Software test automation success
A case study

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Case study

Who:	Large financial institution
Where:	Johannesburg
When:	2006 to 2008
What:	Adoption of test automation with the aim of reducing cost and increasing productivity

Contents

Introduction

" On the island of testers they were forever doomed to search for what should not and could not exist, knowing to succeed would bring misery to the gods."

Lessons Learned in Software Testing

Cem Kaner
James Bach
Bret Pettichord

" A fool with a tool is still a fool."

Challenges

1. Lack of an end-to-end defined automation process.
2. Insufficient re-use of tools, scenarios and data.
3. Automation involved late in the process.
4. No living documentation.
5. Slow uptake of test automation and shelfware.
6. No means of proving automation benefits and cost justification.
7. Dependency on key resources.

Solving the problem

1. Formal organisational project launched.
2. Project had to be based on a sound financial base.
3. Funding for the project approved at the highest level.
4. Failure not an option.
5. Resourced with capable and skilled resources.
6. Driven by a passionate person.

Project testing

1. Formal project launched in May 2006.
2. Project had a significant budget.
3. Detailed business case was documented to facilitate return on investment.
4. Steering committee tracked progress on a monthly basis.
5. Macro project broken down into workgroups.
6. Dedicated workgroup responsible for communication and change management.

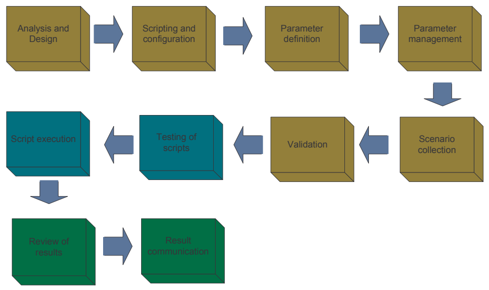
Project testing workstreams

- Test process workstream.
- Test governance workstream.
- ***Test mechanisation and tools workstream.***
- Test repository workstream.
- Test environment workstream.
- Test change management, communication and training workstream.

Test automation work stream

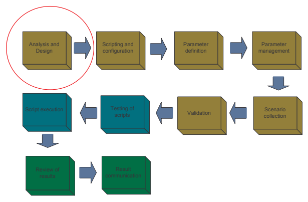
- Automation process.
- Automation process integrated with SDLC.
- Tool selection, procurement and training.
- Automation framework.
- Tool classification.
- Quantification of automation benefits.

Automation process



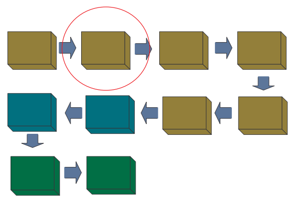
Analysis and design phase

- Understand the client's test requirements.
- Automated solution is proposed.
- Prototyping.



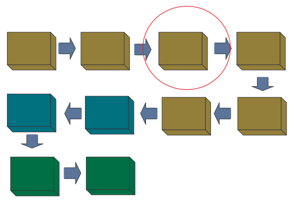
Scripting/Configuration phase

- User requirements implemented.
- Activities in this phase could include recording, scripting and building of special utilities.
- Internal testing of automated test solution.



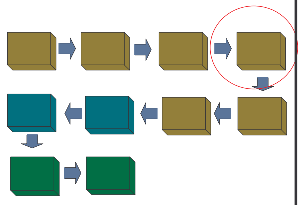
Parameter identification

- Scripts assessed against user-defined scenarios.
- Components identified for parameterisation.
- Components categorised based on nature and function.



Parameter management

- Large amounts of data created in previous step are managed.
- Customised spreadsheets are created.
- Requirement exists that data in these sheets can be maintained by non-technical personnel.
- All scenarios described in both technical and non-technical terms.



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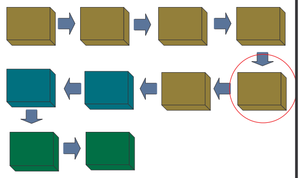
Parameter management

Scenario collection

- Spreadsheet populated with scenarios provided by stakeholders of the system.
- Manual test cases could provide input.
- Actual production outages used as input.



