

Approach for Testing a 3rd Party Upgrade - A Case Study

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Abstract:

This document outlines the steps or approach taken by the QA when the 3rd party application underwent a major Upgrade. The challenge with this upgrade is that the UI and DB were encrypted and there were 7 critical subsystems of Microsoft have been integrated with this application. The approach began with the Analysis/Pre-Test phase where the QA prioritized the 2000/10000 test cases currently available with the application installed on QA servers. The Analysis phase went for 2 months and about 150 bugs were uncovered which helped us to define the scope items and timelines for the entire Upgrade. The major step in this Upgrade was that the performance testing was conducted at labs during the Pre-Test phase (where the benchmarks were set and bottlenecks were identified) and towards the end of the QA certification post bug fixes. Also, the end users were given the feel of the application in the form of Beta Testing for 2 weeks in the QA phase where a good potential bugs were identified. The critical piece of this Upgrade was the Communication plan, where a bi-weekly status was held with Executive Management, daily calls with Compuware for the bugs raised (for 8 months), discussing the findings and impact for the reporting subsystems. The application under discussion is “Changepoint” (Changepoint is a 3rd party application developed by Compuware) and Microsoft has built customizations around it which impacts all the revenue systems of Microsoft like SAP, MSSales, MSExpense etc. This system is used by World Wide Enterprise Services business of Microsoft for managing Customer Engagements worldwide and also used for Customer Invoicing. Because of the planned and meticulous approach by the QA team, the end result was a successful upgrade that went for 8 months with ZERO production bugs and with just 3 UAT bugs.

Introduction

Microsoft uses Changepoint, a 3rd party tool (owned by Compuware) to support the Microsoft consulting business. Worldwide Enterprise Services uses Changepoint application to manage customer engagements worldwide. The data captured in Changepoint enables end-to-end engagement management that includes, project deliverables & task assignment to resources, billing, invoicing, and providing data for driving Service Lines and calculation for incentive compensation. The Changepoint data is pivotal in managing Worldwide Services’ business. The Changepoint undergoes periodic changes / updates in order to facilitate business changes. Apart from using the core product functionality Microsoft also uses the Integration options, which Changepoint provides to integrate it with various critical financial applications.

Considering these integrations with complex financial applications and a widely used finance application by itself, upgrading changepoint to a new version was a carefully executed release since any leakage in the application would have a major impact on the business. This paper gives the reader a detailed picture of testing that is involved in upgrading a 3rd party tool. The 3rd party tool that would be referred in this paper is changepoint.

Key challenges:

- ✓ Encrypted Compuware code had given us little scope to understand the UI and schema changes in the upgraded version
- ✓ Upgrade of a Mission Critical Finance application
- ✓ Integrations with various Microsoft mission critical applications
- ✓ Communication with the product company (Compuware here) to run a smooth upgrade

