Application-Fixture-Test: Building a Robust UI-Testing Architecture

(Or How to Stop Worrying and Love Automated UI-Testing)

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Who Are We?

Phil Quitslund
- Senior Architect for Instantiations
- Eclipse Research Community Member
  - Multi-View Project (OGI/PSU)

Dan Rubel
- Chief Technology Officer for Instantiations
- Author “Eclipse: Building Commercial Quality Plug-ins“
- Developer and architect of VA Assist Enterprise, CodePro and over a dozen other commercial software products

Phil & Dan
- Co-architects of WindowTester

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Instantiations

Founded in 1997, Headquarters in Portland, OR

Leading edge development tools for professional Java developers
- VA Assist Enterprise (Smalltalk & Java)
- CodePro Product Line (AnalytiX, PlusPak, etc.)
- WindowBuilder Pro (SWT & Swing Designer)
- RCP Developer (WindowTester, RCP Packager)

Extensive Eclipse experience
- One of first IBM partners briefed on Eclipse in 1999
- Technical development since January 2000 (>6.5 years)
- First commercial Eclipse & WSAD add-on (Nov. 2001)
- First product certified as “Ready for WebSphere Studio”
- Eclipse Foundation member & major contributor
- Eclipse Projects: KOI (Collaboration), Pollinate (Beehive)

WindowBuilder™

WindowTester

CodePro™ AnalytiX
Continuous Collaborative Code Analysis

IBM Business Partner

Ready for IBM Rational. software

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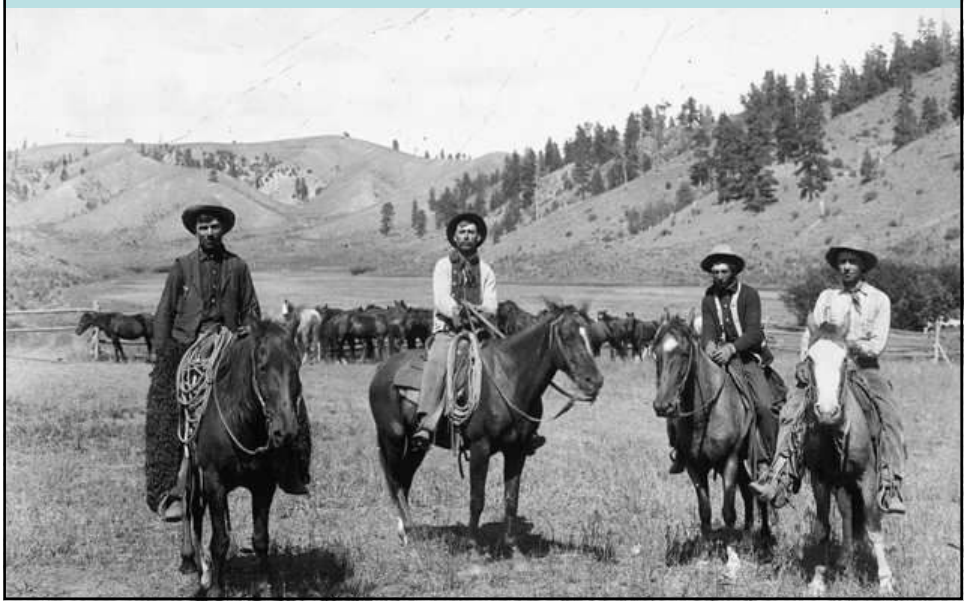
UI Testing in the Wild



UI Testing in the Wild

UI Tests in practice are undisciplined, untrusted and burdensome.

Tests are generally hard to write, hard to understand, and hard to maintain.

In the worst cases, tests are delivering very little value.

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Root Causes

Tests are often doing the ***wrong things*** (in the wrong ways).

Tests are often written by (and/or for) the ***wrong people***.

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Proposed Solution

An architecture that partitions UI testing into two activities.

Writing Tests: Testers write tests in an application-specific test language.

Writing Fixtures: Developers build fixtures that make up the primitives in the test language.

Tests *and* fixtures are first class development artifacts.

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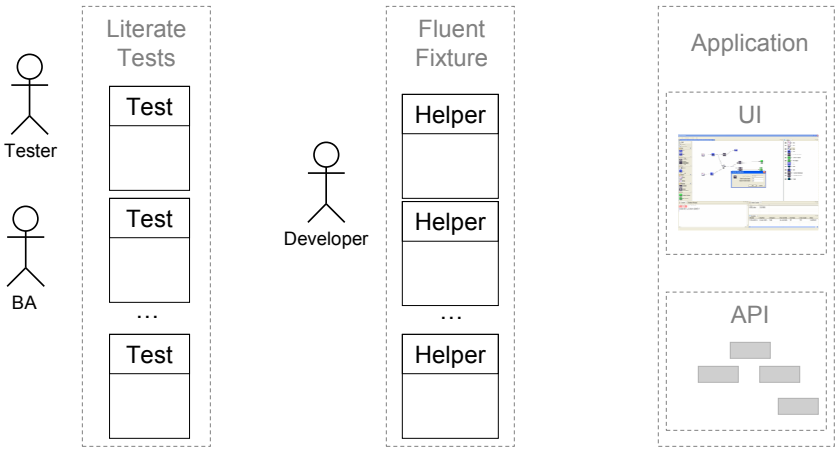
Application/Fixture/Test