Validation

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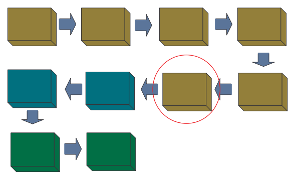
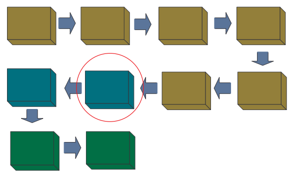
- Automated validation of results important due to volume.
- Spreadsheet updated with expected results.
- Validation done by script using information from spreadsheet.
- Clear "Pass" or "Fail" indicators provided.
- Summary of results provided.



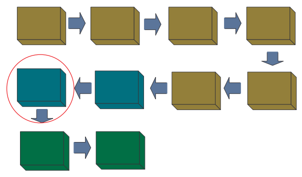
Testing of scripts

- Like all new software, the scripts must be tested.
- Important that when defects are reported during the actual test cycle that the tool is above reproach.
- Scripts must be able to react to anomalies in a predicted fashion.
- Must still be able to report effectively on operational scenarios.



Script execution

- Scripts are run against target application.
- Stability of system determines support required.
- Strive to provide as much meaningful data in the shortest possible time.



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Testing ol scripts

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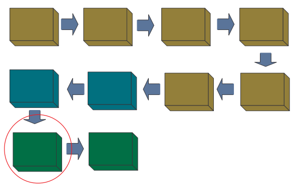
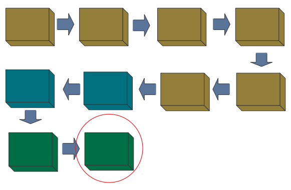
Review of results

- Results are reviewed internally.
- Focus on abnormal failures due to environmental or other conditions.
- Checks are done to ensure data integrity and scope coverage.



Result and benefit communication

- Because of size, results are saved in repositories.
- Screen dumps of all defects are kept.
- Communicate benefit in terms of automation lifecycle stage.



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Categorising our toolset

Why?

The strength in categorising tools is the ability to provide uniquely customised, automated testing solutions which, in conjunction with manual testing, aim to mitigate both the product and project risks associated with solution deployment.

Categorising our toolset

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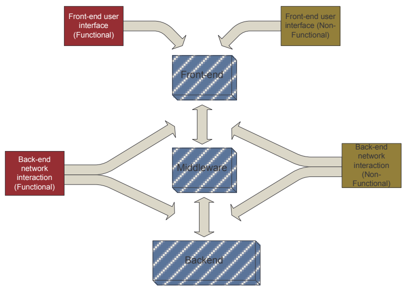
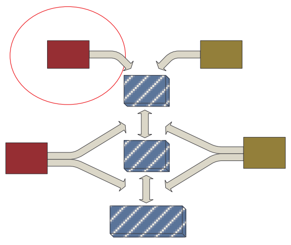

Front-end user interface (Functional)
Front-end user interface (Non-Functional)
Front-end
Back-end network interaction (Functional)
Middleware
Back-end network interaction (Non-Functional)
Backend

Categorised toolset

- Front-end user interface (Functional)
- Back-end or network interaction (Functional)
- Front-end user interface (Non-functional)
- Back-end or network interaction (Non-functional)
- General automated testing utilities

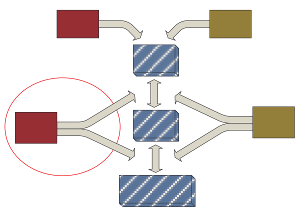
Front-end user interface (Functional)

- Record and playback.
- Simulate user interaction with applications.
- Provide support for unit, integration, system and acceptance testing.
- User regression testing particularly suits the nature of these tools.



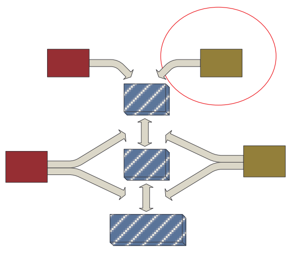
Back-end or network interaction (Functional)

- Ability to simulate user interaction in the absence of a front-end.
- Supports bottom-up integration.
- Provides the ability to find defects much sooner in the SDLC.
- We found it valuable in testing SOA implementations.



Front-end user interface (Non-functional)

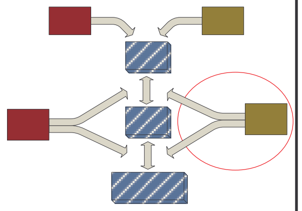
- Ability to generate the required load for performance, load and stress testing.
- These types of tests can typically not be performed manually.
- Tool is dependent on the functional quality of the application under test.
- Test environment comparison with production .



