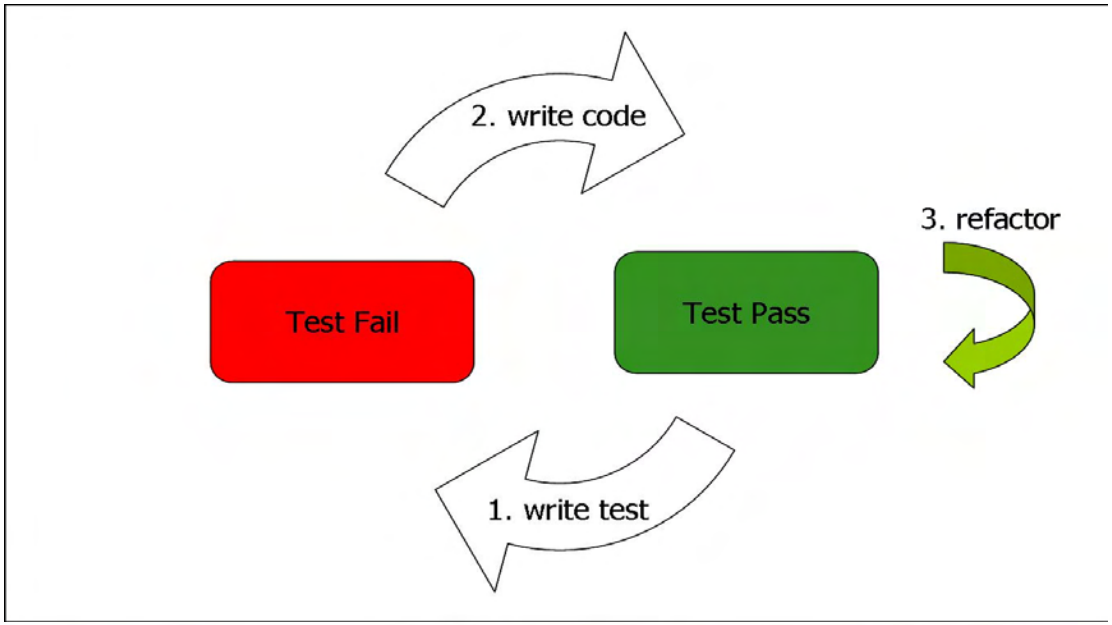
"Test-Driven Development (TDD) is an evolutionary approach to development which instructs you to have test-first development intent. Basically, you start by writing a test and then you code to elegantly fulfill the test requirements."