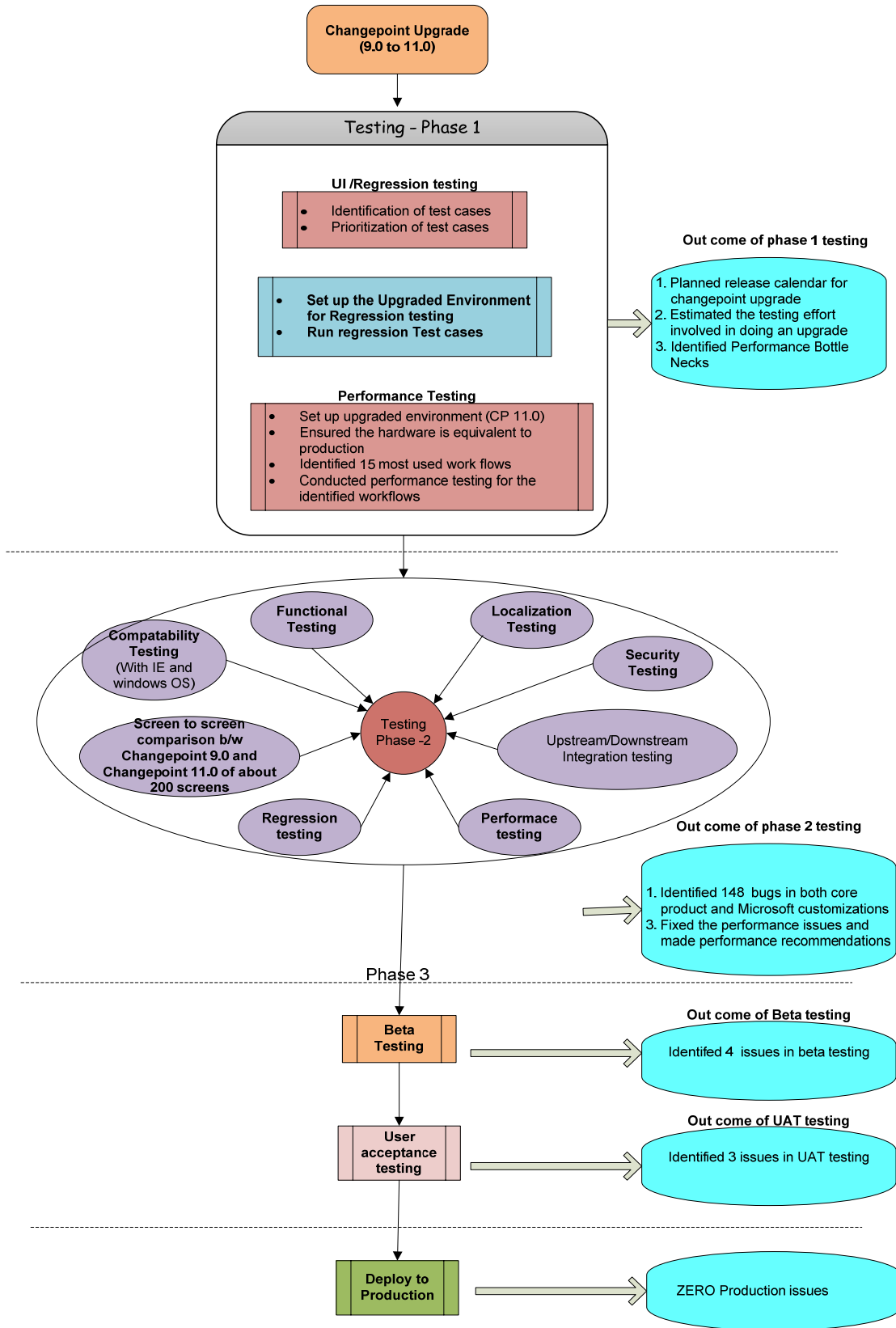
- ✓ Business communication
- ✓ User training

A test driven Upgrade!

- ✓ Unlike other upgrades/new release for an application, this upgrade was kicked off by the test team with the first phase of testing.
- ✓ The outcome of phase 1- testing served as inputs for the analysis and development teams and helped us in planning the release calendar for changepoint upgrade.
- ✓ With a testing team of 8 members; changepoint upgrade was a show that was run by Test team with 75% of the IT effort contributed by the test team spanning across 9 months.
- ✓ The testing for the entire upgrade was carried out in 3 phases. The key things handled in each phase of testing are listed below.

SNO	Phase of testing	Types of Testing
1	Phase 1	<ul style="list-style-type: none"> ➤ UI testing (of the upgraded UI) ➤ Regression testing of 2000+ test cases
2	Phase 2	<ul style="list-style-type: none"> ➤ Functional Testing ➤ Integration testing ➤ Localization Testing for 27 languages ➤ Security Testing ➤ Compatibility Testing (with different windows OS and IE) ➤ Performance testing ➤ Screen to screen comparison b/w CP 9.0 and CP 11.0 ➤ Regression testing
3	Phase 3	<ul style="list-style-type: none"> ➤ Beta Testing ➤ User acceptance testing

The flow chart given below gives pictorial details of the upgrade spanned across a whopping 9 months



Phase 1 Testing:

Change point 11.0 (Upgraded application) was first deployed in the stand alone test environment in this phase. The test team explored it to understand the changes in the UI and functionalities. The key things handled in this phase were

- UI/Regression testing
- Performance testing

UI/Regression testing:

A thorough exercise of revising the test cases written on the product core functionality, since the inception of changepoint implementation in Microsoft was taken up by the test team to come up with the test cases that need to be executed to understand the new version and the changes it has.

