Proving a Problem is Solved

A developers perspective on requirements testing.

Your presenter

A quick overview

INTRODUCTION

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A Little About Me

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What I Do…..

- The Open Planets Foundation technical dept.
- OPF Events
- OPF Project work
  - SPRUCE
  - SCAPE
- My main goal is to encourage and facilitate community development of high quality digital preservation tools.

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Overview

- Defining Requirements?
  - Specifying software systems.
  - What makes a good requirement?
- Software Development Practices
  - Who'd win a fight? Agile vs. Waterfall methodologies.
  - Thinking testability at every step.
  - Open communication and simplicity.
- Thought into Action?
  - Tools and practices to test requirements.

Specifying software systems.

Requirements, what are they good for?

Knowing when you're done AKA testing your requirements.

DEFINING REQUIREMENTS

Why Specify Requirements?

- The Bottom Line
  Requirements are the contract between the user and the developer.
- When Procuring a Solution
  Requirements provide some of the fine details of the contract between procurer and supplier.
- In Theory.....
  - The customer knows they got what they wanted.
  - The supplier knows when they've delivered.
  - We get nice reporting metrics as the project progresses.

The 9 Virtues of Requirements

- So Wikipedia says, edited highlights ;) :

Unitary (Cohesive)	The requirement addresses one and only one thing.
Complete	The requirement is fully stated in one place……
Consistent	The requirement does not contradict any other requirement….
Non-Conjugated	The requirement is atomic, i.e., it does not contain conjunctions….
Traceable	The requirement meets all or part of a business need……
Current	The requirement has not been made obsolete over time.
Unambiguous	The requirement is concisely stated…..
Specify Importance	The requirement must specify a level of importance….
Verifiable	The implementation of the requirement can be determined….

Traceable and Verifiable

- I'd like to champion two attributes:
  - Traceable
  - Verifiable
- And the greatest of these is VERIFIABLE
- A truly verifiable requirement isn't :
  Ambiguous, conjugated (un-atomic), inconsistent (contradicts another test), though static analysis may be required to ensure completeness

Who'd win a fight: Agile vs. Waterfall methodologies?

A few first hand observations on testing and development.

Simplicity, openness and communication.

SOFTWARE DEVELOPMENT PRACTISES

Agile vs. Waterfall Methods

- Not trying to settle the great debate in software development.
- It's possible to treat methodologies as toolkits.
- The real procurement issues:
  - Specifying what's to be done.
  - Proving it's done.
- Between the two lies complexity and miscommunication.

Before I Started in IT….

- My first experience of poorly communicated of requirements.
- Who defines when a stone's large?
  - The supplier (my boss): >= a tennis ball
  - The customer: >= a golf ball
- My first experience of working evenings and weekends re-picking stones over 8 acres….

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Early days in IT

- Organisation in hurry to implement feature.
- The main test developer on leave.
- Feature developer green and keen on golf.
- So just run the dev tests, it's a minor change.
- Result: back from the golf course early and working late to remove 150,000 duplicate orders from the live system

Coil Plate Mill

Working for British Steel / Corus circa 1999

Scene of my most spectacular real world test failure

Where Waterfall Meets Agile

- Corus a waterfall project over 2 years, BUT :
  - Replacing and enhancing an existing system, one component at a time.
  - Access to business owner, domain experts (metallurgists) in the same office, and end users on site, a two mile car journey away.
  - Open and accessible communication and feedback opportunities.

Real Testable Specifications

- Pension Benchmarking & Attribution
- Requirements Provided by:
  - Financial Analysts
  - Delivered as a set of spreadsheets
  - Reserved another set for testing
  - When software gave the same answers as the spreadsheet, your done
- Client site deployment was another story

What Have I Learned?

- Developing software is the process taking an idea and making it real.
- Clear communication of ideas is a pre-requisite.
- The feedback loop between users, analysts, testers, and developers should be open, honest and regular (think constant).
- Decompose the problem into discrete testable elements.
- Think testability from the ground up.
- Delivering working software shouldn't be a big deal.

Building testing into the development process.

Connecting developer and acceptance tests.

Automated testing and continuous delivery.

THOUGHT INTO ACTION?

Who's the Driver?

- Test Driven Development
  Unit Tests : Build the thing right
  - Tools and processes for developers
  - Write a failing test.
  - Write the code to make the test pass, and repeat
- Behaviour Driven Development
  Acceptance Tests : Build the RIGHT THING
  - Tools and processes for teams, based on TDD
  - Define the system in terms of required behaviour
  - Link these specifications to developer tests

Cucumber: A BDD Tool

- Designed specifically to help business stakeholders get involved in writing acceptance tests.
- Provides the sandwich filling between Acceptance Tests and Unit Tests, in a variety of mixable flavours:
  - Integration tests
  - Browser testing
  - Smoke tests
  - And so on….

Cucumber: Encouraging Communication

- Facilitates the discovery and use of a ubiquitous language for project teams.
- Tests written collaboratively by the team, encouraging clear communication.
- Cucumber tests written in a medium and language that business stakeholders understand.
- Cucumber tests interact directly with the code.