TDD Cycle

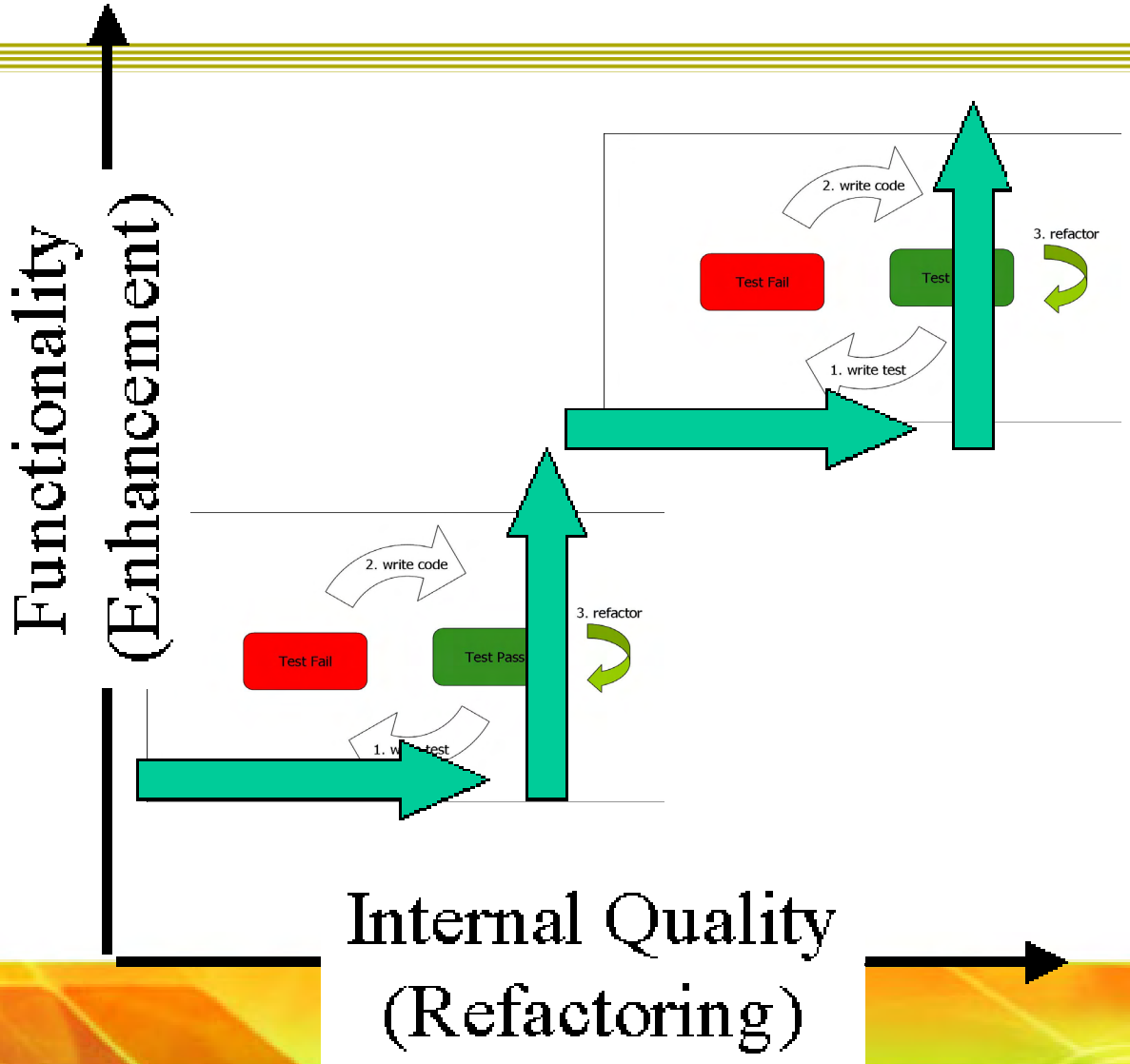


Refactoring and TDD

- Refactor on every green bar
- Look for Code Smells to Refactor
- No Automated Developer Test -> Hard to Refactor



Refactoring and TDD



Refactoring and Simple Design

Refactoring and Simple Design

- Think about tomorrow, but design, test and code for Today's need

- Produce simple artifacts that could be made flexible instead of Complex flexible artifacts

Refactoring and Simple Design

- Do the **simplest** thing that could possibly **work**

- Evolve into elaborate solutions

The Simplest Thing That Works

The simplest thing that works

- Don’t try to solve **big problems** in one go
  - Break them down into **little problems** and solve them one at a time
- Do the **simplest thing** that meets the **current requirement**

The simplest thing that works

- Use **interfaces** / abstractions to insulate areas of risk or unknown
- Use **TDD** + **refactoring** + **interfaces** to keep the system extensible

Evolutionary Design

Evolutionary Design

- The complexity of your design should support the **current requirements** at hand (being built in this Iteration) and no more.

Evolutionary Design

- Do not design for future flexibility, let new requirements **"pull"** more complex designs - Refactor later.

Evolutionary Design

- Evolutionary Design should not be practiced without the ability to **refactor** and evolve the design.

Code Smell

Code Smell

Code smell is a hint that something can be improved somewhere in your code.

Code Smell Samples

Code Smell Samples

- Duplicated Code
- Methods too big
- Nested “if” statements
- Classes with too many instance variables
- Classes with too much code

Code Smell Samples

- Strikingly similar subclasses
- Too many private (or protected) methods
- Similar looking code sections
- Dependency cycles
- Passing Nulls To Constructors
- Classes with too little code

Refactoring (to Patterns)

Refactoring (to Patterns)

- Simple Design -> Code Smell -> Refactor

- Refactoring (to Patterns) is the ability to transform a “Code Smell” into a positive design pattern