Following are the set of activities performed during this phase of 6 weeks:

- Revisited the entire test suite of 10000 test cases and identified 2000 test cases to be executed.
- Team of 3 testers executed the 2000 test cases for duration of 6 weeks and identified several issues in the core product as well as the MS Customizations.
- Showstoppers were fixed with the help of Compuware and Microsoft Development Team.
- Identified around 30 Core product issues which were resolved through the daily bug triages with Compuware.
- Daily Test Progress was communicated to all the key stake holders of the Upgrade.

Performance testing:

From the past upgrades that were taken up for changepoint in Microsoft, there were instances where there were major performance hindrances for the application. This has prompted us to take up the performance testing much early in the cycle to avoid any last minute risks.

Following are the set of activities performed during this phase of 3 weeks in parallel with UI/Regression testing:

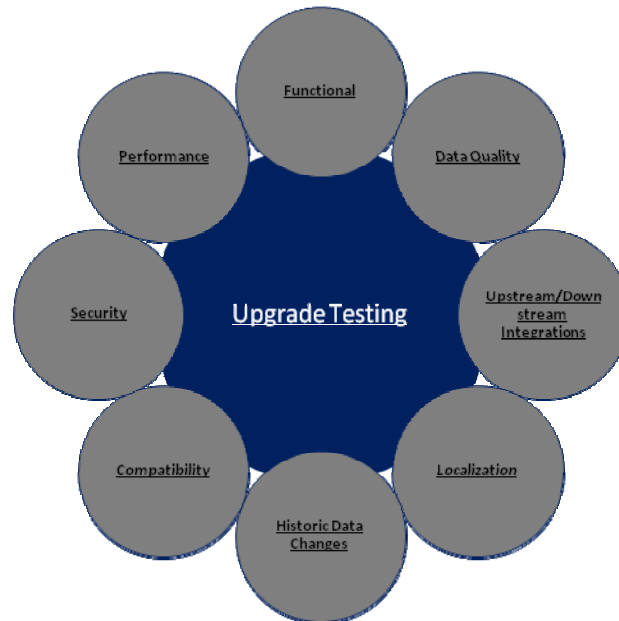
- Performance test plan was prepared with 15 key workflows which was ratified by the business.
- Deployed the application in the Performance Labs at Microsoft with production equivalent hardware.
- Silk Performer was used to stress test the application under varying loads of 30, 60, 90 and 120 users.
- 1 Tester worked for 3 weeks with the performance consultant on daily basis and helped him by giving the test data for all the scenarios prior to the execution
- Few performance bottlenecks were identified in this phase and have been reported to Compuware.

Summary:

- Estimated the testing effort required to run the complete upgrade.
- This phase enabled to come up with the Go-live plan for the Changepoint Upgrade after having a detailed discussions with executive management and downstream systems (involving Product Management, Development, QA and Program Management teams) based on the above findings.

Phase 2 Testing:

The core part of upgrade testing was executed in this phase. We have identified all the possible types of testing that changepoint upgrade would require and implemented all of them in this phase. The below section will walk through in detail about how we executed all of them. A team of 8 testers worked for a duration of 6 months in this phase.



Functional Testing:

Functional Testing done by us revolves around testing the core application functionality.

Following are the set of activities performed during this phase:

- Two test environments were set up with the old and new versions of Changeoint.
- Master Test Plan was prepared and signed off by all the 7 upstream and 3 downstream applications teams.
- New Test Cases were written for the changed and new functionality.
- Regression testing for old/unchanged functionality continued with 2000+ test cases identified.
- Tested the fixes given by Compuware and Microsoft development teams on a regular basis.
- Comparison of 100+ screens between the old and new versions yielded
 - List of functionality differences which was then shared with the product management team. These differences were incorporated in the User Training Manual.
 - List of bugs to be fixed by the Microsoft/Compuware development teams.
- Daily bug triages were held with Compuware team for a period of 6 months which helped in addressing the issues quickly.
- Weekly Test Progress was communicated to all the key stake holders of the Upgrade.

