Innovate2011

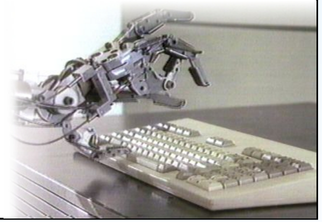
The Rational Software Conference

11th and 12th of October

Let's build a smarter planet.

# Test Automation Frameworks

*The reality behind the myth…*



**Neil Williams**
**Test Automation Architect**

# Welcome…

## Titles

- Client Technical Professional
- Rational Quality Management Professional Lead
- Senior QM Consultant / Senior ASQ Consultant
- Test Automation Architect

## Testing Experience

- Functional Automation (13 years)
- Performance Testing (4 years)
- Test Management (10 years)
- Techie (Forever)

## Abstract

- *"There are various misconceptions around the benefits of automation, this session aims to dispel the myths around automated testing and demonstrates why and where automation can truly add value. We will cover types of framework, both business and technical as well as best practice to ensure robust, resilient testing"*

## Plan

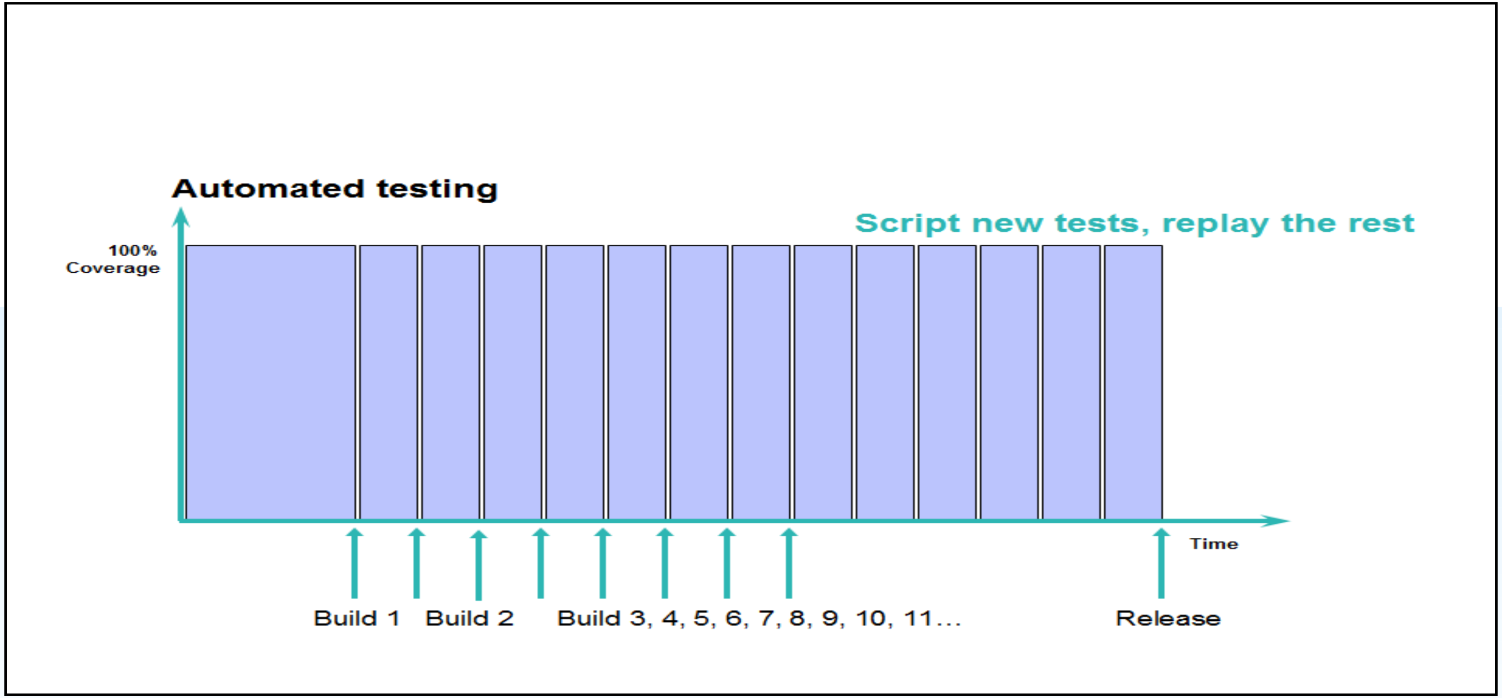
- Why do we automate
- What do we automate
- How do we automate