Front-end user

Back-end or network interaction (Non-functional)

- Due to the nature of implementation, it is not practical to use the front-end to generate the required load (ATM, point-of-sale devices).
- Typically these kinds of tests cannot be performed manually.
- Test environment comparison with production .
- We found it valuable in testing the performance of services in SOA implementations.



General automated testing utilities

- Provides general support for manual and automated testing activities.
- Compares large amounts of data.
- Generates unique data sets from production data.
- Generates vast amount of test data.
- Provides support to all previously-mentioned tool categories.

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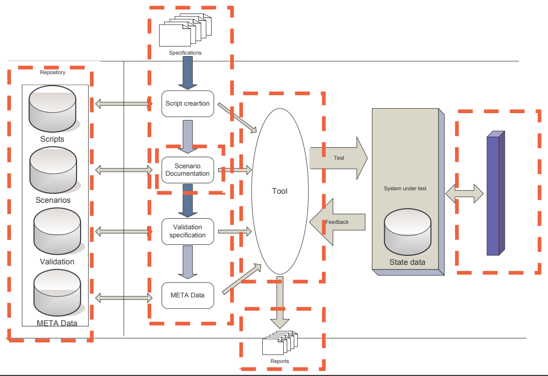
Automation framework



Contemporary automation issues

Automation lag

- Refers to the time lost between the implementation of the application, and the point at which automated functional scripts can be used during testing.

Front-end user
interface (Non-
Functiona)

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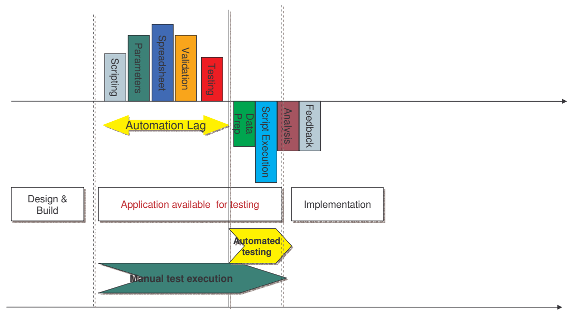
Automation lag



Contemporary automation issues
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User acceptance testing and automation

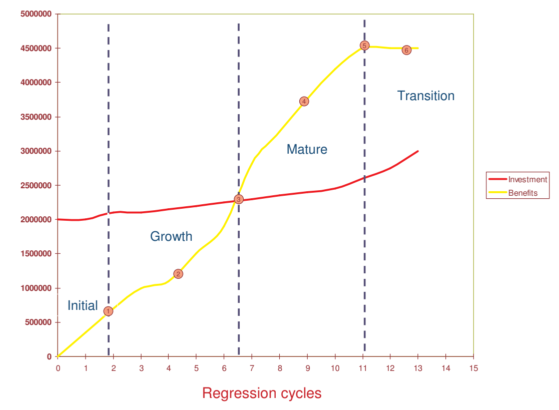
- To perform successful user acceptance testing, the involvement of the user is critical – both in defining the test, execution and validation of results.
- Users responsible for acceptance are asked to complete the scenario spreadsheet.
- We ask the user to monitor a few initial script executions.

Automation benefit calculations

1. Historically problematic to get accurate measures.
2. Focus initially on quality.
3. Difficult to quantify quality in monetary terms.
4. Decision taken to focus on productivity improvement and associated cost reduction.

Automation benefit calculations process

1. Identify the smallest common element.
2. In most cases it would be the parameters identified in the scripting process.
3. Compare effort (duration) associated with manual testing with that of automated testing per parameter.
4. Describe the improvement in monetary terms by using an average resource cost.



Automation benefit

1. Total cost saving for the period 2005 to mid-2008:
   R86 183 171.00 ($ 8600 000 US)
2. Benefit confirmed by system owners and users.
3. Calculation method reviewed by Finance.
4. Return of this nature justified the significant investment made in both project testing and automation tools.

What have we learned?

1. Having a test tool is not a strategy.
2. Automation does not test in the same way that a manual tester does.
3. Record and playback is only the start.
4. Automated test scripts are software programs and must be treated as such.
5. The value lies in maintenance.
6. Categorise your toolset, and design integrated solutions.

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Thank you

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