Upstream/Downstream Integration testing:

Integration testing is one of the key parts of upgrade testing; since we do not want other systems that are integrated with changepoint to get impacted with the upgrade.

Following are the set of activities performed during this phase:

- 7 upstream and 3 downstream integrations were tested.
- Unveiled issues that affected integrated systems which helped the downstream systems fix the issues much early in the cycle.
- Few data issues were discovered in this phase which was fixed by Microsoft & Changepoint Development teams.
- One of the Mission critical downstream systems faced issues because of the upgraded Changepoint application. Upon analysis by the test team, the causes of these issues were identified to be due to
 - a minor functionality change in Changepoint.
 - Changes in the database scheme in the upgraded version for Changepoint.

This helped the downstream applications to fix the aforementioned issues at their end.

- One of the Changepoint integrations with the upstream system was failing, because of a schema change in one of the dependant table in Changepoint
 - This issue was fixed by updating one of the customized stored procedures in Changepoint

Localization Testing:

As the name suggests, we had to check if the new version of changepoint supports the languages it used to, in the old version.

Following are the set of activities performed during this phase:

- The application was tested for 27 different languages.
- Unveiled few localization issues that were fixed by Compuware.

Security Testing:

Security Testing was taken up for two different reasons,

- Changepoint being a Finance application with PII data (personal identifiable data) shouldn't be fallible for hackers
- Microsoft has security norms that every application in it should comply with

Following are the set of activities performed during this phase:

- Comprehensive security audit was performed for the upgrade as the UI/Middle tier was completely changed.
- Tested for SQL Injection/Cross site scripting on the upgrade version with the help of tools like Tamper IE and Fiddler.
- 15 security bugs were found in this phase which was fixed by the Compuware.

Compatibility Testing:

New Changepoint point was tested for various versions of Windows OS and IE versions.

Following are the set of activities performed during this phase:

- Tested for Windows OS
 - Vista
 - XP
 - 2003 Server
- Tested for IE versions 6 and 7.
- Few Issues were found in this phase which was fixed by the Compuware.

Performance testing:

Performance testing was done again during the end of this phase (right before Test Certification) in the performance labs with the same set of scenarios identified before.

Performance testing in both the phases yielded the below outputs:

- IIS and SQL recommendations were given by the IIS and SQL consultants for performance enhancements.
- No major bottlenecks found. This was a key deciding factor for the test certification.

Summary:

- Identified 148 bugs in both Core product and Microsoft Customizations.
- Daily Triage with Compuware were very effective in resolving the issues in real quick time for a duration of 6 months
- Shared the findings/observations with Senior Management every fortnight to keep them posted on the happenings.
- Weekly meetings with Upstream/Downstream applications helped in resolving the issues early in the cycle
- 2 phases of Performance testing in the entire upgrade cycle avoided surprises in the production.

Overall, Changepoint Upgrade was a marathon testing effort (spanned across 9 months) with a good planned approach that resulted in ZERO production issues.

PHASE 3 – Testing

Beta Testing

- Beta testing helped the business to identify the issues before the UAT and Go-live.
- 30 users from all the regions participated in this test effort.
- Daily Triage were held for 2-week duration in order to prioritize and fix the issues.
- Changepoint testing was done on a standalone environment during this phase.
- Only 4 defects were found and fixed in this phase

UAT testing

- Changepoint UAT spanned across 3 weeks (post test certification) integrated with all the upstream and downstream applications.
- 30 users from all the regions participated in this test effort.
- Daily Triage were held for 3-week duration in order to prioritize and fix the issues.
- Only 3 defects were identified during this phase.

Production Deployment

ZERO Defects in Production.

Test Metrics

Upgrade Bug Summary