# In a world before automation…

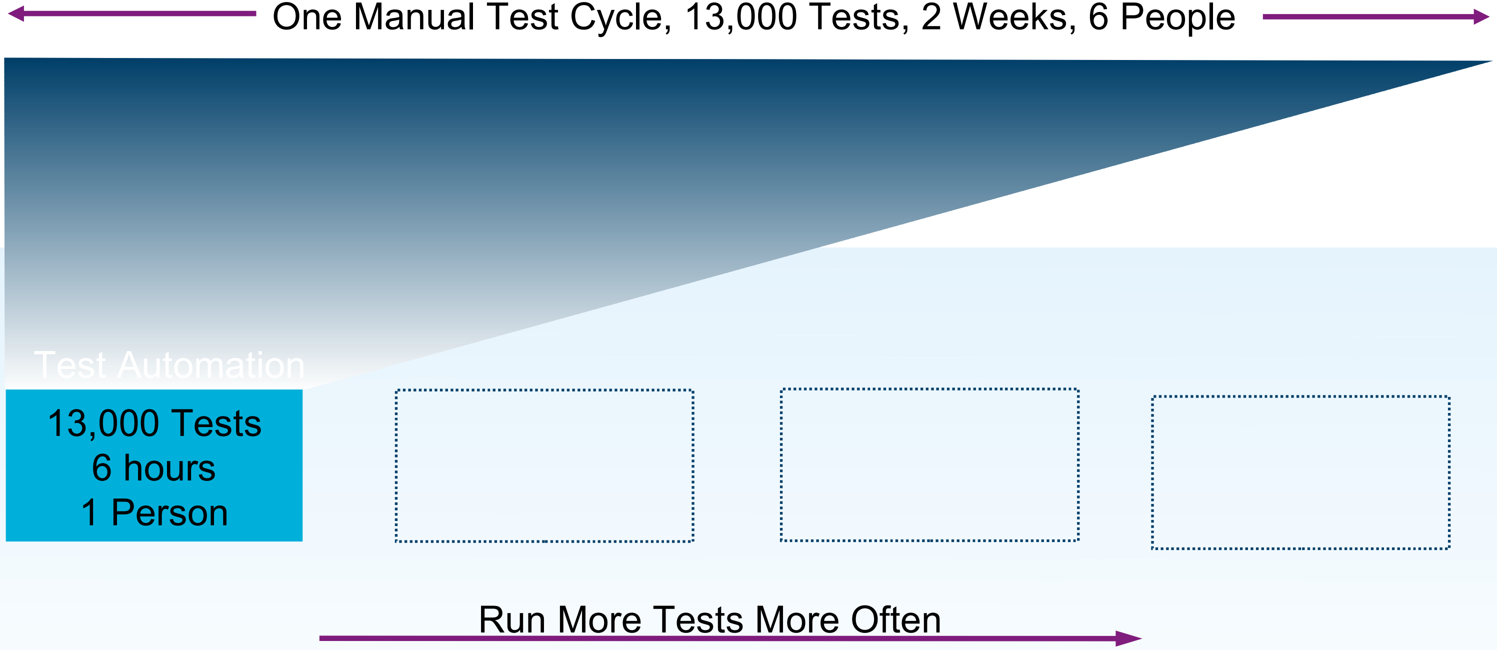
…when manual testing ruled the earth

- Resource intensive
- Slow
- Repetitive
- Error prone
- Incomplete

# Why do we automate…



# Why do we automate…



One Manual Test Cycle, 13,000 Tests, 2 Weeks, 6 People

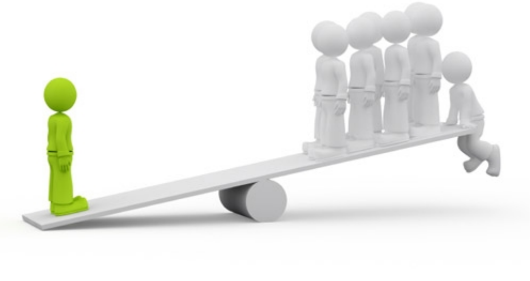
Test Automation

13,000 Tests
6 hours
1 Person

Run More Tests More Often

# What do we automate…

- Build verification tests (“smoke tests”)
- Regression tests
- Data-driven tests
- Configuration tests
- Tedious tests
- Complex tests



# Test Automation…

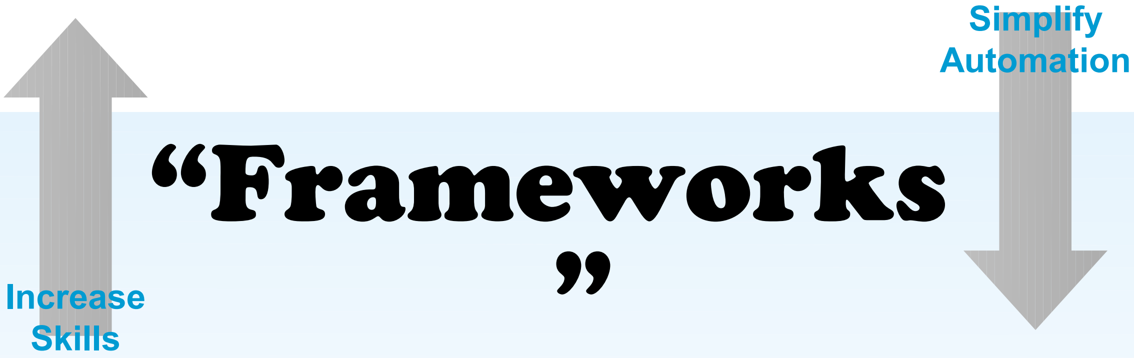
…is a <u>skill</u> possessed by experienced technical testers

- The art of test automation is to develop a test automation strategy/approach that is:

  - Modular
  - Reusable
  - Robust
  - Resilient

- …includes both Test and Task automation

# How to bridge the gap…



Increase Skills

“Frameworks”

Simplify Automation

# What is a framework…

**The term "framework" is a heavily overloaded idea**

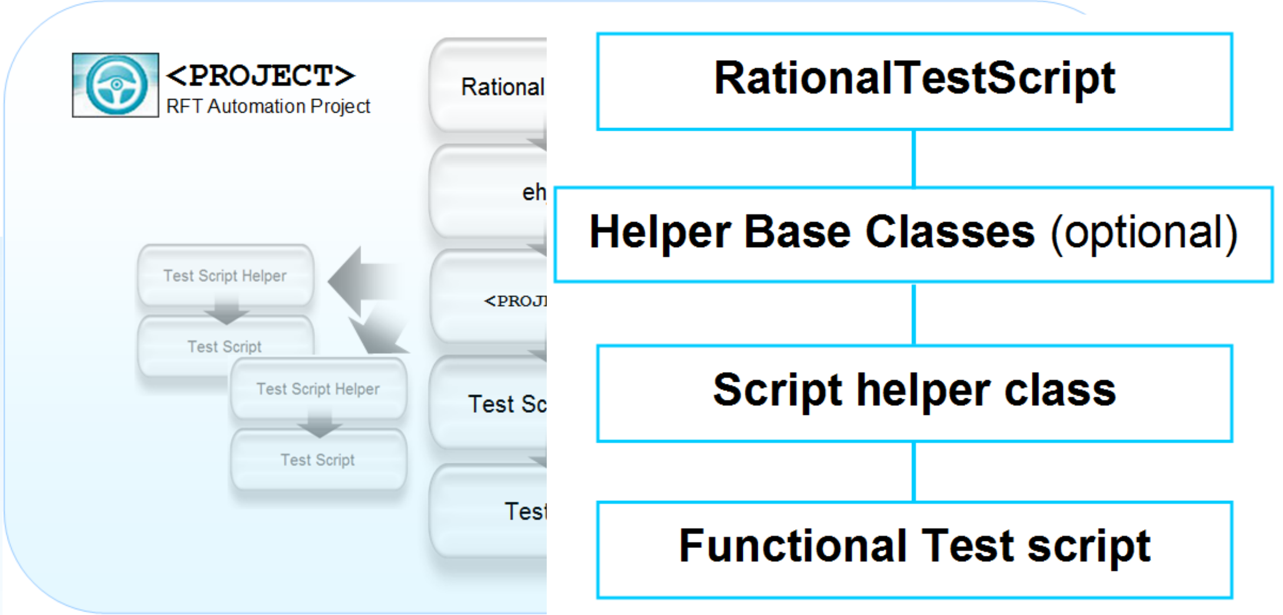
> *"A test automation framework is a set of assumptions, concepts and tools that provide support for automated software testing.*
>
> *The main advantage of such a framework is the low cost for maintenance."*

