



**The Implications of Deviating from Software Testing Processes: A Case Study of a Software
Development Company in Cape Town, South Africa**

by

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Abstract

Ensuring that predetermined quality standards are met is an issue which software development companies, and the software development industry at large, is having issues in attaining. The software testing process is an important process within the larger software development process, and is done to ensure that software functionality meets user requirements and software defects are detected and fixed prior to users receiving the developed software. Software testing processes have progressed to the point where there are formal processes, dedicated software testing resources and defect management software in use at software development organisations.

The research determined implications that the case study software development organisation could face when deviating from software testing processes, with a focus on function performed by the software tester role. The analytical dimensions of duality of structure framework, based on Structuration Theory, was used as a lens to understand and interpret the socio-technical processes associated with software development processes at the case study organisation. Results include the identification of software testing processes, resources and tools, together with the formal software development processes and methodologies being used. Critical e-commerce website functionality and software development resource costs were identified. Tangible and intangible costs which arise due to software defects were also identified.

Recommendations include the prioritisation of critical functionality for test execution for the organisation's e-commerce website platform. The necessary risk management should also be undertaken in scenarios with time constraints on software testing, which balances risk with quality, features, budget and schedule. Numerous process improvements were recommended for the organisation, to assist in preventing deviations from prescribed testing processes. A guideline was developed as a research contribution to illustrate the relationships of the specific research areas and the impact on software project delivery.

Key words

Software testing

Software development methodology

Software development life cycle

Organisational processes

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List of acronyms and abbreviations

ANT	Actor-network Theory
AT	Activity Theory
GTM	Grounded Theory Methods
IEEE	Institute of Electrical and Electronics Engineers
IS	Information Systems
ISTQB	International Software Testing Qualifications Board
IT	Information Technology
RBT	Resource-based Theory
SDLC	Software development life cycle
SDM	Software development methodologies
SLA	Service Level Agreement
ST	Structuration Theory
UAT	User Acceptance Testing

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

Software testing is a vital aspect of software development, as the software development industry struggling to develop software which both meets project budget constraints and required standards of quality (Ichu & Nemani, 2011: 716). The main challenge facing software testing is ensuring that functionality meets user requirements (Rao & Sastri, 2011: 1232). In addition, testing usually needs to be completed within an acceptable and agreeable time limit. Allen (2008) advocates that quality related shortcuts should be avoided in an attempt to reduce the costs of reworking software. This is also related to reducing the impact that malfunctioning software has on business.

Inadequate software testing could increase the likelihood of system failure or unknown defects occurring during software use (Rao & Sastri, 2011: 1239). This could even cripple a software development organisation financially. Gruner and Van Zyl (2011: 18), state that there is mostly a finite amount of software testing time available and that this needs to be allocated and used wisely. Software testing has evolved from haphazard testing processes performed by software developers, to the current situation with formalised processes, dedicated testing staff and defect tracking software (Ichu & Nemani, 2011: 717).

1.2 BACKGROUND TO THE RESEARCH

Software failure occurs when system functionality does not conform to prescribed specifications (Naik & Tripathy, 2008: 9). In the South African context, for example, a functionality problem was reported about poor user experiences on the platforms of a leading event ticket vendor (Houston, 2012).

This particular incident was due to problems with the queuing system which was implemented to cope with high traffic volumes (Houston, 2012). One of the causes of the incident reported was due to an internal system failure when the website was subjected to high traffic volumes. Another problem experienced was that, when concluding payments, the system had issues integrating into an external payment vendor system.

Software testing should be done under controlled conditions and according to a planned strategy, where testing activities are executed. Software testing results obtained should be evaluated against acceptance criteria in order to verify the proper integration of all components making up a complete system (Naik & Tripathy, 2008: 566).

Due to software testing time and cost constraints, Myers *et al.* (2004: 43), states that a key issue of software testing involves compiling and executing software test cases, which have the highest probability of detecting the most software issues.

Deviations from the mandated software development processes can result in the end product delivered being of a poor quality, late and over budget (Christie, 2009). Time is essentially being wasted, as defect fixes and additional regression is required; these have associated costs to the software development organisation (Black, 2002: 403-404).

1.2.1 Software Development Life Cycle

Software development is embarked upon to fulfil particular business requirements, which may include the technological and processing needs of an organisation (White, 2004: 53). The software development life cycle (SDLC) starts at the software definition stage, where the software requirements are defined and specifications formalised (Saleh, 2009: 5). The implementation phase then follows and is concerned with the software design. This is followed by the coding of software and then by software testing.

Thereafter, the maintenance stage is reached in the SDLC, where released software is adapted, enhanced with new functionality and any prevailing outstanding issues fixed. Kaur and Sengupta (2011: 3) indicate that the dimension of time is a crucial element during software development, as projects need to be delivered on time (as planned). Allocated time should be well managed beforehand and during software development, to ensure that the different tasks required to culminate in a completed and on time project are in place.

1.2.2 Software Testing

Software testing strategies provide the road map for testing processes (Sawant *et al.*, 2012: 983), with a planned strategy being required for successful execution. The estimated time required, resource demands and costs involved are aspects determined through test planning (Naik & Tripathy, 2008: 167).

Software testing techniques prescribed by the Institute of Electrical and Electronics Engineers (IEEE) Computer Society includes software tester intuition and experience, together with specification, fault and usage based techniques (Abran *et al.*, 2004: 5–2). In addition, software testing can be done according to the unique nature of applications and the use of combinations of prescribed software testing techniques. Test cases should cover all software functionality, with each test case stating what the expected behaviour of software should be under specific conditions (Desikan & Ramesh, 2006: 28). Test case information should include test data, test environment details, changes which should be produced and expected outputs for a specific test case.

Testers should perform test execution on software based on the plans and test documents, reporting any errors found to the development team (Singh & Khan, 2012: 152). It should be ensured that test cases use the correct data and that the validation point is not skipped when performing test execution; this ensures that the correct request or response is made. During instances where there is a difference between the actual and expected software behaviour, a defect needs to be raised for rectification.

According to Burnstein (2003: 194), the software testing process should be supplemented with tools, together with measurements relating to testing specific aspects. These aspects can be used to assess and improve the testing process and the associated software product.

1.2.3 Software Development Methodologies

Mendonca and Brewer (2002: 43) state that the use of software development methodologies (SDM) continues to be the strategy for achieving quality in software development. There are a number of SDM available in the software development industry, such as heavyweight, middleweight and lightweight life cycle models, amongst others:

1. **Heavyweight life cycle models** are process-centric and guided by a plan, such as the Waterfall methodology. This is a document-driven methodology with documented process procedures for all tasks, milestones and their variants (Guntamukkala *et al.*, 2006: 268). For this particular research project, these will be known as the Waterfall model;
2. **Middleweight life cycle models** possess flexibility attributes, such as the Evolutionary prototyping model, where prototypes are developed based on requirements and refined based on customer feedback (Guntamukkala *et al.*, 2006: 269-270); and
3. **Lightweight life cycle models** have quicker software release cycles and face-to-face communication is preferred over documentation (Guntamukkala *et al.*, 2006: 268, 270). The software product is developed on an incremental basis with product functionality being developed in sub-sets. For this particular research project, these will be known as Agile methods.

SDM are considered an integral part of software development, as methodologies guide the timely and orderly execution of the various procedures, rules and documentation used to develop software (Ramsin & Paige, 2008: 3). For some methodologies, the software testing process is done during the development process (Herschmann, 2009: 52) and, for other software development methodologies, at the end of the development process (Naik & Tripathy, 2008: 1).

1.2.4 Deviation from software testing processes

Major goals of software testing include ensuring that testing activities are planned and that there is adherence to applicable standards and procedures (Agarwal & Tayal, 2007: 71). Any non-compliance issues - which cannot be resolved within a software development project - should be addressed by senior management. Maidasani (2007: 95) indicates that software testing processes are not always followed as required (examples include either no test planning, or not following a plan when executing testing). Testing processes may also not be clearly defined, with pressure to deliver a project on time and within budget leading to software either not being tested sufficiently, or not tested at all (Maidasani, 2007: 90).

Poor quality management would be one of the reasons why the quality standards of a project's deliverables are not attained (Kaur & Sengupta, 2011: 4). Periodic quality evaluation and appropriate preventative and defect removal measures are required to ensure software quality.

1.2.5 Implications of software defects

Brewer and Dittman (2010: 214) state that the cost of non-conformance is the total cost an organisation incurs due to a product not meeting user requirements. There are internal failure costs when software defects are detected before a system is fully deployed. These costs can be attributed to code being scrapped or rework needed, with rework requiring repetition of the same tasks to correct identified errors. External failure costs are the costs associated with software defects being detected after a system is fully deployed. Additional costs - in relation to internal failures - could include loss of market share and lawsuits from customers and other stakeholders.

A defect introduced during initial requirements (that makes it to the final release) may cost as much as a thousand times more the cost of detecting and correcting the defect during initial requirements (Desikan & Ramesh, 2006: 11). This is due to problems in released software requiring costly product support calls, additional software development to correct the defect, retesting and releasing the fix (Patton, 2001: 320–321). Gruner and Van Zyl (2011: 29) state that new projects would need to be delayed in order to fix defects from previous projects, with negative financial costs also arising from the delay of a software release (Nagappan *et al.*, 2008: 529). According to Papow (2011: 160), any negative financial impacts associated with software failure could lead to organisations investigating the quality practices within their software development processes.

From the literature discussed, it is evident that software development methodologies advocate various processes for testing software. It is also evident that software failures lead to financial losses (Brewer & Dittman, 2010: 214), which suitable testing processes and appropriate guidelines may prevent.

1.3 STATEMENT OF THE RESEARCH PROBLEM

From the literature, it is evident that software is required to be subjected to rigorous testing processes in order to be successfully implemented. Deviating from testing processes could result in implications for software development organisations. The following research problem is formulated:

Software development organisations are unclear of the implications if testing processes are not followed during the software development process in South Africa.

1.4 RESEARCH QUESTIONS, SUB-QUESTIONS AND OBJECTIVES

The research question formulated to support the stated research problem is: What are the implications of non-conformance to software testing processes?

To investigate the research question, a number of research sub-questions are formulated in Table 1.1. The various research methods and their respective objectives are also included:

Table 1.1: Research sub-questions

Research Sub-questions	Research Method(s)	Research Objectives
How is software testing conducted during the SDLC process?	Literature analysis and interviews.	Determine how software testing is conducted during the SDLC.
What testing processes do software development methodologies advocate?	Literature analysis.	Determine the testing processes that software development methodologies advocate.
What factors may result in software testing processes being deviated from?	Literature analysis and interviews.	Identifying factors which result testing processes deviations.
What are the implications resulting from software defects?	Literature analysis and interviews.	Identifying implications resulting from software defects.

Source: Author, 2017.

The goal of the research was to understand the software testing processes in place at a software development organisation and to identify deviations from these processes. The implications the software development organisation could face were identified and recommendations were given to improve problematic areas impacting the software testing process.

Research into testing standards and processes is important for software development organisations, as this assists the organisation with choosing the right standards which suits their software and meets their requirements (Alshammri, 2013: 325). This can also lead to more improvements and

amendments to standards and processes, which can ultimately lead to the software development organisation releasing higher quality software.

1.5 STRUCTURE OF THE THESIS

A summary of the structure of this thesis is shown in Figure 1.1:

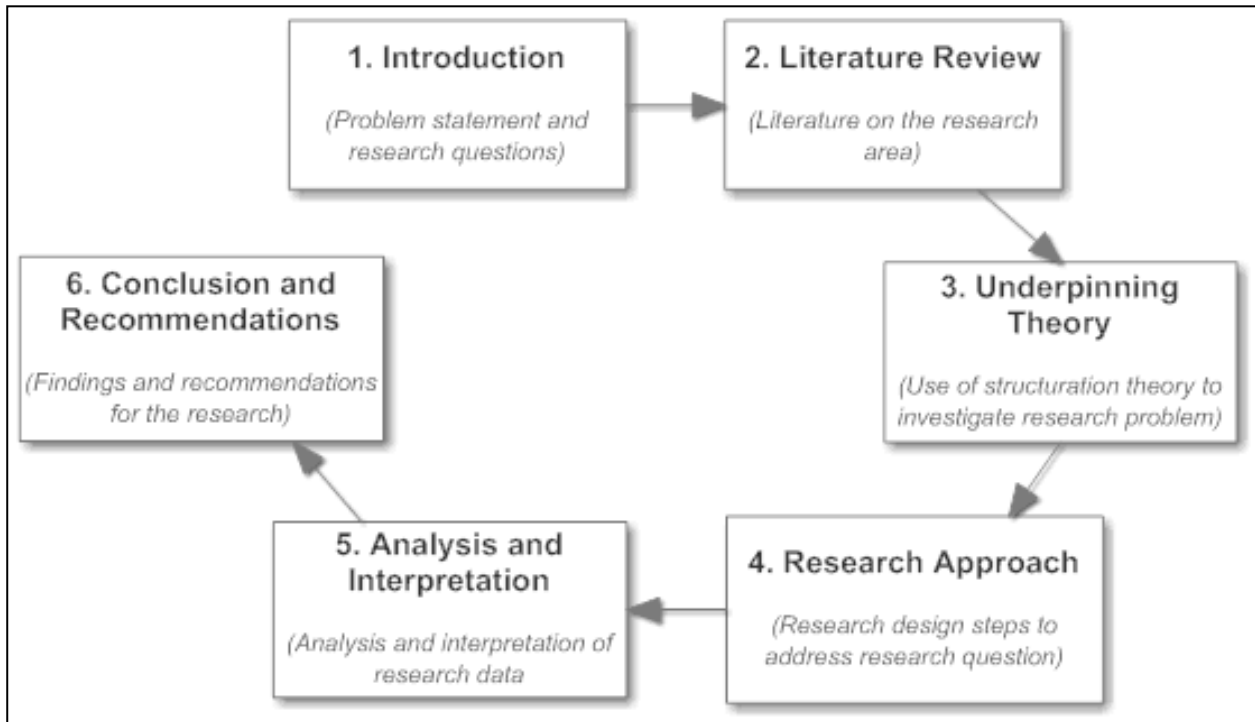


Figure 1.1: Structure of Thesis

Source: Author, 2017.

1.6 CHAPTER SUMMARY

The aim of this Chapter was to present the significance and value that software testing brings in the software development process. Software testing that developed software meets requirements, and that defects are fixed before the software is released to its users. The software testing process requires sufficient time to be effective, as testing specific planning, techniques, execution and reporting need to be done during the SDLC to thoroughly test the software.

Different software development methodologies place different requirements on the software testing process, with software development projects also having constraints on time, resources and budgets, which can negatively impact the software testing process. This in turn could lead to deviations from software testing processes, resulting in software defects being present in released software. This could have implications of varying severity for a software development organisation.

The scope of the research was limited to a specific South African software development organisation, with emphasis being on the e-commerce website domain. The focus was the software testing process, specifically on the function performed by the software tester role. Ramnath (2010: 36) states that Agile methods, followed by the Waterfall model, are the most dominant software development methodologies used in South Africa. Middleweight software development methodologies will not be covered in line with these findings.

The next Chapter presents the literature relating to the research questions, including the software testing processes during the SDLC and software testing processes prescribed by software development methodologies. Reasons for deviations from software testing processes were investigated, together with the implications of software defects.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Literature relating to the stated research problem and research questions proposed in Chapter 1 is discussed in this Chapter. The literature to the research questions are:

- i) Software testing during the software development process (Section 2.2);
- ii) Software development methodologies (Section 2.3);
- iii) Deviation from testing processes (Section 2.4); and
- iv) Implications of non-conformance to software testing processes (Section 2.5).

This is summarised and concluded in Section 2.6. This Chapter will then lead onto Chapter 3, where the researcher will formulate a suitable theoretical underpinning for this research.

As discussed in Section 1.2, the aim of software testing is to identify any unknown or unspecified software behaviour within the software being tested, so as to verify that detected defects are reported or corrected. Test processes also assist software development organisations to mitigate risks associated with the use of the software products they develop.

There are numerous definitions of software testing, for example, that software testing demonstrates that software operates as intended and verifies that requirements and features are met (Zimmerer, 2010: 7). This definition is similar to the definition of Rao and Sastri (2011: 1232), with Myers *et al.*, (2004: 1–2) elaborating on this definition, stating that:

...software testing tries to ensure that software does not do anything unintended and that software functionality is predictable and consistent when used in a variety of ways by users.

Related software testing research was also undertaken by Khalane (2013) and Koka (2015) in the South African context.

2.2 SOFTWARE TESTING DURING THE SOFTWARE DEVELOPMENT LIFE CYCLE PROCESS

This section contains a discussion on software test strategies (2.1.1), test techniques (2.1.2), test cases (2.1.3), test execution (2.1.4), test measurements (2.1.5) and associated processes, which span from the conception to the completion of testing processes. This is adapted from the test lifecycle processes (Jones, 2001: 88) and generic stages in software development (Saleh, 2009: 5), where

the Analyse (Test Strategies), Design (Test Techniques), Implement (Test cases), Execute (Test Execution) and Evaluate (Test Measurements) processes are followed, as depicted in Figure 2.1:

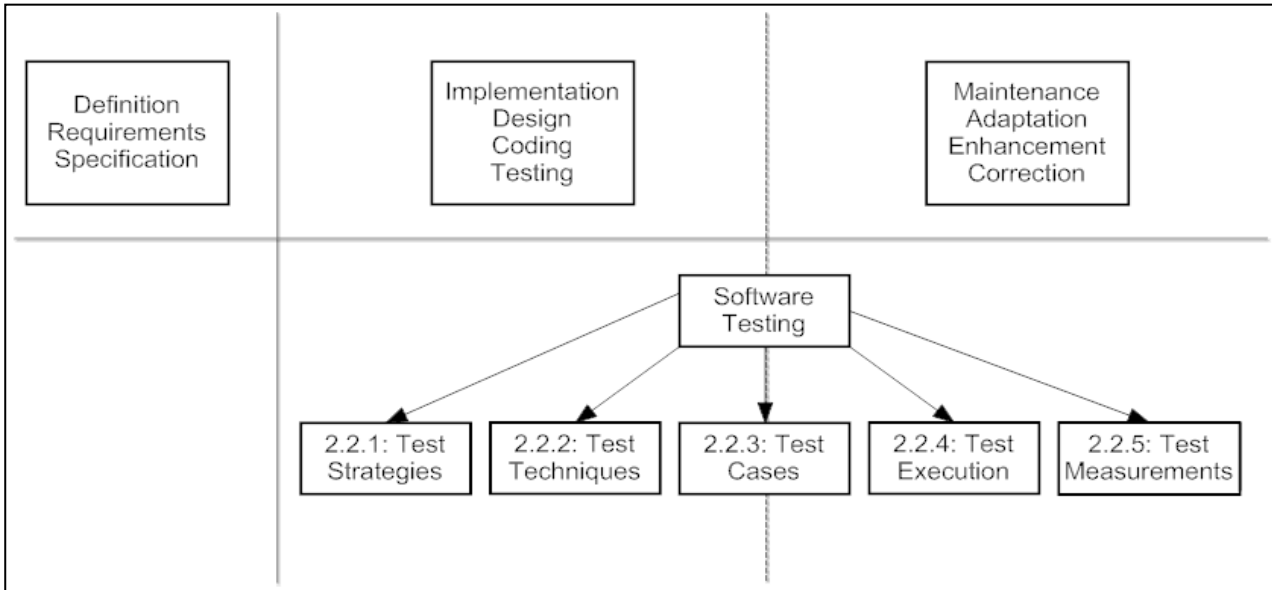


Figure 2.1: Software testing process

Source: Author, 2017.

2.2.1 Test Strategies

Test strategies need to be implemented prior to commencing testing processes (Myers *et al.*, 2004: 9). A test strategy needs to be in place which allows the maximum possible critical defects to be detected and to bring software to an acceptable quality level, while consuming less resources and time (Farooq & Quadri, 2013: 41). The testing process is a project management challenge requiring the plan, monitor and control aspects of that particular discipline in order to be done successfully (Rao & Sastri, 2011: 1232). A test strategy will help to mitigate testing challenges, which include ensuring that functionality meets user requirements and that testing is completed within an acceptable and agreeable time limit.

According to Lazić (2010: 462), a test strategy includes the following three factors namely scope, governance and resources of testing, as illustrated in Figure 2.2:

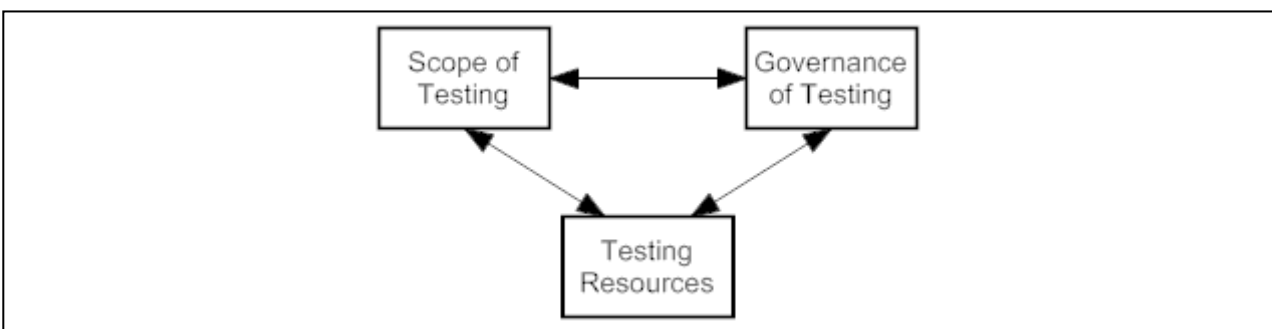


Figure 2.2: Test strategy

Source: Lazić, 2010.

The scope of testing, in relation to project requirements and the governance of testing, and together with organisation objectives around testing, are contained in this section. Testing resources refer to software testers (or any other roles players in the SDLC) performing testing activities.

The areas of scope, governance and resources of testing as part of a test strategy are discussed below, in relation to software project requirements and organisational objectives in terms of testing:

i) Software project requirements:

According to Thompson (2010: 141), a test strategy states how the software testing processes for a project should be implemented; these are based on test goals and objectives, including risk assessments. A test strategy can also be formulated based on the evaluation of a current project situation and quality issues which become evident (Weber *et al.*, 2005: 27).

The entry and exit criteria should also be defined for projects, in relation to processes in the SDLC, as to when software test execution should commence (Weber *et al.*, 2005: 27). A test strategy is process-compliant, adhering to processes developed for Agile methods or traditional Waterfall model approaches. Testing processes are done in order to give assurances that testing goals will be attained and be achieved cost effectively (Abran *et al.*, 2004: 75).

ii) Organisational Objectives:

A testing strategy needs to take into account the level of assurance that a software development organisation requires, together with the specific characteristics of the software being tested (Berner *et al.*, 2005: 579). Lam (2001: 20) furthermore states that the necessary standards that need to be adhered to (and processes that need to be followed) in a project need to be defined upfront. The need for cost efficiency in relation to testing strategies is gaining importance, as organisations aim to reduce development time associated with their software products, while simultaneously undertaking to advance software quality (Lazic & Mastorakis, 2008: 599).

iii) Testing resources:

Testers provide testing services to a software development team, providing current and accurate information about the current state of a software product (Pavlov, 2011: 46). Forecasting is also done in relation to the success of the software development being undertaken, in terms of detection of defects and their correction.

A tester should be expected to provide stakeholders with the following information, provided they have a proper understanding of the responsibilities in the software development project (Pavlov, 2011: 46):

1. What is the current state of the software product in relation to compliance with customer requirements based on qualitative and quantitative assessments?
2. Will the project team be able to deliver the product on time and in good quality, based on current trends of detecting and correcting defects?
3. Which corrective measures can be recommended to be taken if current prospects are unfavourable?

According to Rawlinson (2000), the level of assurance needed by an organisation (dependant on the business impact of software failures) ultimately determines what the test strategy should be for the software being tested. Abran *et al.*, (2004: 75) state that test strategies, techniques and measures should be incorporated into distinct and controlled processes. This is due to test processes supporting test related activities, such as proving direction to software testers, from project inception to measurement of testing results.

To summarise, test strategies provide a road map for all testing activities in a software development project, where factors such as scope of testing, type of software being tested, software development methodology being used, project time lines, time required for testing, resources required, governance processes and testing entry and exit criteria should all be considered when the test strategy is constructed. Test strategy considerations are depicted in Figure 2.3:

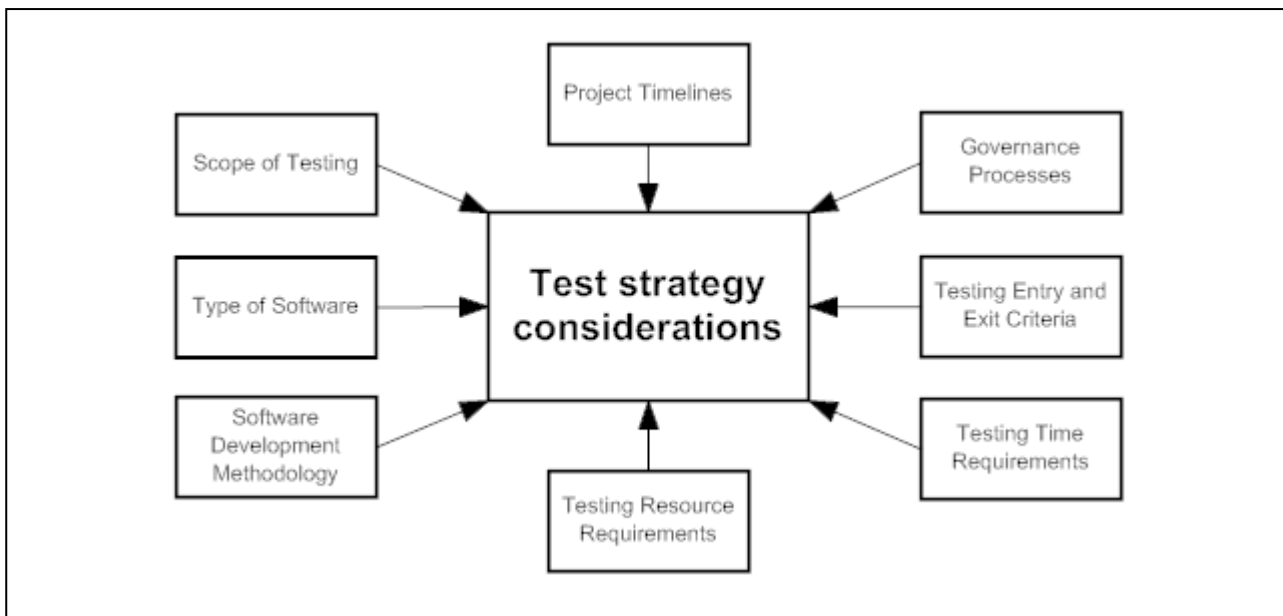


Figure 2.3: Test strategy considerations

Source: Author, 2017.

A test strategy therefore provides the necessary guidance for testing processes in order for the released software to meet the required quality, as required by stakeholders.

2.2.2 Test Techniques

Test techniques are used to ensure that software being tested meets the expected business and technical requirements, together with the intent of finding software defects (Roongruangsuwan & Daengde, 2010: 46). There is a danger when not using different test techniques as part of the testing process; this results in certain defects not being detected, as certain software is exercised in different ways dependent on the test technique used (Kaur & Sengupta, 2011: 4). Test techniques should be adhered to throughout the software development process, as these validate software quality (Adrion *et al.*, 1982: 159).

Furthermore, factors such as time required for test execution and the type of software being tested should be factored into the process of selecting test techniques. Test techniques assist software testers to attain their goal of finding defects as early as possible and to ensure that defects get fixed (Patton, 2001: 19).

The test techniques discussed are recommended by experts in the software testing industry (Patton, 2001; Myers *et al.*, 2004) and the software testing industry governing body, the International Software Testing Qualifications Board (ISTQB, 2010), as shown on Figure 2.4:

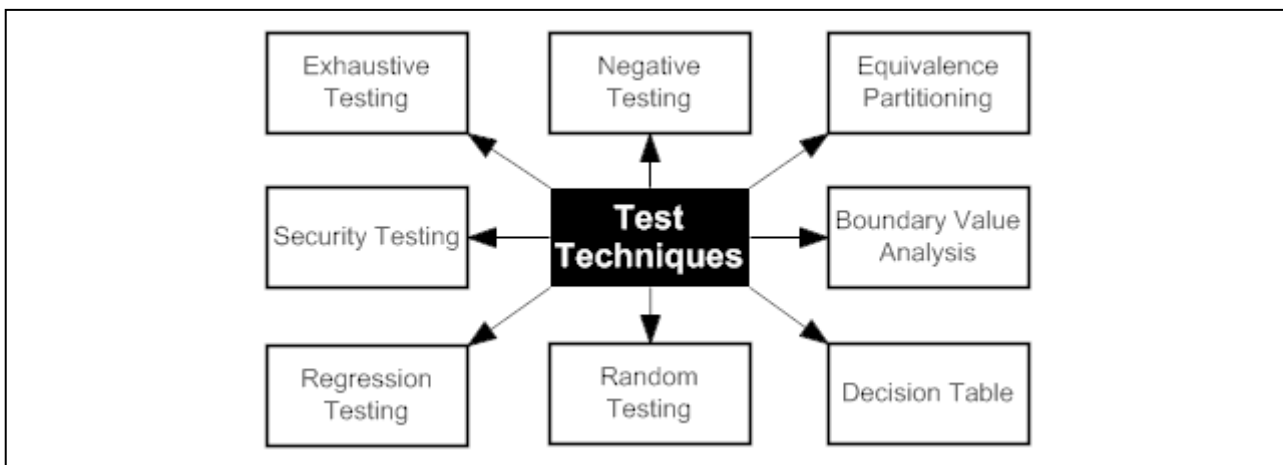


Figure 2.4: Test techniques

Source: ISTQB, 2010.

i) Equivalence Partitioning:

The ‘equivalence partitioning testing technique’ is the grouping of a set of test cases where the same result or defect occurs within a designated range (Patton, 2001: 66). By using this technique, a tester methodically reduces the huge set of possible test cases into much smaller (though still equally effective test sets), resulting in time being saved when creating test cases.

The equivalence partitioning testing technique involves selecting test cases from the software specifications (Haung, 2009: 215). For each condition in a specification, the technique prescribes

that a test case is created which satisfies the condition, and that a negative test case is created where the condition is not satisfied. Equivalence partitioning is not only restricted to input conditions for test cases; the technique could also be used for similar groups of outputs in the software being tested (Naik & Tripathy, 2008: 245).

ii) **Boundary Value Analysis:**

The ‘boundary value analysis’ test technique advocates that software test cases are created to be close to or at the boundaries of input domains of variables (Burnstein, 2003: 72). Reasoning behind this is that defects are likely to be concentrated close to the lowest or highest values for inputs, which experienced testers would have come across. An extension of this technique is robustness testing, whereby test cases are created to be outside the input domain of variables, to test an application (Abran *et al.*, 2004: 78-79). Figure 2.5 graphically represents the equivalence partitioning software testing technique, depicting the boundaries which need to be tested:

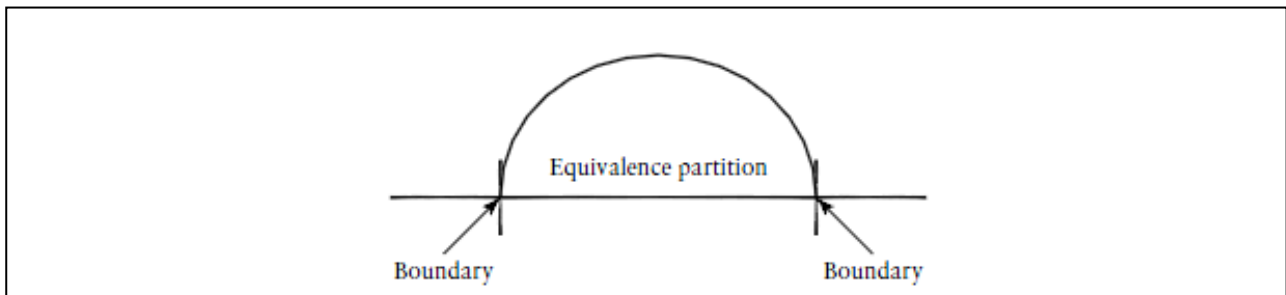


Figure 2.5: Boundaries of an equivalence partition

Source: Burnstein, 2003.

iii) **Decision table testing technique:**

The technique often used to represent logical decisions within software is known as the ‘decision table testing technique’ (Hambling, 2010: 88). Specification documents often contain business rules, which are used to define the functions of software, together with the conditions where each function operates. Single decisions may be simple, but the collective result of all these valid conditions can develop into rather intricate scenarios. Software testers are required to be assured that all combinations of these conditions - which may take place - have been tested. The various paths through which information can flow within software, based on technical architecture and the business rules of the software, need to be captured in a way that enables all these combinations to be explored.

iv) **Random testing:**

The ‘random testing technique’ is an instinctive and improvised process, with the fundamental premise the listing of probable defects or defect likely scenarios, creating test cases derived from

these scenarios (Myers *et al.*, 2004: 88). The technique is also sometimes referred to as error guessing. There is not a specific methodology followed when using the random testing technique. Using a combination of intuition and experience, a software tester can list certain likely error types, and subsequently create test cases to attempt to reveal software defects. Random testing has been demonstrated by Yueh *et al.*, (2010: 60) to effectively detect failures, by exercising software in unexpected ways. Random testing is especially useful when software source code or specifications are unavailable. Myers (2004: 90) advocates using the random testing technique to add additional test cases as part of a test strategy.

v) Negative testing:

The robustness of software can be tested using ‘negative testing’, by exploring possible anomalies with inputs in an attempt to reveal errors (Takanen *et al.*, 2008: 17–18). Examples include entering values which are too high for specific conditions or inputs, special characters, negative values or zeros (Schaefer, 2008: 15). Software error handling and recovery will also be evaluated during this process, which is an aspect that is often badly designed and tested by software developers. According to Perry (2007: 231), the completeness of error handling affects the usability of software. Negative testing can assist in preventing scenarios where end users encounter software failures and the question is asked as to how something seemingly obvious was not detected prior to software being released to a live environment (Schaefer, 2008: 15).

vi) Regression testing:

Regression testing is performed after making functional improvements, or fixing defects, in software under testing (Myers *et al.*, 2004: 106). Regression testing is done to determine whether a software change has regressed other aspects of the software and is usually performed by re-running a subset of software test cases in relation to where the change was made. There is great importance in performing regression testing, as areas in software where changes and defect fixes were made have a tendency to have more defects.