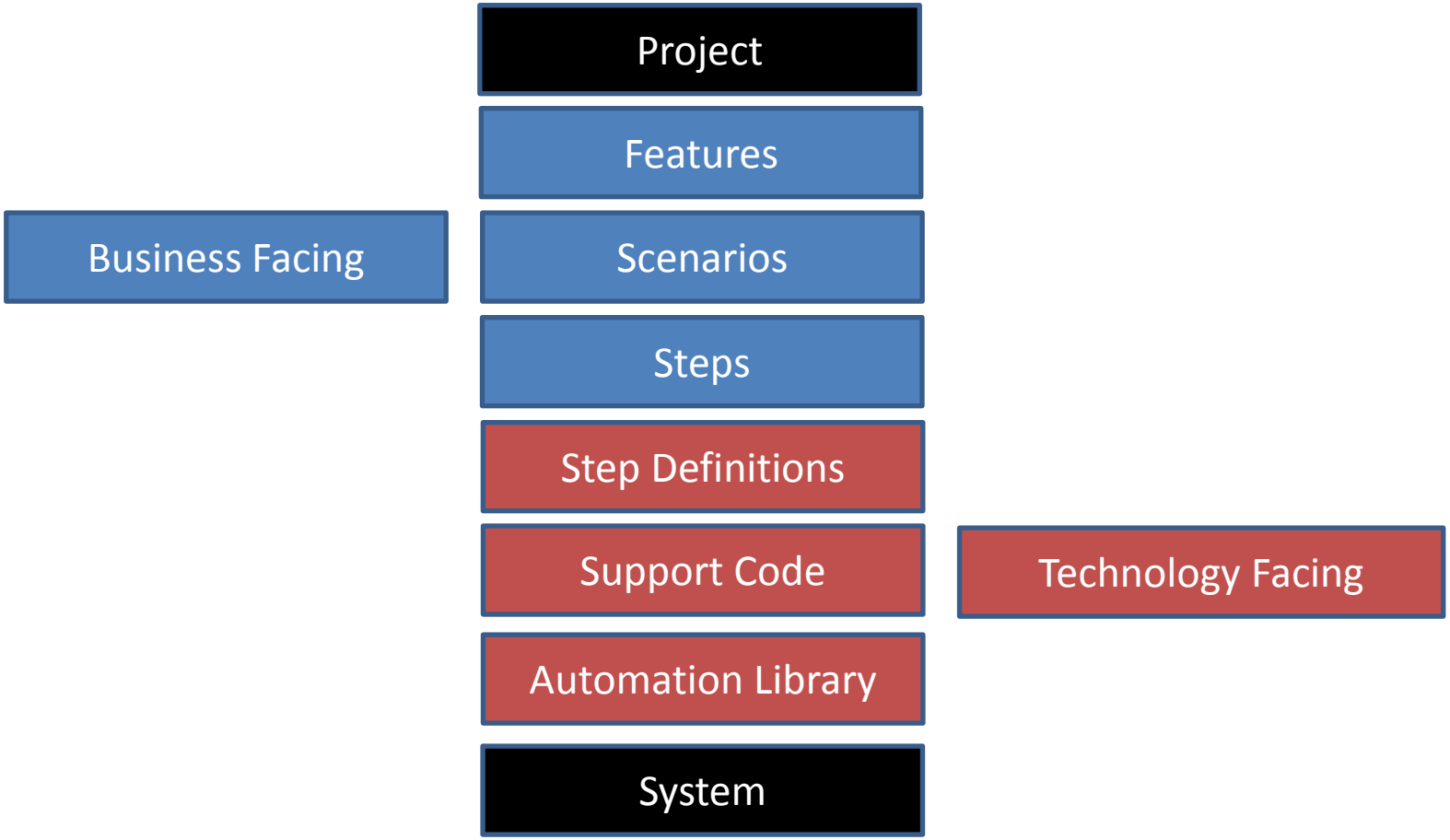
Cucumber: Managing Complexity

- Decompose the system into FEATURES, a low level unit of functionality
  e.g. customer registration
- A feature is made up of TESTABLE scenarios, providing detailed examples of desired behaviour as STEPS:
  - GIVEN some condition
  - WHEN some action / criteria
  - THEN desired result
  - AND further result…..

Cucumber: A Little Detail

- Cucumber test cases are called scenarios, scenarios are made up of steps.
- The business-facing parts of the test suite are grouped into features and stored in feature files.
- Feature file syntax known as Gherkin.
- Below the hood step definitions translate business-facing steps into code.

Cucumber: Testing Stack



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Putting it all together

- Continuous Integration
  - Automated build and testing of project
  - Ideally at every code change
  - Can run any kind of automated test
  - Up to date results should always be visible to the whole team.
- Continuous Delivery
  - Delivering a working system as BAU
  - Start with a test system
  - It’s possible to deploy live quickly and often

Footnote: Testing Creatively

- Good testing is NOT easy.
- Adding automated tests to existing code is challenging, refactoring without tests to ensure nothing's broken.
- Think creatively, black box testing is a good place to start with existing codebases.
- Think creatively, Wizard of Oz testing…..

Final Thoughts

- A bias towards Agile as it encourages:
  - Communication
  - Rapid Feedback
- Specifying systems to a truly testable level of detail is HARD.
- But if YOU, the customer, don't know how to verify you've received what you asked for then you're almost certain to miscommunicate the idea.

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