# Increase Skills

Becoming a “Technical Tester”

- Experience
- Enabling users to deepen technical skills and become self sufficient through a mix of training, mentoring and consulting
- Best Practice Guidance
- Joint ownership of the developing solution
- Experience

# The framework starts here…



RationalTestScript

Helper Base Classes (optional)

Script helper class

Functional Test script

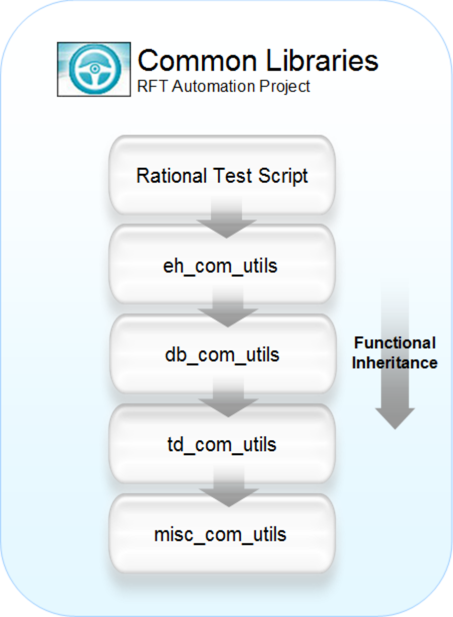
ect Libraries

or Handling

ities

ming Conventions

# As skills develop so does the framework...



Common Libraries
RFT Automation Project

Rational Test Script

eh_com_utils

db_com_utils

td_com_utils

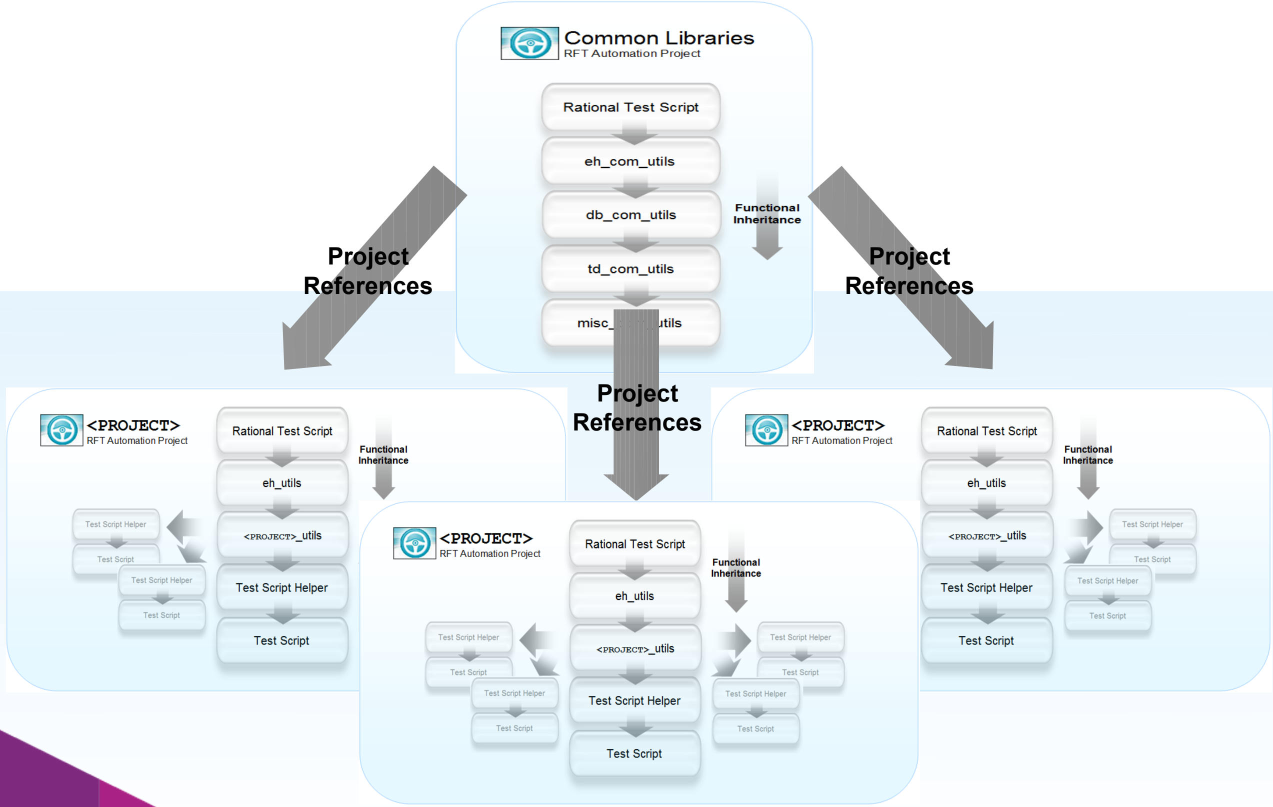
misc_com_utils

Functional Inheritance

## Functional Libraries

- Error Handling
- Database
- Test Data
- Miscellaneous

# As skills develop so does the framework…



Common Libraries
RFT Automation Project

Rational Test Script
eh_com_utils
db_com_utils
td_com_utils
misc_[illegible]utils