According to Biswas *et al.* (2011: 290), test cases which may have picked up regression errors are disregarded due to the selection of test cases being a manual process. An additional regression testing issue is that testers are only advised on the functional description of software, thus they are lacking the required knowledge of the underlying code in order to accurately select applicable test cases for a software change. The scenario can occur within a software development organisation or with integration to a third party company. Figure 2.6 graphically represents the equivalence regression testing technique, when testing is done on a code change followed by regression testing and required fixing of defects, prior to software being released:

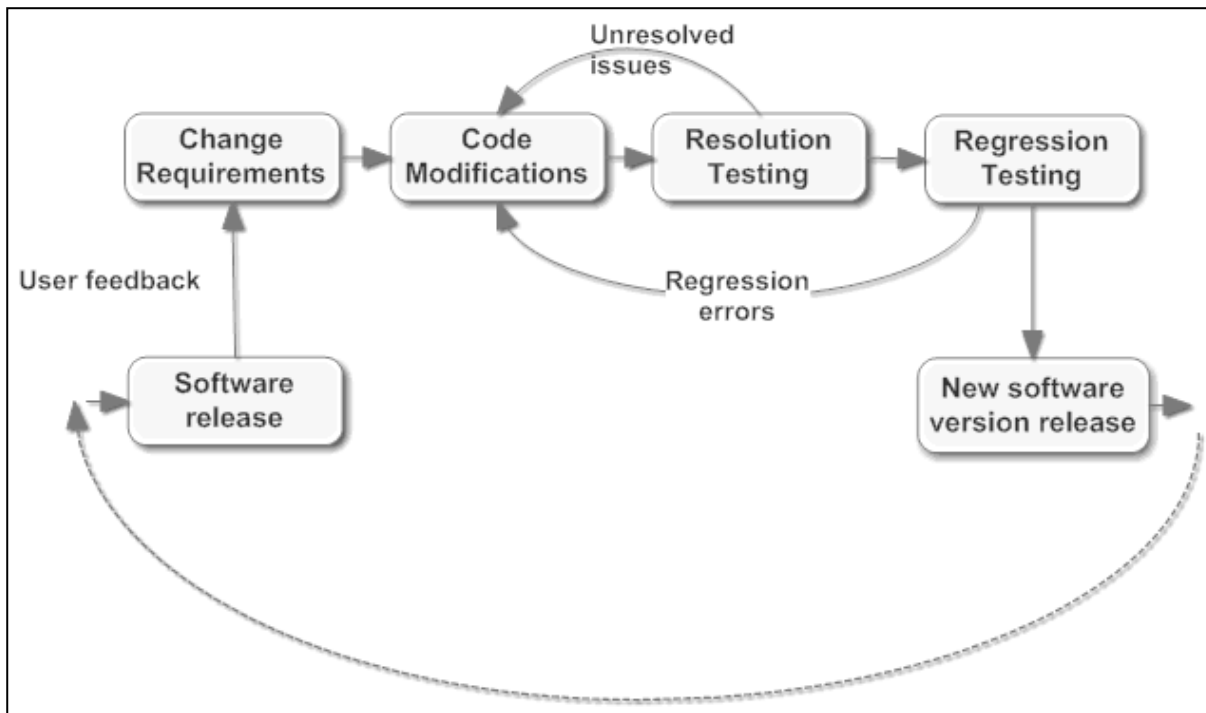


Figure 2.6: Activities that take place during software maintenance and regression testing

Source: Biswas *et al.*, 2011.

vii) Security testing:

Security testing is a specialist area, according to Morgan (2010: 20), which should also be applied to e-commerce websites - especially where aspects such as credit card information is used. Security testing poses unique problems to software development organisations, as security is generally not a software feature. The majority of security faults and areas of weakness in software are not linked to security functionality, but are as a result of an intruder's unforeseen and deliberate misuse of software. From a functional testing perspective, security testing would (in a sense) be considered negative testing, which poses much greater challenges than verifying positive behaviour in software (Arkin *et al.*, 2005: 84). According to Patton (2001: 211), security testing is a specialised and challenging area of testing, requiring the necessary experience and knowledge before the test technique can be used (Farooq & Quadri, 2013: 42).

viii) Exhaustive testing:

Exhaustive testing is a software test technique whereby all possible combinations of input values and pre-conditions are used to test software (Veenendaal, 2009: 130). Schaefer (2008: 18) states that the use of exhaustive testing should, in principle, result in all defects being detected; in practice, however, applying the technique is not possible, as there are too many possibilities to test. An example of exhaustive testing is where a device has 20 inputs, each having 10 possible values (Kuhn *et al.*, 2004: 418). In this scenario, this would total 10^{20} combinations of possible settings. A

few hundred test cases can only be created and executed based on the typical time and resources available for the testing. This does however result in only a fraction of one percent ($< 10^{15}$ possible cases being covered).

The often limited time and resources available to test software can limit the ability to complete testing efforts (Farooq & Quadri, 2013: 42). It is recommended that different test techniques be selected and applied and not to use exhaustive testing. The use of different testing techniques can assist in detecting the maximum possible defects and bringing software to an acceptable quality, as required by the software development organisation, while consuming less project resources and time.

In summary, the use of various software test techniques on the same program code, at best, may result in defect detection; this would otherwise go undetected if only a single test technique was used. The type of software being tested and the time required for such test activities should be factored into the test technique selection process. Different test techniques could ensure that business and technical requirements are met, as well as ensuring that functionality is correctly implemented under the various test conditions and scenarios in which software would be tested.

2.2.3 Test Cases

Software test cases are created as a mixture of standard test elements, known as test steps (Naik & Tripathy, 2008: 22). Different test steps can also be joined to create more intricate, multi-step tests. Software test cases should be captured clearly to enable other testers to easily comprehend and re-use these test cases.

According to Yueh *et al.* (2010: 66), test cases should be created to reveal different ways in which software could fail. This can be done by creating a diversity of test cases in areas of the software being tested, such as the input domain, using diverse range of computations in these areas. Test case design can assist with software test coverage and increase defect finding capability, which can be up to twenty five percent more when testers are trained and use test design techniques (Veenendaal, 2010: 18).

Software test cases can be created to achieve different objectives, such as revealing deviations from user requirements or assessing conformance to specifications (Bertolino, 2007: 87). Additional objectives of test cases are to evaluate the robustness of software.

In this section, test case creation, test case prioritisation and experienced based test case design are discussed.

i) Test Case Creation:

The process of identifying sets of categories and choices for software test cases from the details in specifications are essential tasks which software testers perform (Patton, 2001: 66). Inappropriate selection could possibly result in testing being either excessive or inadequate. The creation of test suites (which are groupings of test cases) is vital software testing activity, as the thoroughness of a test suite drives the extent of testing, together with the of revealing software failures (Poon *et al.*, 2011: 142).

According to Everett & McLeod (2007: 84), test cases should include the following information:

1. Unique test case identifier;
2. Unique title;
3. Brief description;
4. Suggested test data;
5. Test start up procedure; and
6. Test execution steps.

ii) Test Case Prioritisation:

Test case prioritisation is done to prioritise and schedule the order in which test cases should be executed, from highest to lowest priority (Haug, 2009: 12-13). Test case prioritisation was developed to ensure that test cases of a higher priority are executed first, reducing the issue of time constraints during the test execution phase. There is a conflict between obtaining high test case execution coverage, and minimising testing time required, for efficient and effective software testing (Szilagyi, 2008: 45). This is depicted in Figure 2.7:

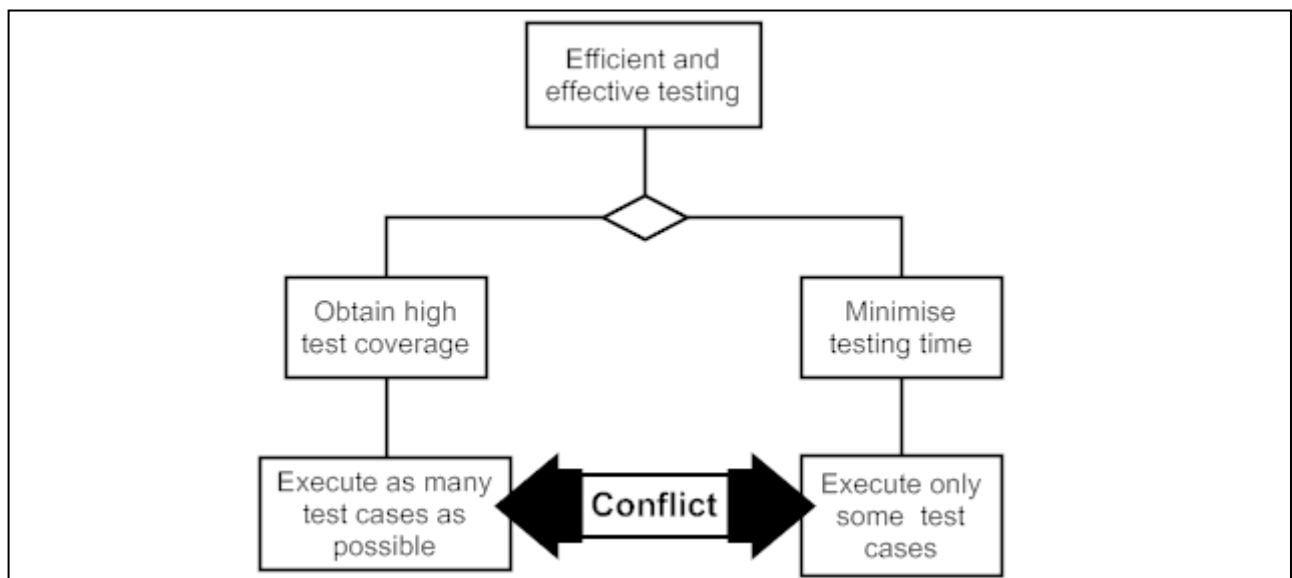


Figure 2.7: Test Case Needs and Wants

Source: Szilagyi, 2008.

iii) Inputs into Test Case Design:

Tests for non-conformance to specifications, together with negative testing and recovery testing, can be incorporated into test cases (Hambling, 2010: 119). Detailed documented test cases make it possible for almost any additional project resource to execute test cases, even with minimal knowledge of the software being tested; this could reduce test execution time should a time-sensitive scenario arise.

According to Hambling (2010: 119), experience gained in the software domain is advantageous when testing software, as the tester creating test cases would have a better understanding of how software is used and would have knowledge on critical functionality. This allows viable scenarios to be conceived and gaps in software functionality to be potentially identified. Experienced based software test case design is a black box test design technique (Hambling, 2010: 119), where a tester has no knowledge of the inner workings of the code being tested (Sawant *et al.*, 2012: 984).

iv) Measuring Effectiveness of Test Cases:

Test case specifications should be verified for conformance with software requirements at the end of the test design phase (Afzal, 2007: 62). Factors that could impact the value of test cases include:

1. Test cases being designed where functional specifications are not complete;
2. Sub standard test design; and
3. Incorrect understanding of test specifications by testers.

The traceability of test cases to software functional specifications are common methods used for verifying test case specifications. Similarly, a requirements tracking matrix document can assist with tracing test deliverables to test cases (Singh & Khan, 2012: 150). This is done by tracking and verifying that all software requirements are covered in the test case design phase so that, in the event that requirement changes arise, the process of checking that test scenarios, conditions and cases have been updated is simplified.

2.2.4 Test Execution

Preparation for software test execution assists with the process being completed in the shortest possible time (Maes & Mertens, 2008: 52). Specifying test scripts and creating test cases prior to software being tested can save valuable testing time during the software test execution phase. The areas of software test environments, used to replicate where software will operate in a live environment, together with defect tracking processes (where software defects are detected and fixed during test execution) is performed prior to software being release to a live environment, are contained in the section below.

i) Software Test Environments:

Software test execution needs to take place in the required test environment, with activities such as installation verification of software in a particular environment, together with documentation relating to the installation process being completed (Weyuker *et al.*, 2000: 78). Requirements for software test environments are determined by complexity, frequency and impact of software failure for the software being tested, prior to software being released to a live environment. Test environments should be protected and access restricted to ensure the integrity of the environment where software is tested (Rasa *et al.*, 2010: 7). In the case of e-commerce websites, compatibility testing is done to determine how web pages are displayed on different browsers, browser versions, screen resolutions and operating systems. E-commerce website functionality may not function as required on specific variances of any of the aforementioned factors (Balfagih *et al.*, 2012: 157).

In the event that different test environments need to be used, acceptance tests need to be run on a selection of likely target test environments (Humble & Farley, 2010: 125–126). A selection of test environments would need to be set up for at least one of each target test environments. There should also be test environments for integration, exploratory and pre-production testing. These environments can mimic the production environment and have their own unique configuration. Ravichandran (2012: 28) states that the time required for the software testing process can be decreased if tests are run in parallel in each of the required test environments, as each test requires actual execution time.

A related potential testing issue within the e-commerce context includes a lack of adequate test environments for payment gateways, which can negatively impact the integration testing process between an e-commerce website and the designated payment gateway (Paygate, 2012).

ii) Software Defect Tracking:

Detecting software defects is one of the greatest challenges in software development (Itkonen *et al.*, 2009: 494). Software testing ensures that requirements are examined before software is released to a production environment and that any defects are reported to developers for rectification, before the software release. Regression testing should be done after fixes are made to determine whether changes made have regressed other aspects of the software (Myers *et al.*, 2004: 106). Software defects detected during test execution are classified according to the severity of the defects (Raja *et al.*, 2012: 4). The defect severity scheme used should be based on the project, in order to focus on defects that will actually impact on the project and usage of software being tested (Lazic & Mastorakis, 2008: 609).

Terminologies and their meaning may vary and are dependent on people, projects, organisations or defect tracking tools.

The details in Table 2.1 are the industry-accepted classifications:

Table 2.1: Software defect severity classification

	Critical	Major	Minor	Trivial
Impact	Defect impacts critical functionality or data.	Defect impacts major functionality or data.	Defect impacts minor functionality or non-critical data.	Defect does not impact functionality or data.
Workaround	A workaround is not possible.	A workaround is possible, but is not obvious and is difficult.	An easy workaround is possible.	No need for a workaround.
Example	Unsuccessful installation, complete failure of a feature. This could include not being able to search on products or complete purchases.	Feature not functional from a particular module, but can be used if complicated indirect steps are followed in another module/s. This could include not being able to checkout from the shopping cart, but only from the wish list.	Minor feature which is not functional in a particular module, but the same task can easily be accomplished from another module. This could include a link which does not point to the correct location, but the target page can be accessed via a different page.	Petty layout discrepancies, spelling or grammatical errors. Issue is merely an inconvenience. This could include a styling issue on specific browser impacting content presentation.

Source: adapted from Raja *et al.*, 2012.

Software defect priority determines the importance or urgency of fixing a software defect once it has been logged (Raja *et al.*, 2012: 5). The priority may initially be specified by a software tester when logging the software defect but should be finalised by the project or product manager. Defect priority rating indicates the impact that a failure has on the use of the software being tested. In exceptional cases, the priority of a defect may be elevated if an important customer (or many customers) are impacted, and the defect is fixed sooner than it would ordinarily have been (Zheng *et al.*, 2006: 248).

Table 2.2 depicts different software defect priorities and the rationale behind the classification:

Table 2.2: Software defect priority

Defect Priority	Urgent	High	Medium	Low
Action	Defect must be fixed in the next build.	Defect must be fixed in any of the upcoming builds but should be included in the release.	Defect may be fixed after the release or in the next release.	Defect may or may not be fixed at all.

Source: adapted from Raja *et al.*, 2012.

The factors of software defect severity and priority are subjective and the chances are high that there will probably be some disagreement with the definition of each. To mitigate the chances of differing opinions, agreeing to and documenting some standards (with examples) should be done before the testing process commences (Raja *et al.*, 2012: 5). Attributes which defects can include could be a defect summary, detailed description, detection date and which resource the defect is currently assigned to.

The following details can be included for a logged defect (Li *et al.*, 2010: 20):

1. The expected date of defect closure;
2. Which resource identified the defect;
3. The unique defect number;
4. The software build version the defect was detected in; and
5. Any supplemental notes relating to the defect.

The test execution process uses information from the test planning process and test techniques to create and execute test cases. Defects identified during test execution can be fixed, if required, dependant on severity and priority identified. Fixing identified defects enhances software quality and also verifies that software meets requirements. Defect tracking systems and the required testing environments are also important requirements for software testers to ensure effective test execution.

2.2.5 Test Measurements

As stated in 1.2.2, the information provided by test measurements can be used to determine factors such as software readiness for release, which include features being completed, documentation and defect count (Kaner & Bond, 2004: 7). The information provided from measurements or metrics enables organisations to have visibility on the specific characteristics of their processes and products (Farooq *et al.*, 2011: 671). Software measurements add value by keeping organisations informed and aware of all phases of the software development process. Quadri and Farooq (2010: 7) indicate that software measurement can play an important role in increasing the effectiveness of software testing process.

Software test measurements can assist in answering the question of how effective an organisation's software testing processes are, once the necessary measurements are developed and implemented (Lazic & Mastorakis, 2008: 604).

This is depicted in Figure 2.8:

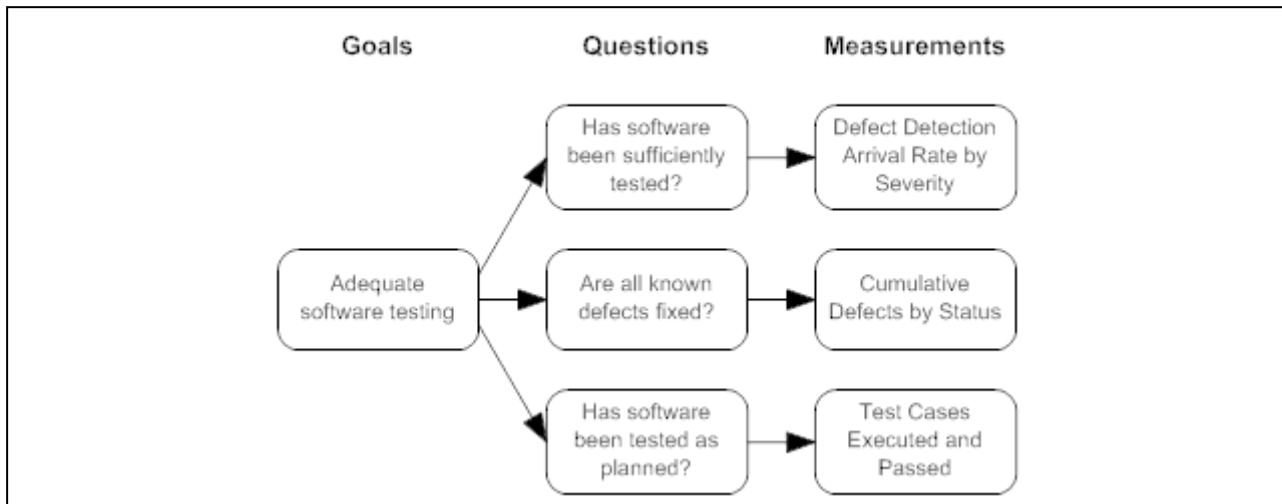


Figure 2.8: Testing Goals, Questions and Measurements

Source: Lazic & Mastorakis, 2008.

Potential goals which test measurements can assist in realising, together with defect and testing process measurements, are contained in this section.

Software test measurements provide better project control and provide insight into how software development organisations develop software (Basili *et al.*, 2007: 253). Software measurement efforts and measurement data can also contribute to higher level decisions being made, which impacts business strategy in software development organisations. Potential goals can be identified (based on analysis of measurements), such as decreasing customer reported defects (Basili *et al.*, 2007: 253). Defect analysis measures and categorises defects, whilst root-cause analysis ascertains sources of defects (Weyuker *et al.*, 2000: 78). Software testing cannot directly enhance software quality or remove defects; instead, the defect reporting process makes defect fixes possible, which can contribute to enhanced software quality.

According to Nair *et al.* (2011: 1), software development organisations require effective defect management, as defect management is a highly influencing factor in the production of high quality software. Defects should be officially created, monitored and closed during software development and maintenance processes, including e-commerce websites (Li *et al.*, 2010: 20). Data stored for each software defect would correspond to specific faults, which can provide data to be used for measurements. In addition, data from web server logs and defect capturing tools can provide measurements to indicate software quality. Rababah and Masoud (2010: 4) state that e-commerce

website quality sub-factors include internet browser version compatibility and cross browser support; defects per supported browser version can be measured.

Exit criteria factors for testing could include that an agreed percentage of test cases e.g. ninety percent, are passed (Singh & Khan, 2012: 148). According to Farooq and Quadri (2013: 48), test measurements can be done against the following factors:

1. Number of defects;
2. Defect rate;
3. Defect type;
4. Size (test cases generated);
5. Test coverage;
6. Time (usually execution time);
7. Type of software; and
8. Experience of testers.

Software test measurements allow software development organisations insight into most SDLC activities, as software testing interacts with most functionality. Based on factors such as time and defects, testing processes can be investigated and possibly improved, regardless of the nature of the software being tested.

2.3 SOFTWARE DEVELOPMENT METHODOLOGIES

Software development presents unique problems, including unrealistic expectations on budget, deadlines and moving requirements (Laplante & Neill, 2004: 12). Organisations and projects have their own unique nuances, requiring a range of techniques and strategies; there should, however, not be a scenario where none of these are used. Using recognised techniques and methodologies is required to manage the intricacies and issues associated with the software development process. Imreh and Raisinghani (2011: 460) indicate that organisations have introduced quality related procedures and software development methodologies to attain higher standards of software quality.

Using a particular software development methodology is not a guarantee of high quality software (Mendonca & Brewer, 2002: 503). A software development methodology provides the framework for understanding and arranging the required tasks in a project, serving as a good base from which development can proceed. Processes performed during the SDLC are becoming complex and resource intensive, executing actions with the primary aim of developing quality software, in accordance with previously specified user requirements. This goal can only be attained by using structured, carefully guided and documented software development processes (Krishna *et al.*, 2012: 4580).

Testing is a section within the software quality assurance process which is done to ensure that software enters a production environment without major defects which can result in software failures (Morgan, 2010: 13). Testing can be implemented at any time in the SDLC, but most of the test efforts occur after the requirements have been defined and the coding process is completed (Roongruangsuwan & Daengde, 2010: 46). Nemani and Ichu (2011: 723) indicate that quality assurance resources are not included in all phases of the SDLC, due to cost and time involved, with no perceived tangible benefits by management. The benefits that comprehensive testing can bring is not always understood, such as the value of defect free software products.

The software testing processes prescribed by the Waterfall and Agile software development methodologies will be investigated in the next section.

2.3.1 Software testing processes for Waterfall model

The Waterfall model is process-oriented and plan-driven, with documented process procedures for all tasks, milestones and their variants (Guntamukkala *et al.*, 2006: 268). The Waterfall model has clear demarcations between phases in the SDLC, such as when developers pass developed software to the testers prior to release (Desikan & Ramesh, 2006: 33).

Figure 2.9 depicts the various processes for the Waterfall model, together with loopback processes when any issues are detected during any specific phase of development:

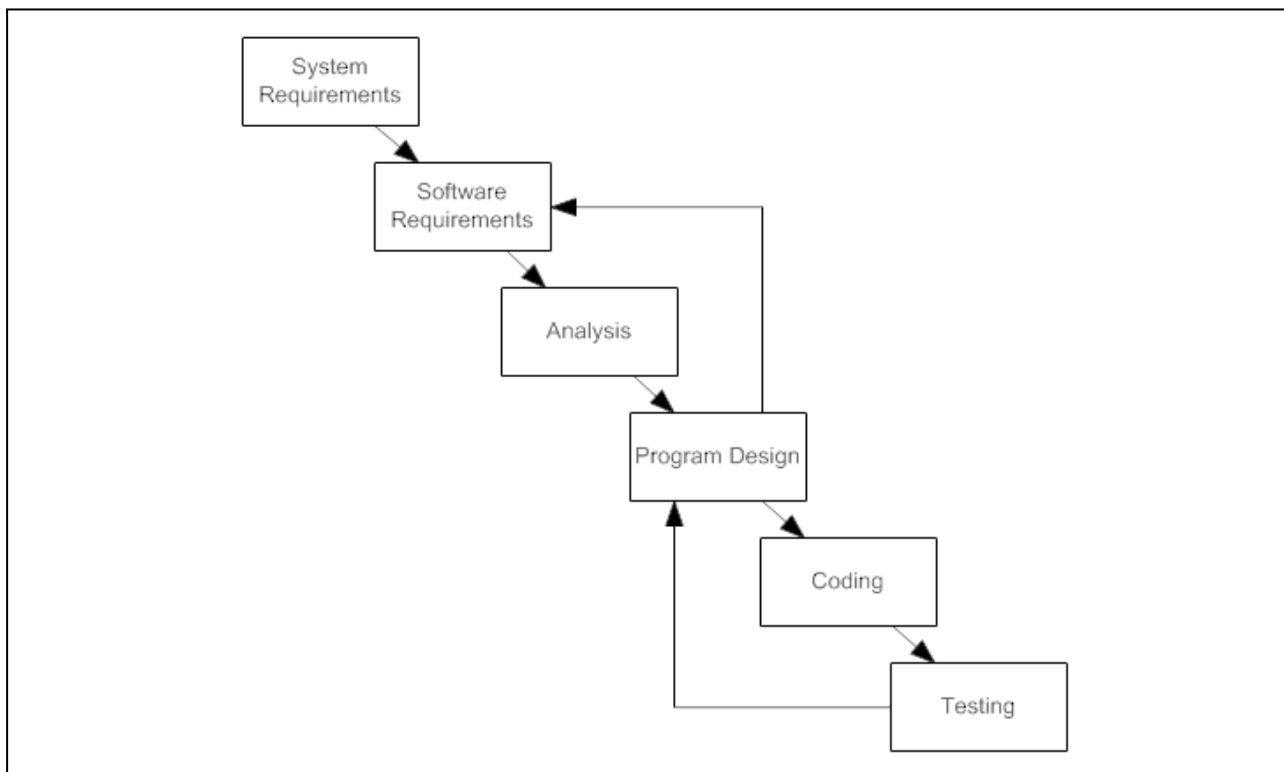


Figure 2.9: Waterfall model development processes

Source: adapted from Royce, 1970.

In relation to sequential software development methodologies, which the Waterfall model is an example of (Sawyer, 2004: 97), Royce (1970: 335) states that test processes should be handled by test specialists. Software test specialists would be able to perform better testing than system designers, providing that, as advocated by the Waterfall model, good software documentation is available.

Waterfall model test processes (in relation to test planning and test case design) use case testing, regression testing and user acceptance testing (Royce, 1970: 336), as discussed in this Section and depicted in Figure 2.10:

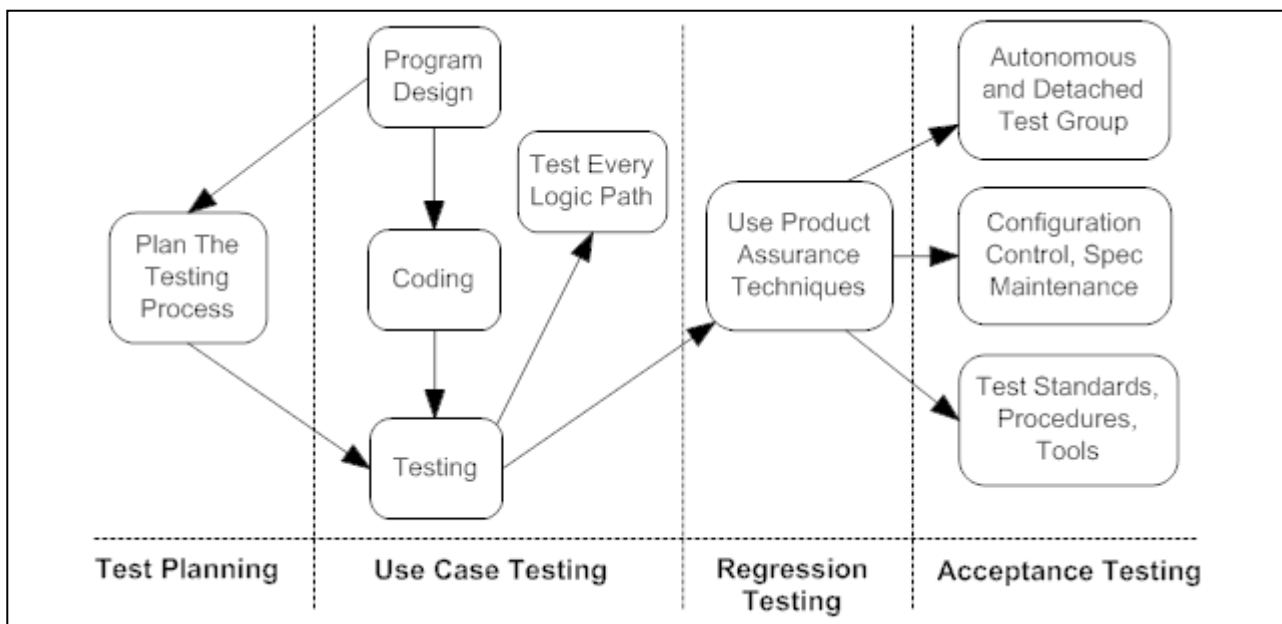


Figure 2.10: Plan, Control, and Monitor Computer Program Testing for Waterfall model

Source: adapted from Royce, 1970.

i) Test Planning:

In relation to sequential software development models, which include the Waterfall model, Szabó and Samuelis (2009: 64) state that the test planning process runs in parallel to development, with its own processes. Abran and Moore (2004: 75) advocate that planning for the testing phase should commence during the early stages of the requirement process, before software is designed. Test planning can indicate potential software weaknesses, such as design oversights or contradictions, together with omissions or ambiguities in the documentation required to create test plans. Testing and quality assurance is undertaken to prevent possible issues; it is preferable to rather avoid issues than it is to correcting them.

Test planning provides a framework within which software testing will be conducted (Naik & Tripathy, 2008: 21–22). That framework is a set of ideas, facts or circumstances that testing may be

executed within. A scope of software test activities is covered, outlining the managerial aspects of testing, rather than detailed test techniques and specific test cases. A test plan includes details of resources required, time required, a schedule of activities and a budget. Mapping the software test plan with the software project plan will assist with accurate time estimates being given, together with the matching requirements to test cases (Liou, 2011: 128).

Features in the software to be tested are identified and the objectives and detailed behaviour of test cases defined (Naik & Tripathy, 2008: 22). Test objectives are determined using information sources, including functional and system requirements, where one or more test cases are designed to achieve each test objective. The use of specification-based methods to create test cases is preferred, according to Huang (2009: 53), in relation to code-based methods. A scenario where source code does not implement functionality from a specification will result in a test case not being generated to reveal what was not implemented.

Myers *et al.*, (2004: 145-146) indicates that a big misstep in test planning is the presumption that there will not be any defects detected. This can result in the intended use of resources, such as people and time, being underestimated, which is a known problem within the IT industry. Knowledge around the project history and the software itself is used to estimate the effort and time required to fix defects, as part of the planning process (Weiss *et al.*, 2007: 1).

ii) Use Case Testing:

Desikan and Ramesh (2006: 27) indicate that once the development phase is complete, software is subjected to testing. Use cases are formulated in the requirements phase by investigating the related data pertaining to the project and passed as software specifications (Thummadi *et al.*, 2011: 70). Waterfall model testing prescribes that test execution is done against use cases, once code is developed. Defects are reported in relation to use cases, which need to be fixed before code is released to a production environment.

Use case testing ensures that conventional and exceptional workflow processes are tested for in a system (Black, 2009: 52). Testing is done from the perspective of the various role players who directly interact with the system. Testing is also done from the perspective of various stakeholders where there may be indirect interaction with the software. Software testers would obtain use cases from system designers or business analysts, with use cases serving as frameworks for creating test cases.

Table 2.3 depicts a use case example for an e-commerce purchase, with the normal workflow of a customer completing a transaction, together with exceptions in the normal workflow process which may occur:

Table 2.3: E-commerce purchase use case example

Normal workflow	Exceptions
1. Customer adds item(s) into the shopping cart.	Customer attempts to the checkout process with an empty shopping cart; system displays an error message.
2. Customer starts the checkout process.	Customer provides invalid address, payment, or delivery details; system displays applicable error message(s).
3. System obtains customer's address, payment, and delivery information.	Customer abandons transaction before or during the checkout process; customer is logged out by system following 10 minutes of inactivity.
4. System shows all relevant information for customer to confirm.	
5. Customer confirms order to system for delivery to take place.	

Source: Black, 2009.

iii) Acceptance Testing:

Acceptance testing, as used in the Waterfall model, is a recognised testing process which is undertaken to establish if software meets the acceptance criteria of a customer (Naik & Tripathy, 2008: 450). Acceptance testing comprises of user acceptance testing (UAT) and business acceptance testing. UAT is undertaken by the customer to determine if the software meets contractually stipulated acceptance criteria, before the confirmation is given that user needs have been met. Business acceptance testing is done at the software development organisation to establish if the software will pass the UAT process. Test cases are derived and executed from the client's contractual requirements, including the acceptance criteria.

According to Kaner (2003: 10), good acceptance tests should provide enough structure for users to report the results of their testing effort effectively. This allows reviewers of completed acceptance tests to understand and troubleshoot any issues which may have occurred. Failures found in acceptance testing are typically credible, with some users running complex scenarios which exercise many of the possibilities of software being tested.

iv) Regression Testing:

The maintenance phase of the Waterfall model takes place after software has been released, during which the software needs to be maintained (Petersen *et al.*, 2009:390). The software testing process (using the Waterfall model) is stated by Szabó and Samuelis (2009:66) as being more complicated for regression testing, with appropriate test case selection and review processes required to test changes before these are released. Maintenance is done to refine software output, fix defects and improve performance and quality. Further software maintenance tasks can be performed, such as the acceptance of new user requests and improving software reliability (Bassil, 2012: 743)

The structured processes advocated by the Waterfall model places emphasis on planning all test processes. Use case and user acceptance testing furthermore assist with ensuring that user requirements are met and defects are detected before software is released. This is in addition to the prior processes of test case creation and execution performed by software testers.

2.3.2 Software testing processes for Agile methods

Agile methods prescribe quicker software release cycles and face-to-face communication is preferred over documentation (Guntamukkala *et al.*, 2006: 270). Agile methods thus provide challenges to software testing, in order to deal with the volume and speed of changes which are made, without compromises to software quality (Black, 2010: 20). A tester's workflow should be in parallel with developers, an example being where acceptance test cases are written while the corresponding code is being developed (Leffingwell, 2011: 53).

Software testing using Agile methods can be divided into business- and technology-facing tests (Leffingwell, 2011: 185). Business-facing tests describe test scenarios and their results, where software quality is critiqued with the intent on discovering inadequacies, without focussing on the technical coding of software. An example could be that, if a user withdraws more money than available in their account, the software automatically makes the required option available for the user to apply for a loan. Similarly, technology-facing tests would describe technical terms as used in software development. An example is where different browsers implement JavaScript programming differently; testing would thus need to be done on the most commonly used browsers to ensure compatibility.