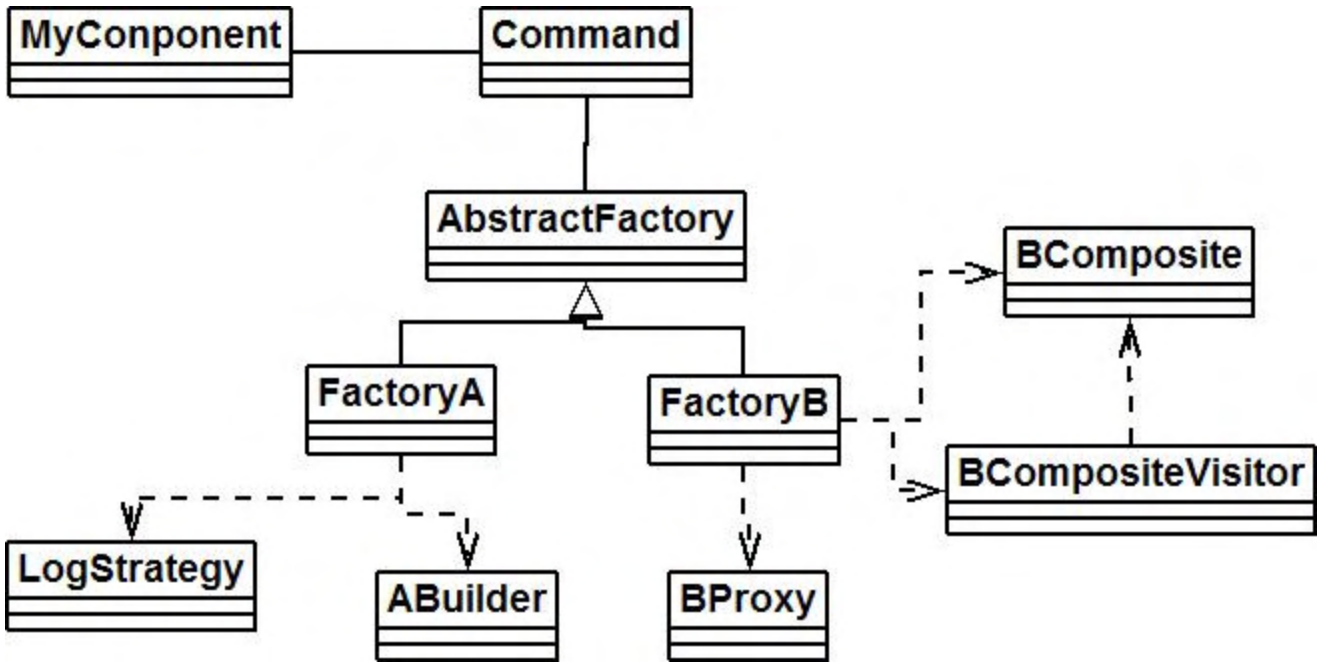
Design Patterns

Design Patterns

- **Proven solution** to a problem in context
- Classic solutions to common OO design problems
- Become a **common language** among developers

Applying Design Patterns

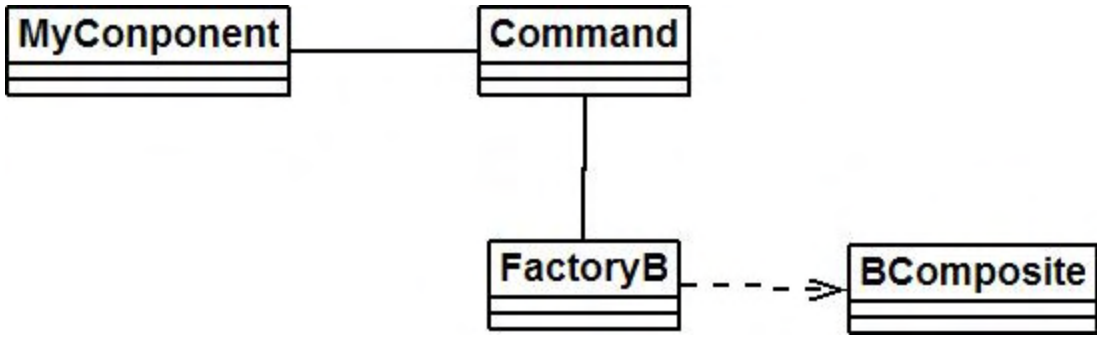
Applying Design Patterns - Upfront Design



Applying Design Patterns - Upfront Design

- Pre-emptive Design
- Sounds Great! But do I really need it?
- Wow, 3 weeks designing, beautiful diagrams!
- I generated lots of Pattern code (functional and test)

Applying Design Patterns - Emergent Design



Applying Design Patterns - Emergent Design

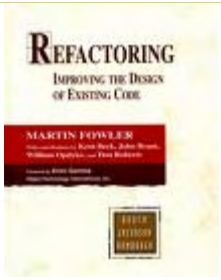
- Evolutionary Design
- Positive Patterns were "pulled" naturally
- Several components were just fine without Design Patterns
- Unit Test (TDD) validates the Refactoring to Patterns

Case Study

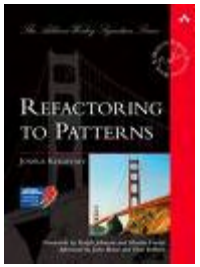
Recommended Readings

Recommended Readings

- ***Refactoring: Improving the Design of Existing Code,*** **Martin Fowler , Addison-Wesley, 2000.**



- **Refactoring to Patterns, Joshua Kerievsky, Addison Wesley, 2004.**



- **Design Patterns: Elements of Reusable Object-Oriented Software, Erich Gamma, Richard Helm , Ralph Johnson, John Vlissides, Addison-Wesley 1995**

- **http://www.thoughtworks.com/**
- **http://agilemanifesto.org/**

Refactoring
Tips and Suggestions

Refactoring Tips and suggestions

- Design **every day**
- **Isolate** the **unknown** with **abstractions** / interfaces
- **Mock out** dependent systems for testing

Refactoring Tips and suggestions

- **Refactor** code so it **communicates intent**
- **Test everything** – don't refactor without tests
- Focus on **simplifying complexity** rather than documenting it

Session Learning's

Session Learning's

- Understand Refactoring and TDD as Agile techniques
- Understand Agile Simplicity and Evolutionary Design Techniques

Session Learning's

- Understand how simple design evolves into more elaborate design by means of TDD and Refactoring
- Understand what code smells are and how they can be Refactored into Design Patterns (when appropriate)

Questions?

THANK YOU!