Functional Inheritance

Project References

Project References

Project References

<PROJECT>
RFT Automation Project

Rational Test Script
eh_utils
<PROJECT>_utils
Test Script Helper
Test Script

Functional Inheritance

Test Script Helper
Test Script
Test Script Helper
Test Script

<PROJECT>
RFT Automation Project

Rational Test Script
eh_utils
<PROJECT>_utils
Test Script Helper
Test Script

Functional Inheritance

Test Script Helper
Test Script
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Test Script
Test Script Helper
Test Script
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Test Script

<PROJECT>
RFT Automation Project

Rational Test Script
eh_utils
<PROJECT>_utils
Test Script Helper
Test Script

Functional Inheritance

Test Script Helper
Test Script
Test Script Helper
Test Script

# Example Methods

Querying a database

File access

Accessing test data sources

- Excel
- Database
- XML

File comparison

Object manipulation

Custom Verification Points

Custom log files

Clipboard/string manipulation

Registry access

Overriding methods

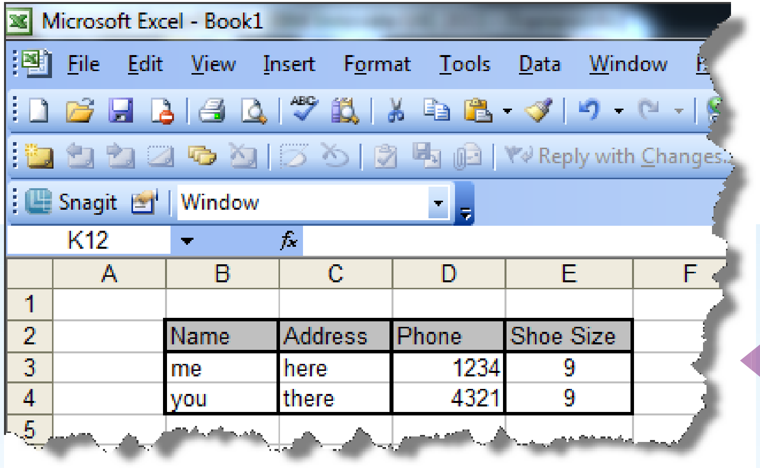
Timers

Error Handling

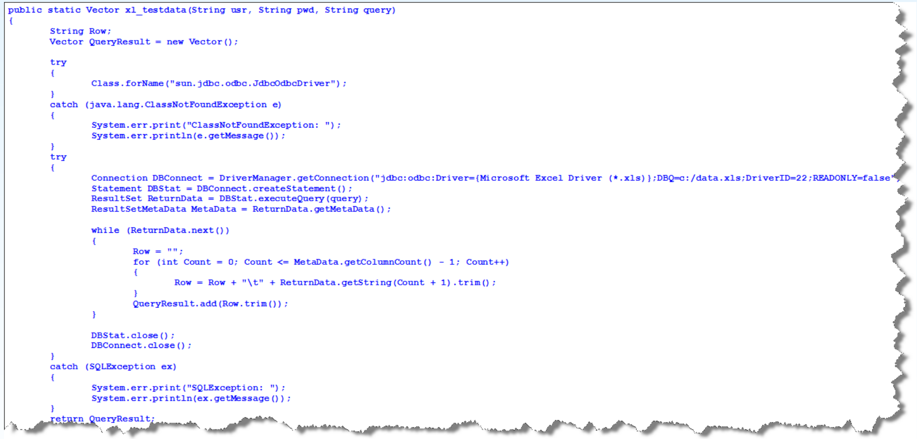
Windows API

# Example Methods

Part of the planning / developing of a test automation framework is considering the best approach



|   | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 1 |  |  |  |  |  |  |
| 2 |  | Name | Address | Phone | Shoe Size |  |
| 3 |  | me | here | 1234 | 9 |  |
| 4 |  | you | there | 4321 | 9 |  |
| 5 |  |  |  |  |  |  |

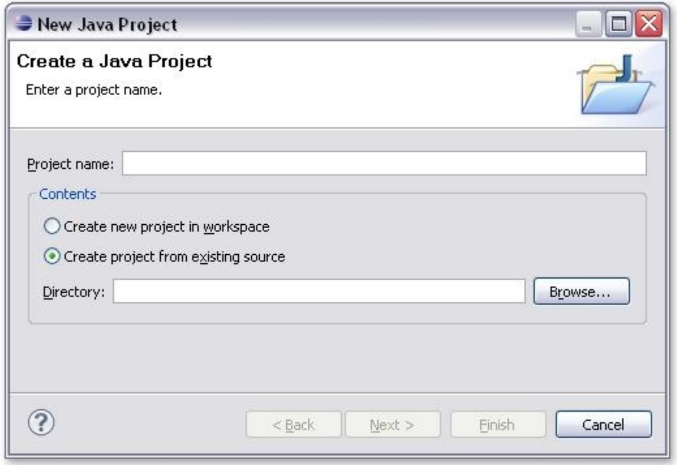


```
public static Vector xl_testdata(String usr, String pwd, String query)
{
        String Row;
        Vector QueryResult = new Vector();

        try
        {
                Class.forName("sun.jdbc.odbc.JdbcOdbcDriver");
        }
        catch (java.lang.ClassNotFoundException e)
        {
                System.err.print("ClassNotFoundException: ");
                System.err.println(e.getMessage());
        }
        try
        {
                Connection DBConnect = DriverManager.getConnection("jdbc:odbc:Driver={Microsoft Excel Driver (*.xls)};DBQ=c:/data.xls;DriverID=22;READONLY=false"
                Statement DBStat = DBConnect.createStatement();
                ResultSet ReturnData = DBStat.executeQuery(query);
                ResultSetMetaData MetaData = ReturnData.getMetaData();

                while (ReturnData.next())
                {
                        Row = "";
                        for (int Count = 0; Count <= MetaData.getColumnCount() - 1; Count++)
                        {
                                Row = Row + "\t" + ReturnData.getString(Count + 1).trim();
                        }
                        QueryResult.add(Row.trim());
                }

                DBStat.close();
                DBConnect.close();
        }
        catch (SQLException ex)
        {
                System.err.print("SQLException: ");
                System.err.println(ex.getMessage());
        }
        return QueryResult;
```

# Example of a dynamic Framework

**Example of an “English” style test case:**

***Enter “My Java Project” into the text field with the label “Project name”.***



New Java Project

Create a Java Project

Enter a project name.