Figure 2.11 depicts business and technology-facing tests using Agile methods, with business-facing tests including functional and system acceptance tests, with test execution being mostly manual. Technology-facing tests include unit, component, performance, load and security tests, with the execution being automated or through the use of testing tools:

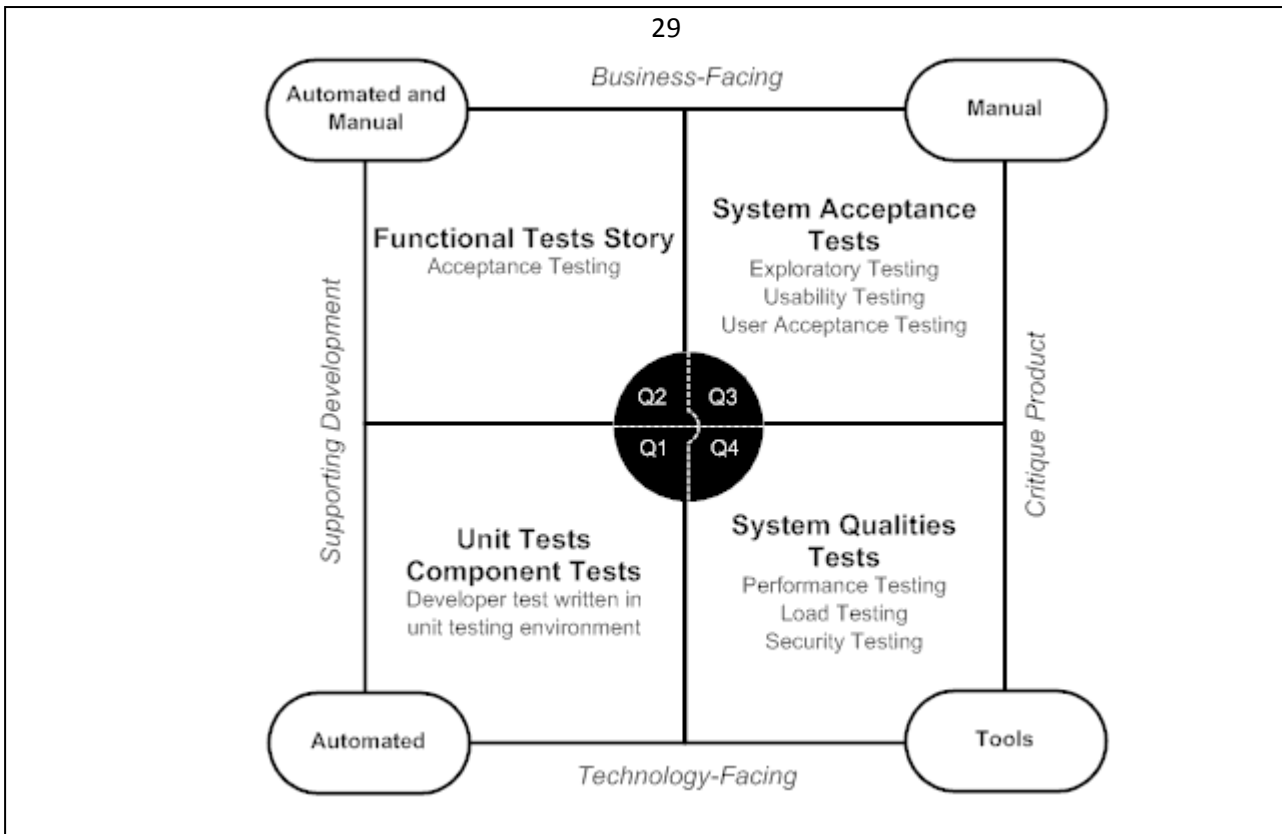


Figure 2.11: The Agile Testing Matrix

Source: adapted from Leffingwell, 2011.

Exploratory testing, test automation, usability testing and regression testing will be discussed further in this Section, in relation to Agile methods.

Takanen *et al.*, (2008: 74) are of the opinion that exploratory testing approaches, as prescribed by Agile methods, are useful for testing outside the specifications, with a good exploratory tester always finding unexpected flaws in software. The ‘out-of-the-box’ perspective of exploratory testing can reveal bugs that might be missed by testers blinded by the specifications. There is always a risk involved when the quality of the tests is based on chance and on the skills of the individual tester.

Exploratory testing combines the experience of testers with an orderly approach to the testing process, in scenarios where software specifications are either non-existent or insufficient, and where time pressures exist (Hambling, 2010: 119). There are simultaneous design, test execution, defect logging and learning processes, which are time-boxed and planned around specific testing goals. Exploratory testing thus maximises the quantity of testing which can be accomplished during limited periods of time. The testing goals also assist to focus the testing effort the most critical aspect of the software under test.

i) Test Automation:

Bromnick (2001: 282) indicates that test automation, as prescribed by Agile methods, gives the opportunity for large scale regression to be performed economically. Tests can be run overnight without human intervention needed, with regression testing only being cost effective if automated. Martin *et al.*, (2007: 610) indicate that automated tests need to be unambiguous - with specific criteria in place to constitute a test which passed, which results of a test can be automatically checked against. Software requirements may not contain detail level to allow construct explicit automated tests to be constructed (when Agile methods are used).

Test automation is often seen as a means to remove repetitive tasks from testers and not to replace it, in order to free up time for creative manual testing (Itkonen *et al.*, 2009: 494). Martin *et al.*, (2007: 610) agree with the previous statement, confirming that expectations for automated tests to completely replace manual tests are not realistic. Additional time is thus available to testers for designing more effective test cases and can focus on the areas which may have previously been overlooked (Berner *et al.*, 2005: 573).

Automated testing allows shorter release cycles to be accomplished, as test cycles can be considerably reduced. The execution of tests can be done more often, with defects being picked up quicker and costs associated with rectifying defects being reduced.

ii) Usability Testing:

Usability testing, as prescribed by Agile methods, is considered an vital and commonly used methods for assessing software product design, aiming to evaluate usability by mimicking interaction between a user and the software product in a controlled environment (Sonderegger & Sauer, 2010: 404). Usability testing refers to the extent in which the goal of a particular task is successfully accomplished. Reference is also made to the amount of time and effort expended by a user to accomplish the goal of a particular task. This can be quantified by the deviation from the optimal user behaviour, such as task completion time and the quantity of actions required by the user to achieve a particular task.

iii) Regression Testing:

The shorter lifecycle of software development (as advocated by Agile methods) enforces limitations and constraints on conducting regression testing (Yoo & Harman, 2012: 68). The Agile Manifesto advocates change requirements, even late in the development processes and delivering working software with preference to shorter timescales, which could be as short as a couple of weeks (Beck *et al.*, 2001).

Thummadi *et al.*, (2011: 74) conclude that the use of software methodologies differ from the idealised procedures implied by their methodological descriptions. The influences of factors such as

culture, business environment and people play a role in the deviations. In relation to Agile and Waterfall software development methodologies, Imreh and Raisinghani (2011: 460) indicate that certain software development organisations have been successful with the implementation of Agile methods, while others have experienced less success or complete failure, in comparison to the Waterfall model and in relation to the organisations the researchers investigated.

2.4 DEVIATION FROM SOFTWARE TESTING PROCESSES

Organisations aim to bring innovative software products to the marketplace, with time inescapably becoming a limited and valuable resource (Cohen *et al.*, 2004: 78). It is then still expected that the software be tested thoroughly in order to meet deadlines. There is limited time and resources to perform software testing, which can limit an organisation's ability to effectively complete testing efforts. The need for compliance with processes and requirements is based on the principle that organisations can improve deliverables, if software development processes are repeatable and measurable (Homès, 2009: 7).

Any deviation from software testing processes should be documented, to determine current processes and their differences in relation to what these processes should be (Perry, 2007: 437). Factors such as the processes used to perform software testing, inputs, outputs or deliverables, software users or customers and process deficiencies should be documented. Deviations could include non-conformance to standards, procedures or guidelines (Perry, 2007: 438). Deviations can also include non-conformance to business practices generally accepted as sound, such as software development methodologies.

Project time pressures and unique organisational factors, which may lead to deviation from testing processes, together with non-conformance to software development processes (including e-commerce websites) will be discussed further in this Section.

2.4.1 Project time pressures leading to deviation from testing processes

Liou (2011: 128) states that whenever the overall project schedule is reduced, or there are delays from code development, the test effort is always the one that got impacted severely in terms of time. The twenty five to thirty percent of total time which Rawlinson (2000) suggests is set aside for software testing (that which is time boxed so that the testing time is not reduced due to upstream project delays) is, as a release date approaches, not always adhered to. The competing resources of money, quality and time impact each other, also influencing whether functionality is included or excluded in software released to a production environment (Morgan, 2010: 13). In order to release software quicker, it will usually cost more and quality may be compromised.

Figure 2.12 depicts the competing resources of time, money and quality in order for software features to be implemented:

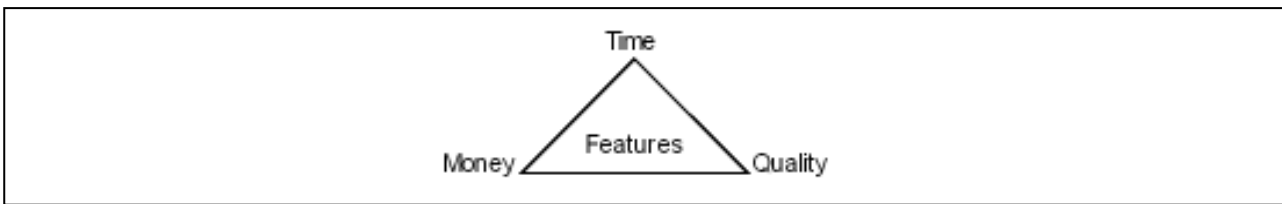


Figure 2.12: Resources Triangle

Source: Morgan, 2010.

Testing is often postponed - and planned testing time reduced - to stay on the delivery schedule. Development needs to be completed for test execution to begin, which often results in testers being left with little time for test execution. Developers are allowed to continue coding late into a project, exceeding their allocated time period (Cohen *et al.*, 2004: 78). Nelson (2007: 76) states that, when a project falls behind schedule, testing is one of the first areas that gets reduced. In order to meet deadlines, test planning is eliminated and minimal testing is performed. Risk-based testing can assist the testing process with testing the right things at the right time, when testing time is reduced or tight deadlines need to be met (Bach, 1999: 1). Risk-based testing can be used when other methods of organising the test effort demand more time or resources than available, and focuses and justifies the test effort.

Alam and Khan (2013: 41) find risk-based testing to be a powerful testing technique, assisting test teams to streamline their testing efforts, mitigating risk and minimising testing efforts in the process. Software testing processes require an effective risk management process to prevent costly software failures (Vijayaraghavan, 2003: 1). Risk-based testing cannot guarantee a risk-free project; the technique requires best practices in risk management where risk is offset with quality, functionality, budget and scheduling to accomplish a positive result (Alam & Khan, 2013: 41). It is important that time spent on testing is directed at important tasks and not squandered when demanding project deadlines need to be met. Examples of time being squandered include duplicated testing or the testing of interesting, yet unimportant functionality (Bromnick, 2001: 285).

The need to meet release dates can result in test results being re-interpreted in terms of what is meant by 'passing a test'. If tests had 'failed', there would still have been the need for discussion and interpretation of the test results (Martin *et al.*, 2007: 610). Processes which lead to the decision to release software to a live environment should be based on solid engineering practices and must undertaken by knowledgeable and qualified individuals (Weyuker *et al.*, 2000: 78). When software testers determine that software is ready for release, they certify that the software should operate at a satisfactory level of reliability.

2.4.2 Unique organisational factors leading to SDLC process deviation

Managing software requirements is critical to the software development process, as omissions or errors for important requirements leads to increased product cost and may in some cases result in project failure (Chemuturi, 2013: 1). Requirements precede all other SDLC phases, namely software design, software development and testing. Potential issues relating to software requirements include unclear or poorly defined requirements, missing requirement analysis and requirements which are not aligned with customer needs (Alam & Khan, 2013: 33). It is accepted that that change taking place in a software development project is inevitable and should thus be permitted in the life cycle of a project.

Due to various reasons, change in projects is inevitable, including scope changes by customers and stakeholders influencing changes to tasks or project scope (Taylor, 2008: 187). It is thus critical that organisations have a formal change control process in place, which many organisations do not have. Without a formal change control process, either ‘scope creep’ occurs or a change is dealt with by using a workaround, with no planning done to deal smoothly with changes.

Requirement changes are the most immediate and most significant example, according to Laplante and Neill (2004: 10). The authors indicate that the more something is understood, the more flaws are realised in relation to original presumptions. If these changes are not factored in, the costs of accommodating such requirement changes escalate exponentially. If requirement changes are not properly controlled, uncontrollable scope creep (and increased costs) may result.

Proper understanding and management of requirements can prevent project failures and contribute to high quality software being released (Chemuturi, 2013: 1). In order to keep requirements static and attempt to guarantee results, organisations using sequential methodologies use contracts where the price and scope are predetermined. This differs from organisations using Agile methods where contracts are established on time and expenses, where the aspect of scope is not rigid (Sillitti *et al.*, 2005: 146).

2.4.3 Non-conformance to software development processes

If a high standard of quality is not maintained for software development processes prior to testing, numerous software defects will be detected once testing is performed (Kelly, 2008: 25). As quality cannot be added at the end of a project, steps to ensure that quality is attained must be included from the early phases of a project (Balfagih *et al.*, 2012: 153). This includes using adequate planning that is continuously evaluated to ensure that these are satisfactory. The required compliance and monitoring needs to be planned, which can include standards, practices and conventions; these need to be enforced to ensure quality for all software development processes.

Examples include documentation, security standards, coding standards and payment standards for e-commerce websites.

Davidavičienė and Tolvaisas (2011: 726–727) indicate the importance of the passive and active elements of an e-commerce website required by its users. This includes functionality around the purchasing process, beginning from the moment when potential buyers enter an e-commerce website - and the various steps required - leading to a successfully completed online transaction. This includes product search functionality, shopping cart, checkout process and feedback from the website when progressing through purchase steps (Balfagih *et al.*, 2012: 159). If software development processes are not followed and the aforementioned critical functionality is impacted, there may be a severe impact to users.

Desikan and Ramesh (2006: 6) furthermore indicate that, if testing processes are ineffective, this may lead to unexpected defects when software is released. This is depicted in Figure 2.13:

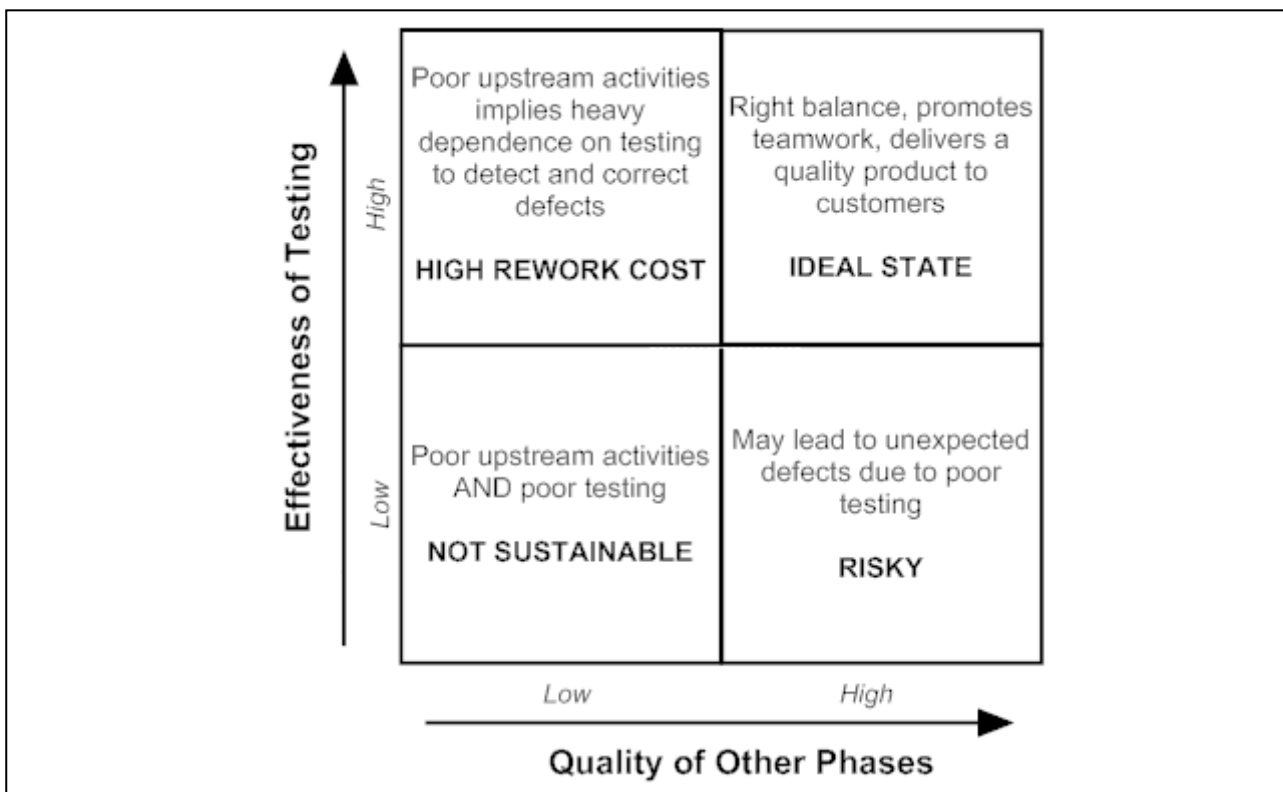


Figure 2.13: Relationship of effectiveness of testing to quality of other phases

Source: Desikan & Ramesh, 2006.

Ahmad *et al.*, (2014: 65) state that the monitoring of software testing activities is important, as this can result in the detection of deviations within the software development process. As there is a business risk associated with every release of software to a production environment, it is important that there is a release plan in place. All required resources need to be involved and aware of the

software release process plan, in order to achieve successful releases (Humble & Farley, 2010: 129).

Structured software testing processes assist with effective testing so that requirements are met - and defects are detected and fixed- before software is released. The business environment that software development organisations operate in place time constraints on getting software released; accordingly, changes may occur at short notice. Unique organisational processes and compliance software testing processes may not be enforced thoroughly enough, which may also lead to deviation from software testing processes.

2.5 IMPLICATIONS OF NON-CONFORMANCE TO SOFTWARE TESTING PROCESSES

According to Christie (2009: 20), persons involved in financial aspects of an organisation (such as accountants, lawyers and auditors) act on the assumption that organisational processes which are in place should be mandatory. Any subsequent non-compliance to such processes is seen as being failures or deviations, with possible implications for the organisation concerned.

When software does not conform to quality requirements, there are different types of costs associated with non-conformance (Wagner & Seifert, 2005: 1). Internal costs are failures which occur during the software development process before software is released, whilst external failure costs result from failures after software is released. Cost types associated with the conformance and non-conformance to software testing processes is represented in Figure 2.14:

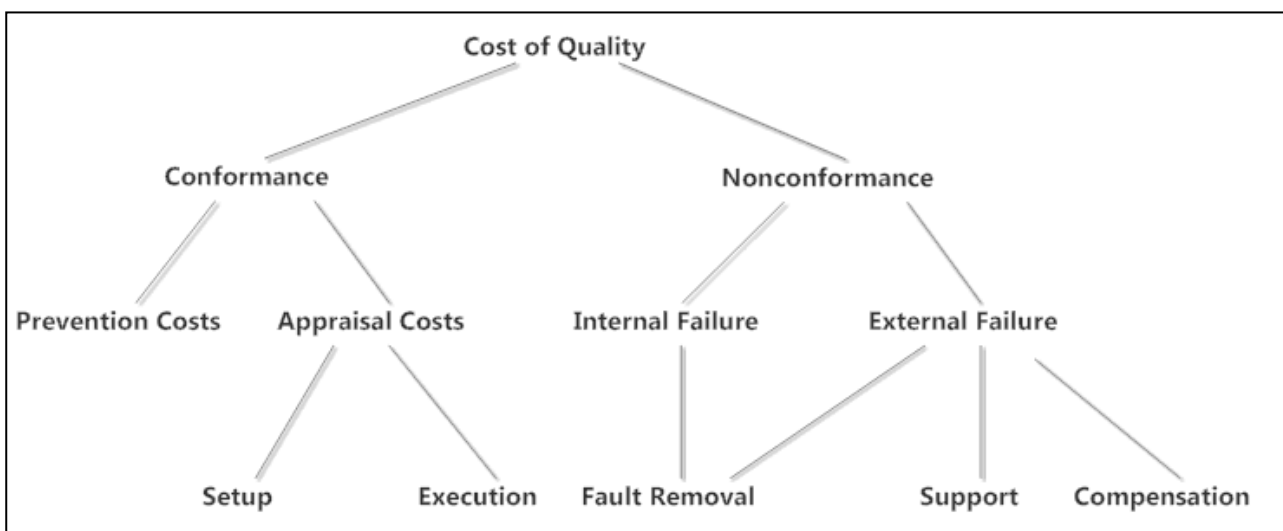


Figure 2.14: Cost types for conformance and non-conformance to software testing processes

Source: Wagner & Seifert, 2005.

Software defects can end up not being detected if tests are executed incorrectly, as requirements may not have been correctly understood by software testers who create and execute test scripts

(Berenbach, 2006: 18). Defect logging processes that are not correctly followed - such as when insufficient or incorrect information is specified, or the severity of the defect being incorrect - result in delays in fixing defects (Raja *et al.*, 2012: 2). This can result in a critical defect being present in software which should have been fixed prior to release, or a delay to a planned release because of the issue.

The impact of software defects can be evaluated through its direct cause (the resultant defect) or indirectly (using a root cause analysis), where the software development phase in which the defect originated can be identified (Raja *et al.*, 2012: 1,3). This could include requirements, design, coding or a deployment phase during which a defect was introduced.

The impact of software defects, together with the unique impact of software defects for e-commerce websites, is contained in this Section.

2.5.1 Implications of software defects

Papow (2011: 3) indicates that the cost of addressing software defects goes beyond brand damage control, as a software anomaly could be a widespread defect which is staggeringly expensive to fix. Extensive software redevelopment is an example of unanticipated costs resulting from software defects once software is released. There may also be the need to bring down systems for hours, if not days, in order to uncover the underlying causes and to halt further issues as a result of software defects. Fixing defects would require additional labour costs, with project resources such as project managers, developers, analysts and testers having quantifiable costs associated with their time, which can be billed per unit of work or per day (Langer, 2012: 98).

Defect removal costs also include costs for re-testing fixes, to ensure that new defects are not introduced, and for additional retesting, if new defects are found and fixed (Wagner & Seifert, 2005: 1). Support costs could also be incurred for external failures, relating to service staff being required to identify and troubleshoot defects. Compensation costs could also form part of external failure costs, if there has been damage caused in some way to a customer site due to a software failure.

Third party software development companies are often contracted to manage some (or all) of the functionality of software applications (Villela *et al.*, 2007: 2). A service level agreement (SLA) would be in place whereby the software development company, as the vendor, is charged for each service requirement which is missed. In other words, when a request of the application does not meet the requirements as specified within the SLA, a financial penalty is incurred by the vendor.

Software defects require time to be fixed and re-tested, with time being a scarce resource when production software is impacted. This directly translates to financial losses as software development

resources are diverted from work they would be busy on at the time and the associated resource cost. Compensation and SLA breaches are further examples of implications of software defects.

2.5.2 Implications of software defects for e-commerce websites

Following a well-known online book retailer going live with its e-commerce website for the first time, a defect was introduced (Morgan, 2010: 10). If a customer ordered a negative amount of books, the quantity specified for the transaction would result in the amount being refunded to the customer. The software development team did not anticipate a user attempting to purchase a negative amount, thus the scenario was not tested. Code was subsequently developed, tested and released to only permit refunds to customers when these are done by administrative staff, with self-requested refund issue no longer occurring.

The need for e-commerce websites to attract potential customers, encourage first-time purchases and retaining repeat purchases is impacted by the important factor of quality (Balfagih *et al.*, 2012: 159). Software defects on website functionality can prevent or dissuade customers from completing transactions (Nili *et al.*, 2014: 6). This can include informational failures where website information provided is irrelevant, inconsistent or incomplete. Examples of this can include incorrect product categories or variations or missing links on a website. Functionality defects can include insufficient payment options or payment problems.

According to Mangiaracina *et al.*, (2009: 7), the cart management is critical in the purchasing process for e-commerce websites, as there is a very high dropout rate for users; this is higher than seventy five percent of all transactions, if there are software-related issues experienced by users. This includes the functionality to add or remove products from the shopping cart, changing product quantities and saving products in the cart before continuing to shop on the e-commerce website (Mangiaracina *et al.*, 2009: 7). The payment process is also important, as there can be various methods by which payment can be authorised (Cenfetelli & Benbasat, 2002: 701).

Furthermore, if there are software issues surrounding the different costs as presented to users (including the cost of products, partial or total discounts or delivery costs), this can either lead to the loss of a sale or a loss of revenue or profit for e-commerce websites (Cenfetelli & Benbasat, 2002: 701). The possibility for cross- and up-selling opportunities will also be lost if there are software issues with the checkout process. Phan (2003: 589) also states that database errors could result in incorrect products being shipped at the wrong time, at an incorrect price, within the e-commerce context.

Functionality on e-commerce websites around price discounts is important, whereby discounts can depend on quantity ordered or as a percentage of the price (Alston *et al.*, 2002: 2,4,7). There is a

risk that the wrong model for shipping cost calculations can be used, based on factors such as pricing, weight and the amount of items, where there should be no delivery charge based on (Vijayaraghavan, 2003: 87). Updates to determine sufficient stock availability should be done, in order to not potentially sell a product for which there is no stock or which is discontinued (Vijayaraghavan, 2003: 89). Shopping cart functionality includes items selected for purchase, the quantity ordered, customer billing and shipping information; an issue with any of these would prevent an order from being completed. Any calculation errors occurring when completing purchases could have negative financial consequences; customers could either pay less than they should or not be able to complete transactions (Vijayaraghavan, 2003: 84).

The correct customer information also needs to reflect when a customer logs in; a defect occurred on a British website where users data, including personal information such names, date of birth, and details of orders placed previously were displayed to the wrong users (BBC, 2015). This required that the site be suspended, preventing any sales taking place during this time.

For e-commerce websites, purchase process functionality is critical. Software defects may prevent users from using required functionality (adding products they intend to purchase or preventing them from completing purchases). Incorrect information may result in products not displaying or being available, or users may pay the incorrect prices for products. The loss of potential sales could, as a result, lead to negative financial consequences for the e-commerce website.

2.6 CHAPTER SUMMARY

The purpose of this Chapter was to investigate literature relating to the research problem. Software testing processes and techniques, either specific to the software testing discipline or software development methodologies, can be applied to assist with ensuring software is released with no defects. The unique factors of e-commerce websites can also benefit by applying software testing processes and techniques, including critical purchase functionality.

Unique organisation processes and time pressures to meet release deadlines are some of the factors which software development organisations face, which play a role in non-conformance to prescribed testing processes. This may lead to software defects being detected by users after software is released. Due to the transactional nature of e-commerce websites, these defects may have negative implications (dependant on defect severity). There would be additional costs incurred in order to fix, re-test and re-release software.

The next Chapter presents theoretical underpinnings for this study.

CHAPTER 3

THEORETICAL UNDERPINNING

3.1 INTRODUCTION

The previous Chapter introduced software testing within the software development life cycle, together with the unique testing processes prescribed by the dominant Waterfall and Agile software development methodologies. Deviation from prescribed testing processes can result in defects, with associated negative implications for software development companies.

Theoretical underpinnings for this study are introduced to explore implications of deviations from software testing processes. The Chapter introduces the use of theories in research in general, information systems research, and software development research specifically. Also covered in this chapter is how structuration theory was applied in similar studies and the relevance of structuration theory to this particular study, together with a theoretical framework to investigate the research problem.

The introduction in Section 3.1 is followed by a discussion on the use of theories in research in Section 3.2. Theories in information systems research is discussed in Section 3.3, followed by theories in software development research in Section 3.4 with a suitable theory - structuration theory - being selected. The use and application of structuration theory towards the research problem is discussed in Section 3.5 and a framework based on the dual nature of structure in software development was created to investigate the research problem in Section 3.6. The Chapter is summarised and concluded in Section 3.7.

3.2 THE USE OF THEORIES IN RESEARCH

A theory provides the researcher with theoretical clarity and the ability to connect new knowledge obtained through data collection action processes, to the body of knowledge which the research data is relevant to (DePoy & Gitlin, 2010: 60). Theories sketch the definitions within particular domains to clarify why and how the relationships involved are connected (Wacker, 1998: 361).

A scientific theory delineates a set of phenomena, and attests to the nature of the phenomena and the particular relationships it involves. It explains abstract terms and clarifies why certain relationships transpire (Easterbrook *et al.*, 2008: 293). It draws attention to particular events or phenomena, clarifying relationships which may have otherwise been misunderstood or gone unnoticed without the guidance of the theory (Maxwell, 2013: 49–50). A good theory thus enables the scientific community to observe and assess research using a proven theory (Easterbrook *et al.*, 2008: 293).

A theory, by definition, must have four essential criteria (Wacker, 1998: 363-364):

1. Theoretical definitions;
2. Domain limitations;
3. Association linking; and
4. Forecasting.

A theory plays an vital part as to how aspects are seen and understood for an empirical study, with the theory becoming a lens through which the research area is viewed (Easterbrook *et al.*, 2008: 293). Phenomena within the real world is too complex to investigate without a great quantity of separation taking place, which is provided by a theory (regardless of whether this is explicitly noted within the research).

A theory can also provide a framework in order to make sense of research data that is collected. Data which may have been deemed to be unrelated or irrelevant (in relation to each other or the research questions) may be made sense of by fitting them into an existing theory (Maxwell, 2013:49). The concepts of an existing theory are thus slots within a closed area in where data can be placed, showing relationships between data placed in the different slots.

3.3 THEORIES IN INFORMATION SYSTEMS RESEARCH

Information systems (IS) are critical to the success of modern organisations, with new systems regularly being developed to increase competitiveness, productivity and profitability (Satzinger *et al.*, 2002: 3). The research problem is thus relevant to the area of IS, as there may be implications for organisations due to not conforming to software testing processes.

IS researchers have historically drawn on theories from fields of economics, psychology and general management. This has resulted in the IS field being a multifaceted blend of theoretical and conceptual fundamentals (Wade & Hulland, 2004). Numerous researchers have investigated theories used within IS research, including the structural nature of theory (Gregor, 2006), actor-network theory (Tatnall & Gilding, 1999) and resource-based theory (Wade & Hulland, 2004). This is further discussed in the section below.

3.3.1 Structural nature of theory in Information Systems research

Gregor (2006: 611–612) examined the structural nature of theory in IS research in relation to domain, ontological, epistemological and socio-political factors.

- i) Domain factors:

These include the phenomena of interest within the domain, together with the main problems and associated limitations of the particular domain. This introduces the use of theory in IS research, how scientific knowledge is constructed and how socio-political factors impact the research area.

ii) Ontological factors:

These include what theory is, how theory is composed and how the term is understood within the discipline (Gregor, 2006: 611–612). Other factors include how contributions are made to knowledge, how theory is articulated and the types of declarations or statements that can be done.

iii) Epistemological factors:

These include how theory is constructed, how scientific knowledge can be created, acquired and communicated, and how theory is tested (Gregor, 2006: 611–612; Scotland, 2012: 9). Other factors include the research methods that can be used and criterion that can be used to ascertain the reliability and rigidity of the research methods used.

iv) Socio-political factors:

These include how domain specific knowledge is understood by stakeholders in relation to people activities (Gregor, 2006: 611–612). Other factors include where and by whom theory has been developed, how this knowledge is applied and if the knowledge is anticipated to have practical usefulness and relevance. Considerations also need to be made around ethical, political or social impact related to the utilisation of discipline specific knowledge.

3.3.2 Actor-Network Theory in Information Systems research

Actor-network theory (ANT) provides a powerful and alternative framework for understanding innovation within IS by utilising the strengths of qualitative research (Tatnall & Gilding, 1999: 962-963). Strengths of qualitative research within IS include contextual issues such as social, political and organisational concerns, together with the perceptions of research participants in the setting where the study is being conducted (Maxwell *et al.*, 2005: 31).

ANT provides an explicit way of conceptualising technology as being an actor within the actor-networks, where elements such as people, organisations, software and standards interact (Walsham & Sahay, 2006: 12). Human and non-human actors (within a research situation) are treated as equals, avoiding the lack of diversity and explanation by use of binaries, with entities being specifically classified as either one or the other (Tatnall & Gilding, 1999: 963). There were either social or technical factors in the context of the researchers' investigation, which is inherent in many other methodologies, although it is a concept which the researchers did not factor in. ANT is

relevant to the research problem as this takes place within an organisational context with the technology factor of software development taking place.

ANT offers advantages over other IS research methodologies, especially where considerations of a political nature are essential. ANT is not focused on process improvement for IS development, but an ANT study may provide information to understand a particular failure or success within the IS context (Tatnall & Gilding, 1999: 962).

3.3.3 Resource-Based Theory in Information Systems research

The resource-based theory (RBT) has been used in numerous instances in IS research, enabling researchers to understand how specific parts of an organisation impacts the organisation at large (Wade & Hulland, 2004: 131–132). In relation to the research, this would be the software testing resources that impact the quality of the software used by customers.

RBT provides an approach for IS researchers to understand the role of IS within organisations (Wade & Hulland, 2004: 131–132). This requires that the position of IS resources within an organisation be investigated and defined, in order for comparison to be done with roles played by other organisational resources. This can then create an inclusive understanding of the organisation's future competitive ability.

RBT provides a useful distinction between information technology (IT) and IS (Wade & Hulland, 2004: 132). IT is stated as being based as asset-centric, whilst IS comprises a combination of capabilities and assets created around the constructive use of IT. Ravinchandran and Lertwongsatien (2005: 262) also state that, from a RBT perspective, that intangible IS resources (such as the knowledge of an organisation's staff) and IS functional capabilities (such as physical hardware and software) are important factors of how IT is deployed and utilised within an organisation; these can, in turn, impact organisational performance. RBT will, through its recognition of the importance of complementary resource usage of tangible and intangible IS resources, uncover an enhanced role for IS in sustaining organisational competitiveness (Wade & Hulland, 2004: 132).

3.4 THEORIES IN SOFTWARE DEVELOPMENT

People that develop IS solutions harness the power of technology to allow modern organisations to realise benefits through the use of these systems (Satzinger *et al.*, 2002: 3). According to Easterbrook *et al.* (2008: 294), software development researchers have historically been mediocre at relating the collected data to the underlying theories used for their research. The resultant research is thus more difficult to interpret and compare for many empirical studies conducted during the past few decades.

Numerous theories have been used in the software development of IS, including Grounded Theory Methods (Adolph *et al.*, 2011), Activity Theory (De Souza & Redmiles, 2003) and Structuration Theory (Orlikowski & Robey, 1991), which is discussed further in the section below.

3.4.1 Grounded Theory Methods

Adolph *et al.*, (2011: 509) found grounded theory methods (GTM) to be an effective tool for software development research. These researchers used GTM to investigate how software development teams manage their activities in problematic situations. The use of GTM enabled the researchers to view problems from the perspective of the participants in their research. The story of the problem investigated was then represented as a set of conceptual hypotheses.