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Example: Creating a Project (Free)

```
@Test
public void verifyProjectCreation() {
        click(menu("File/New/Other..."));
        waitFor(shellShowing("New"));
        click(tree("General/Project"));
        click(button("Next"));
        enter("MyProject");
        click(button("Finish"));
        waitFor(shellDisposed("New Project"));
        assertThat(projectExists("MyProject"));
}
```

Create Project Test (w/o Fixture)

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Example: Creating a Project (Fixture)

```
import static WorkbenchHelper.*;

@Test
public void verifyProjectCreation() {
        createProject("MyProject");
}
```

VerifyProjectCreation.java

```
public static void createProject(String projectName) {
        click(menu("File/New/Other..."));
        waitFor(shellShowing("New"));
        click(tree("General/Project"));
        click(button("Next"));
        enter(projectName);
        click(button("Finish"));
        waitFor(shellDisposed("New Project"));
        assertThat(projectExists(projectName));
}
```

WorkbenchHelper.java

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Payoff: Fixture Reuse

```
public void createProject(String projectName) { ...}
public void createFile(String filePath) { ...}
```

WorkbenchHelper.java

```
import static WorkbenchHelper.*;

@Test
public void verifyFileCreation() {
        createProject("MyProject");
        createFile("MyProject/myFile.txt");
}
```

VerifyFileCreation.java

Pattern: Intention-Revealing Fixture:

Fixture methods should have revealing names.

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Payoff: Test Maintenance

```
public static void createProject(String projectName) {
        click(menu("File/New/Other..."));                  (1) → Menu change
        waitFor(shellShowing("New"));                      (2) → Shell name change
        click(tree("General/Project"));                    (3) → Tree path change
        click(button("Next"));                             (4) → Button text change
        enter(projectName);                                (5) → Focus change
        click(button("Finish"));                           (6) → Button text change
        waitFor(shellDisposed("New Project"));
        assertThat(projectExists(projectName));
}
```

WorkbenchHelper.java

The Rub:

Test infrastructure should not leak!

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Payoff: Test Simplicity

```
import static WorkbenchHelper.*;

@Test
public void verifyFileCreation() {
        createProject("MyProject");
        createFile("MyProject/myFile.txt");
}
```

VerifyFileCreation.java

Pattern: Self-Verifying Fixture:

Fixtures enforce their own contracts.

Pattern: Externalized Configuration:

Fixtures encapsulate configuration details (locale, OS, app version, etc.)

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A/F/T Process Summary

Testers write literate tests built out of primitives provided by the fixture.

Fixtures are delivered and maintained by developers.

Fixtures are a model, interface and contract.

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Tests vs. Fixtures

Tests are

literate, declarative, descriptive (DAMP)

> A well designed Domain Specific Language will appear as **D**escriptive **A**nd **M**eaningful **P**hrases.
>
> http://blog.jayfields.com/2006/05/dry-code-damp-dsls.html

Fixtures are

intention-revealing, robust, DRY

> **Don't Repeat Yourself** (**DRY**, also known as **Once and Only Once** or **Single Point of Truth (SPOT)**)
>
> http://en.wikipedia.org/wiki/Don't_repeat_yourself

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Challenge: Breaking Down the Wall

Requires an investment in change.

New kind of collaboration between QA and dev.

http://en.wikipedia.org/wiki/Image:Greatwall_large.jpg

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Process Patterns

1. Fixture as Deliverable
2. Lockstep Delivery
3. Fixture Failure Escalation

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Fixture as Deliverable

How do you ensure fixtures are well-factored?

Treat fixtures as deliverables.

(Estimate, schedule, review, etc.)

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Lock-step Delivery

How do you ensure testers are never fixture-starved?

Bundle fixture deliveries with the associated functionality.

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Fixture Failure Escalation

How do you ensure that fixtures stay in sync?

Run regular (full coverage) fixture smoke tests and treat failures as developer P1s.

Prime directive: protect your client (QA).

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Key Points

Fixtures reify a model of the application under test

Fixture model should be defined in terms of domain expert's vocabulary (A DSL for testing)

Fixtures are the *only* way for testers to access the application

Fixtures are built and maintained by the same developers who deliver functionality

Fixtures are deliverables (need to be estimated, scheduled for, reviewed, etc.)

Tests might be DAMP but fixtures are DRY

- improves maintainability since logic that is most likely to change (and has the broadest impact) is not repeated

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