Project name:

Contents

○ Create new project in workspace

● Create project from existing source

Directory:

Using a dynamic lookup:

```
enter("My Java Project", textfield().with(label("Project name:")));
```

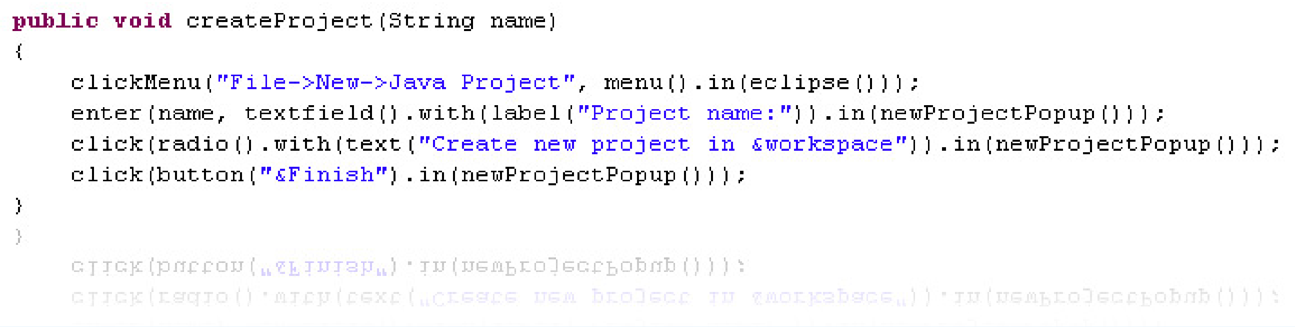
Add in the hierarchy:

```
enter("My Java Project", textfield().with(label("Project name:")).in(dialog().with(title("New Java Project"))));
```

Simplify for reuse:

```
enter(name, textfield().with(label("Project name:")).in(newProjectPopup()));
```

# Example of a dynamic Framework



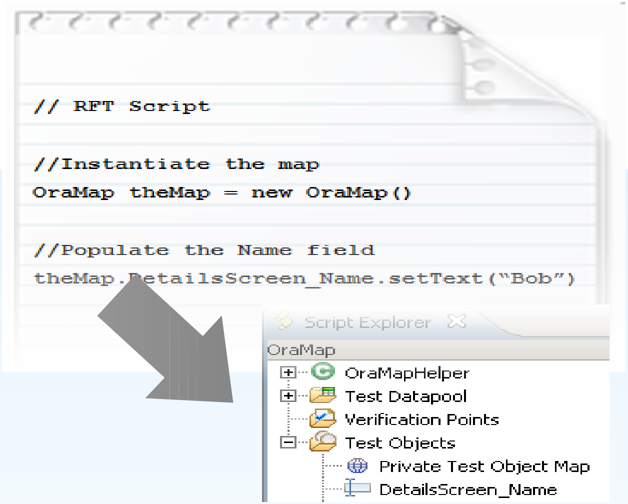
```
public void createProject(String name)
{
    clickMenu("File->New->Java Project", menu().in(eclipse()));
    enter(name, textfield().with(label("Project name:")).in(newProjectPopup()));
    click(radio().with(text("Create new project in &workspace")).in(newProjectPopup()));
    click(button("&Finish").in(newProjectPopup()));
}
```

Record/Replay has it’s place…

- RFT could have recorded this in $^1/_{20}$ of the time

Not forgetting the object map…

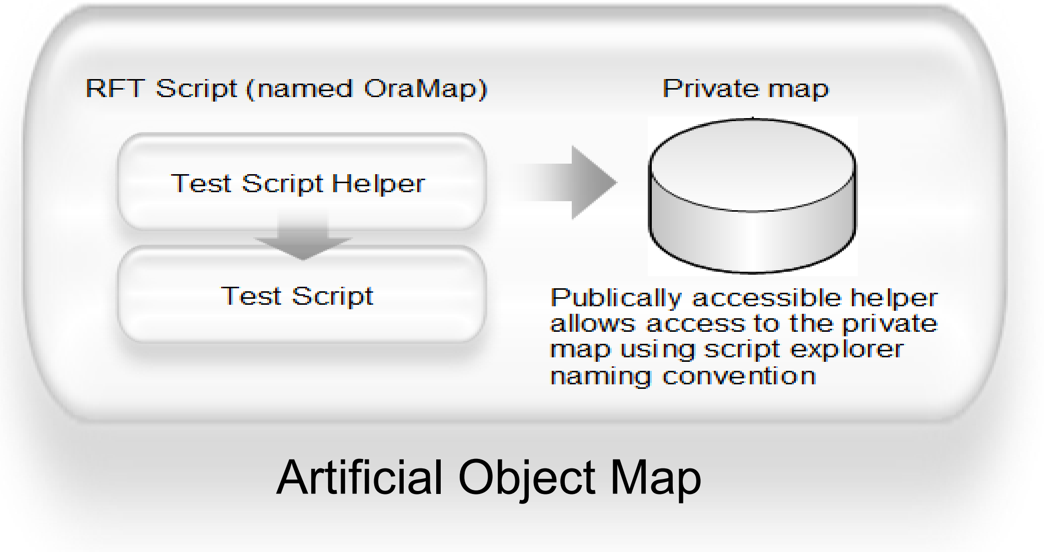
# Example of the ITCL Framework



```
// RFT Script

//Instantiate the map
OraMap theMap = new OraMap()

//Populate the Name field
theMap.DetailsScreen_Name.setText(“Bob”)
```