GTM is a rational and undeviating collection of data collection and analytical processes designed to create theory (Charmaz, 1996: 28–29). GTM comprise of a series of inductive methods data analysis. Within the area of study, a researcher would begin with specific cases or events, with increasingly more theoretical groupings then developed to create, explain and to understand the data involved in the research, and to identify patterned relationships within the data.

The corresponding theoretical analysis is built, based on what the researcher discovers is relevant in the actual world, within the research area. GTM provide processes for systematically shaping and handling qualitative data, though can also be applied to quantitative data (Charmaz, 1996: 28-29).

Data on a phenomenon within a research area is collected by a researcher, which is then analysed through identifying patterns of occurrences which then suggest concepts (Adolph *et al.*, 2011: 1270). Properties of a grouping of concepts are then developed by means of comparison - with past occurrences - within the same grouping. The primary category is developed, whereby the most variations are captured following data analysis, which also addresses the key concern of research subjects. The process of generating categories and their properties continues until data saturation is reached for the categories. This scenario exists when no new properties added following additional data collection to current categories.

Glaser and Strauss (1967: 79) state that formal theory can be created from data, though it is likely necessary and preferable to create formal theory for GTM research from an existing theory. Substantive theory is, in turn, the strategic link in the formulation and generation of formal GTM. After data saturation is reached, the substantive theory is evaluated against other theories which are described in literature (Adolph *et al.*, 2012: 1270). Review on literature is done late in the data collection process to prevent predetermined concepts being enforced on the substantive theory being developed from the data.

Similar software testing research using case study research was undertaken by Khalane (2013) using GTM. The research was specifically around identifying and presenting the interests of stakeholders with regards to quality assurance where software projects used the Scrum variant of Agile methods.

Researchers are required to report on their positions within the research process by engaging in continuous self-reflection when using GTM (Suddaby, 2006: 640). This is done to ensure that personal biases, outlook on the world and presumptions are taken into account while gathering, interpreting and analysing data. The continuous nature of reflection is difficult, especially for researchers unacquainted to a model of science in which the researcher is an important focus of the process.

Research was conducted at the researcher's company, thus factors such as continuous reflection and personal bias factors may have had a negative impact on the study. It is due to this reason that GTM was not be used for the research.

3.4.2 Activity Theory

Activity theory (AT) provides an analytical framework which has been successfully used to understand and explain collective work, including the software development process, which requires collective work from different role players (De Souza & Redmiles, 2003: 14). AT was used to analyse the observations made by one of the aforementioned authors.

AT is broadly defined by Kuutti (1995: 27) as being a theoretical and interdisciplinary system for examining activities undertaken by people, such as the process of creating software. AT requires that there must be a minimum quantity of significance associated with individual actions. This would then be incorporated into the basic unit of analysis, which is known an activity (Kuutti, 1995: 27). This resolves the issue of analysis of real life situations outside laboratory conditions, which are not very successful. This is due to actions always being situated within context and it is difficult to understand these actions without the necessary context. Due to context being incorporated into the unit of analysis, the objective of the research was in essence collective, despite individual actions being of significance to the research. This is possible as an individual may be involved at times in multiple simultaneous activities, with individual and social aspects being simultaneously interlocked.

Activity is a form of action directed at an entity, with activities differentiated by means their different entities (Kuutti, 1995: 29). The transformation of an entity into a result motivates the need for activities. An entity can be tangible, something physical, and could include less tangible entities, such as plans, or be completely intangible, like widespread ideas. The only requirement is that the

activity may be distributed for manipulation and changes by the participants of the particular activity. The purpose and motivation of an activity may undergo changes during the process, with the purpose and motivation only being exposed during the process of performing the activity.

Activities and their associated elements undergo constant development and change, with this progression not being undeviating (Kuutti, 1995: 27). Activities also have a history of their own, with remnants of older phases of activities often embedded. Past analysis of the progress of activities is often required to comprehend the more current situation of activities.

Mediating artefacts are part of the AT framework, tools used to manipulate an object in order to attain a required result (De Souza & Redmiles, 2003: 15). Relations between activity elements are mediated (in other words not direct) and are as a result of interaction (Kuutti, 1995: 28). Within the software development context, this includes configuration management tools, bug tracking tools and email, which enable the software development process (De Souza & Redmiles, 2003: 15). In the aforementioned examples, the object is seen and manipulated within the constraints of the instrument used (Kuutti, 1995: 28).

Activity theory was applied to process-centred software development environments by Barthelmeß and Anderson (2002: 34–35), which is the domain of the research problem. It was noted that different users had different work styles, requiring the adaptation of operations for unforeseen situations, requiring changes to planned sequences of operations. AT appears to cover the research area and processes, but not in establishing a linkage between software defects and resulting implications. It is due to this reason that AT will not be used for the research.

3.4.3 Structuration Theory

Current work in social theory deviates from preceding customs suggesting that social phenomenon can be assumed as consisting of both biased and impartial aspects (Orlikowski & Robey, 1991: 143). The researchers applied this premise of duality to comprehend the relationship between IT and organisations, creating a theoretical framework. It was based on Giddens's theory of structuration, where the development and deployment of organisational IT is a social phenomenon. The framework proposed by Orlikowski and Robey (1991) can be used to guide software development research, with Rose and Scheepers (2001: 217) also using structuration theory (ST) for software development research, suggesting some frameworks for practical use.

Giddens (1984: 25) states that the recurrent collection of regulations and resources which is structure, is outside of the concept of time and space. Structure represents abstraction and coordinates as memory traces, which are structures within knowledgeability, but is marked by an absence of a subject. Social systems in which structure is recurrently concerned comprises of

established activities involving human agents, recreated across time and space. Analysis of structuration of systems involving social systems requires the investigation of such system modes, which are established in the well-informed activities of the established actors. These actors make use of rules and resources in diverse contexts of action, and are created and recreated during interactions.

'Structure' was conceptualised by Giddens as being 'rules and resources', which are used by actors in their interactions (Turner, 1986: 972). Rules are generalisable processes and methods that agents have, through which they can use their capacity to recognise forces of socialisation and alter their place in the social structure by, for example, employing formulae for action within social systems. Numerous significant properties are explained by the rules of structure, including that these rules are assumed, informal, frequently brought up and used in everyday conversations and routines.

Similar software testing research using case study research was undertaken by Koka (2015), where ST was used as an analytical framework to analyse data and to improve the understanding of the Scrum variant of Agile methods and related software quality assurance processes. According to Coad and Herbert (2009: 177) the use of ST has made a distinctive contribution to management accounting research for three decades. In relation to needed financial reporting, governance around organisational process needs quantified, including those of software development and associated testing processes (Wagner & Dittmar, 2006: 2,7).

Structuration theory closely aligns with the proposed research from the software development and reporting perspectives; hence, this is the particular theory to be used.

3.5 DUALITY OF STRUCTURE OF STRUCTURATION THEORY

ST intends resolving theoretical debates in relation to the importance of human agents and their action vs. emphasis on social systems structures (Walsham & Han, 1991: 53). Human agents have a transformative capacity, which is the power to make a difference in a situation through their actions (Rose & Scheepers, 2001: 217). The structured properties of social systems involve coordinating the activity of human agents, which is done by authoritative resources.

The theorem of duality of structure is critical to the structuration concept (Giddens, 1984: 25). Agents and structures are not independent groups of phenomena, but these represent a duality. The concept of duality of structure states the structural properties of social systems are both the means and result of the practices which these recurrently organise. Structure is more an internal as an activity for individuals, due to memory traces and instantiation in social practices, and is both constraining and enabling. The controlled properties of social systems can widen in terms of both time and space, outside of the control of any specific actors.

Agency is closely linked with power, which in turns involves the utilisation of resources (Rose & Scheepers, 2001: 217). This agency structure debate is resolved by Giddens by creating duality of structure, whereby agents and structures are not treated as separate phenomena (Walsham & Han, 1991: 53–54). Structure is based on communication between people, which results in collective structures being created and re-created due to the dual nature of this interaction. The essential concept of duality of structure for ST can be visualised in the figure below:

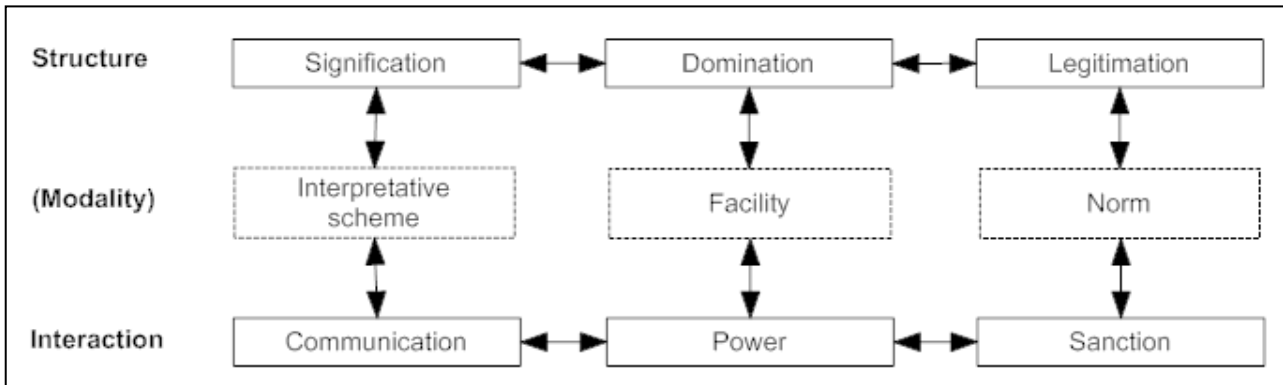


Figure 3.1: Analytical Dimensions of Duality of Structure

Source: Walsham & Han, 1991.

The figure above describes the factors of structure (from a social perspective) and interaction (involving people), each divided into three dimensions, and then linked together by means of three modalities between these factors (Walsham & Han, 1991: 54). These factors are inextricably linked, with separation of structure and interaction into three dimensions used to assist with analysis.

3.5.1 Signification of Structure

As part of the interaction component, communication takes place whereby interpretative schemes are used – knowledge stocks that agents in a particular process or structure use to understand the actions of other role players and themselves (Walsham & Han, 1991: 54). Within the software development context, this can include a particular type of project requiring different role players with specific skill sets, such as project management, analysis, coding and testing. Once all the required processes have been successfully performed by the various role players, this results in a completed artefact which is a structure of signification. The financial aspect of signification structures within private organisations include the need for cost consciousness, while signification structures within the organisational field level of private organisations include the need for quality improvements (Wanderley & Cullen, 2012: 165).

3.5.2 Domination of Structure

Human actors utilise power within interactions by using the ability to assign material and human resources (Walsham & Han, 1991: 54). Resources include authoritative resources, responsible for coordinating the activity of human agents, and allocative resources, which are the result of having control of physical items or natural resources (Rose & Scheepers, 2001: 217). Resources are focused on by signification and legitimation factors of structure, with power itself not being a resource in the context of domination of structure. In the software development context this is represented by persons in leadership positions having the authority to allocate resources or tasks for the their respective discipline, with structures of domination being produced and reproduced as a result (Walsham & Han, 1991: 54). An example would include whom has the control, performing certain tasks in specific situations (Crowston *et al.*, 2001: 172).

3.5.3 Legitimation of Structure

Human agents sanction their actions by drawing on norms or moral codes (Walsham & Han, 1991: 54). Within the software development context, norms or standards can include organisational standard operating procedures which are known and understood by role players (Orlikowski & Robey, 1991: 159). This can also include the processes of a software development methodology which are followed at an organisation. Social structures of legitimation are thus produced and reproduced (Walsham & Han, 1991: 54), with examples including agents having the necessary process knowledge in order to know what to do next in a process and knowing when and how to take remedial action to resolve problems which may arise (Crowston *et al.*, 2001: 172).

3.6 APPLICATION OF STRUCTURATION THEORY IN THIS STUDY

Orlikowski and Robey (1991: 151–152) proposed a perspective which places IS centrally within the structuration process. By drawing on ST to understand the relationship between organisations and IS - as there is a combination of assets and capabilities created in the constructive use of IT (Wade & Hulland, 2004: 132) - the underlying duality of IS is acknowledged. This dual nature is evident in IS existing as a result of human action, together with institutional properties shaping human action with IS (Orlikowski & Robey (1991: 151-152).

IS is the result of biased human actions in specific structural and cultural situations, with IS having the power to give organised existence to these contexts as part of its constitutive role (Orlikowski & Robey, 1991: 151–152). IS is also a collection of rules and resources concerned in bringing agreement to human actions, this contributing to recurrent creation and transformation within these specific contexts. IS is both a forerunner and a result of organisational action.

The software development process is realised through the various roles assumed by human actors in creating IS (Orlikowski & Robey, 1991: 158). Use of ST framework to scrutinise software development activities informs researchers of the institutional context that supports the various roles. Software development team members do not work in isolation, but are influenced by factors including their current state of knowledge in the software development domain and their area of speciality, the resources available to them, including people and tools, management and the organisational structure and culture.

Software development research can focus on software development team members drawing on their organisation's institutionalised structures of signification, domination and legitimation to perform their work function (Orlikowski & Robey, 1991: 158). Institutional aspects of software development can be investigated through analysis of interpretive schemes, resources, and norms of the software development organisation, and trying to comprehend if these factors enable or hinder the activities of software development team members.

The framework below was used to investigate the research problem, describing the influences of organisational structure and technology on each other during the software development process.

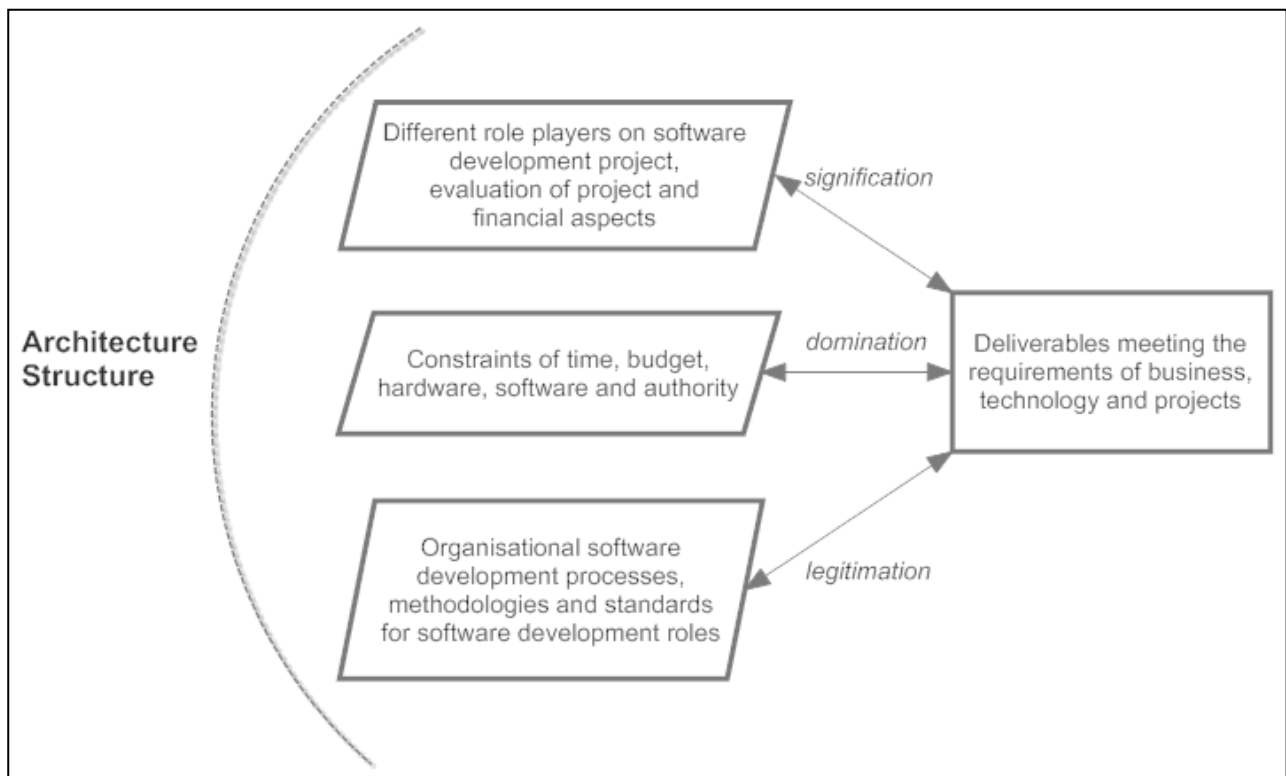


Figure 3.2: Conceptual Framework

Source: Author, 2017.

The outcome of the research was to identify process deviations at the case study organisation, relating to the software testing process and associated implications. Recommendations to improve processes were given as related to the various research questions.

3.7 CHAPTER SUMMARY

The aim of this Chapter was to present a theoretical underpinning to the current study, specifically around the use of ST to explore implications of deviating from software testing processes.

The Chapter examined the use of theories in IS research, and then more specifically the use of theories in software development research. GTM, AT and ST were evaluated, with GTM and AT found to be not preferential for the specific research problem. ST was used as an analytical framework in this study, with research involving software testing (Koka, 2015) and financial reporting (Coad & Herbert, 2009) using this particular theory.

The Chapter described the underlying duality of IT using ST, where the dual nature is evident with IT resulting from human action, together with institutional properties shaping human action with IT. ST became a lens through which the research area was viewed. Social structure and human interaction factors, divided into three dimensions and then interlinked by three modalities between these factors, where described in Section 3.5.

ST is discussed in Sections 3.4.3 and 3.5, with the application of ST to this particular study presented in figure 3.2 in Section 3.6. The significance of this Chapter is that it informs the methodology presented in Chapter 4, and is further applied in the findings contained in Chapter 5. The next Chapter presents the research design process that was used in conducting this study.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION

The previous Chapter discussed theoretical underpinnings, which assisted with the investigation of the research problem. The purpose of this chapter was to give a description of the steps taken to attend to the research question, as discussed in Chapter one, from a research design perspective. This chapter explores and justifies choices around research methods, theory and processes in order to adequately explore the research area and problem.

The introduction is followed by a discussion on research methods and design in Section 4.2. Ontology, together with associated epistemology and underlying theoretical perspectives are discussed in Section 4.3. The chosen research approach, research method and time frames are discussed on Section 4.4. An overview of the case study is discussed in Section 4.5, with data collection methods and analysis discussed in Section 4.6. The Chapter is summarised and concluded in Section 4.7.

Figure 4.1 below represents the Chapter structure:

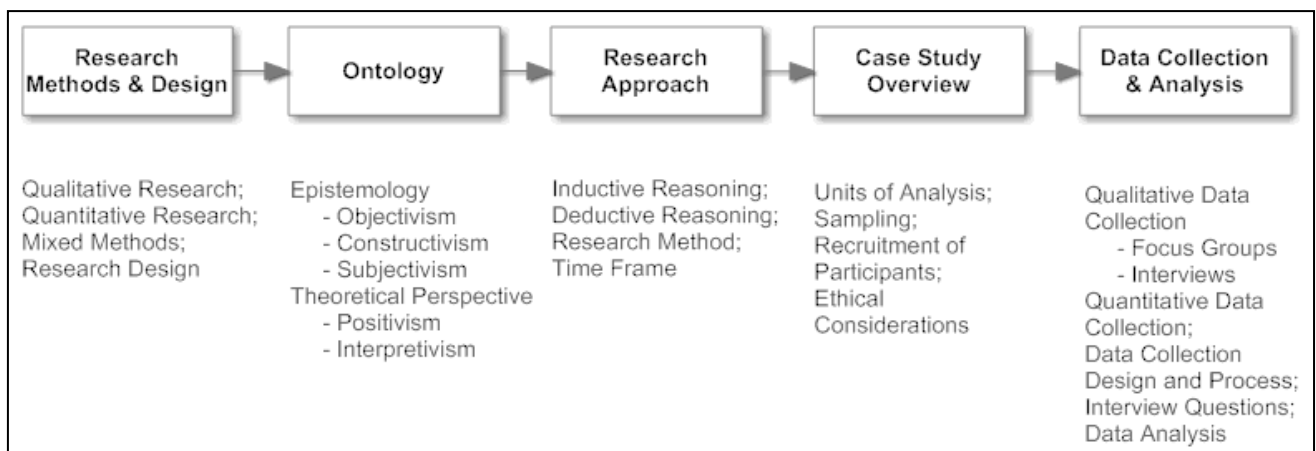


Figure 4.1: Chapter structure

Source: Author, 2017.

4.2 RESEARCH METHODS AND DESIGN

Research methods are all methods and techniques that can be used to conduct the research process (Kothari, 2004: 7), with research being a process of obtaining scientific knowledge using specific research methods and techniques (Welman *et al.*, 2005: 2,5-6). Scientific knowledge obtained using research must be systematically observed, controlled and replicable, using either or both of the two main approaches to research, namely quantitative and qualitative research.

i) Qualitative Research:

Qualitative research is used to investigate and comprehend a multitude of social issues (Ritchie & Spencer, 2002: 305) indicate that. Its wider use is underpinned by persistent requirements to understand complex behaviours, needs, systems and cultures. Holliday (2007: 6) furthermore indicates that qualitative research involves interpreting and exploring the social variables within the particular setting that the research is conducted in, while setting manageable boundaries to these variables.

ii) Quantitative Research:

Holliday (2007: 6) states that quantitative research involves the disciplined application of established rules for statistics, experiments and survey design in order to validate results obtained during the research process. Quantitative data results can be used for prediction, with such studies commonly being hypothesis-driven (De Villiers, 2005: 111). The main objective of quantitative research is to establish the relationship involving an independent variable, in relation to other collections of dependant or outcome variables in a population (Singh, 2007: 63).

iii) Mixed Research Methods:

The use of mixed research methods has gained recognition, whereby qualitative and quantitative research methods are used in the same research project. There has also been development in the perception and legitimacy of the use these methods being in the areas of human and social sciences (Creswell, 2009: 203). The use of mixed methods in research is an approach to scientific knowledge where numerous outlooks, perspectives and angles are considered, always factoring the stances of qualitative and quantitative research (Johnson *et al.*, 2007: 113).

This popularity is due to research methodology continuing to grow and change; mixed methods are progressive as the qualities of qualitative and quantitative research are harnessed. Mixed methods have the disadvantage of adding complexity and more time to the research process (Neuman, 2011: 163). Problems which need to be addressed by researchers in social sciences are often complex, with the use of only quantitative or qualitative approaches being inadequate in addressing the complexity (Creswell, 2009: 203). According to De Villiers (2005: 112), numerous research investigations need diverse investigation techniques to cover the research area to achieve data triangulation. An example is where qualitative research is done as an investigative exercise, creating the platform for quantitative research which follows to provide data triangulation.

4.2.1 Research Design

According to Neuman (2011: 163), research design involves creating a strategy to guide the research process, with the strategy varying dependant on the type of data which needs to be

collected and analysed; this can be quantitative, qualitative or a combination of both methods. The function of research design is thus to plan for obtaining pertinent evidence which requires the minimum amount of time, effort and funds (Kothari, 2004: 14).

The research problem needs to be clearly formulated in order to prepare a research design, including the conceptual structure wherein the research is conducted (Kothari, 2004: 14). Ontology, epistemology and theoretical perspectives, which are discussed in the next Section, are significant contributors to research design processes (Gray, 2013: 29).

The research question relates to understanding what the implications of non-conformance to software testing processes are. Unpacking issues relating to software testing, software development methodologies, process adherence and implications of non-conformance are areas of significance which need to be investigated in order to answer the research question. The ability to compare independently conducted qualitative work, including case studies on particular topics, is limited (Ward, 2002: 195–196); thus, generalisability of study results may be specific to the circumstances at the organisation where the case study will be undertaken.

4.3 ONTOLOGY

According to Neuman (2011: 92), ontology revolves around the nature of reality and what exists in the world. The two basic stances around ontology are realist and normalist. The view from a realist perspective is that real world situations exist independently of people, and what they perceive in situations which they are involved in. The normalist view is that people do not experience the real world situation, with their experience being as a result of interpretations and inner subjectivity.

Ontology is the study of existence, in relation to what comprises reality and their relations (Gray, 2013: 19). An ontological analysis clarifies the structure of knowledge, with ontology being the core of any of knowledge representation system for any particular domain (Chandrasekaran *et al.*, 1999: 21). Terminology for representing knowledge cannot exist without ontology, together with conceptualisations which underpin knowledge in particular domains.

The researcher has a normalist ontological position because, as prescribed software development methodologies and industry standards may prescribe software testing processes, these may not be adhered to due to organisational or project specific reasons. Details in this Section below will cover the related elements of epistemology and theoretical perspectives.

4.3.1 Epistemology

While ontology involves the understanding of what reality is, epistemology attempts to understand knowledge and what it entails having knowledge (Gray, 2013: 19). Epistemology involves

processes needed to produce knowledge and to determine what scientific knowledge looks like, once this is produced (Neuman, 2011: 93). It is concerned with how we know the world around us and we verify claims made in the world to be true.

Epistemology provides a philosophical background in the decision making process, in deciding whether available knowledge is legitimate and adequate (Gray 19-20). An epistemological perspective assists with clarifying issues relating to research design and provides an all-encompassing structure for research. This includes the type of evidence that will be obtained, where it will be obtained and how it will to be interpreted. Having understanding of research philosophy can also assist researchers in recognising particular research designs should be suitable for their unique research objectives.

The epistemological stances of objectivism, constructivism and subjectivism are discussed in the section below.

i) Objectivism:

Objectivism states that there is only one reality from an ontological perspective, which can be understood by carefully dividing and studying its parts (Wilson, 2000: 205). Objectivism, from an epistemological perspective, states that proper objectivity is possible (Neuman, 2011: 100), where people's subjective views (such as values, attitudes and beliefs) can be objectively studied (Gray, 2013: 20).

ii) Constructivism:

Constructivism focuses on understanding how dissimilar persons construct their sense of the world and how meaning is assigned to their actions, rejecting the idea that there can be separation from human context in relation to scientific knowledge (Easterbrook *et al.*, 2008: 291). People can construct their own understanding and interpretation in different ways, thus opposing equally valid interpretations of the world which may, however, still exist (Gray, 2013: 20).

iii) Subjectivism:

From an ontological perspective, subjectivism views the world as having multiple realities, ultimately forming an interconnected world (Wilson, 2000: 205). From an epistemological perspective the knower and the known are interdependent (Wilson, 2000: 205), with subjects constructing meaning from within the collective, including religious beliefs (Gray, 2013: 20).

The researcher has experience in software testing at two software development organisations; the experience gained allowed the researcher to relate to the subject matter and understand the literature on the subject from an epistemological perspective.

4.3.2 Theoretical Perspective

Researchers need to position their research within one of two broad areas of philosophy, which will underpin their research from a theoretical perspective (Lubbe & Klopper, 2005: 106). This could either be a positivist or interpretive stance, to be discussed in the Section below.

i) Positivism:

The positivism theoretical perspective assumes that the world is objective and that the observer exists independently from observations (Lubbe & Klopper, 2005: 80). Positivism is a scientific method with knowledge discovered by means of controlled empirical means (such as experiments) with the intention being to produce an unbiased and exact representation of reality (De Villiers, 2005: 111).

Research results should be reliable and consistent, other researchers should be able to replicate the results and the results should not include the perceptions and biases of the researcher (De Villiers, 2005: 111). Quantitative methods are mostly used for positivist research, as data mainly consists of numbers and measurements and analysis would be done using statistical methods.

ii) Interpretivism:

Interpretivism is a philosophical approach where the assumption is made that the world is more complex than it seems to the observer (Lubbe & Klopper, 2005: 79). Interpretivism seeks to bring awareness to hidden social forces and structures within the research area (Scotland, 2012: 12), including those which are which are time and context dependent (De Villiers, 2005: 111).

Interpretivism mainly leads itself to qualitative studies where research questions are investigated, with the focus being to understand phenomena which takes place in normal settings and where verbal information is used (De Villiers, 2005: 111–112). It is suitable for research into multifaceted human activities and social phenomena, with the collection and analysis qualitative data producing results relating to complex information where human principles and experiences are pertinent. Findings associated with interpretivism are also subjective and may differ between researchers.

The researcher's theoretical position is interpretive, with the stance of exploring and explaining how and why process deviation is taking place at the organisation where the research will be conducted. This also corresponds with the constructivists epistemological perspective, which will often use exploratory case studies (Easterbrook *et al.*, 2008: 291).

4.4 RESEARCH APPROACH

As part of the process to select an appropriate research approach, researchers should compare the various approaches used in previous studies (if any) and motivate why the particular research

approach is selected (Dagnino & Cinici, 2016: 318–319). Evidence already published regarding the research should be examined carefully, while also clearly stating how the chosen approach will meet the research objectives.

The general concept of investigation which the scientific approach to research hinges on comprises of the inductive and deductive research approaches (Gray, 2013: 16). These cover the opposing areas of discovery for inductive research, and proof for deductive research, to be discussed further in the Section below.

i) Inductive Reasoning:

A researcher using the inductive research approach should plan the data collection and analysis processes, from which patterns may emerge (Gray, 2013: 17). These patterns may indicate linkages between research variables, which generalisations and relationships could be established from the study. Qualitative data can be collected and analysed using methods such as observations, semi- and unstructured interviews and informal dialogue, using inductive reasoning (Johnstone, 2004: 266).

ii) Deductive Reasoning:

When using deductive reasoning, the underlying research concepts need to be made quantifiable in a manner that the research concept can be noticed (thus confirming these have actually taken place), with metrics and indexes produced to meet the requirement (Gray, 2013: 17). A thematic analysis of data collected from qualitative methods, together with the resultant quantitative data, can be analysed using deductive reasoning (Johnstone, 2004: 266).

Inductive reasoning thus uses qualitative methods to discover and obtain information within the research area, with deductive reasoning using quantitative methods to test and either prove or disprove the results.

4.4.1 Research Method

A case study within the software development domain can be done to investigate a single instance of a current software development phenomenon (Runeson *et al.*, 2012: 12). The rationale for a single case is representative of a commonplace situation, with the case study represents an e-commerce website project, at a specific organisation (Yin, 2009: 46).

Yin (2009:18) states that case study research is a comprehensive process which covers the rationale of planning, methods for collecting data and ways to analyse data in a technically distinct situation. Welman, Kruger and Mitchell (2005: 194) also state that the case needs to be defined and the boundaries determined, which the delineation of the proposed research will accomplish.

Furthermore, Yin (2009: 21) identifies three case studies approaches namely explanatory, exploratory and descriptive.

Performing an in-depth case study on a software development organisation, and involving all role players in the software development process, will allow the researcher to understand the unique workings of the organisation. This is in relation to the software development process and the impact on the software testing process. Eisenhardt (2002: 14) is of the opinion that combining qualitative and quantitative data in case study research can be highly synergistic.

The nature of the case study will be exploratory, as the research question is investigative, with an in-depth study being conducted on a software development organisation developing an e-commerce website.

4.4.2 Time Frame

A researcher should usually have a rough idea as to the time frame available to conduct the research (Gray, 2013: 35). If the time frame available is short term, then a cross-sectional case study would need to be undertaken, whereby data is collected at one point in time. According to Lapan and Quarteroli (2009: 168), the typical time frame for cross-sectional studies ranges from six weeks to six months. Most research studies are cross-sectional, due to the constraints of time and resources (Gray, 2013: 35).

If the time frame available is more generous, it may be possible to undertake a longitudinal case study, whereby change and development is studied over a longer period of time (Gray, 2013: 35), which can take six months to a year or more (Lapan & Quartaroli, 2009: 168). A longitudinal case study allows changes to be examined at various periods afterwards (Gray, 2013: 35), while the longer time period also allow the researcher to collect data from participants on more occasions (Lapan & Quartaroli, 2009: 168).

A cross-sectional case study will be undertaken, give the time constraints on the researcher. A comparison case study design was not considered as a single case was used (Lapan & Quartaroli, 2009: 168).

4.5 OVERVIEW OF CASE STUDY

The organisation that the case study was conducted on has been in existence for 35 years, is based in Cape Town and has partnerships with international industry affiliations. These partnerships support the organisation's commitment to best practice standards and quality delivery, adding depth to the organisation's expertise and value in its solutions to its customers. The organisation operates in a broad range of client industries within South Africa.

The organisation's e-commerce website allows for customised design, product ranges and features as required by its customers, with a demo e-commerce website also being available to prospective customers. The software development team is responsible for ensuring that customised design and features are implemented as required by customers. Buyers are responsible for maintaining the product range available on the e-commerce website using in-house developed systems. The software development team is also responsible for ensuring that the e-commerce website updates according to any changes made by the buyers, using the in-house developed systems.

The function of an outsourced software vendor (which the case study organisation performs) allows its clients to better utilise their existing resources and to target core applications to improve IT's contributions to their organisation's business objectives (Lee *et al.*, 2003: 89). This is as a result of the extent and intricacies of IT expansion, with many organisations being less predisposed to take on the responsibility of internal software development; more organisations are seeking to outsource their IT functions to external service providers to fulfil this particular need.

4.5.1 Sampling

Obtaining a sample from a given population should follow a plan based on sample design (Kothari, 2004: 55–56). Researchers should select a sample design which is appropriate for their particular research study, based on the factors as shown in Table 4.1 below.

Table 4.1: Sample Design Steps

Universe Type	Unit of Sampling	List of Source	Sample Size	Sampling Procedure
Clearly defining the set of objects for the research.	Selecting one or more specific sampling unit for the research.	Selecting representation of sample population.	Optimal sample size which is both representative and reliable in relation to the research should be selected.	Researcher selecting sampling procedure.
Finite example: The population of a city, the number of workers in a factory.	Geographical, e.g. state or district.	Must contain list of names of participants.	Parameters of interest in a research study may determine sample size.	Non-respondents may impact measurements.
Infinite example: the number of stars in the sky.	Social unit, e.g. family or school.	Specifically for a finite universe.	Budgetary constraint may determine sample size.	Natural bias in reporting of data may arise with participants.

Source: adapted from Kothari, 2004.

When using purposive sampling, researchers need to use their intuition when choosing cases, to allow the research question(s) to be answered and to attain research objectives (Saunders *et al.*,

2016: 495). The inclusion - or exclusion - of cases on the research project needs to be a carefully thought out process, when selecting samples using purposive samples. With case study research, due to the smaller sample sizes involved, purposive sampling is often employed.

Based on a small sample of possible research participants which had an understanding of the research area, suitable research participants from the various departments at the case study organisation were selected as a sample.

4.5.2 Units of Analysis

Participants were selected using purposive sampling from various departments including Information Technology (IT), Operations (O), a Business Unit (BU), Supply Chain (SC) and Project Management Office (P) at the organisation. Participants included senior management (SM), middle management (MM) and specialist (SX) job roles. Participants selected are familiar with the research area.

The job role abbreviation was appended to the department abbreviation when referring to participants, e.g. a participant in a middle management job role in the Supply Chain department would be 'MMSC'.

4.5.3 Recruitment of research participants

According to Easterbrook *et al.* (2008: 294), the choice of data collection methods depends on factors that include the researcher's theoretical stance, access to research participants and how closely the method aligns with the research question.

The researcher's theoretical position is interpretive, with the stance of exploring and explaining, and is employed at the organisation where the research will be conducted. The researcher has management approval to conduct the research and will thus have access to the necessary research participants. The case study research method will allow the researcher to understand the unique workings of the organisation and allow the researcher to investigate the areas of software testing, software development methodologies, processes adherence and implications of non-conformance; these are areas in relation to the research question.

4.5.4 Ethical Considerations

Neuman (2011: 155) states that the basic principles of ethical social research include obtaining some form of informed consent from participants and honouring confidentiality. The researcher will explain the background and purpose of the study, together with confidentiality of data collected and request consent from participants before commencing with data collection. Reynolds (2003: 15) advises getting the facts and analysing any potential issues as part of ethical considerations. The

role players need to be identified in a particular situation and how they stand to gain or lose from how the situation is handled. The researcher also considered how the role players in the software development process are impacted based on their decisions.

4.6 DATA COLLECTION AND ANALYSIS

According to Yin (2009: 18), data collection for case study research needs to be from multiple sources, with the data needing to converge in a triangulating fashion. Data triangulation limits the impact of a specific interpretation of a particular single data source, and ensures that complementary data is collected for a study (Runeson *et al.*, 2012: 49). A conclusion, where data is triangulated using multiple sources, is much stronger than one based on a single source. It is vital to cautiously choose data sources, to organise unprocessed and processed data in a controlled manner to facilitate the data analysis process (Runeson *et al.*, 2012: 47).

4.6.1 Qualitative Data Collection

Focus groups are comprised of a limited number of people, placed together to communicate their ideas and thoughts in relation to a particular open ended questions (Welman *et al.*, 2005: 201). This normally involves the researcher, six to twelve participants and a moderator in a room for roughly an hour and half (Neuman, 2011: 459). The researcher directs the interaction in either a structured or unstructured manner, dependant on the nature of the research (Welman *et al.*, 2005: 201).

Focus groups provide a natural setting for research participants to freely express their ideas and opinions, with open expression encouraged from members' marginalised social groups. Other advantages of focus groups include research participants feeling empowered and the opportunity for research participants to query and explain their answers to the group (Neuman, 2011: 460).

Focus groups only allow for a specific - or very few - topics to be deliberated, while the mediator might also unintentionally restrict the free expression of members in a group session. Other disadvantages of focus groups are that fewer ideas can be produced than would be the case for individual interviews; in addition, thoughts and ideas can be more extreme in relation to responses for the research questions (Neuman, 2011: 460).

i) Interviews:

Semi-structured interviews were used for qualitative research; a prepared interview guide was used, with listing questions and of themes which need to be covered in interviews (Lubbe & Klopper, 2005: 122–123). This particular type of interview is relevant to the research study, as topics of a sensitive nature will be discussed, such as organisational processes and financial details which are

not publicly disclosed (Welman *et al.*, 2005: 167). Research participants will also be from a diverse background, making semi-structured interviews suitable to collect data.

An advantage of an interview guide (as used with semi-structured interviews) is that it serves as a checklist and helps with ensuring that the same information is obtained from different research subjects (Lubbe & Klopper, 2005: 123). An interviewer may also make use of probing comments to explain unclear responses and to request for clarification for partial responses (Welman *et al.*, 2005: 167).

Disadvantages of an interview guide (as used with semi-structured interviews) is that it does not allow the interviewer to pursue topics or topics which were not anticipated when the interview was constructed (Lubbe & Klopper, 2005: 124).

The researcher will make use of semi-structured interviews, which will be conducted with the various role players at the software development organisation, in order to identify important variables in the specific research area.

4.6.2 Quantitative Data Collection

Most research within the business and management area involves arithmetical data, or the data involved can be quantified, to allow research question to be answered and research objectives to be met (Saunders *et al.*, 2016: 496). Quantitative data can include simple counts, such as the frequency of occurrences of events. It could also include more complex data, such as values which add up to test scores, prices or rental costs.

Quantitative sources of data for case studies can include documentation and archival records (Yin, 2003: 86). Quantitative data - which is analysed - has the advantage of allowing researchers to investigate, present, explain and examine relationships and trends within the data in relation to the research problem (Saunders *et al.*, 2016: 496). There is a disadvantage with quantitative data when in an unprocessed state; it can express very little meaning to most people before it has been processed and analysed. It is thus only made useful when transformed into information.

4.6.3 Design of Data Collection

Semi-structured interviews were scheduled with research participants and held in meetings rooms. Interviews will be recorded using a voice recorder and conducted in English, using the problem conceptualisation structure and literature, to guide research participants.

Documented organisational software development processes, which includes the software testing process, were obtained from the organisation's process repository. Archival records were obtained

from the organisation's defect tracking tools which contained defect details on e-commerce website operations.

4.6.4 Data Analysis

According to Yin (2003: 109-115), the analysis of case study data involves investigating, grouping, indexing, testing and bringing together qualitative and quantitative data to address the original research purpose. A general analytical strategy is needed, requiring theoretical propositions, based on the original objectives and design of the case study, with the associated research questions and literature. A case study description would involve developing a descriptive framework for organising the case study and serves as an alternative to the formal research strategies.

Qualitative data was the primary source of information, obtained by interviewing role players in the software development process in relation to certain factors, including software development processes, organisational processes and measurements. The researcher will relate this information to the quantitative data to determine how these factors can play a role in deviation from testing processes.

Once the case study data has been reviewed, a thematic framework was set up to pinpoint key concerns, notions and themes, from which the data could be checked and referenced (Ritchie & Spencer, 2002: 313). Quantitative data – such as defects reports - would allow the researcher to view trends and relationships with the data and to correlate to the related phenomena (Lubbe & Klopper, 2005: 107-108). This is an example of third degree data where the researcher independently analyses work artefacts which are already available (Runeson *et al.*, 2012: 48). This is also an example of a structural textual analysis, which is a quantitative form of textual analysis where recurrent elements in the content of texts are categorised and counted (Dagnino & Cinici, 2016: 12).

4.7 CHAPTER SUMMARY

The aim of this Chapter was to describe the research design steps followed to address the research problem. The Chapter examined different research methods and research design, including how scientific knowledge is understood and obtained. Ontology was also covered, which is core to knowledge representation system for any particular domain, together with philosophy underpinning for the research.

The case study research method which was used was examined in the Chapter, together with different time frames available for the data collection process. The choice of using a single organisation for the case study and data collection - at a single point in time for the case study - were also justified.

An overview was done on the details of the case study organisation, including the specifics relating to the research problem. The choice of research participant sampling, research participant selection and their selection, together with ethical considerations when interviewing the research participants, were also covered.

The Chapter discussed different qualitative and quantitative data collection methods, with details on the relevant data that would be collected at the organisation, to address the research problem. Details on how collected data would be analysed and correlated were also discussed. The next Chapter presents the analysis and interpretation of the research data which was collected.

CHAPTER 5

ANALYSIS AND INTERPRETATION OF RESULTS

5.1 INTRODUCTION

The Chapter presents the analysis and interpretation of research data, which was collected to address the research problem. This was to understand software testing processes and software development methodologies used at an organisation. Deviations from software testing processes were also identified and implications quantified which the case study organisation could incur in released software due to software defects.

The introduction is followed by a discussion on the data collection and analysis which is covered in Section 5.2 and which included the data collection process using structuration theory. Website and software development as signification was covered in Section 5.3, with domination in software development covered in Section 5.4. Legitimation of software development was covered in Section 5.5. The interpretation of data is done through the lenses of structuration theory and discussed in Sections 5.3, 5.4 and 5.5. The Chapter was summarised and concluded in Section 5.6.

5.2 DATA COLLECTION AND ANALYSIS

Case study methods guided the data collection process, with interviews being conducted with research participants to obtain qualitative data. Quantitative data was also obtained at the organisation, which included defect reports and process documents, to allow for data triangulation (as required by case study methods). Literature reviewed was also used to compare the collected data.

This was in line with the research objective, which was an investigation into factors which can contribute to additional costs incurred by the case study organisation when software testing processes are deviated from, with emphasis on the e-commerce website.

5.2.1 Data Collection Process

The table below represents the number of research participants who were selected, and the research participants who responded, from various departments. These included Information Technology (IT), Operations (O), a specific Business Unit (BU), Supply Chain (SC) and Project Management Office (P) at the organisation. Participants included senior management (SM), middle management (MM) and specialist (SX) job roles.

Table 5.1 below represents the roles and number of research participants who were selected, and the research participants who were interviewed:

Table 5.2: Research participants' selection and response

Title / Role	Number of Participants Selected	Number of Participants Interviewed
Senior Management IT (SMIT)	1	1
Senior Management Operations (SMO)	1	1
Senior Management Project Management Office (SMP)	1	1
Middle Management IT (MMIT)	4	4
Specialist IT (SXIT)	6	6
Middle Management Business Unit (MMBU)	2	2
Specialist Business Unit (SXBU)	2	2
Middle Management Supply Chain (MMSC)	1	1
Specialist Supply Chain (SXSC)	3	3
Middle Management Project Management Office (MMP)	2	2
Specialist Operations (SXO)	2	2
Total	25	25

Source: Author, 2017.

5.2.2 Structuration Theory and Data Analysis

Transcriptions of the interview audio recordings was done as part of the data analysis process, with the information structured using the key concepts of ST. The initial data analysis process was guided using the themes of signification, domination and legitimation of ST.

The concept of signification represented work and outputs at the organisation, including the organisation's e-commerce website. The concept of domination (which includes people and technical resources and the control of these) together with concept of legitimation (which includes organisational processes) were also represented in relation to the research area. The three concepts are outlined in Table 5.2:

Table 5.3: Themes from data collection process

Signification	E-commerce website functionality.	Critical e-commerce website functionality.	Completed software development projects.	Software development resource costs.	Implications associated with software defects.
Domination	Software testing process resources.	Reviews during software development process.	Governance processes	Live environment software releases	Root cause analysis
Legitimation	Formal software development processes.	Software development methodologies.	Software testing tools.	Testing processes.	Differences in testing process.

Source: Author, 2017.

5.3 WEBSITE AND SOFTWARE DEVELOPMENT AS SIGNIFICATION

Signification of structure was used to analyse how agents use stocks of knowledge in a particular process to understand their own and other role players' actions (Walsham & Han, 1991: 54). Within the software development context, the organisation's e-commerce website (as a structure of significance) was discussed with respondents, together with how projects are evaluated after completion at the organisation. The aspects of signification structures (Wanderley & Cullen, 2012: 165) was also discussed with respondents, in relation to how software development resources are calculated at the organisation. The implications associated with software defects at the organisation were also discussed with respondents, which relates directly to the research problem.

5.3.1 E-commerce website functionality

In relation to the functionality present on the organisation's e-commerce website platform, 21 respondents are aware of the functionality which is present, with the following critical functionality being listed by the respondents:

1. Ordering/checkout process (11 respondents);
2. Credit card payments (5 respondents);
3. Usability/site navigation (4 respondents);
4. Product display (4 respondents);
5. Credit card and information security (3 respondents);
6. Search functionality (3 respondents);
7. Accurate pricing and product information (3 respondents);
8. Correct payment calculations (2 respondents); and
9. Different payment methods (1 respondent).

When asked: "what is the critical functionality for the organisation's e-commerce website?" one of the respondents indicated that:

The pricing needs to be accurate, and then if we are taking people's money, be it in points or be it in credit card, that are critical functions, because we have to accurate, we have to be very secure. (SMO)

Information recorded in the organisation's RT Tracker tool, where live environment defects are logged by internal users, was analysed for a six month period i.e., from 01 January to 30 June 2016, with twenty e-commerce website defects identified during this period. Table 5.3 below illustrates the defect types:

Table 5.4: E-commerce website defects for case study organisation

ID	Status	Date Created	Date Closed	Client Code	Defect Summary	Resolution
3565223	Resolved	12 May 2015	01 Feb 2016	0581	VAT not included on checkout	Expired tickets (> 6 months old with no action)
3587714	Resolved	11 Jun 2015	01 Feb 2016	0541	Points transfer issue	Expired tickets (> 6 months old with no action)
3606284	Resolved	09 Jul 2015	01 Feb 2016	0414	Product price and availability display issues	Old (inactive) ticket no activity in more than 5 months
3630064	Resolved	17 Jul 2015	01 Feb 2016	0414	Product details display issues	Old (inactive) ticket no activity in more than 5 months
3655552	Resolved	14 Aug 2015	01 Feb 2016	0414	Client specific banner reflecting on incorrect website	Old (inactive) ticket no activity in more than 5 months
3673415	Resolved	09 Sep 2015	27 Jun 2016	0541	Product text displaying incorrectly	Closing tickets not actioned for more than 6 months
3735094	Resolved	25 Nov 2015	27 Jun 2016	0541	Part payments functionality	Closing tickets not actioned for more than 6 months
3768576	Resolved	14 Jan 2016	10 Jun 2016	0541	Product delivery message issue	Issue fixed and deployed to live
3785309	New	02 Feb 2016	–	0100	Product reflecting as being available when not available	–
3796648	Open	11 Feb 2016	–	0581	Voucher value not applied correctly	–

ID	Status	Date Created	Date Closed	Client Code	Defect Summary	Resolution
3797042	Resolved	12 Feb 2016	28 Jun 2016	0576	Product price display issues	Issue fixed and deployed to live
3806430	New	24 Feb 2016	–	0541	Redemption processing problem due to validation issue	–
3812960	New	24 Mar 2016	–	0599	Login process issue	–
3821624	Open	17 Mar 2016	–	0541	Incorrect product delivery days displayed	–
3842824	New	13 Apr 2016	–	0414	Banners not loading correctly	–
3884780	New	31 May 2016	–	0541	Incorrect product delivery days displayed after completing order	–
3893161	Open	13 Jun 2016	–	C116	Incorrect calculation of delivery charge without VAT	–
3899596	New	22 Jun 2016	–	0600	Client specific banners reflecting on the incorrect websites	–
3907097	New	28 Jun 2016	–	0414	Product reflecting as being available when not available	–
3907189	New	28 Jun 2016	–	0541	No technical specifications displaying for product when information was captured	–

Source: Author, 2017.

Processes around the use of the RT Tracker tool are unclear, as defects which were not resolved for a period of five to six months were being closed without including comments. It is thus unclear if the actual issues were resolved. This constituted 35 percent of identified defects during the sample period. Live e-commerce website defects were difficult to locate as defects logged were not always categorised correctly, both in terms of the affected project and severity of the defect. Reporting is compromised as details were not logged accurately and users of the tool were not updating their assigned defects timeously.

In relation to back office processes which impact on the e-commerce website, such as a defect in the sample list where a client specific banner reflected on the incorrect website, which related to what one of the respondents stated:

Critical is the teams that manage the control of what products get displayed. (MMIT)

5.3.2 Completed software development projects

Lessons learnt, or retrospective meetings after completed projects not being held at the organisation for completed projects, were stated by 14 respondents. The remaining respondents stated that it was either not being held at all (4 respondents), it was being held always (3 respondents), with the other 2 respondents unsure of whether these meetings take place. The meeting is part of the organisation's software development process document and is the IT Project Manager's responsibility to schedule. In relation to why lessons learnt or retrospective meetings are not always held, respondents stated:

It's not properly formalised at this point. It needs to be improved. (SMP)

It's something that needs to be improved, but there certainly are. (SMO)

When asked: "are there any retrospective or lesson learnt meetings held after each completed project at your organisation?" one of respondents stated:

Especially if there were issues along the way, or the end product was not exactly what we wanted to start off with. (SXO)

When asked about retrospective or lesson learnt meetings at the organisation, one of the respondents stated:

They are always finger pointing meetings, instead of actually covering how to make things better. (SXIT)

5.3.3 Software development resources costs

The organisation's software development resource costs are based on the cost of the different people resources, as stated by 10 respondents, with 8 respondents not knowing how these are calculated. The organisation generates revenue by selling the time of their software development resources, in hours, to clients, as stated by 7 respondents. Cost estimates are given to clients, with the costs associated for each of the different resources required to complete the software development project, with mark-up being added to the costs given to client, as stated by 8 respondents.

When asked: "What are the costs of software development resources?" one of the respondents stated that:

The selling price is normally two times or three times the cost. (SMIT)

When asked: “what does mark-up on software development resources consist of?” one of the respondents stated that:

One third is the salary, one third is the overhead, to provide a desk and all the overheads to run the business and one third should be contributing towards profit of the business. (SMO)

5.3.4 Implications resulting from software defects

Respondents indicated that the following costs are associated with software defects:

1. Service level agreement penalties (7 respondents);
2. Reputational/brand damage (4 respondents);
3. Delays to other projects, as resources are diverted to fix defects (3 respondents);
4. Paying overtime/extra money to resources (1 respondent);
5. Loss of potential income on e-commerce website (1 respondent);
6. Possible fraud, ordering items for free (1 respondent); and
7. Loss of income for virtual products (1 respondent).

When asked: "what is the impact associated with software defects?" one of the respondents indicated that:

There's always a financial impact, with any defects you get. The earlier you can pick up the defect, the cheaper it is to fix it, the later you pick it up, the more expensive it is to fix because then it needs to actually go back through the development lifecycle. (SMP)

The respondent also indicated the following in relation to the cost of software defects in relation to service level agreements:

With regards to a specific program and its service level agreements, there's a huge impact if testing has failed and we are releasing defective software. (SMP)

The information provided by the respondents is largely backed up by the literature (Papow, 2011: 3; Wagner & Seifert, 2005: 1; Vijayaraghavan, 2003: 87,89) which was reviewed on the impact of software defects.

5.4 AUTHORITY-DRIVEN INTERACTIONS WITHIN SOFTWARE DEVELOPMENT AS DOMINATION

Domination of structure was used to analyse how power is power within interactions with human resources (Walsham & Han, 1991: 54) and within the software development context. This is represented by persons in leadership positions having the authority to allocate resources or tasks for their respective discipline, with structures of domination being produced and reproduced as a result.

Which resources were responsible for the software testing process, along with the review process and governance processes during the software development process at the organisation, was discussed with research participants. The process of determining when software was ready to be released to a live environment at the organisation, together with root analysis if defects were found in the live environment, were also discussed with respondents.

5.4.1 Software testing resources

The testing team was indicated as being primarily responsible for the software testing process at the organisation, by all 25 respondents. Developers were also required to assist with the testing process (6 respondents), together with business analysts (2 respondents). Business users, which include product managers, user acceptance testing resources and clients, as indicated by 1 respondent each respectively, also need to perform testing to confirm that functionality meets their requirements.

When asked: “which resources are responsible for the software testing process?” one of the respondents said the following:

We have our own testing department, or division, team, so we might not be resourced enough, but they're responsible for testing. (SMIT)

The details provided by the respondents are consistent with what is specified in the organisation's software development process document.

5.4.2 Reviews during software development process

In relation to reviews being done during the software development process, 23 respondents stated that this was being done, but 11 respondents indicated that the frequency of the reviews was not sufficient and not applied as rigorously as it should be.

In relation to Agile methods, when asked: “are reviews done during the software development process at your organisation?” one of the respondents stated:

Most of the projects that we're working on at the moment they are, so most of the time we are doing reviews. (SMIT)

With regards to the review of code at the organisation, 4 respondents stated:

We tend to not always review it as much as we'd like to. (MMIT)

I think it doesn't always happen, it should happen. (SXIT)

There's no formal code reviews. (SXIT)

We will occasionally go through code reviews. (SXBU)

In relation to reviews on functional specifications, one of the respondents said:

If a functional spec has been developed, then that is being reviewed and signed off.
(SMP)

In relation to reviews on technical specifications, one of the respondents said:

The documentation and the review of that is not very formalised, it just happens and sometimes I don't think it happens. (SMP)

In relation to test case reviews, one of the respondents said:

I'm not sure how well we review the test cases. (SMP)

The review of functional specifications and test cases are on the organisation's software development processes document, though not technical specifications or code reviews.

Reviews which should take place - as per the software development process document - include the following:

1. Functional specification review meeting to be held with business analyst, developer, tester, client and project manager;
2. Requirements should be reviewed separately by developer and tester;
3. Test cases to be reviewed by another tester, business analyst or other project staff; and
4. A release meeting to be scheduled by project manager and attended by developer, tester and release resource prior to changes being made live.

5.4.3 Governance processes

In relation to governance processes in the software development process, 7 respondents, including the SMIT and SMP, were unsure if these were in place. A further 3 respondents stated that these were not in place.

The remaining 14 respondents indicate that processes in the software development process were in place, but 8 of these indicated that processes were not strictly enforced.

When asked: "are there any governance processes in place at your organisation to ensure that software development processes are adhered to?", one of the respondents stated:

There are governance processes, they are managed outside of IT, and often when that is the case, as is the case here, they don't actually cover your IT development as they should. (SXIT)

5.4.4 Live environment software releases

In relation to how it is determined at the organisation that software is ready to be released to a live environment, 22 respondents indicated that they understood that there is an approval process that is followed. Of these respondents, 7 indicated that there should be a signoff process from testers before changes are made live. This particular process is not stated on the software development process document.

Signoff was stated by 8 respondents as being required from business stakeholders outside of the IT department, which includes internal stakeholders or clients, before changes are made live. Test execution results were indicated by 6 respondents as being a determining factor in the decision to release software.

When asked: “how is it determined that software is ready to be released to a live environment at your organisation?” one of the respondents said:

The test cases have been completed, if they have done test cases, and they basically say that it can be released. (SMP)

Outstanding defects which were not fixed, as detected during test execution, was stated by 5 research participants as being a reason that the release decision is based on. Software requirements being met was indicated by 4 respondents as being a determining factor in deciding to release software (or not) to a live environment.

Adequate test case coverage and regression testing being performed on impacted areas were each indicated by 1 respondent as being reasons that the release decision is based on. These details are also stated in the literature reviewed (Veenendaal, 2010: 18; Myers *et al.*, 2004: 106; Kaner & Bond, 2004: 7) on the software testing process. Having a release meeting with all stakeholders was indicated by 1 respondent as being another factor in the decision to release software to a live environment.

5.4.5 Root cause analysis

Root cause analysis is done for software defects at the organisation, according to the feedback from 17 respondents, with 4 respondents stating that root cause analysis was not done at the organisation or they did not know if it was being done.

When asked: “is any root cause analysis done on live environment defects, in relation to specific development processes at your organisation?” one of the respondents stated the following:

We firmly believe in doing root cause analysis, the IT team don't necessarily like it. (SMO)

Root cause analysis at the organisation is this not necessarily done to the level of specific development process as stated by 3 respondents.

When asked “are there any root cause analysis done on live environment defects in relation to specific development processes at your organisation?” one of the respondents stated the following:

On a specific business unit, if there is a problem, there is a root cause analysis format to be followed, it happens on that side, I do not believe that it's happening at the rest of the business. (SMP)

5.5 STANDARDS WITHIN SOFTWARE DEVELOPMENT AS LEGITIMATION

Legitimation of structure was used to analyse norms or standards within the software development context, in relation to the research area (Orlikowski & Robey, 1991: 159). These include organisational standard operating procedures, tools and software development methodologies, which was discussed with research participants. Legitimation of structure also involves role players with the necessary process knowledge, in order to know what to do next in a process (Crowston *et al.*, 2001: 172), with software testing processes being covered in this regard, and was also discussed with research participants.

5.5.1 Software development processes

In relation to software development processes at the organisation, 23 respondents are aware of these and that they are formalised. The software development process was mentioned by 13 respondents, with testing being mentioned by 12 respondents.

When asked: “are there formal software development processes defined at your organisation and which areas do these cover?” a respondent stated:

There are formal processes defined and they cover development, the build process in our IT department, which covers software development and testing. (SXIT)

Analysis, as part of the software development process, with includes requirements and documentation were mentioned by 8 respondents, with 6 respondents mentioning the release process, which includes the deployment of code. The details stated by respondents were confirmed in the organisation’s software development process document, with the aforementioned processes being present.

5.5.2 Software development methodologies

Respondents were aware of software development methodologies: 21 respondents indicated that they are aware of the concept, with 2 of these respondents unsure of what is being used at the

organisation. It was stated by 11 respondents that a combination of Waterfall and Agile methodologies were being used on projects at the organisation, which are not strictly enforced.

In relation to the use of Agile methods, which were introduced recently at organisation, and the current Waterfall method also in use, one of the respondents stated:

We've only got our first few projects from an Agile point of view that we're working in, so it remains to be seen which one is more effective, and just how much we have to learn as an organisation. (SMO)

Regarding issues associated with the Waterfall software development methodology, a respondent stated that:

There can be a lot of miscommunication in terms of what is actually done and what can be moved forward. (MMBU)

This is largely from a development perspective, though the testing resources were unclear of the impacts, in terms of what can be tested and what would waste valuable time.

When asked: “are you familiar with software development methodologies used at your organisation, such as Agile and Waterfall, and their respective impact on the testing process?” one of the respondents stated the following:

The Agile one the tester will be involved right from the beginning, because it's an iterative process and we test right from the start, whereas the Waterfall one we wait until development is completed and handed over from the developer and then they will test at the end. (MMP)

This statement is largely confirmed by literature reviewed on the respective software development methodologies (Leffingwell, 2011: 53; Desikan & Ramesh, 2006: 33).

On the subject of software development methodologies and specific testing processes not being followed, a respondent states that there is:

A tendency to cause downstream issues with testing because sometimes there are specifications, sometimes there aren't, bugs get logged, bugs don't get logged, cases get written or don't get written. (SXBU)

This lack of guidance, which a software development methodology attempts to provide, can result in processes not being followed. Regarding the impact on testing processes (if specific methodology is not being followed), one of the respondents replied:

If there are too many changes, if you're in the middle of something and then you have to redo your test cases because a new change came in, then negative. (SXIT)

5.5.3 Software testing tools

In relation to testing tools that are being used at the organisation, 23 respondents were aware that these existed. The following testing tools were mentioned by respondents:

1. MantisBT, for defect logging and tracking (10 respondents);
2. Testlink, for test case management and execution (8 respondents);
3. Video recording software (3 respondents);
4. RT Tracker, for defect logging (2 respondents);
5. SoapUI, for web service testing (1 respondent); and
6. Robot Framework, for test automation (1 respondent).

With regards to the testing tools used at the organisation, one of the respondents indicated:

There's a case for a more unified approach to tracking defects, so that they can be linked to test cases, and so that your test suite improves as defects are found. (SXIT)

The testing tools mentioned by respondents corresponded with details on the organisation's software development process document.

5.5.4 Software testing processes

The software testing processes used at the organisation were in place and formalised, and included the following processes, as indicated by respondents:

1. Test case creation (6 respondents);
2. Test execution (4 respondents);
3. Defect logging and fixes (4 respondents);
4. User acceptance testing (4 respondents);
5. Testing after changes are made live (2 respondents);
6. Test planning (1 respondent);
7. Use cases (1 respondent);
8. Exploratory testing (1 respondent);
9. Cross browser testing (1 respondent);
10. Integration testing (1 respondent);
11. Regression testing (1 respondent); and
12. Test data (1 respondent).

The details provided by respondents confirmed literature reviewed on software testing processes, including test strategies (Myers *et al.*, 2004: 9; Lazić, 2010: 462), test techniques (Roongruangsuwan & Daengde, 2010: 46; Kaur & Sengupta, 2011: 4), test cases (Naik & Tripathy, 2008: 22; Yueh *et al.*, 2010: 66), test execution (Maes & Mertens, 2008: 52; Weyuker *et al.*, 2000: 78) and test measurement processes (Kaner & Bond, 2004: 7; Farooq *et al.*, 2011: 671).

In relation to integration testing with the organisation's payment gateway provider, one of the respondents stated that testers should do the following:

Log in onto the payment gateway site, onto their portal and they can actually see the transactions that are there or not. (SMIT)

In relation to time required to complete test execution, one of the respondents stated:

Goal is to have as much coverage as possible within the time constraints the testing team always has. (SXIT)

With reference to software testing processes, when asked: "Any reason you can think of that they're not being followed?" one of the respondents said:

Instead of following a tedious lengthy process, a tester might decide to either test not fully as it should, or ignore certain processes that may consume too much time or energy from the tester, might keep him from other work. And I think that's what's sort of lead to a culture of not following the correct process when testing any piece of the software. (MMIT)

In relation to whether software testing processes should be different - depending on the nature of development done at the organisation - 13 respondents stated that processes should be different depending on the nature of the development. There is no official and documented process to validate the 13 respondents' statements.

When asked: "are there any differences in the testing processes dependant on the nature of the development which was done?" two respondents said:

It should just be quantity as opposed to quality, it should still be doing certain tests, it just might be less tests. (SMIT)

Big releases, like for example a specific business unit, is in all probability tested better...smaller fixes for less critical systems, are probably tested less. (SMP)

5.6 CHAPTER SUMMARY

The aim of this Chapter was to present the analysis and interpretation of research data which was collected to address the research problem.

Data collection and analysis covered the collection of qualitative data, which included recorded interviews with the various respondents at the selected organisation. Quantitative data was also collected and included organisational defect reports and process documents, with literature also used for data triangulation. The ST themes of signification, domination and legitimation were identified in relation to the interview questions posed to respondents.

Website and software development - as signification - covered the organisation's e-commerce website functionality, with meetings following completed software development projects at the organisation also being covered. Software development resource costs at the organisation and implications associated with software defects were also covered.

Authority-driven interactions within software development, as domination, covered resources involved in the software testing process at the organisation. Reviews during software development processes and the governance processes in place at the organisation were discussed with respondents. The process for determining to release software to a live environment, together with root cause analysis on defects, was also discussed.

Standards within software development as legitimation covered the organisation's software development processes and the software development methodologies used at the organisation. Software testing tools used at the organisation, with the processes for testing the organisation's e-commerce website was discussed. It was also discussed with respondents whether there were any differences in the software testing processes, depending on the nature of the development which was done.

The next Chapter concludes the study, with recommendations to the findings discussed in this Chapter being given.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

There is a requirement to subject software to rigorous testing processes, in order for the software to be successfully implemented. Deviating from testing processes could result in software defects, and this is a problematic area for software development organisations.

Based on the research problem, this Chapter summarises how the research objective and research question were addressed. This is in relation to the research process, subsequent findings and recommendations for this study. A summary the thesis structure is covered in Section 6.2, with a summary of the research findings covered in Section 6.3. Recommendations were offered in Section 6.4, with the research contribution discussed in Section 6.5. Suggestions for future research within the research area were covered in Section 6.6. Additional limitations for the research were covered in Section 6.7, with the Chapter concluded in Section 6.8.

6.2 SUMMARY OF THE THESIS

The objective of this study was to investigate and explore software testing processes prescribed by industry and different software development methodologies. Deviations from prescribed testing processes were also investigated, together with implications of resulting software defects. A case study was undertaken at a software development organisation with an e-commerce website, which was the domain that the research was focused on.

This Section summarises the work conducted in this study, with the findings informing the conclusion, which then informs the recommendations. The thesis is divided into six Chapters, with the structure summarised in Figure 6.1:

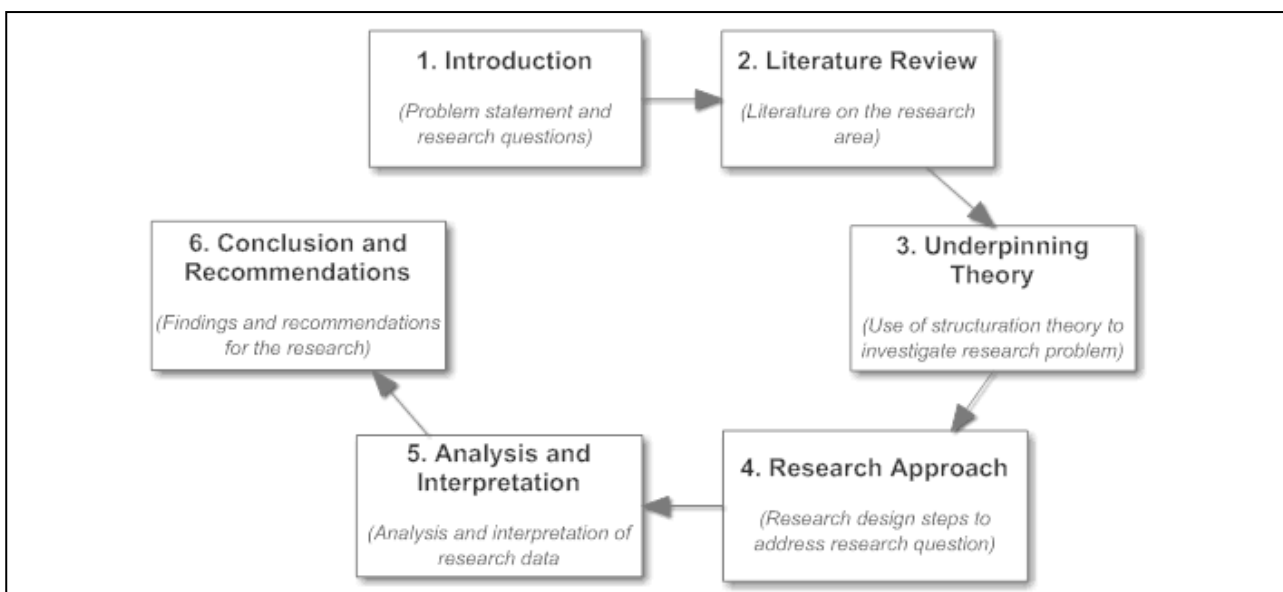


Figure 6.1: Thesis structure

Source: Author, 2017.

Chapter 1 introduced the study, presenting an overview of the research area and identified research problem. The areas of the SDLC, software development methodologies, software testing processes, deviation from software testing processes and implication of software defects were investigated, which lead to a research problem being formulated:

Software development organisations are unclear of the implications if testing processes are not followed during the software development process.

The research problem informed the main research question which is:

What are the implications of non conformance to software testing processes?

Chapter 2 explored literature and provided a detailed review and insight into the following research areas in relation to the research problem:

1. Software testing during the software development life cycle process;
2. Software development methodologies and their prescribed testing processes;
3. Deviation from prescribed software testing processes; and
4. What are implications resulting from software defects?

Chapter 3 involved investigation into the use of theories in research, which guide researchers with theoretical clarity and the ability to connect new knowledge obtained through data collection action processes. Theories used previously in software development research including GTM, AT and ST. ST was found to be the most suitable framework to address the research question, where key concepts such as structure, system and structuration (the duality of structure) assisted the researcher to identify major themes (and sub-themes) from the interview transcripts. The conceptual framework used in this research was adapted from the ST concept of duality of structure, which outlines interaction between social structure and human factors.

Chapter 4 presented a detailed overview of the research methods used to collect and analyse data. Purposive sampling was done at the case study organisation for participants involved in the research area.

The data collected was analysed and presented in Chapter 5, with data analysis done on transcribed audio recorded interviews with research participants. Themes identified from the data collection process included the ST concepts of signification, domination and legitimation.

Signification of structure themes identified included e-commerce website functionality, completed software development resources costs and implications associated with software defects.

Domination of structure themes identified included software testing process resources, reviews during software development process, governance processes, live environment software releases and root cause analysis.

Legitimation of structure themes identified included formal software development processes, software development methodologies, software testing tools and software testing processes.