Script Explorer

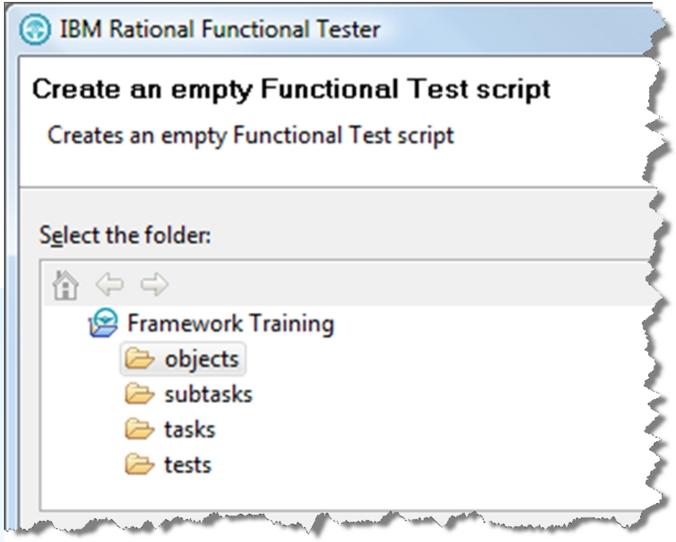
```
OraMap
⊞ OraMapHelper
⊞ Test Datapool
  Verification Points
⊟ Test Objects
    Private Test Object Map
    DetailsScreen_Name
```



Publically accessible helper allows access to the private map using script explorer naming convention

Artificial Object Map

# Example of the ITCL Framework



IBM Rational Functional Tester

Create an empty Functional Test script

Creates an empty Functional Test script

Select the folder:

- Framework Training
  - objects
  - subtasks
  - tasks
  - tests

`JavaClassicObjects` contains

`btnPlaceOrder`

`SelectCDSubTasks` contains

`clickPlaceOrder()`

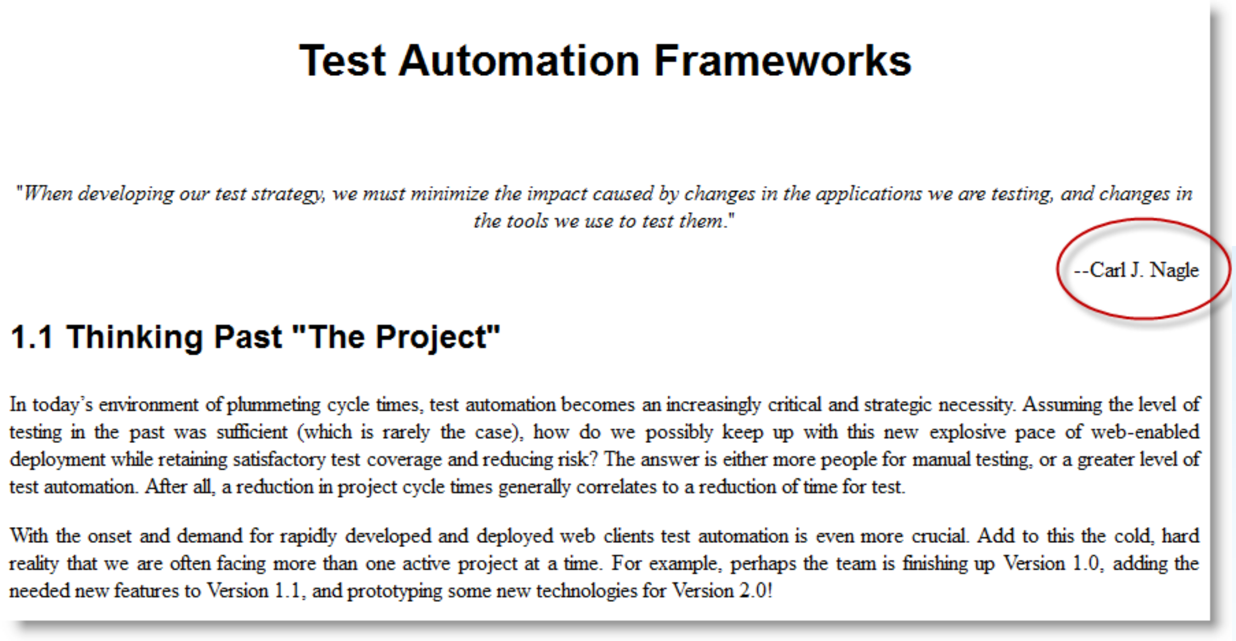
`clickPlaceOrder` contains

`classicsObjects.btnPlaceOrder()`

`OrderCDTasks` contains

`clickPlaceOrder`

# Yet more examples…



## Test Automation Frameworks

*"When developing our test strategy, we must minimize the impact caused by changes in the applications we are testing, and changes in the tools we use to test them."*