6.3 SUMMARY OF FINDINGS

The purpose and the objectives of the study, together with the research questions, and how the objectives are met are reflected in the summary of findings. Answers to the research questions were drawn from interview responses, with inferences to literature.

6.3.1 Software testing processes and techniques

The findings indicate that there are various software testing processes and techniques that are applied at the organisation. Testing processes and techniques are primarily used to ensure that developed software meets requirements. Some of the most cited testing processes include test case creation, test execution and user acceptance testing. It was also found that software testing processes and techniques used at the case study organisation are formalised.

Some of the most cited test techniques include exploratory testing, cross-browser testing, integration testing and regression testing, which are relevant within the e-commerce website domain.

The software testing team was found to be primarily responsible for the software testing process at the case study organisation. Developers and business analysts are also required to assist with the testing process. Business users, which include product managers, user acceptance testing resources and clients, also need to perform testing to confirm that functionality meets their requirements.

Software testing tools are being used at the organisation to facilitate the software testing process, as per the organisation's software development process document. These testing tools include MantisBT (defect logging and tracking), Testlink (test case management and execution) and RT Tracker (defect logging).

6.3.2 Software development methodology specific testing processes

It was found at the organisation that testing is involved from the beginning of software development projects when Agile methods are used, while with Waterfall methodology the process starts once development is completed and handed over from the developer.

With the Waterfall methodology, it was found that there were communication issues at the organisation as to what development was completed. This negatively impacted the testing process as testers were unclear as to what functionality to test and what was not yet working.

It was found that a combination of Waterfall and Agile software development methodologies were being used on projects at the organisation, which were not strictly enforced. Agile methods were introduced within the last year, with the organisation currently in a learning process regarding Agile methods. Not using a specific methodology had negative implications for testing, if there are too many changes; testing tasks (such as test cases) had to be redone. Mixing software development methodologies can result in processes not being followed, which can result in an increased likelihood of defects - both prior to a release and after software is released.

6.3.3 Deviations from prescribed testing processes

Governance processes for software development were found to be in place at the organisation, but were not being strictly enforced. This can result in heavy dependence on testing to detect and fix defects, if upstream activities are poor. Similarly, poor testing can result in defects when software is released to a live environment.

It was found that reviews during software development processes are not always done at the organisation; these are done more often when Agile methods were used on a project. Similarly, it was found that meetings following projects being completed were not always held, as per the case study organisation's software development process document.

It was found that root cause analysis was done for software defects at the organisation, but was not necessarily done at the level of where the defect originated in a specific development process. This made it more difficult to identify where the organisation's software development governance processes were not effective enough.

It was found that time constraints was a factor, in relation to time required to complete test execution. Literature (Gruner & Van Zyl, 2011: 18) indicated that there is mostly a finite amount of software testing time available that needs to be allocated wisely. There are time requirements for factors, such as software defects to be fixed and re-tested (Patton, 2001: 320-321), which impacts on the time available to complete testing when there are deadlines in place.

Many respondents were under the impression that there is a signoff process by software testers prior to changes being made live. This is not stated and required as per the software development process document. Testing provides stakeholders with the necessary information to make a decision to release software or not, in relation to compliance with customer requirements based on qualitative and quantitative assessments.

6.3.4 Implications resulting from software defects

The following tangible costs were found to be associated with software defects, together with how these costs can be quantified, as identified by research respondents in relation to the case study organisation's e-commerce website:

1. Paying overtime/extra money to resources (this can be equated to the hourly cost of a software development resource which cannot be recuperated from a client);
2. Loss of potential income on an e-commerce website (any website downtime or loss of functionality means that orders cannot be completed and sales are lost during that period; this can be equated to the average hourly turnover);
3. Possible fraud, ordering items for free (loss of the cost of an item, including virtual products); and
4. Service level agreement penalties (financial penalties levied against the organisation).

The following intangible costs were found to be associated with software defects, as identified by research respondents in relation to the organisation's e-commerce website:

1. Reputational or brand damage; and
2. Delays to other projects, as resources are diverted to fix defects.

Intangible costs are more difficult to quantify, as it is more difficult to quantify how much revenue is lost due to reputational or brand damage or project delays. There may be no noticeable drop in revenue and projects delays can be recovered without any additional costs.

It was found that processes for the RT Tracker tool were unclear, as defects logged using the tool were being closed without including comments and the classification of defects were not accurate. It is thus unclear if defects were resolved or what the nature of the defects was, such as e-commerce website related.

6.4 RECOMMENDATIONS

Recommendations based on the aforementioned findings can be summarised into four key points:

1. Software testing processes and techniques;
2. Software development methodology specific testing processes;
3. Deviations from prescribed testing processes; and
4. Implications resulting from software defects.

6.4.1 Software testing processes and techniques

Test execution for the organisation's e-commerce website platform should be prioritised for the critical functionality, as indicated by research respondents. Some of the most cited areas include the ordering and checkout process, credit card payments and product display.

In scenarios where there are time constraints in finishing test execution, critical functionality should be tested first and proven to be working before less critical areas are tested. The necessary test case prioritisation should be done in the organisation's test case management tool to facilitate this process.

The necessary risk management should also be undertaken in scenarios with time constraints, to achieve a positive outcome which balances risk with quality, features, budget and schedule. The exploratory test technique should also be applied in time constraint project scenarios, as indicated in the literature reviewed (Hambling, 2010: 119).

A more unified approach to tracking defects in relation to test cases should be investigated at the organisation, so that they can be linked to test cases, and so that the test suite improves as defects are found.

6.4.2 Software development methodology specific testing processes

The specific processes associated with different software methodologies should be more strictly enforced on a per project basis, to prevent the various issues raised by respondents. This is due to Waterfall or Agile specific methodology processes being combined or not enforced, with negative impacts on software development processes (including testing).

The organisation should also undertake training with regards to Agile methods, as this has been newly implemented as additional learning should take place, as indicated by senior management.

6.4.3 Deviations from prescribed testing processes

The organisation's test case review process should be more stringently enforced, to ensure that changes are covered and tested thoroughly before these are released to a live environment. This can also help to reduce new defects being introduced. Similarly, test execution processes should also be checked, to prevent issues where testing processes are not followed. Ensuring that there are sufficient testing resources will also help to ensure that testing processes are followed correctly, as this can assist with mitigating the need to skip processes to save time.

Process improvements which the organisation can undertake, include reviews on technical specifications and code reviews. These were mentioned by research respondents but not formalised, as these are not mentioned on the organisation's software development process document.

The signoff process, which many respondents were under the impression is done by software testers, should be communicated to relevant stakeholders. Business stakeholders have the responsibility to sign off that the software delivered meets their requirements.

6.4.4 Implications resulting from software defects

It was found that the following information provided by the software testing process must be factored into the decision to release software to a live environment:

1. Outstanding defects not yet fixed;
2. Software requirements being met;
3. Adequate test case coverage; and
4. Regression testing on impacted areas.

Testing after changes are made live, as per the organisation's software development process document, is an important process and should be done immediately after changes have been made live. The process can assist with detecting any issues relating to a deployment after changes are made live. Similarly, the roll back process - as per the organisation's software development process document - needs to be better clarified as changes may need to be reverted if defects are picked up after changes are made live.

Process improvement is needed for the RT Tracker tool, with regards to closing tickets and classification of defects, in order to improve reporting.

There appears to be a heavy dependence on testing at the organisation, with improvements in upstream activities, including analysis, technical specifications and code review processes. This can result in an ideal state where team work is promoted and resulting in quality delivery to clients (Desikan & Ramesh, 2006: 6).

6.5 RESEARCH CONTRIBUTION

A guideline was developed for the case study organisation, based on the conceptual framework, to illustrate the relationships of the specific research questions on software project delivery, as seen in Figure 6.2. The use of the analytical dimensions of duality of structure framework, based on ST, was applied as a lens to understand and interpret the phenomenon. The use of theory guided the interview questions which research participants were asked, based on the research sub-questions.

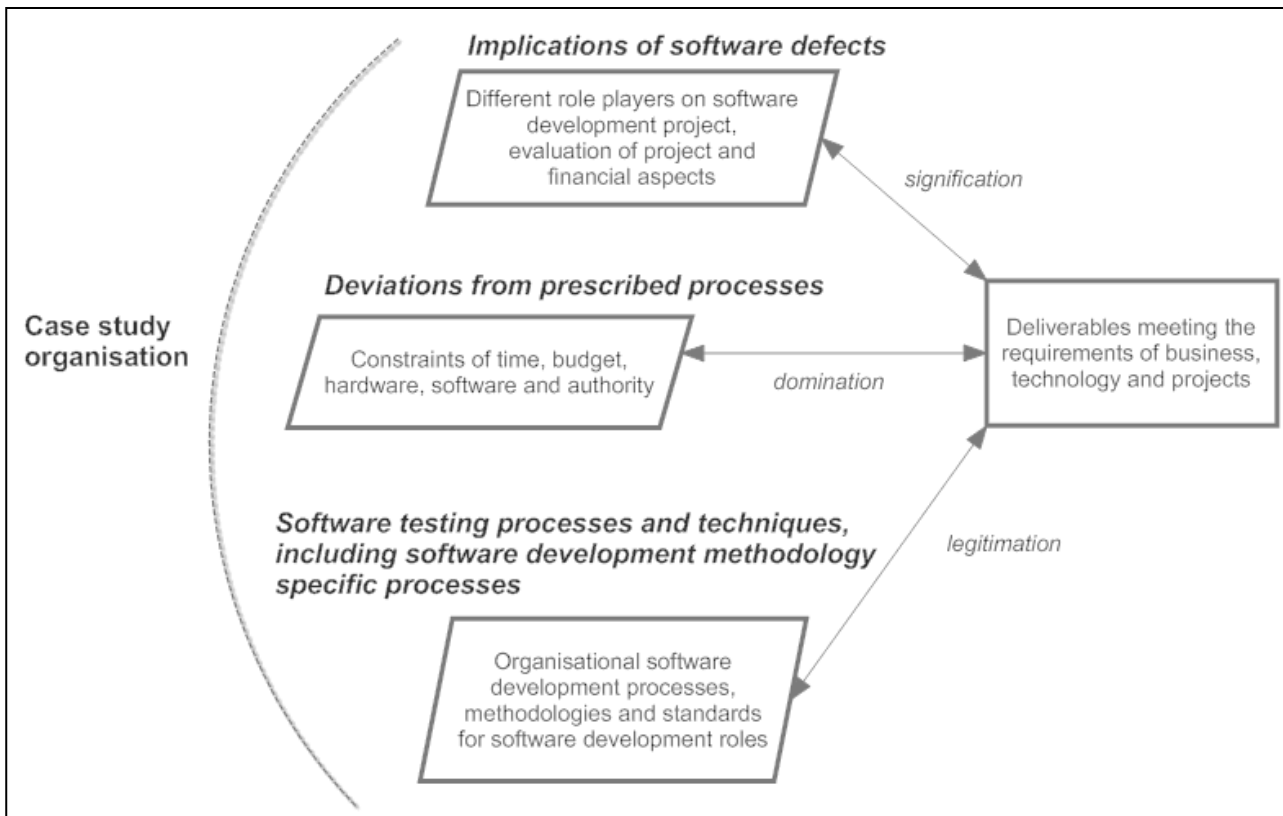


Figure 6.2: Guideline based on conceptual framework

Source: Author.

As a result of the research, the case study organisation gains understanding on specific software development and organisational process issues, identified as a result of this research. Addressing these issues can prevent issues, such as software defects, occurring in future. The necessary remedial action would need to be implemented by the case study organisation for future evaluation.

6.6 SUGGESTIONS FOR FUTURE RESEARCH

It was possible to determine what the impact of software defects was to the case study organisation, together with specific software testing process improvements that could prevent software defects in future. It was not possible to determine the specifics in relation to revenue lost and additional costs that the case study organisation was incurring due to software defects. Determining revenue lost and additional costs incurred due to software defects is an aspect that the case study organisation would need to implement as part of improving the maturity of their processes. This could result in the areas of scope, governance and resources for software testing to be increased accordingly, to prevent software defects.

This particular research case study was undertaken on a specific organisation. Another study could explore the software testing processes at other software development organisations with e-commerce websites. Such a study could provide a comparison of results of this particular study.

Similarly, a study could also be undertaken on a software development organisation doing in-house development for their own e-commerce website, i.e. where development is not outsourced, which is what the case study organisation does on behalf of clients.

Software development and testing processes can also be compared to this particular study.

6.7 LIMITATIONS

Generalisation would be stronger if a third party had reviewed the data collected, but this was not done. The researcher was aware that doing so could have avoided some degree of bias.

6.8 CONCLUSION

This Chapter concludes this study, reflecting on the value of the research and illustrating how the study's objectives have been met. The Chapter started with a summary of the thesis, followed by a summary of the research findings, providing an overview of the purpose and objectives of the study, together with the research questions.

In closing, recommendations are offered based on the research findings, together with suggestions given for future research within the research area.

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**APPENDIX A:
INTERVIEW TRANSCRIPTS**

i) Business Unit:

Interview with AS – 13 September 2016 at 12h00

RR – Good afternoon, today I will be speaking with AS, who is a consultant, good afternoon AS.

AS – Good afternoon.

RR – Before we continue, kindly confirm that we may record this particular conversation?

AS – Yes.

RR – Thank you.

First question, are there any formal software development processes defined at your organisation and which areas do these cover?

AS – Yes, we have processes on the methodologies on the project management, as well as how the different programs run and the specific processes pertaining to these programs.

RR – OK, are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

AS - We have governing processes in place more for the CPA, your customer protection etcetera, and that should relate into the way the systems are developed to ensure that the legal aspects are covered.

RR – Is there any specifics that you'd like to mention, or is it just kind of like a broad?

AS – It's CPA, it's TCF, treat the customer fairly, something that's come through now in, from a governance point of view. Those are the two major things in our enterprise that needs to be covered.

RR – OK cool, so it not so much from a software development process perspective?

AS – I don't work with that part, I work with the legal governance, however what is important with software is that the reasonable requirements, to protect data, needs to be adhered to.

RR – OK cool, thank you very much for that.

Are there also any financial implications associated with software defects at your organisation?

AS – Financial implications of software defects?

RR – Yes.

AS – Are you referring to the enterprise system or to our clients?

RR – So it would be within the organisation, so if there are any defects, regardless of the systems, could be enterprise. A more generic question, are there any implications?

AS – There will be, because there can be penalties, legal penalties on the organisation. As I said, for breaking, basically if you don't adhere to the legal requirements, you could have penalties to adhere to, your customers can sue you, there could be financial implication on your brand, your reputation etcetera.

RR – OK cool, thank you for that.

Are familiar with the functionality which is present on the enterprise e-commerce website at your organisation?

AS – No.

RR – Thank you for that.

And also from a software testing perspective, which resources are responsible for the software testing process at your organisation?

AS – The testers, or should we call it the team of testers from what I understand, and also the business analysts assist as a support to the testers, and then release management is a support to the testers.

RR – OK, thank you very much for that.

How is it also determined that software is ready to be released to a live environment at your organisation?

AS – It follows a specific brief, the development brief, certain deliverables need to be met, and once those deliverables are met and tested, it can go live.

RR – OK, thank you for that.

Are you by chance familiar with any software development methodologies used at your organisation?

AS – No.

RR - Such as Waterfall or Agile?

AS – Yes, I know about Waterfall, that what they use, and Agile, sorry, but I'm not knowledgeable how to use it.

RR – No problem, and are there any reviews done during the software development process at your organisation?

AS – Not that I am involved in, but there are reviews done on the quality of development and the outcomes, and the functionality in the form of reviews, how the programs are managed.

RR – OK, so would that form part of any retrospective or lessons learnt meetings held?

AS – Yes.

RR – After each completed project at your organisation? So how strictly would the latter be enforced?

AS – Not strict.

RR – Is there any reporting also done in relation to live defects in relation to specific development processes at your organisation? Like root cause analysis or anything like that?

AS – We do root cause analysis on specific programs, and we evaluate, but it's not at the standard that it should be.

RR – OK.

AS – From a system point of view, really investigating the system.

RR – OK, thank you for that.

Are you aware of how software development resources, costs at least, are calculated at your organisation?

AS – Yes, as a principle, not the detail of what the values are, their hourly rate, but I know how they develop the formula.

RR – OK, so it's like a formula per resource depending on their role, or how does it work exactly?

AS – So the cost of the resource times a factor for the organisation to ensure that the operational costs and profits are included in the rate.

RR – OK, thank you for that.

Are you aware of any systems used at your organisation to facilitate the software testing process, such as test case management and defect tracking tools?

AS – I'm assuming there will be, I'm not that close to the testing process itself to know, but I'm assuming that they'd use software to assist them with the management of the testing etcetera.

RR – OK cool, and I think that's all the questions from my side, thank you very much for your time and for availing yourself AS, much appreciated.

AS – Hoop ek het jou gehelp?

RR – No problem.

AS – I don't know a lot about that.

Interview with CV – 14 September 2016 at 14h00

RR – Good afternoon, today I will be interviewing CV, who is a Business Analyst, afternoon CV.

CV – Good afternoon.

RR – Thank you, before we continue, kindly confirm that we may record this particular conversation?

CV – Yes, you may.

RR – Thank you.

First question, are there any formal software development processes defined at your organisation and which areas do these cover?

CV – I wouldn't call them software development processes, but there are processes around the entire SDLC, at the organisation I'm employed by. We don't ascribe to Agile or Waterfall methodologies specifically when it comes to actual software development.

RR – OK, thank you for that.

This actually ties in with one of my other questions, so in terms of the methodologies, which ones are used at your organisation, and what is the impact on the testing processes?

CV – As I said, we don't ascribe to one or the other particularly, which I think is a problem. We do something somewhere in the middle what I'd almost call 'Agi-fall', so I've been told it's called, which has a tendency to cause downstream issues with testing because sometimes there are specifications, sometimes there aren't, bugs get logged, bugs don't get logged, cases get written or don't get written. And, we end up with information sitting in people's heads and not in any formal documentation.

RR – OK, thank you for that.

Are there any systems used at your organisation to facilitate the software testing process, such as test case management and defect tracking tools?

CV – Yes, we do have such tools?

RR – Do you know the names of these?

CV – We use Testlink for test cases and tracking of those, and we using Mantis bug tracker for actual bug logging, and defect management.

RR – Thank you very much for that.

Are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

CV – Yes, I am.

RR – And which enterprise e-commerce website functionality is deemed to be critical?

CV – I don't follow?

RR – Of all the functionality on the enterprise e-commerce website, which bits would be the most critical?

If you're not sure, maybe pick three.

CV – OK, in my opinion, it's the checkout process, that stream of, from order summary to order completion is the most critical component as far as I'm concerned.

RR – OK, thank you for that.

What are the testing processes used for enterprise e-commerce website?

CV – We have a set of use cases, which are then assessed for variations, and the testers will, our test analysts will go long and create a set of test cases and select test data, or create test data and execute each of those scenarios , and log any defects that they may find.

RR – OK, so which resources are ultimately responsible for the software testing at your organisation?

CV – Our test analyst team.

RR – Are you aware if there are any differences in testing process dependant on the nature of the development which was done, such as defect fixes, updates or a new website for a client at your organisation?

CV – Not to the best of my knowledge, because broadly speaking we follow more or less the same process. There is obviously some nuance styling depending on what exact piece of functionality we're testing.

RR – OK, thank you for that.

How is it determined that software is ready to a live environment at your organisation?

CV – The test team will sign off the piece of functionality into UAT, our client or clients will attend to UAT testing and once the client is happy, and has provided UAT signoff, we then go into the release process and it's deployed from our staging environment to our production environment.

RR – OK, thank you for that.

Are there any financial implications associated with software defects at your organisation?

CV – Yes there are.

RR – Any specifics you'd like to elaborate on in that regard?

CV – With our client we enter into service level agreements, and each service level agreement has an associated measure. Software defects are measured on a monthly basis, because we release on a monthly basis, and should we not meet the requirements, we are faced with what's called a service credit, which means that our maintenance fee can have a deduction placed against it, to the client's benefit.

RR – OK, thank you for that.

Are there any reviews done during the software development process at your organisation?

CV – Yes, we, depending on the client, will review business requirements specifications, functional requirements specifications. We will review test cases, we will occasionally go through code reviews, and we will definitely review feedback from UAT, do decide if something is a defect or simply an aspect of the functionality which the client may not have interpreted their requirement to resulting.

RR - OK, thank you for that.

Also, are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

CV – We do have processes in place, I wouldn't necessarily say that they are always followed, hence my perspective on the type of methodology that we tend to use. We have a high level release management process which deals with software development from the point of receiving instruction from client, or from enterprise to enter into development, to the point at which it's released and reviewed by the external customer, the third party to our client.

RR – OK, thank you for that.

Is root cause analysis done on live environment defects in relation to specific development processes at your organisation?

CV – Yes, and usually with regards to any potential service credits we may be faced with.

RR – OK, and also at the end of each completed project at your organisation, are there retrospective or lessons learnt meetings held?

CV – For certain clients yes, on the client's that I tend to be assigned to, that's not part of our process.

RR – OK, thank you for that.

And lastly, how are software development resource cost calculated at your organisation?

CV – It depend on the resource, we have so called maintenance resources, where he client will pay for their full time, and that is a discounted hourly rate. On the other hand we job bag style work where create a work breakdown structure and estimate hours and present an estimate to client.

RR – OK, perfect, thank you very much for that and your time and for availing yourself, much appreciated CV.

CV – It's a pleasure.

RR – Thank you.

Interview with GS – 16 September 2016 at 13h00

RR – Good afternoon, today I will be interviewing CV, who is a Release and Operations Manager, good afternoon GS.

GS – Hello RR.

RR – Thank you, before we continue, kindly confirm that we may record this particular conversation?

GS – Yes, you may.

RR – Thank you.

First question, are there formal software development processes defined at your organisation and which areas do these cover?

GS – There are formal processes in certain areas, they cover testing and release portions, ja, not so much the development.

RR – OK, thank you for that.

And are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

GS – There's governance in terms of?

RR – Is there a framework or something like that?

GS – There's a framework, version control, that type of thing?

RR – Just whatever systems, measures are in place at the organisation that you are aware of?

GS – Nothing that I'm particularly aware of.

RR – OK, are you also familiar with the functionality present on the enterprise e-commerce website at your organisation?

GS – What's that?

RR – The enterprise e-commerce website, you online mall or catalogue?

GS – Ja, what about that?

RR – Are familiar with the functionality which is present?

GS – Yes.

RR – And which of the enterprise e-commerce website functionality is deemed to be critical?

GS – You mean which portions of the site, what's the most critical portions, will probably be displaying the correct values to customers, and, when it comes to the client the design is very critical to them. But obviously the most important thing is that we're showing the correct values and that whatever happens on the interface is communicated back to the database, if there's any discrepancies there it can cause huge repercussions.

RR – Thank you for that, and just discuss your understanding of the current testing processes used for the enterprise e-commerce website?

GS – The current testing processes is that they'll be notified of development that's in place, they'll be provided with functional documentation, and based on that they'll create test cases to, against that document and then hopefully execute against that, against whatever development has been completed. Based on that there will be bugs raised, issues raised in functionality, and then it causes a cycle of going back between the developer and between the tester to resolve these issues, until it's in a state where full execution is done to be released.

RR – OK, so how is it also determined that software is ready to be released to a live environment at your organisation?

GS – How is it determined?

RR – Yes.

GS – From a testing perspective, it's determined from the various test cases being resolved, and where a test case is not resolved, then it must be agreed that that functionality is not currently required, they can be parked over or allowed to be skipped. But also in terms of allowing the release is very dependent on infrastructure approval, that they are happy that security requirements have been met by developers.

RR – OK, thank you for that.

And which resources are responsible for the software testing process at your organisation?

GS – The testers, what do you mean?

RR – Whose responsibility is it?

GS – We've got dedicated testers for that.

RR – OK, thank you for that.

Are you also familiar with software development methodologies used at your organisation, such as Waterfall or Agile, and their respective impacts on the testing process?

GS – Ja.

RR – Which ones are used?

GS – It mostly for management we use Waterfall, but I don't know that it's necessarily followed to the book, but it's the closest process that is followed.

RR – And what is the impact on the testing processes as result of it?

GS – The biggest impact is probably, part of the process is going back and forth between the developers, and there can be a lot of miscommunication in terms of what is actually done and what can be moved forward. A lot of breaks in communication happen there in terms of allowing things, we end up missing deadlines because it's not communicated between the developers and the testers and project manager, in terms of where things are in the process. So a developer might fix something, but a tester only finds out about two weeks later, and ja, because of the Waterfall process where you test and finish and it should be in, it's kind of a loopback.

RR – OK, thank you for that.

Just in terms of what you mentioned now, are there reviews done during the software development process at your organisation?

GS – Reviews, what do mean by reviews?

RR – There's obviously a project that is planned, or there's a certain amount of time it needs to be done in. Now during that process, at certain milestones or whatever the case may be, are there reviews done during the software development process?

GS – Yip, there are weekly work in progress meeting that are held at the company level, to see where resources are at and what's going on, and there is dedicated project managers to every project who monitor what's going on as well.

RR – OK, is there any differences in terms of the testing process dependant on the nature of the development which was done, such defect fixes, updates or a new website for a client?

GS – What's the question?

RR – Are there any differences in the testing process?

GS – Is this based on different types?

RR – Exactly.

GS – I'd say there shouldn't be, but there can be yes, when there's any emergency fix we probably have a more direct approach, it has to be dealt with immediately, to ensure that real time customers are not impacted. But if it's a new build, more project based and has a plan to it scheduled.

RR – OK, thank you for that.

Are there any systems used at your organisation to facilitate the software testing process, such as test case management and defect tracking tools?

GS – Yes, they do have a tool for creating test cases, and a tool for logging bugs and tracking bugs?

RR – Do you know the names?

GS – Mantis and Testlink.

RR – Thank you

Are there financial implications associated with software defects at your organisation?

GS – Yes, our client does penalise us for defects that they believe affect their reputation.

RR – Anything else in that area that you'd like to elaborate on?

GS – Specifically?

RR – Anything else in that area?

GS – I suppose other financial impacts would be internally, we could be impacted through obviously having to have overtime resources, to facilitate and correct issues, which also delays

other projects because you end up taking resources off what they're currently working on to facilitate an emergency fix. Which has all sorts of downward effects across the organisation.

RR – OK, thank you for that.

Are there retrospective or lessons learnt meetings held after each completed project at your organisation

GS – No, there aren't.

RR – Are there root cause analysis done on live environment defects in relation to specific development processes at your organisation?

GS – There are root cause analysis done on specific items that the client requests a root cause analysis, as a company we don't necessarily do a root cause analysis.

RR – OK cool, and lastly, how are software development resource costs calculated at your organisation?

GS – To my understanding, because I don't do the costing myself, my understanding is either two and a half times the cost of a resource is what they are charged at. This is not necessarily true, take a standard rate of a developer and times it by two and half to cost it out.

RR – OK cool, thank you very much for your time and for availing yourself, much appreciated GS.

GS – Thank you.

RR – Thank you.

Interview with NA – 30 August 2016 at 10h00

RR – Good morning, today I will be interviewing NA, who is a Supervisor, morning NA.

NA – Good morning.

RR – Thank you.

Before we continue, kindly confirm that we may record this particular conversation?

NA – You may.

RR – Thank you very much.

First question, are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

NA – Am I aware of?

RR – The functionality present on the enterprise e-commerce website?

NA – Yes I am.

RR – OK, thank you.

And which e-commerce website functionality is deemed to be critical?

NA – I don't think there's one, in my opinion there isn't one specific area, because there are various elements and they are all critical.

RR – Any specifics you'd like to mention there, like say, I'm going to use an example three, the top three that you think are the most critical?

NA – You answer me this, in your opinion, when you visit a website, what do you deem most critical to you as a user?

RR – Look, I have my opinion, but I need your opinion in terms of what you think is critical? Because I'm obviously going to use particular information for the research.

NA – For me personally, if I visit a website it must be user friendly. I need to be able to browse very easily and I need various search options to be available.

RR – OK, perfect, thank you for that.

What are the testing processes used for the enterprise e-commerce website at your organisation?

NA – Well as far as I'm aware, various stakeholders besides IT need to test the website, depending on their role in whatever part of the website applies to them. So various people do testing for bugs, in general.

RR – OK, so which resources are responsible for the software testing process at your organisation?

NA – Software testers.

RR – OK, thank you for that.

How is it determined that software is ready to be released to a live environment at your organisation?

NA – I assume it's based on the testing outcome.

RR – OK, are there any formal software development processes defined at your organisation and which areas to these cover?

NA – So that answer is twofold, yes there are formal processes in place, I'm not hundred percent sure which areas they cover though.

RR – OK, no problem.

Would you be familiar with any governance processes in place at your organisation which ensures that software development processes are adhered to?

NA – No.

RR – OK, no problem thank you for that.

Are there any financial implications associated with software defects at your organisation?

NA – Definitely not.

RR – Are there root cause analysis done on live environment defects in relation to specific development processes at your organisation?

NA – I know from my perspective as far as my clients go, if there are any issues that arise we request a RCA. As to whether that's a formal process in place in the area I don't know, based on the requirements from clients I suppose.

RR – OK, thank you very much for that.

Are there any systems used at your organisation to facilitate the software testing process, such as test case management and defect tracking tools?

NA - I don't know.

RR – OK, and are there a retrospective or lessons learnt meeting held after each completed project at your organisation?

NA – Those that I'm involved with, yes, I'm not sure if that applies to everyone.

RR – OK, I think that is pretty much all the questions from my side, thank you very much for your time NA, much appreciated.

NA – Pleasure.

ii) Information Technology:

Interview with ADJ – 23 September 2016 at 14h45

RR – Good afternoon, today I will be interviewing ADJ, who is a senior software tester.

Good afternoon ADJ.

ADJ – Good afternoon.

RR – Thank you.

Before we continue, kindly confirm that we may record this particular conversation?

ADJ – You may record.

RR – Thank you.

First question, are there formal software development processes defined at your organisation and which areas do these cover, in the software development process?

ADJ – Yes, there are, I would say the full life cycle from planning, to our analyst documentation phase, to our software development teams, right through to our UAT and client testing phases of the development.

RR – OK, thank you for that.

And are you familiar with software development methodologies used at your organisation, such as Waterfall and Agile methods, and also, what the respective impacts on the testing process?

ADJ – Currently at my organisation I would say we are not making use of any one of the specific methodologies, I'm obviously aware of the methodologies, but I don't think we implement it fully of these methodologies, but secluded to specific teams, whether it's development or testing in their own capacity. Can you read the second part of the question?

RR – The second part is what is the impact on the testing process for any of these respective processes?

ADJ – I would say the impact is quite big on the testing process, if we're not following a full methodology from start to finish, when everyone's on board on the same place, it can cause quite a lot of confusion down the line. It can cause quite a lot of delays in the development process, as things are not always in the right places that they should at the time we need to test these processes.

RR – OK, thank you very much for that.

Are you familiar with the functionality which is present on your enterprise e-commerce website at your organisation?

ADJ – Yes.

RR – And which website functionality is deemed to be critical?

This is for that enterprise e-commerce website.

ADJ – OK.

RR – Your catalogue as I've been told by your other participants.

ADJ – Ja, I would say on an enterprise level we would definitely say that it's our catalogue. Our client or call centre management interface is the most integral enterprise software.

RR – Just the enterprise e-commerce website, which functionality there is deemed to be critical? The research is around, focuses on e-commerce software, so which functionality there at your organisation, which you are familiar with, is deemed to be critical?

ADJ – On our catalogue I would say definitely say functionality wise that our ordering of products, our management of stock and that kind of thing on the ordering process, our checking out of the products, purchasing via whatever purchase method we would be using. So just from a front end perspective you asking me?

RR – Whichever is on that website yes.

ADJ – I'd say obviously critical is the teams that manage the control of what products get displayed, the usage of the website, products on the catalogue. Most important I would say is the actual interface, the actual visual website, the catalogue itself.

RR – OK, thank you for that.

Discuss your understanding of the current testing processes used for the enterprise e-commerce website?

ADJ – Can I be candid?

RR – You may.

ADJ – OK, when our enterprise e-commerce level catalogue developed originally, and obviously set a foundation for what most of our products are built on as well, the testing processes were quite extensive. Everything from the testing team getting the development testing, to checking out products, to managing the backend, the transactional stuff is actually managed in the system itself. Whether transactions get reversed, whether comms gets sent out for these things, the product management in terms of the warehousing of the product and the delivery. These are all important parts, currently I think on our specific thing, these processes have kind of died done a bit, not too much testing on our internal enterprise level work is being happening, but that's definitely what's happened in the past. That's from the bug management to the development work, to authentication on the actual catalogue.

RR – Just to clarify, so the testing processes, just so that I understand, they are in place?

ADJ – Yes.

RR - But they're not being followed?

ADJ – I would say yes, they are not always being followed, I could probably list a multitude of reasons, but there are testing processes in place definitely, for the testing that should happen on the thing. Definitely over time these processes are less and less followed, from various areas within.

RR – Any reason you can think of that they're not being followed?

ADJ – I would say, in my personal opinion, a priority thing, from different areas in the business. It might come from management or it might come from the development team, or from the testing team itself. Various parts of our internal stuff might be deemed less important than other work, and instead of following a tedious lengthy process, a tester might decide to either test not fully as it should, or ignore certain processes that may consume too much time or energy from the tester, might keep him from other work. And I think that's what's sort of lead to a culture of not following the correct process when testing any piece of the software.

RR – OK, and which resources are responsible for the software testing process at your organisation?

ADJ – The testing team.

RR – OK.

Are there any systems used at your organisation to facilitate the software testing process, such as test case management and defect tracking tools?

ADJ – Yes, would you me to list them for you?

RR – Yes, if you don't mind.

ADJ – We make use of Mantis for bug tracking and defect management, MantisBT. We use Testlink, it's a case management piece of software, we also make use of some automated tools, we make use of SoapUI for our web service testing. There is some automation being put in place as well, Robot Framework, we also make use of software to assist with the test proof and client management, we do use some video editing software to record our tests. We use that for future reference as to how functionality exists on the system in a previous state, if we do ever do changes we can view these videos of our testing process.

RR – OK, thank you for that.

Are there any differences in the testing process depending on the nature of the development which was done, such as defect fixes, updates, or a new website for a client?

ADJ – I would definitely say yes, there should be, changes or alterations in the process depending on what we use, and I think we do currently have that in place. It's very dependent on what we're doing, it's difficult to just say yes, but I think when there are new projects coming in or alterations

for bug fixes, we do tend to, whether it's official process, or we as a group decide that that's how we are going forward with the testing. We will see changes in process, it's hard to avoid.

RR – OK, are there any reviews done during the software development process at your organisation?

ADJ – Minimal.

RR – Are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

ADJ – Yes, but whether the governance is being fully met, I wouldn't be able to comment on that.

RR – OK, and how is it determined that software is ready to be released to a live environment at your organisation?

ADJ – I think the tendency is, bug free or what we would obviously call acceptable, or known or low risk bugs. If all or known requirements have been met, in the sense that we've met the requirements laid out by whoever has initiated the project, or accepted which requirements will be left out of the scope. Then we will decide that we can release.

RR – Ok, thank you for that.

Are there any financial implications associated with software defects at your organisation?

ADJ – Yes, definitely.

RR – Anything specifically there that you'd like to elaborate on?

ADJ - Ja, so obviously when defects occur, then in the various environments, be it live, production or our development environment, this results in a direct impact on how much time we need to spend retesting and regression systems. These tend to escalate quite quickly, and really just pulls the resources off work that will generate any sort of income, and it ties up the resources to keep retesting and regressing, because of defects that go in. That will obviously have financial implication as we bill clients, our time is billed and if you spend weeks more just focusing on one defect because it keeps reoccurring, we're losing money, because can't work on new projects to generate income.

RR – OK, are there root cause analysis done on live environment defects, in relation to specific development processes, as you have in your formal software development processes?

ADJ – Yes we do, we do root cause analysis on defects that occur in the live environment.

RR – Is it to the level of where specific development processes, was it in the beginning phase, or the end phase or the middle phase where the defect actually originated?

ADJ – My personal opinion on that would be no, the root cause at our organisation is generally things to be more focused on what the specific defect was. Why did this thing happen in our production environment, and the usual outcome would be that it was due to this or that, but would not go further to seek out the process or very origin of why.

RR – Ok, thank you very much for that.

Are there any retrospective or lessons learnt meetings held after each completed project at your organisation?

ADJ – No.

RR - OK, thank you for that.

And lastly, are you aware of how software development resource costs are calculated at your organisation?

ADJ – No.

RR – That's all the questions from my side, thank you very much for your time and for availing yourself ADJ, much appreciated.

ADJ – Thanks

RR – Thank you.

Interview with AL – 31 August 2016 at 12h45

RR – Good afternoon, today I will be interviewing AL, who is an external contractor, doing software development. Good afternoon AL.

AL – Good afternoon RR.

RR – Thank you.

Before we continue, kindly confirm that we may record this particular conversation?

AL – No problem.

RR – Thank you.

First question, are there any formal software development processes defined at your organisation and which areas do these cover?

AL – There are processes, well being an external developer I sort of fall outside most of those processes, but there are processes in defining the scope of work to be done. I'm more on the

receiving end of those, just doing the actual development, but I am aware of the processes that are behind the scenes before the work gets to me, and then after the work is handed back over for testing at the end of my development.

RR – OK, thank you for that.

And are there any reviews done during the software development process at your organisation?

AL – So, dev reviews are few and far between, if I remember correctly. The dev review in this organisation is done almost as part of the testing process, so the end user testing process, so there's no formal code reviews. So the only time that issues with code is picked up is when it actually results in an end user bug.

RR – OK, thank you for that.

Are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

AL – I am.

RR – And which e-commerce website functionality is deemed to be critical?

AL – There's multiple levels of critical functionality, so in terms of cost to company, monetary cost to company, obviously in terms of the e-commerce platform that would be the processing of credit card transactions, and then point transactions. But then in terms of business reputation, anything that is public facing becomes critical, if there is a flaw, even if it is just a usability flaw, on a public catalogue that immediately has reputational damage, especially since our catalogue is often not directly branded as the organisation. Meaning the companies that use us get reputational damage and then pass that on to us. Unfortunately in certain business units with the very few companies who can actually afford in the current economic climate that sort of program, you don't want any of them to be bad mouthing you to other companies, because the pool of sales is quite low.

RR – OK, thank you for that.

Are there any other financial implications associated with software defects at your organisation?

AL – The risk of fraud, because of loopholes in an online e-commerce system is always extremely high, so the bug which allows a user to manipulate a system in getting free goods for example, immediately has a huge financial repercussions on the organisation.

RR – OK, thank you for that.

What the testing processes used for the enterprise e-commerce website?

AL – So, I am aware, I've only been exposed to regression testing on the catalogue after each change, or each piece of software that could affect the catalogue and then end user testing, so testing a piece of work that we are busy adding. I haven't been exposed to any type of testing that is done on the catalogue system.

RR – OK, and which resources are responsible for the software testing process at your organisation?

AL – It will be the testers, the testing team, there's also supposed to be that you have business analysts who do testing against the functional spec, to make sure that all elements of the functional spec are actually covered by what has been developed. I don't think that happens often enough, and then it's often left to the testing team to do functional testing as well as the actual software testing at the end. I do believe that there's value in getting business analyst testing, getting functional testing ahead of the testers actually testing the usability and other elements.

RR – OK, thank you for that.

Are you also familiar with software development methodologies used at your organisation, such as Waterfall and Agile methods?

AL – I don't like any of those terms, the IT department does make use of I suppose modified Agile, but every Agile implementation is modified. If you were to follow Agile to the letter it becomes extremely restrictive, and that's exactly not the point of doing Agile development. But I would say it's taking the pieces of multiple methodologies and then making it work within the organisation.

RR – OK, thank you for that.

Are there any differences in the testing process dependant of the nature of development which is done, such a defect fixes, updates or a new website for a client?

AL – Testing, or the scope of testing I think, being in a service industry is often based on the client, so how important the client is, that is more how much testing and the level of testing that's going to go into it.

I don't think that you need to follow any different testing processes based on the type of work that is done. Obviously if the application has a frontend, that is an immediate point of contact for the user, and that's where testing should be focused, and then follow through from there to whatever backend services are required. But there are also times where you are testing only something which is service or something which is on the database, and in that case it is up to the developer to provide a means for a tester to actually get access to that service. So that does change the way that you would have to test a bit.

RR – OK, thank you for that.

How is it determined that software is ready to be released to a live environment at your organisation?

AL – Of the test cases which testers have to make sure are all signed off, the test cases do assume that you have coverage of at least a high percentage of the possible area that could be affected. Test case coverage is a very difficult subject, because how do you decide what enough coverage is, is ninety percent enough, while ten percent could mean failure for a user. So I think the goal always is to have as much coverage as possible within the time constraints the testing team always has.

RR – OK, thank you for that.

Are there any retrospective or lessons learnt meetings held after each completed project at your organisation?

AL – Project management office, account managers, those sort of people do have those after big builds, I've never attended one which was of much use. The problem with those meetings is that they are always finger pointing meetings, instead of actually covering how to make things better. It's often a case of IT did this and project management office did that, instead of focusing on how we can make it better the next time we actually have to do a build.

RR – OK, thank you for that.

Are you aware of how costs are calculated for software development resources at your organisation?

AL – I am, I don't think I should be the one to say how they are calculated if you do need that information.

RR – Anything that you think, that you'd like to elaborate on?

AL – Well, I think that it is the same as it is for most service industries, you try to cover the cost of your resource. The cost of the resource being not only the time that they spend here, but any other things like leave, sick leave, those sort of things need to be covered at the base for the resource, so that the resource isn't a drain on the organisation. And then obviously you want to make profit for every hour of work that the resource is doing, and beyond that you want to make profit for hours that the resource isn't doing any client work as well. So that you do actually have scope to do things that aren't client requests, those are enterprise projects and improving the system overall.

RR – OK, thank you for that.

Are there any systems used at your organisation to facilitate the software testing process, such as test case management and defect tracking tools?

AL – I do know that they are there, Testlink I think is still used for test case management, RT Tracker is used for user reporting, or other department reporting of defects that have been found. I do think there's a case for a more unified approach to tracking defects, so that they can be linked to test cases, and so that your test suite improves as defects are found. Problem having a manual intervention every time a defect is found, having to remember to going to update your test cases to cover that defect is quite time consuming, and because it's time consuming it often not, in my experience, not done, because you are busy with a bug, you forget to go and update your test case at the end of resolving the bug.

RR – OK, thank you for that.

Are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

AL – There are governance processes, they are managed outside of IT, and often when that is the case, as is the case here, they don't actually cover your IT development as they should. Governance is then just there again as a stick, rather than a guide, so the only time we ever see, have involvement with governance, is when something has gone wrong and governance is then used so say, "you didn't do this". Instead of there being clear processes up front saying, "This is what you need to do and this is what the repercussions will be".

RR – OK, thank you for that.

Last question, are there root cause analysis done on live environment defects, in relation to specific development processes at your organisation?

AL – Yes, again these are painful processes, just because it is often an emotional reaction to something that has gone wrong, instead of having it be a technical, or devoid of people, type of meeting. What I'd like to see more often is that the actual issues are addressed in these meetings, not the fact that you don't, that a resource hasn't performed. Rather looking at the overall high level to change things going forward.

RR – OK, thank you for that.

Lastly thank you very much for your time and for availing yourself AL, much appreciated.

AL – Thank you RR.

RR – Keep well.

RR – Good morning, today I will be interviewing AT, who is a Systems Architect.

Good morning AT.

AT – Morning RR.

RR – Before we continue, kindly confirm that we may record this particular conversation?

AT – Yes you may.

RR – OK, thank you very much.

First question, are there any formal software development processes defined at your organisation and which areas do these cover?

AT – Yes we do have formal processes, it covers from program inception, design, development, testing and as far as I know, deployment.

RR – OK, thank you for that.

Are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

AT – Yes, we are required by some of our clients to follow very strict processes, in terms of development and deployment, and, when you refer to governance are referring to something external or?

RR – Something internal, more internal, is there any overarching processes within the organisation to ensure that people do what they supposed to do, because there could be ramifications such legal, if they don't do what they're supposed to do?

AT – In terms of following development processes in my area, no one has ever asked if I do to be quite honest. I don't know about the web area, and I don't think in our, I know on a specific program, on the client site there might be. In other words, the big client might have processes in place. In my area, no.

RR – OK, thank you for that.

Also, are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

AT – Enterprise, yes.

RR – And which e-commerce website functionality is deemed to be critical?

AT – You referring now to our client websites?

RR – Specifically the enterprise e-commerce website, which functionality on there is critical functionality?

AT – OK that's the, so that's our online malls, where our different clients?

RR - Yes, correct.

AT – Well, the critical stuff there is our entire ordering process, that that happens, and follows the guidelines that we basically developed, in terms of making sure that people cannot spend more than they should. That when an order is placed it is actually processed, and then of course the credit card payment provider authorisation part, to make sure that we allows an order, a person's credit card transaction is approved. So those are the most critical.

RR – OK, thank you for that.

What are the testing processes used for the enterprise e-commerce website?

AT – OK, this is not something I'm not directly involved, or very rarely, what I know should happen is that if any changes are made to the site, it should be submitted to the testing team. They will then test it, if there any errors they will refer it back, bug recording software that is used to record that, the developers will have to fix what's wrong and the site will not go live until the testing signs it off.

RR – OK cool.

Just to elaborate on what you last mentioned, how is it determined that software is ready to be released to a live environment.

AT – OK, I know that extensive test cases are being prepared, are in place actually, for current functionality, so if anything's changed or anything new is added you will develop new test cases and you can also replace your existing sites to make sure, and it's not testing the direct area affected, also run test cases for regression testing on all areas affected, that includes other clients online malls.

RR – OK, thank you

Are there also any differences in the testing process dependant on the nature of the development which was done, such as defect fixes, updates or a new website for a client?

AT – Not that I know of to be quite honest, no. I think it followed the same process you have to test, whatever it is, even if it's a emergency fix you need to ensure that nothing else is broken, so I don't think there are any differences that I know of.

RR – No problem.

Which resources are responsible for the testing process at your organisation?

AT – For the?

RR – Testing, software testing process at your organisation?

AT – Well, it's a joint, it should be a shared responsibility between the testing team, do you want that?

RR – Whichever your understanding.

AT – For myself I certainly believe the developers are also responsible for making sure that the software that they deliver to the testers is reasonably complete and bug free. So the responsibility does not just lie with the test team.

RR – Are there reviews done during the software development process at your organisation?

AT – No, very rarely.

RR – Also In line with that, are there retrospective or lessons learnt meetings held after each completed project at your organisation?

AT – We have done that on occasion ja, but it's, not in all cases.

RR – OK, thank you for that.

Are you familiar with software development methodologies used at your organisation, such as Waterfall and Agile methods?

AT – Yes.

RR – Which of the methods are they, used?

AT – Both, Waterfall for our bigger clients and very informal Agile for most of our development, and then formal Agile for some.

RR – Are there any systems used at your organisation to facilitate the software testing process. Example test case management and defect tracking, think you did mention about this a bit earlier on?

AT – Defect tracking, we used to use Bugzilla, I'm not sure what it's called now. I do get the bugs every now and then, I just haven't noted. I know that there's been numerous software to record their test cases and to execute, but I don't know.

RR – Are there any financial implications associated with software defects at your organisation?

AT – Yes, firstly, the most visible one I think is loss of reputation, and that's the first financial implication. Secondly, some, one of our client specifically, there is SLAS, penalty clauses, when

certain things are deployed to production. There is the cost of rework, cost of rescheduling, and also the cost of managing those kind of issues, they all have financial implications, some hidden, some not.

RR – OK, thank you for that.

Are root cause analysis done on live environment defects in relation to specific development processes at your organisation?

AT – Only for one of our clients, that I know of.

RR – Thank you.

AT – If there's an RCA, it might be formal or a discussion, between the HOD and the whatever, it's only formally done for one of our clients.

RR – Perfect.

Lastly, are you aware of how costs are calculated for software development resources at your organisation?

AT – In other words how our costing model works if we, ja?

RR – Just on general.

AT – Ja, I know, I work out the costing in many cases.

RR – Anything you'd like to elaborate in that particular area?

AT – In terms of how we do it?

RR – Yes.

AT – OK, we have software that we developed that creates the different tasks of each new development.

It might be technical architecture, testing resources, each of the different resources have a different cost assigned to them that we charge out to the client, and the software will then do a costing model based on the information we put in.

RR – OK, perfect, thank you.

That's all the questions from my side, thank you very much for your time AT and availing yourself, much appreciated.

AT – My pleasure.

RR – Thank you, keep well.

Interview with BM – 23 September 2016 at 13h30

RR – Good afternoon, today I will be interviewing BM, who is a software tester.

Good afternoon BM.

BM – Good afternoon.

RR – Thank you.

Before we continue, kindly confirm that we may record this particular conversation?

BM – Yes, that's fine.

RR – Thank you.

First question, are there formal software development processes defined at your organisation and which areas do these cover?

BM – Sorry, formal software?

RR – Development processes.

BM – Processes?

RR – Yes.

BM – I wouldn't say formal.

RR - Do you have documented processes that you are aware of?

BM – Give me an example of a process?

RR – Within the software development area at your organisation, is there formal/documented processes in place and which areas do these cover, that you are aware of? There's no right or wrong answer, there's just your answer.

BM – Not that there aren't processes, you do find something, but I'm just thinking of one of the formal ones, like Scrum or Agile, and I think we've got our own process that we follow, but I think we are not always aware of it, there being a process.

RR – OK, do you know which areas the processes cover within the software development lifecycle?

BM – So you're talking about the whole cycle, not just testing?

RR – Yes.

BM – Oh, OK.

RR – So to your knowledge, whichever processes are in place, which areas do these cover?

BM – OK, let's start with testing, it's difficult.

RR – If it comes back to you at a later stage, let me know, not a biggie.

BM – No, I just really can't think of an example of, just tell me.

RR – In order to build a piece of software, certain actions are required, certain phases. At your particular organisation, what processes are there and which areas do these cover? Like you said, testing is one of them, which other areas are there?

BM – Ja, it would cover all of the areas I suppose, but it's just hard to define. You know sometimes there are documentation, sometimes there isn't, and there isn't, there's no, I don't see a particular pattern always. I know we apparently do Waterfall, where we have your requirements upfront, but it's not always like that. But you do need a process for something to happen, obviously there is a process, because there's development and then there's testing afterwards, but sometimes the testing comes before you expect it. So it's, I don't know what you call the process?

RR – It's your process.

BM – I don't see it as a process, for the testing that we do, it just comes to you, and you just do it, you aren't always aware of the big picture, the whole flow. Maybe we're just too busy.

RR – OK cool.

Are you familiar with software development methodologies used at your organisation, such as Waterfall and Agile methods, and also what their respective impact is on the testing process?

BM – OK, like I said just now, Waterfall, which maybe describes what we do, with a bit of Agile in between. There are often changing requirements and they get slotted in, because you can't wait for phase two.

RR – And how does that impact the testing process?

BM – Ja, in a good way I suppose, because if you're aware of changes and stuff that happen.

RR – Is this positively or negatively?

BM – Well, actually negative, if there are too many changes, if you're in the middle of something and then you have to redo your test cases because a new change came in, then negative. Otherwise, I haven't really experienced too much disruption, normally it's good when there's a change and we get told, and we act on it, I don't see a problem.

RR – OK, no problem.

Are you familiar with the functionality which is present on the enterprise e-commerce website at your organisation?

BM – The functionality on the?

RR - Enterprise e-commerce website.

BM – E-commerce website, yes.

RR – And which e-commerce website functionality at your organisation is deemed to be critical?

The catalogue that you got, which are the critical bits?

BM – Oh, what parts of it?

RR – Yes.

BM – The redemption checkout process, that's what everyone focuses on, because that is what impacts the revenue.

RR – Perfect, and also discuss your understanding of the current testing processes used for the enterprise e-commerce website at your organisation?

BM – The processes for testing?

RR – Yes.

BM – Well, we wrote our test cases upfront, we did from the spec, so that when everything was ready we could go and run test cases. But there's also been a lot of ad hoc testing as well, things that were not documented, like exploratory testing, I don't know what you call it, it's actually been mostly that I think. Browsing and finding problems.

RR – OK, perfect.

Are there any systems used at your organisation to facilitate the software testing process, such as test case management and defect tracking?

BM – Yes, defect tracking.

RR – Do you know which tool they are?

BM – Mantis.

RR – Mantis is for?

BM – Logging bugs.

RR – And is that the only tool that you guys have?

BM – For test cases we use Testlink, and that is it, the only tools that we use, Testlink and Mantis, that's it.

RR – OK, which resources are responsible for the software testing process at your organisation?

BM – The testers, although other people do test as well, product managers also look, they ask us to log the bugs, so a lot of other people do their own testing as well. The developers, we often have to give them test data so that they can, and the clients as well, they do the user acceptance testing, so it's not just the testers.

RR – OK cool, and there any differences in the testing process depending on the nature of development which was done? Such as defect fixes, updates or a new for client at your organisation?

BM – Yes, sometimes you would have to do regression if it was a fix to something. If it was something new, maybe you won't need to do regression. It depends, if it's a big fix or a small fix, you always adapt to what is done.

RR – OK perfect.

Are there reviews done during the software development process at your organisation?

BM – You mean like code reviews, or what kind of reviews?

RR – Whichever reviews, that could be an example as well.

BM – OK, yes, I would say so, I was just thinking of management reviews, when they look to see how far we are and how everything's going, how many issues are left. Then we are prioritising things depending on the review.

RR – Cool.

So how is it determined that software is ready to be released to a live environment at your organisation?

BM – I think when the client is happy, because they get their UAT test packs, and there are always bugs we know about, that they don't know about. You can never fix all the bugs, but as long as everything that's left is minor, or even if there's major, but that's very rare, no will find it, and if the client is happy and if they accept the known bugs, then surely.

RR – OK cool.

Are there financial implications associated software defects at your organisation?

BM – Yes.

RR – Anything specific that you'd like to elaborate on in that area?

BM – I don't really know much about the financial implications, I don't know much is being spent on, I have no ideas what the figures are. So I can just imagine the longer it takes to release, the longer it takes for them to start making profit.

RR – So just another question relating to that, are you aware of how software development resources, their costs are calculated, at your organisation?

BM – No idea.

RR – Thank you for that.

Are there root cause analysis done on live environment defects, specifically in relation to specific development processes, as I mentioned earlier on, at your organisation?

BM – Root cause analysis?

RR – Yes.

BM – I don't think so, I don't know that, I'm not involved.

RR – OK, no problem.

Are there any retrospective or lessons learnt meetings held after each completed project at your organisation?

BM – No, trying to think of an example, no specific meetings as such, sometimes we discover something went wrong.

RR – After the project is done or whatever needs to be done, is there any meetings, have you been to one as an example? Like after the fact, retrospective or lessons learnt?

BM - No, I'm trying to think of a meeting that we had, no we've had review meetings, but there was never like a lessons learnt like, "oh we've done this wrong" and "let's change our process", anything like that. So that's my answer.

RR – OK cool.

Lastly, are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

BM – Governance what?

RR – Something from a legal perspective or a framework at your organisation to ensure that people do what they are supposed to within the software development space?

BM – I don't think we're that formal.

RR – OK perfect.

I think that's all the questions from my side, thank you very much for your time and for availing yourself BM, much appreciated.

BM – Pleasure,

RR – Thank you.

Interview with BM – 23 September 2016 at 13h30

RR – Good afternoon, today I will be interviewing BM, who is a software tester.

Good afternoon BM.

BM – Good afternoon.

RR – Thank you.

Before we continue, kindly confirm that we may record this particular conversation?

BM – Yes, that's fine.

RR – Thank you.

First question, are there formal software development processes defined at your organisation and which areas do these cover?

BM – Sorry, formal software?

RR – Development processes.

BM – Processes?

RR – Yes.

BM – I wouldn't say formal.

RR - Do you have documented processes that you are aware of?

BM – Give me an example of a process?

RR – Within the software development area at your organisation, is there formal/documented processes in place and which areas do these cover, that you are aware of? There's no right or wrong answer, there's just your answer.

BM – Not that there aren't processes, you do find something, but I'm just thinking of one of the formal ones, like Scrum or Agile, and I think we've got our own process that we follow, but I think we are not always aware of it, there being a process.

RR – OK, do you know which areas the processes cover within the software development lifecycle?

BM – So you're talking about the whole cycle, not just testing?

RR – Yes.

BM – Oh, OK.

RR – So to your knowledge, whichever processes are in place, which areas do these cover?

BM – OK, let's start with testing, it's difficult.

RR – If it comes back to you at a later stage, let me know, not a biggie.

BM – No, I just really can't think of an example of, just tell me.

RR – In order to build a piece of software, certain actions are required, certain phases. At your particular organisation, what processes are there and which areas do these cover? Like you said, testing is one of them, which other areas are there?

BM – Ja, it would cover all of the areas I suppose, but it's just hard to define. You know sometimes there are documentation, sometimes there isn't, and there isn't, there's no, I don't see a particular pattern always. I know we apparently do Waterfall, where we have your requirements upfront, but it's not always like that. But you do need a process for something to happen, obviously there is a process, because there's development and then there's testing afterwards, but sometimes the testing comes before you expect it. So it's, I don't know what you call the process?

RR – It's your process.

BM – I don't see it as a process, for the testing that we do, it just comes to you, and you just do it, you aren't always aware of the big picture, the whole flow. Maybe we're just too busy.

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Are you familiar with software development methodologies used at your organisation, such as Waterfall and Agile methods, and also what their respective impact is on the testing process?

BM – OK, like I said just now, Waterfall, which maybe describes what we do, with a bit of Agile in between. There are often changing requirements and they get slotted in, because you can't wait for phase two.

RR – And how does that impact the testing process?

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RR – OK, no problem.

Are you familiar with the functionality which is present on the enterprise e-commerce website at your organisation?

BM – The functionality on the?

RR - Enterprise e-commerce website.

BM – E-commerce website, yes.

RR – And which e-commerce website functionality at your organisation is deemed to be critical?

The catalogue that you got, which are the critical bits?

BM – Oh, what parts of it?

RR – Yes.

BM – The redemption checkout process, that's what everyone focuses on, because that is what impacts the revenue.

RR – Perfect, and also discuss your understanding of the current testing processes used for the enterprise e-commerce website at your organisation?

BM – The processes for testing?

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RR – OK, perfect.

Are there any systems used at your organisation to facilitate the software testing process, such as test case management and defect tracking?

BM – Yes, defect tracking.

RR – Do you know which tool they are?

BM – Mantis.

RR – Mantis is for?

BM – Logging bugs.

RR – And is that the only tool that you guys have?

BM – For test cases we use Testlink, and that is it, the only tools that we use, Testlink and Mantis, that's it.

RR – OK, which resources are responsible for the software testing process at your organisation?

BM – The testers, although other people do test as well, product managers also look, they ask us to log the bugs, so a lot of other people do their own testing as well. The developers, we often have to give them test data so that they can, and the clients as well, they do the user acceptance testing, so it's not just the testers.

RR – OK cool, and there any differences in the testing process depending on the nature of development which was done? Such as defect fixes, updates or a new for client at your organisation?

BM – Yes, sometimes you would have to do regression if it was a fix to something. If it was something new, maybe you won't need to do regression. It depends, if it's a big fix or a small fix, you always adapt to what is done.

RR – OK perfect.

Are there reviews done during the software development process at your organisation?

BM – You mean like code reviews, or what kind of reviews?

RR – Whichever reviews, that could be an example as well.

BM – OK, yes, I would say so, I was just thinking of management reviews, when they look to see how far we are and how everything's going, how many issues are left. Then we are prioritising things depending on the review.

RR – Cool.

So how is it determined that software is ready to be released to a live environment at your organisation?

BM – I think when the client is happy, because they get their UAT test packs, and there are always bugs we know about, that they don't know about. You can never fix all the bugs, but as long as

everything that's left is minor, or even if there's major, but that's very rare, no will find it, and if the client is happy and if they accept the known bugs, then surely.

RR – OK cool.

Are there financial implications associated software defects at your organisation?

BM – Yes.

RR – Anything specific that you'd like to elaborate on in that area?

BM – I don't really know much about the financial implications, I don't know much is being spent on, I have no ideas what the figures are. So I can just imagine the longer it takes to release, the longer it takes for them to start making profit.

RR – So just another question relating to that, are you aware of how software development resources, their costs are calculated, at your organisation?

BM – No idea.

RR – Thank you for that.

Are there root cause analysis done on live environment defects, specifically in relation to specific development processes, as I mentioned earlier on, at your organisation?

BM – Root cause analysis?

RR – Yes.

BM – I don't think so, I don't know that, I'm not involved.

RR – OK, no problem.

Are there any retrospective or lessons learnt meetings held after each completed project at your organisation?

BM – No, trying to think of an example, no specific meetings as such, sometimes we discover something went wrong.

RR – After the project is done or whatever needs to be done, is there any meetings, have you been to one as an example? Like after the fact, retrospective or lessons learnt?

BM - No, I'm trying to think of a meeting that we had, no we've had review meetings, but there was never like a lessons learnt like, "oh we've done this wrong" and "let's change our process", anything like that. So that's my answer.

RR – OK cool.

Lastly, are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

BM – Governance what?

RR – Something from a legal perspective or a framework at your organisation to ensure that people do what they are supposed to within the software development space?

BM – I don't think we're that formal.

RR – OK perfect.

I think that's all the questions from my side, thank you very much for your time and for availing yourself BM, much appreciated.

BM – Pleasure,

RR – Thank you.

Interview with JA – 25 August 2016 at 15h00

RR – Good afternoon, today I will be interviewing JA, who is an Analyst Developer.

Good afternoon JA.

JA – Good afternoon RR.

RR – Before we continue, kindly confirm that we may record this particular conversation?

JA – Yes indeed.

RR – Thank you very much for that.

First question JA, are there formal software development processes defined at your organisation and which areas do these cover?

JA - Formal software development processes, I would say partially, and there's a mixture of like your Agile and, sometimes people misunderstand Agile to be chaos.

RR – OK, thank you for that.

And also, you mentioned Agile, are you familiar with software development methodologies used at your organisation, such as Waterfall and the Agile methods that you mentioned?

JA – Essentially I've used Waterfall in my beginning of my studies, it persisted through to change from Rapid Analysis Development model, the RAD model, and so and so, so I've been through

word for most of these processes, it's essentially part of the Waterfall model, but it's a more focus section, that's what I understand and that's what I've been using.

RR – And how's it being used at your particular organisation?

JA – We have only recently started using Agile, even though I've used it since 2005, and it's now currently 2016, and it's only got introduced at the organisation. Well, it got introduced while I was working here, not before.

RR – OK cool.

So what were they using?

JA – Now that is a question, I'm pretty sure they were using some sort of structure, but it wasn't Agile.

RR – And it wasn't Waterfall?

JA – It was not Waterfall either.

RR – OK, thank you very much for that.

Are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

JA – Now when you mention governance processes, from what I understand being the developer is that there a change control mechanism, is this what you?

RR – Governance in two areas, like is it legally required, and is there any overarching governance structure in place at the organisation to ensure that people are doing what they are supposed to be doing because of the effects of not following process?

JA – I'd say because essentially I'm an endpoint, I'm the person building the thing, I'd say there's more of governance structure around me in doing my tasks and finishing them. However, if you move further up, I don't think that governance process becomes as strict, so it's more rigorously applied.

RR – Perfect, thank you for that.

Are familiar with the functionality present on the enterprise e-commerce website at your organisation?

JA – I am definitely familiar, I've built, and maintained most of it.

RR – OK, and which e-commerce website functionality is deemed to be critical?

JA – As a commerce website, the most critical section of the website is your transactions, your money transfers, if any of these things break it becomes your highest priority to fix.

RR – So yes again, which e-commerce website functionality is deemed to be critical?

JA – Ja, transactions, spend, these are the most critical.

RR – OK, thank you for that.

Also what are the testing processes used for the enterprise e-commerce website?

JA – So, there's various testing processes I know, but the testing processes now, at the moment, is based on functionality and specifications, so you test. It's not sorta automated, might be, but I'm not too familiar with the process. I think there is automated testing, there might be, there's not test driven development, because that's popular on our side, and think it's basically specifications and testing that, and seeing if it works. Don't know what you call that, normal testing.

RR – OK, no problem, thank you for that.

And which resources are responsible for the software testing process at your organisation?

JA – So resources like people?

RR – Yes.

JA – And do I need to mention anything?

RR – No, just maybe if there are any specific people, or a team?

JA – OK yes, we definitely have a testing team, I think our testing team is more organised than most of our development.

RR – OK, thank you very much for that.

Are there any differences in the testing process dependant on the nature of the development which was done, such as defects fixes, updates or a new website for a client?

JA – Is there any testing processes?

RR – Differences?

JA – Differences? Sorry repeat?

RR - Are there any differences in the testing process dependant on the nature of development which was done, such as defect fixes, updates or a new website?

JA – Sorry, I don't understand what that is?

RR – Would the testing processes be different depending on the sort of development that was done?

JA – Oh, OK. I know the testing processes are quite thorough, and they seem to be, they're more consistent, that seems so be the way to do testing, in our organisation. But like the stuff that we build, it's very specific, if we build larger software suite, the testing process may need to change, but I think it applies to us.

RR – OK, thank you.

Are there any systems used at your organisation to facilitate the software testing process, such as for test case management and defect tracking?

JA – OK, so defect tracking we're currently using Mantis, but before that I don't think we were using, we were using like RT Tracker, which were tracking bugs, but it's user interface, that obviously the struggle.

So testing in terms of continuous integration or continuous development, those tests?

RR – Just more testing tools, in terms of that.

JA – Tools, so ja, the testing tools, there's testing tools that the testers use, for me mainly it's Mantis and how they log bugs, so those are the only testing that I, but it would be great to have more sorta feedback in terms of testing. Another testing tool that I know works and is used in the industry.

RR – Perfect, thank you for that.

How is it determined that software is ready to be released to a live environment at your organisation?

JA – Essentially, from functional specs, or specification documents, we build the functionality according to what has been specified. Whatever is left out or loosely worded we'll leave for interpretation later, and once we feel that the software we built is functioning according to spec, we then send it off to testing.

RR – How is it determined that software is ready to be released to a live environment?

JA – – On my side, it's not up to us to determine that, it's usually the testers and whatever they liaise with the project manager and the client. So it's both onto the client and the team.

RR – Perfect, thank you for that.

Are there any retrospective or lessons learnt meetings held after each completed project at your organisation?

JA – I think that the key areas are clarity, sometimes like in inconsistencies in the specification or not having a specification, which has happened many a time is one of the major problems. That an

be sorted out, or can be fixed, but the strictness needs to be applied to whoever is managing a project, so that they can deliver the documents, so we can build it and deliver it as fast as possible.

RR – It that, sorry, from a lessons learnt/retrospective perspective?

JA – Retrospective, ja that is definitely one that is a continuous process, I think it's a continuous thing, but it might be applied through most organisations. So, I'd say, it is a retrospective.

RR – Sorry for cutting your word, but we, do you have those meetings or not?

JA – Those meetings?

RR – Are there retrospective or lessons learnt meetings held after each completed project at your organisation?

JA – With the Agile process there is a retrospective meeting being held right after the demonstration stuff. That would have been nice like throughout my beginning, like when I started, and we built a lot of stuff without a retrospective, so that is definitely something that should have been done.

RR – So is it only for Agile?

JA - With the Agile process it's being implemented, but it's only like a month when they do the demo, so it's a retrospective meeting after we finish our sprint.

RR – OK, thank you very much for that.

Are there financial implications associated with software defects at your organisation?

JA – Everything that is causing a defect, from server downtime, costs you money, to software being defective, and hanging a massive server rack, causing it to be delayed, hanging up, all adds up to costs. So yes, defective software definitely ends up being a cost, both money and time.

RR – OK perfect, thank you very much for that.

Are there root cause analysis done on live environment defects in relation to specific development processes at your organisation?

JA – So, that can be done, but because of time and other projects, which is not excuses, it should actually happen because of that, and the resources that we have currently, not as many as there should be. We don't do this, there's no what it called, the acronym?

RR – RCA.

JA – RCA yes, sorry what do you call it?

RR – Root case analysis.

JA - Root case analysis, there you go.

RR – Thank you very much for that.

Lastly, are you aware of how costs are calculated for software development resources at your organisation?

JA – OK, so in terms of costs, it's usually time allocated, or they use time as a resource, which isn't make sense, because you can only schedule time for people. So that the way they cost for resources, basically how much time they have, and then build up that time to how much it's going to be at the end of the project, and how long a project would take. So the estimations are there, but sometimes it extends over the time period.

RR – OK, thank you very much for that.

Lastly JA, thank you very much for your time and for availing yourself, much appreciated.

JA – No worries.

RR - Keep well.

Interview with JV – 26 August 2016 at 12h30

RR – Good afternoon, today I will be interviewing JV, who is a Front End Developer.

Good afternoon JV.

JV – Good afternoon.

RR – Before we continue, kindly confirm that we may record this particular conversation?

JV – That's fine.

RR – Thank you.

First question, are there formal software development processes defined at your organisation and which areas do these cover?

JV – Look, from what I understand, it's formal, can you ask me that question again? If they exist or what they are, what is the question?

RR – So are there formal software development processes defined, so as exist as you mentioned, at your organisation and which areas do these cover?

JV – Ja look, we do have, some areas of the business I think there is formal process, we have spent quite a bit of time, setting up, you know, certain processes. From putting in new code live, to how we look to start and run projects, quite a bit of ja, I think it's Microsoft Project that's been formulated some processes in both regards ja. They cover the IT side of the business I would say,

just to try and improve how different departments brief things into IT, and how they get run in IT and how they get delivered.

RR – OK, thank you.

How is it determined that software is ready to be released to a live environment at your organisation?