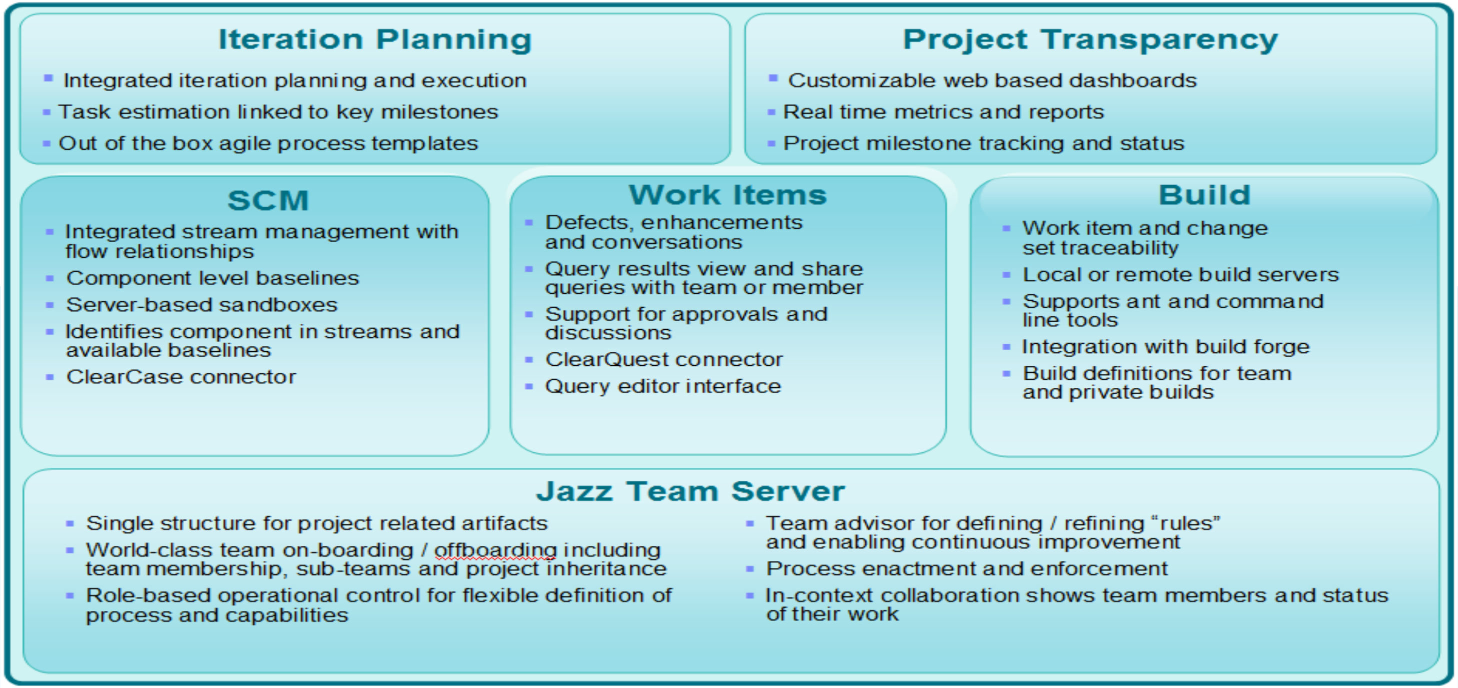
--Carl J. Nagle

### 1.1 Thinking Past "The Project"

In today's environment of plummeting cycle times, test automation becomes an increasingly critical and strategic necessity. Assuming the level of testing in the past was sufficient (which is rarely the case), how do we possibly keep up with this new explosive pace of web-enabled deployment while retaining satisfactory test coverage and reducing risk? The answer is either more people for manual testing, or a greater level of test automation. After all, a reduction in project cycle times generally correlates to a reduction of time for test.

With the onset and demand for rapidly developed and deployed web clients test automation is even more crucial. Add to this the cold, hard reality that we are often facing more than one active project at a time. For example, perhaps the team is finishing up Version 1.0, adding the needed new features to Version 1.1, and prototyping some new technologies for Version 2.0!

# Keep it safe…RTC



## Iteration Planning

- Integrated iteration planning and execution
- Task estimation linked to key milestones
- Out of the box agile process templates

## Project Transparency

- Customizable web based dashboards
- Real time metrics and reports
- Project milestone tracking and status

## SCM

- Integrated stream management with flow relationships
- Component level baselines
- Server-based sandboxes
- Identifies component in streams and available baselines
- ClearCase connector

## Work Items

- Defects, enhancements and conversations
- Query results view and share queries with team or member
- Support for approvals and discussions
- ClearQuest connector
- Query editor interface

## Build

- Work item and change set traceability
- Local or remote build servers
- Supports ant and command line tools
- Integration with build forge
- Build definitions for team and private builds

## Jazz Team Server

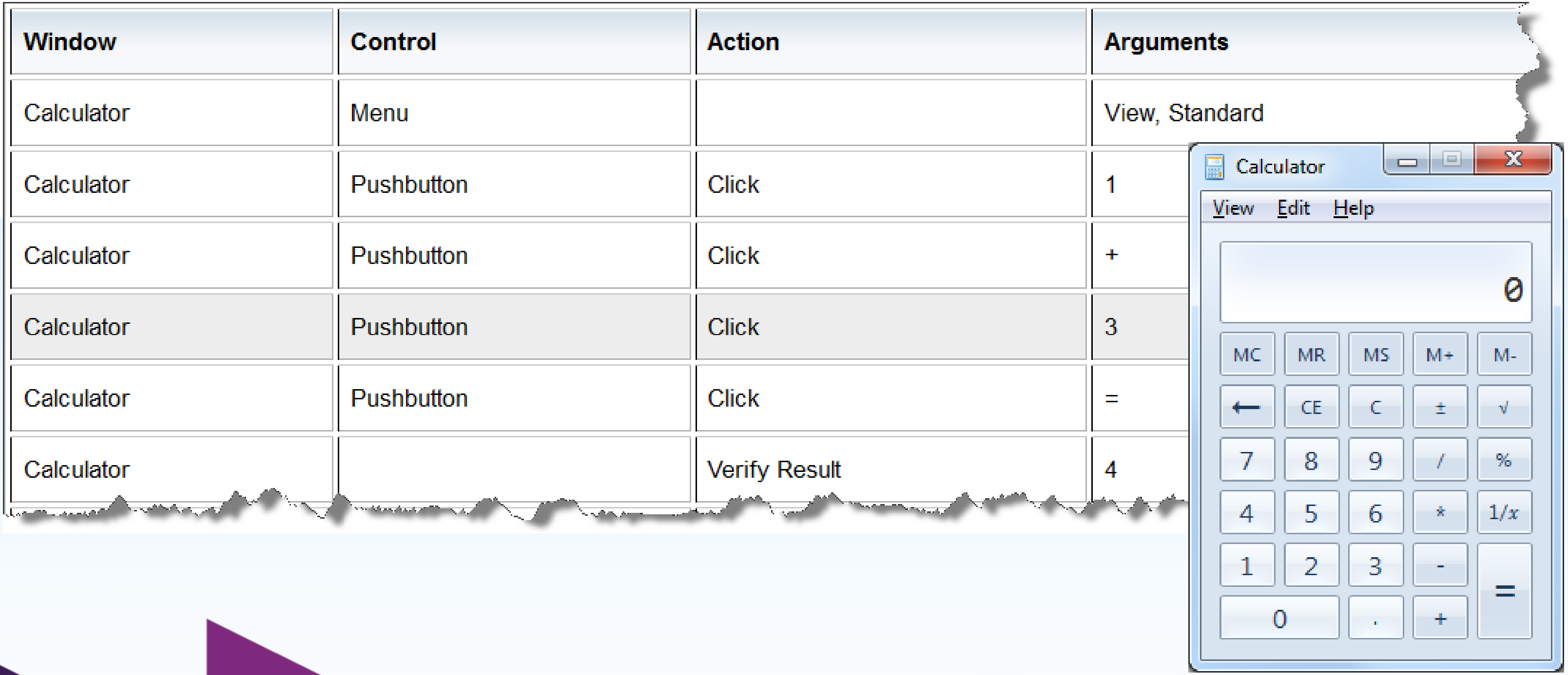
- Single structure for project related artifacts
- World-class team on-boarding / offboarding including team membership, sub-teams and project inheritance
- Role-based operational control for flexible definition of process and capabilities
- Team advisor for defining / refining "rules" and enabling continuous improvement
- Process enactment and enforcement
- In-context collaboration shows team members and status of their work

# Simplify Automation

To be used by “Business Testers”

- Abstracts the test script from the test tool
- Every home grown solution different
- Limited use beyond current project/organisation
- Adds a layer of complexity above and beyond a technical framework

# Simplify Automation



| Window | Control | Action | Arguments |
|---|---|---|---|
| Calculator | Menu | | View, Standard |
| Calculator | Pushbutton | Click | 1 |
| Calculator | Pushbutton | Click | + |
| Calculator | Pushbutton | Click | 3 |
| Calculator | Pushbutton | Click | = |
| Calculator | | Verify Result | 4 |

# Simplify Automation

## Free Frameworks

- Free
- Useful pickings
- Unmaintained
- Out of date
- Unsupported

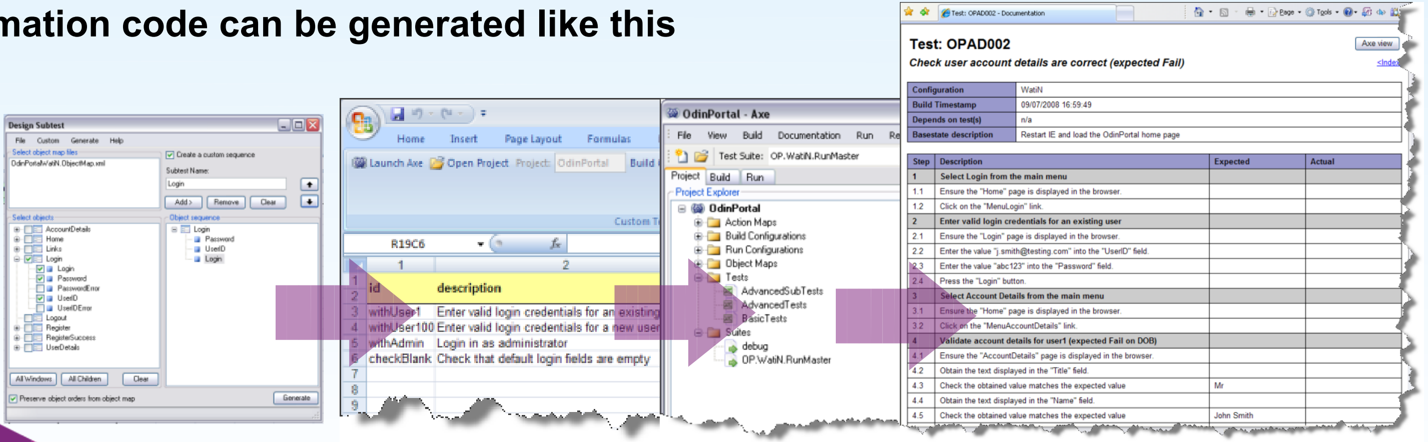
## Commercial Frameworks

- No point reinventing the wheel
- Supported
- Up to date
- Extensible

**An Example** axe

# An axe example

- Unique test automation platform (tools and approach)
- Primary benefit: Enables non-technical testers to rapidly create self documented automated tests for RFT and Robot
- Uses a simple Excel model and a code generation capability.
- 90-95% of automation code can be generated like this



| | 1 | 2 |
|---|---|---|
| 1 | id | description |
| 2 | | |
| 3 | withUser1 | Enter valid login credentials for an existing |
| 4 | withUser100 | Enter valid login credentials for a new user |
| 5 | withAdmin | Login in as administrator |
| 6 | checkBlank | Check that default login fields are empty |
| 7 | | |
| 8 | | |
| 9 | | |

**Test: OPAD002**

*Check user account details are correct (expected Fail)*

| | |
|---|---|
| Configuration | WatiN |
| Build Timestamp | 09/07/2008 16:59:49 |
| Depends on test(s) | n/a |
| Basestate description | Restart IE and load the OdinPortal home page |

| Step | Description | Expected | Actual |
|---|---|---|---|
| 1 | Select Login from the main menu | | |
| 1.1 | Ensure the "Home" page is displayed in the browser. | | |
| 1.2 | Click on the "MenuLogin" link. | | |
| 2 | Enter valid login credentials for an existing user | | |
| 2.1 | Ensure the "Login" page is displayed in the browser. | | |
| 2.2 | Enter the value "j.smith@testing.com" into the "UserID" field. | | |
| 2.3 | Enter the value "abc123" into the "Password" field. | | |
| 2.4 | Press the "Login" button. | | |
| 3 | Select Account Details from the main menu | | |
| 3.1 | Ensure the "Home" page is displayed in the browser. | | |
| 3.2 | Click on the "MenuAccountDetails" link. | | |
| 4 | Validate account details for user1 (expected Fail on DOB) | | |
| 4.1 | Ensure the "AccountDetails" page is displayed in the browser. | | |
| 4.2 | Obtain the text displayed in the "Title" field. | | |
| 4.3 | Check the obtained value matches the expected value | Mr | |
| 4.4 | Obtain the text displayed in the "Name" field. | | |
| 4.5 | Check the obtained value matches the expected value | John Smith | |

# Conclusions

What have we learnt here…

- Frameworks exist everywhere (formal/informal)
- Technical skills are needed to support them
- Additional Layers are needed to support non-technical users (frameworks on frameworks)
- If the business need to automate, why reinvent the wheel?

www.ibm/software/rational