JV – Basically when the software testers give the OK, that's how much I understand it, we have a ticketing system, they do a lot of testing, at the very end they do some UAT, system tests and once everyone is happy, and the software testers are happy, then we go live.

RR – OK, thank you very much for that.

Are there also any reviews done during the software development process at your organisation?

JV – Ja, I think there is, depending on the project you work on there is, some of them for the duration of the project, some of them have frequent check ins, two/three times a week. On some of them check in once a week, or every bi-weekly, but ja, we do quarter basely check ins, we'll get together, see the progress which was made and what other issues we maybe ran into and how we can resolve them.

RR – OK, thank you.

Are you also familiar with software development methodologies used at your organisation, such as Waterfall or Agile methods?

JV – Ja, I mean, there's a couple of new projects started now, they're applying the Agile methodology. I think originally we've always had the Waterfall methodology, where a project gets passed from section to section almost, or from different people to different people. But ja, I'm aware of them, they're not strongly enforced throughout the organisation, but some projects and project managers do enforce certain methodologies.

RR – Thank you very much for that.

Are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

JV – No, I'm not. When you say functionality present? Oh, you mean just how does it work and all of the tech that's being used?

RR – Your organisation has an enterprise e-commerce website.

JV – Yes.

RR – In terms of the functionality that contained on the system, are you familiar with this?

JV – Oh yes, oh ja, definitely. I constantly work on improvements, maybe sometimes enhancements, and bugs as they do come up on our e-commerce platform.

RR – OK, and which of this e-commerce functionality is deemed to be critical?

JV – Look, with any e-commerce site, browsing products and a seamless checkout is very important, you don't want to get people hung up in the checkout process. But also, we've been paying a lot more attention to usability, we've rebuilt our catalogue to be responsive down to mobile, cause a lot of people tend to browse with their mobile phone these days, I mean the last couple of years actually. And I think that is a critical component, there's still improvement that can be made in that regard, in terms of optimising possibly speed, loading of pages and number of http requests. Couple of technical enhancements that we can still make to improve it, but ja, I would say, mobile shopping is critical at this stage for us.

RR – OK, thank you very much for that.

What are the testing processes used for the enterprise e-commerce website?

JV – I think as, depending on the size of the enhancement or the bug fix, but if it's a big chunk of work, let's say we're adding additional security on the checkout, I think a more formal testing will be done, where the testers will run with the whole test case and notes, you know any issues, browser related, functionality related, user friendliness and make sure that it passes on all those fields. Once everyone's happy, we'll also go back to the client, who is sometimes internal project managers, they'll do some UAT and ja, and once everyone is happy we'll go live with it.

RR – OK, thank you for that.

Just in terms of what you mentioned earlier, so are there any differences in the testing process dependant on the nature of the development which was done? So it could be defect fixes, updates or perhaps a new website for a client, would there be any differences?

JV – Ja, I think you got to match up the amount of testing and the way it's being tested, depending on the size of work. If it's literally copy updates, it can be proof read by a tester and confirmed with a copywriter and it can live, where if it's a big part of functionality a lot more time and effort will go in to make sure it's perfect before we go live.

RR – OK, perfect, thank you for that.

Which resources are responsible for software testing process at your organisation?

JV – Software testers, we've got a quite a growing team of software testers, we realised, think the business realised the importance of it, depending on developers to test certain functionality, I think a lot of mistakes would always slip through. Because you might fix something in one area, and then it will affect something in another area, and having a dedicated team of testers just ensures quality work for our clients.

RR – OK, thank you for that.

Are there any systems used at your organisation to facilitate the software testing process, such test case management and defect tracking?

JV – Ja, we use a ticketing system where we log issues, which can give us you know, different browsers. Resources get allocated to different resources, it's just a way of the developer, a way of knowing who all is involved, to have a record of what needs to be done. That's just a normal ticketing system, I know we're using Mantis at the moment and then, ja, I think the testing team has got their own documentation and test cases they build. Depending on the project and the piece of work you keep a trail of what's been and what's been tested.

RR – OK, thank you for that.

Are there any financial implications associated with software defects at your organisation?

JV – Oh ja, if we do there is certain, especially one of our clients, I think if we miss certain targets or deadlines, I'm not exactly sure of all the details, if there's also functional problems with the website, we could definitely face some financial implications. They will fine us if we don't do as per our agreement with them, the SLA, so ja, we gotta make sure that the work's done properly and that we are sure that when we putting something out there that it's correct.

RR – OK, and are root cause analysis done on live environment defects in relation to specific development processes at your organisation?

JV – I'm not directly involved with that, but yes, I think it is done.

RR – And also, are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

JV – I don't know if it is strictly governed, obviously we have our line leaders and our managers, the IT director, but it also comes down very much to the team itself, and ja, I wouldn't say it's strictly governed.

I think, good work is always required, with relation to actual processes, depending on projects, it is governed, but not strictly as other places I can think.

RR – Thank you.

Are you aware of how costs are calculated for software development resources at your organisation?

JV – I'm aware ja, I think there is a structure, different type of work gets different rate, and obviously durations. I think we are still selling by the hour, but although some of our clients we have a retainers running, but it's also again a certain amount of resources for certain amount of hours. Ja, so I'm aware of how it gets calculated, but the finer detail I'm not entirely sure about.

RR – OK, thank you for that.

Lastly, are there retrospective or lessons learnt meetings held after each completed project at your organisation?

JV – Can you ask me that again?

RR – Are there retrospective or lessons learnt meetings held after each completed project at your organisation?

JV – Ja, I wouldn't say each project, sometimes we'll have debrief, how things went during a project or a piece of work, but no not every project. I think it's again some projects we'll focus on what went wrong, and we'll also focus on what went well.

RR – OK, thank you for that.

That's all the questions from my side, thank you very much JV for your time and for availing yourself, much appreciated.

JV – You're welcome.

RR – Keep well.

Interview with PI – 29 August 2016 at 10h30

RR – Good morning, today I will be interviewing PI, who is a consultant specialising in system administration and network administration. Good morning PI.

PI – Hi.

RR – Thank you.

Before we continue, kindly confirm that we may record this particular discussion?

PI – No you may not, I'm just kidding, yes you may.

RR – OK, first question, are there any formal software development processes defined at your organisation and which areas do these cover?

PI – I believe there is, but I'm not really in development as such, we do use source control and everything else, but I'm not as deep in the development cycle at least.

RR – OK, no problem, thank you.

And are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

PI – Sorry?

RR – Are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

PI – I'm not really involved with any of the frontend stuff, I'm involved in backend stuff, so ja, in most cases I don't know what's happening on any of the frontends.

RR – OK, and which e-commerce functionality is deemed to be critical, do you have any idea around that?

PI – Which?

RR – E-commerce website functionality is deemed to be critical?

PI – Anything to do with bank cards would be extremely critical, or anything to do with, well bank cards for one, or any other personal information I would say as well, in terms of POPI and other great big words. Cause there's lots of theft of personal details these days, passwords get violated all the time on lots of international sites, that is a very important part of the process.

RR – Would you say, that sounds like security related stuff?

PI – Ja, definitely security, that's how I understood your question.

RR – OK, no problem, thank you for that.

What are the testing processes used for the enterprise e-commerce website?

PI – Not involved.

RR – OK, and do you also know which resources are responsible for the software testing process at your organisation?

PI – I know some of the head guys, but that's about it. I'm not involved in any of the frontend stuff as you know, I'm not involved in any of the frontend stuff. I basically get given a very short brief on what needs to happen, and sometimes that brief is lacking.

RR – OK, so how is determined that software is ready to be released to a live environment at your organisation?

PI – It get's signed off by the testers, and then the stuff gets made live from then the testers have to verify everything, that everything is working again, so that there wasn't anything isn't missed during the deployment phase.

RR – OK, thank you very much for that.

Are you familiar with any software development methodologies used at your organisation, such as Agile or Waterfall methods?

PI – No, but as I said, I'm not that deeply involved in the development, I only do some of the development in terms of communications. The rest of the front end stuff I not involved with all, prefer not to be involved.

RR – OK, are there any financial implications associated with software defects at your organisation?

PI – I would say it's definitely a risk all the time, because if there's bad code or security issues in any of the code, then yes, there will most definitely be financial implications. So testing of one's software and checking of code, signing off of code actually needs to happen. I think it doesn't always happen, it should happen.

RR – OK, and are you aware of how costs are calculated for software development resources at your organisation?

PI – Not a clue.

RR – Are there any systems used at your organisation to facilitate the software testing process, such as for test case management and defect tracking?

PI – I'm only aware of Testlink, and there's one other that I can't remember, don't know what it's called, Bugzilla? No, not sure, not involved, I don't so the testing.

RR – OK, no problem.

Are there any root cause analysis done on live environment defects in relation to specific development processes at your organisation?

PI – Sorry?

RR – Are any root cause analysis done on live environment defects, specifically in relation to specific development processes at your organisation?

PI – No, the only RCAs I've ever seen happen afterwards, to try and find out what happened or what went wrong in the sense of security and code defects. Do I understand the question correctly?

RR – Yes, think that is kinda what the question relates to.

I think that pretty much all the questions from my side, thank you very much for your time PI, much appreciated.

PI – Cool.

RR – And for availing yourself and for your time, thank you very much.

Interview with RB – 19 August 2016 at 14h45

RR – Good afternoon, today I will be interviewing RB, who is an IT Project Manager.

Good afternoon RB.

RB – Howsit RR.

RR – Thank you. Before we start, kindly confirm that we may record this particular interview?

RB – Yep, no problem with that.

RR – Thank you.

First question, are there any formal software development processes defined at your organisation and which areas do these cover?

RB – There's plenty, and they cover the whole lifecycle of the development process.

RR – OK, thank you.

Are reviews done during the software development process at your organisation?

RB - Code reviews, you are referring to?

RR – Any sort of reviews.

RB – Yes, generally, let me quantify that, not always. We're supposed to regular code reviews, but time is often a problem, so that gets pushed out.

RR – No problem.

Are you familiar with any software development methodologies used at your organisation, such as Waterfall or Agile methods?

RB – Yep, we're always been using a modified Waterfall methodology, but we're trying to move towards Agile.

RR – Thank you.

Are familiar with the functionality present on the enterprise e-commerce website at your organisation?

RB – Yep.

RR – OK, and which e-commerce website functionality is deemed to be critical?

RB – Obviously anything that's to do with participant's money, so ja, that kinda the source of our income.

RR – OK, no problem.

And what are the testing processes used for the e-commerce website?

RB - I'll have to refer to my test manager for that .

RR – OK, no problem.

And are there any differences in the testing process dependant on the nature of development which is done? Example defect fixes, updates or a new website for a client?

RB – Ja, there's, often we have urgent fixes that kinda have to get prioritised over other things, and they may get pushed through the development, testing process a little bit faster than is wise, but it's done on risk basis where if the client is affected directly, then you to get the fix out as soon as possible.

RR – OK, no problem, thank you.

And which resources are responsible for the software testing process at your organisation?

RB – We have a test manager and a number of test resources, who are ultimately responsible, but obviously the developers get involved.

RR – Thank you for that.

How is it determined that software is ready to be released to a live environment at your organisation?

RB – OK, it has to have passed all the test cases, with proof of passing, it gets signed off by the testing/QA team and also the account manager who is ultimately makes the decision to switch it on to live or not.

RR – OK, perfect, thank you.

Are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

RB – Not strictly, but yes, we in principle follow some guidelines for ensuring that the processes are followed.

RR – OK, perfect.

Are there retrospective or lessons learnt meetings held after each completed project at your organisation?

RB – I should say yes, but often it's overlooked. It is in our normal requirements process flow, but often the next project in line kinda takes precedence.

RR – OK, no problem, and thank you.

Are there any systems used at your organisation to facilitate the software testing process, example test case management or, and defect tracking systems?

RB – Yes, absolutely, we've got a number of tools that are used for both of that.

RR – OK.

Are there financial implications associated with software defects at your organisation?

RB – Not always, but certainly it does possibly have an impact, when the financial part of our system, obviously it could affect the way that people can spend points, which means money flow out the door.

And also the issuing of points to our participants, who can then spend it elsewhere.

RR – OK, thank you.

Are root cause analysis done on live environment defects in relation to specific development processes at your organisation?

RB – Where the application is deemed critical or the client has certain SLAs in place, then yes, we need to give an official report, and obviously make sure that that gets fed back to the development team, where they can use that information for future development.

RR – Perfect, thank you.

And lastly, are you aware of how costs are calculated for software development resources at your organisation?

RB – Sorry, how cost are?

RR - Calculated for software development resources at your organisation?

RB – Ja, it's a direct per resource cost as in salary costs, and cost to company overheads, so it's worked out on time spent basically.

RR – Perfect, thank you very much for your time and availing yourself RB, much appreciated.

RB – Sure, no problem.

RR - Thank you very much.

Interview with RO – 19 August 2016 at 11h30

RR – Good morning, today I will be interviewing RO, who is an IT Director.

Good morning RO.

RO – Morning RR.

RR – Thank you RO.

Before we continue, kindly confirm that we may record this particular interview.

RO – You may record this interview.

RR – Thank you very much.

OK, first question, are there formal software development processes defined at your organisation and which areas do these cover?

RO – Yes, there are formal processes defined and they cover development, the build process in our IT department, which covers software development and testing.

RR – OK, thank you.

Are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

RO – What's governance processes, what do mean with that?

RR – Any measures in place to, any overriding measures in place to ensure that people do what they are supposed to do.

RO – I don't know, we have a signoff process for go lives, are you talking about something like that?

RR – Throughout the software development process.

RO – The governance, you talking about stand up meetings, checking that people are doing their work, what else you talking about?

RR – Also maybe from a legal perspective, if you want to use the word governance?

RO – What do you mean with legal?

RR – I'm just elaborating on the governance area, just to give you some guidelines around that particular are.

RO – I don't know, I don't think we have.

RR – OK, no problem, thank you.

Also, how is it determined that software is ready to be released to a live environment at your organisation?

RO – Our testers sign it off, they run all through the test cases and when it's working, it's ready to go live.

RR – Thank you RO.

Are familiar with the functionality present on the enterprise e-commerce website at your organisation?

RO – To a certain extent yes.

RR – OK, thank you.

And which e-commerce website functionality is deemed to be critical?

RO – I would imagine the financial part, when it talks to the bank.

RR – OK, thank you.

And what are the testing processes around, rather used, for the enterprise e-commerce website?

RO – You asking me, I'll have to ask my testers.

RR – OK, thank you.

RO - What are we talking about here is where we use a payment gateway switch, we get test cards from them which we use to perform transactions on our site and make sure that the transactions come through. So, then they can, I think, they get a log in onto the payment gateway site, onto their portal and they can actually see the transactions that are there or not. There is process that they can follow. But also to be extra sure, once something goes live, we meant to test it again with a real card, and make sure that the transactions work correctly. Against the right account, and the right profile.

RR – OK, thank you.

And are there any differences in the testing processes dependant on t he nature of the development which was done? Example defect fixes, updates, or a new website for a client.

RO – There shouldn't be, it should just be quantity as opposed to quality, it should still be doing certain tests, it just might be less tests, there's regression testing, and there'll be, we still have to test the transactions.

RR – OK, thank you.

And which resources are responsible for the software testing process at your organisation?

RO – Well, we seem to be fortunate, we have our own testing department, or division, team, so we might not be resourced enough, but they're responsible for testing.

RR – OK, thank you.

And are you familiar with software development methodologies used at your organisation, such as Waterfall and Agile?

RO – Yes.

RR – OK, thank you.

And which ones are used?

RO – Both, and a combination of both, depending on the situation.

RR – OK.

Are reviews done during the software development process at your organisation?

RO – Say that again?

RR - Are reviews done during the software development process at your organisation?

RO – Reviews of what?

RR – What work has been done, during the process.

RO – When you're doing an Agile process then that's done virtually every day, so ja, most of the time. Most of the projects that we're working on at the moment they are, so most of the time we are doing reviews.

RR – OK, thank you.

And are there any retrospective or lessons learnt meetings held after each completed project at your organisation?

RO – It's certainly meant to in our process, whether we do or don't, I'm not hundred percent sure for all of them. I think on some of them we do.

RR – Cool, thank you.

Are there any systems used at your organisation to facilitate the software testing process? Example test case management or defect tracking?

RO – Yes.

RR – OK.

Are you aware of how costs are calculated for software development resources at your organisation?

RO – Yes I am.

RR – Any specifics you'd like to elaborate on that?

RO – When you're talking just resources, you talking about people?

RR – Yes.

RO – How we work out the costs?

RR – Yes.

RO – Well I can elaborate on it, we have a costing department in this company which works out the salaries, I think they take an average selling price, compare to what's going in the market, and then. Well that works out the cost, depends on the selling price, so the selling price is normally two times or three times the cost.

RR – OK, thank you for that.

Also, are there any financial implications associated with software defects at your organisation?

RO – Say that again, financial penalties?

RR – Ja.

RO – On some of our work, yes.

RR – OK, thank you.

And lastly, are there root cause analysis done on live environment defects in relation to specific development processes at your organisation?

RO – Yes there are.

RR – Thank you, that’s all the questions from my side, thank you very much for your time RO, much appreciated.

RO – Pleasure.

RR – Keep well, thank you.

RO – OK.

Interview with SW – 11 August 2016 at 14h00

RR – Good afternoon, today I will be interviewing SW, who is a software tester.

Good day SW.

SW - Good afternoon RR.

RR – Thank you.

Before we continue, SW would you just like to confirm that we may record this particular interview?

SW – Yes, you may.

RR – Thank you very much.

OK, so my first question is, are there any formal software development processes defined at your organisation and what areas do these cover?

SW – Can you repeat the question?

RR – No problem.

Are there any formal software development processes defined at your organisation, and which areas do these cover?

SW – Yes there are.

RR – Would you like to elaborate if you don’t mind?

SW – Yes there are, for the tools that we use to create test cases, and to document the issues as well, and link to the developers as well. So, interact with the issues, through to.

RR – OK, cool, but is there anything more, from a development process, is there any formal development processes in place?

SW – I’m not sure.

RR – No problem, thank you.

RR - Just getting back to another question of mine, and just to elaborate on what you were talking about, are there any systems used at your organisation to facilitate the software testing process? Examples would be test case management and defect tracking.

SW – Yes, Testlink for test cases, and tracking, Mantis Bug Tracker.

RR – Thank you.

With regards to, testing processes, used for the enterprise e-commerce website, are there any specific testing processes used around this?

SW – Not specific.

RR – Thank you.

Can you tell me which resources are responsible for the software testing process at your organisation?

SW – Resources, you mean like the testers?

RR – As in people, yes.

SW – Yes, software testers, are responsible for testing.

RR – OK, thank you.

Are you familiar with software development methodologies used at your organisation?

Such as Waterfall and Agile methods as examples.

SW – Yes.

RR – OK, which ones, with both that I've mentioned, or, any, with both, any specific ones which you are familiar with? And also, what's used at your organisation?

SW – I'm a bit familiar with both, and currently at my organisation we are more like Agile.

RR – OK, thank you.

RR – Are there any reviews done during the software development process at your organisation?

SW – Yes.

RR – OK, thank you.

RR – Are you aware of how the resources, of how the costs are calculated for software development resources at your organisation?

SW – No on that.

RR – OK, thank you.

Another question, are there any differences in the testing processes depending on the nature of the development which was done? Example is like defect fixes, or updates, or if there is a new website for a client?

SW – Yes, there are.

RR – Thank you.

In the case of a live environment defect, are there any root cause analysis done, in relation to specific development processes at your organisation?

SW – No.

RR – Thank you.

Are there also any governance processes in place at your organisation to ensure that software development processes are adhered to?

SW – No.

RR – Thank you.

Are there any financial implications associated with software defects at your organisation?

SW – Yes.

RR – Thank you.

Are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

SW – Yes.

RR – Which e-commerce website functionality is deemed to be critical and what are the testing processes around this?

SW – The catalogue website, or?

RR – Ja, on that, which functionality is deemed to be critical, and what are the testing processes around this, the critical functionality?

SW – The calculations, with the tiering as well, and also the points allocations for members.

RR – Is this specifically around the e-commerce website, the catalogue as you refer to, what is the critical functionality specifically on that, on that website, what are the testing processes around that?

SW – Critical functionality?

RR – Yes, specifically on the e-commerce website?

SW – To make sure, to show the correct information, what is available, and also show the correct pricing, and when the users are buying, to show that they paid the correct amount and calculations.

RR – Thank you.

Just to recap, OK, we've covered the critical functionality, but, are the, what are the testing processes around the particular critical functionality?

SW – To make sure we do end to end testing, front and the backend.

RR – How's it determined that software is ready to go, to be released to a live environment at your organisation?

SW – When all the critical issues are fixed and everything is working according to the requirements. When it meets the specifications, like the requirements.

RR – OK, thank you.

And, are there any retrospective or lessons learnt meetings held after each completed project at your organisation?

SW – Yes.

RR – Think we've covered all our questions, thank you very much again for availing yourself for the interview, and thank you very much again.

SW – Thank you.

RR – You're welcome.

iii) Operations

Interview with BC – 23 August 2016 at 10h30

RR – Good morning, today I will be interviewing BC, who is the Customer Experience and Operations Director. Good morning BC.

BC – Good morning RR.

RR – Thank you.

Before we continue, kindly confirm that we may record this particular conversation.

BC – Yes, you may record the conversation.

RR – Thank you.

First question BC, are there formal software development processes defined at your organisation, and which areas do these cover?

BC – Yes, there are formal software development processes. They certainly cover all of what we believe are the requirements, which should be covering the business reason for the software development, which then makes it. It's almost like a business story and then it becomes translated into a functional spec, and that should get translated into a technical spec, before the programming begins.

RR – Perfect, thank you.

Also, are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

BC – Interesting question, governance, I'm not too how broad that term, is that, just to clarify, is that related to a legal aspect of, is that around to POPI, Protection Of Personal Information?

RR – Legal, but pretty much, ja, anything you can think around that particular area?

BC – Any governance, OK, we certainly follow a process of testing the software product that has been developed against the functional spec, that would be internal governance. But the external governance, the rules that we have to comply with, are the, particularly when you are working with data, is that we need to protect the personal information of any people involved. We need to, we all sign non disclosure agreements as employees that we will not disclose any of the information from clients to anybody else. So that would be governance, some of it is external, legal South African governance, which is POPI and various other, but what springs to mind is the Protection Of Personal Information and then there a non disclosure act, clause, agreement that we sign between us and our clients, which then translates into between us and our employees.

RR – OK, thank you for that.

Just coming back to the e-commerce functionality as I mentioned, are familiar with the functionality which is present on enterprise e-commerce website at your organisation?

BC – Yes, I would say so, the e-commerce website that I think you're referring to would be related to our performance function, which would be the merchandise fulfillment function. The participants in our programs, how they get awarded, is that they earn points, and then they can redeem these points, the points I the same as currency, so they can redeem these points for merchandise, which is physical goods, or for virtual goods, also they can redeem those points for virtual goods. Virtual goods would be something like airtime, or an electronic voucher, or even magazine subscriptions,

where they get, they redeem their points and they can, they will get delivered, those goods. The other e-commerce area would be on the travel side, where once again points are earned, and points then again could be redeemed for individual travel. And then on both the merchandise and the virtual performance and on the travel, the participant, if they don't have sufficient points to purchase the prize, then we have a linkup, at the moment we're working with a payment provider and they are, they can buy points, which then becomes a credit card transaction to buy the points in order to redeem for merchandise, or a virtual redemption. So that would be the extent of the e-commerce that we've done, from an organisation point of view we have not created an e-commerce site that goes direct to consumers, without actually working with a client face, so we don't have the risk that are linked to an e-commerce site that is working with the general public. We're always working through a customer face.

RR – OK perfect.

Just to, if you can just elaborate on the functionality on the enterprise e-commerce website which is deemed to be critical?

BC – OK, so the critical elements are first of all, in any communication that, the first critical point is, don't be picture and the image of the product that you are selling, be it travel, be it merchandise, be it a voucher, does that truly represent the product that will be delivered. So that's the first requirement, is that the image and the description of the product is accurate. Then the pricing needs to be accurate, and then if we are taking people's money, be it in points or be it in credit card, that are critical functions, because we have to be accurate, we have to be very secure, so that they are not hacked, or people's points are stolen, and so the whole redemption process around point spending, spending of points and information around a person's credit card, all of that is very, very critical. So there are a number of critical points, the critical points are in essence driven by the touch points, where we're touching the client. Is the image accurate, are the points accurate, is the description accurate, so that they are not being lied to, purchasing something which is not true. And then, are the redemptions secure, so can the points be hacked or not. We can't stop a participant giving away their own password and pin numbers and all that, but, so we need to make sure that process is secure and they understand the security issue around it. And also then the credit card, that is another critical area obviously. That's it from the IT point of view, you know the other elements that I can think of are your delivery details, if they change their delivery details, there is a check that we are, have in place, where that delivery address is to be verified if that's the correct address and the right recipient. And it needs to be authorised correctly, so that we are giving to our logistics and warehouse people the right information about that person, where they want it to be delivered to. If

they're purchasing it for themselves or if they're purchasing it for someone else, we need to make sure that that is accurate information.

RR – OK, thank you.

What are the testing processes used for the enterprise e-commerce website?

BC – What are the testing processes? I might need to guess on those, I'm not sure. The first important part of the process is that we employ testers, so the tester is a person that is well professionally qualified, has got the right business acumen to be able to take a business case and a functional spec and a technical spec and then write test cases. We do try and provide test cases, or it's supposed to be standard practice from anyone who's writing the business case, should be providing test cases, but that testing protocol needs followed by somebody who's able to really translate the spec, or translate the software into functionality by saying, is it working, or isn't it working through test cases and checking against your specifications which have been written.

RR – OK, perfect, thank you.

Just in terms of the testing processes, are there any differences depending on the nature of the development which was done, such as defects fixes, or updates or a new website for a client?

BC – There definitely will be a difference, because the difference will be related to what is the spec. So what is it that we're writing, if we're writing a new website for a client, then depending on what is the functionality of that website, if the website is purely information sharing, it's not as difficult a service or product to test, because it is merely reflecting information. But if that website has got functionality, and if the functionality could be, it could be a claims website, basically the way that our websites would work is they would explain the objective of the program, the participants would need to go away and do something, but then they would interact again with the website, and so that website needs to provide the functionality of participants details, they might want to update their mobile and email and then that.

So that would need to be accurately then caught on that website and translated into the data in the organisation, so that the rest of the business can access that. But we also need to then, in some websites we might be designing claim forms, so the participants might have gone away, done something, and in the example of retail outlets they would make sales, and those claims would need to then come through the system, if that is the functionality of the website that was done. So there would be then interaction that is required, that requires very different testing to just information, and then certain bits of software don't really get into the public eye, they might not get on a website, so there would be, that would be back office type software, software that gets written for, let's say a contact centre. We have a contact centre management system that is enabling the contact

centre agents to interact with participants over the phone. So some of the software might then provide the functionality for interacting directly with the database system used at the organisation, or using a website into the company system, if that in fact clarifies your question?

RR – It does, thank you.

Also, how is it determined that software is ready to be released to a live environment at your organisation?

BC – It depends on, let's say if I had to talk around the organisation's mobile application, I think we've just gone through our, I think we're on our third version of our mobile application. The first iteration of it, it was tested by the developer and the testing team, and then what we did was expanded the offering into a user group, and so there was user acceptance testing, and what we found in that user group was that there was a lot of functionality that hadn't been thought of in the specification process. And so what we did is create a version one, and then we created a version one point one, went one point two. We are now on a version two of this particular app, and what that app is endeavouring to do is to give a good user experience, so there's functionality that doesn't look so good, but is it functional. And then we go into the user side where we're saying it needs to look good, so it needs to look professional, so then there's a user acceptance testing as well, and we'll find that there'll be an ongoing testing and revamping of products as things change, or as we find more, better ways of doing things, there will be a continuing improvement process on things like apps, certainly those that are interacting in the public. But even in our backroom work, when, as users are finding a better way of doing things, then we're certainly are encouraging that we constantly are improving on the software that we develop.

RR – Just to elaborate again on the question, in terms of that decision, how is determined that the software is ready to go live?

BC – When the project owner for a project like, if I can stay with the mobile app, the project owner will talk to the user team and say, OK the things that need to be fixed, once these are fixed we are happy to go live. And then the project owner would talk to the client owner, who owns the relationship with the client, and if that client owner is comfortable to sell it into the client space, then it will go live. It might even go live when it's not one hundred percent right, but if it's ninety percent right, we will show the client, this is what we're still working on, but it's, ninety percent is still there, at least we can go to market. That's kinda where the decision making would rest, between the client owner and the project owner.

RR – OK perfect, thank you for that.

Are there any reviews done during the software development process at your organisation? I think you mentioned a little bit about that on your previous explanation?

BC – I think there definitely are reviews, there certainly, there's a regular Monday meeting, a regular weekly meeting where all software that is in process and is being work on is getting reviewed. So the project owner would be sitting with the IT project manager and the IT director and sometimes members of the team, where they will OK, this is the new work coming in, this is the existing work that we're working on, where we're at, what needs to be done, so that, I think that constitutes a review. So a regular review meeting is sufficient, depending on how quickly you've got to develop type thing, and also the complexity.

RR – OK, thank you for that.

And also, are there any retrospective or lessons learnt meetings held after each completed project at your organisation?

BC – I don't know if each would have, I think it's something that needs to be improved, but there certainly are, in some of the big programs, depends. In the one area of our business, with one of our big clients, we tend to use a Waterfall approach, we have to hit the deadline, and if we are late there's a lot of review and discipline that's going as to why we're not on track. There are milestone reviews in that Waterfall approach, and the afterwards there quite a formal review of what needs to happen, but we are also working with a more Agile approach, and there as each sprint comes to an end, the process there is to review what have we done, how far are we and what can we improve. So it depends on which process we're using, whether you do it at the end of the project or you're doing it in the project, but I quite like the idea of the Agile development methodology, because it helps you to catch things earlier, although it doesn't necessary make it quicker. They do brag that Agile is quicker, but I'm not sure of that, but in the long run it will be quicker because you will pick up everything that you are working on, but this is our first, we've only got our first few projects from an Agile point of view that we're working in, so it remains to be seen which one is more effective. And just how much we have to learn as an organisation.

RR – OK perfect.

RR - BC, I think we've run out of time for this particular interview, but we will continue this later on.

BC – OK, thanks RR.

Continued at 23 August 2016 at 16h00

RR – Another question BC, are there any systems used at your organisation to facilitate the software testing process, examples being test case management and defect tracking?

BC – I'm not aware of the exact details, but I am aware of that we are using some type of testing regime.

So I'm not aware of the detail, I don't know what the details is, but, certainly test cases is something that they guys are asking for when we write a spec, but I don't know how the testing works.

RR – OK, no problem, thank you for that.

Are you aware of how costs are calculated for software development resources at your organisation?

BC – Yes, we have a rate for the job, and we will try to calculate based on an average rate for a person, let's say a developer or a tester. We will understand what the spec is, and then estimate the number of hours that are required, and then the rate, the costing is largely based on the rate for the job, which calculated from the person's salary, let's say the average salary for a developer, multiplied by three. Which means it's made up of three thirds, one third is the salary, one third is the overhead, to provide a desk and all the overheads to run the business and one third should be contributing towards profit of the business. That would be, that would be the kind of standards formula that we try and use. Certain clients are bullies, and they bully us, they won't allow us to make profit, so they will only work on two times the salary, but at least we are covering the salary for the individual and we're covering our overheads. Certain other clients are even worse bullies and they're saying, but we can get a programmer or a tester or whatever at whatever the rate is, and they're saying, we're not prepared to pay more than that. We don't like doing business like that, because it's not sustainable. You've got to cover your overheads, who pays for the lights and water, who pays for the desks, who pays to run the business, somebody's got to pay for that. So we don't like to be bullied, but sometimes we do compromise.

RR – OK, thank you for that.

Are there financial implications associated with software defects at your organisation?

BC – There certainly are, the, I'll give you a specific example, in one of our clients, we had direct penalties that are levied against us if we make mistakes. For instance, if specific functionality does not work correctly, for whatever reason, then we do not, the client does not get the income. Then, we have in the past, had to foot the bill ourselves, and they can also levy a penalty against us in terms of service level agreements, because if the release didn't go out on time, the software wasn't performing its function correctly, they can then, there's a formula that they apply which will then

subtract money from us, from future billings, against that particular task that they had paid us for. Or the role that that software is supposed to playing without paying us form, so there are substantial financial penalties that can be levied if we don't get the job working correctly, that's one of the clients. In certain other clients, they are not as mission critical, so we don't get penalised, but we still can lose money. So if a transaction, for instance if we go into fulfilment in the warehouse area, and a transaction goes through at a nil value, it's very difficult for us to recover the impact from that. So, the errors can create financial penalties for us, which is well, we try to avoid that at all costs. And as we move into the virtual world, the fulfilment, our business works of the currency of points, if the currency of points are redeemed for virtual vouchers, the virtual vouchers could be like airtime, or it could be magazine subscriptions, or some kind of electronic voucher, then, and that system doesn't work correctly, then we will be buying goods and selling them for nothing, because we're not getting the related income. So we're not really selling it, we're not getting our money for the sale. If those transactions don't work seamlessly, we can get severely punished financially. Also if staff decide to act less scrupulously, they can play the system, then you could lose money that way as well. So your systems need to be fairly robust and secure.

RR – Perfect, thank you very much for that explanation BC.

And lastly, I think this kind of ties in with what you mentioned earlier on, are there any root cause analysis done on live environment defects in relation to specific development processes at your organisation?

BC – We firmly believe in doing root cause analysis, the IT team don't necessarily like it, because it takes them away from programming work, and, but it's understandable. There is a distinct requirement for root cause analysis, we like to think of it as the fives whys, and if you can, using kind of a branching logic, if you can ask why something happened, and then you ask why when you get an answer, you ask why did that happen, and you get that answer and you ask why again. Once you drill down five levels of why, you can get pretty close to what was the root cause. Quite frankly, often the root cause has got two foundation areas. The one is the brief was not clearly understood by the person receiving the brief, or the, so the brief is one area. So the brief can go wrong where client doesn't know what they're doing, where we don't know what the client is wanting, and the client is not aware of the data, and if client has big data problems, then you're writing a spec that could be, you're writing a spec that be fallacious. It could be wrong because your data is not commensurate with what the thought is. So it's all around the, in fact three areas. The one is the brief, the other is the data, could be nowhere near to what the client believes the data to be, or the person writing the spec believes the data is. And the third one is if we don't test correctly, the testing is at the end f the value chain, so the testing is important, cause it can catch a lot of

things going wrong. And we've spent an incredible amount of time cleaning up client data, and helping our clients, and we've done for the probably the last twenty five years, since we moved into the computer world. We've always prided ourselves in being able to clean the data and help the client to clean up their data, because clients don't necessarily understand the impact of bad data, or a bad brief on the outcome. So we need to very good on having a look at, getting to root cause analysis.

RR – Thank you very much for the explanation BC.

Lastly, thank you very much for your time, for availing yourself, much appreciated.

Interview with GT – 15 August 2016 at 10h00

RR – Good morning, today I will be interviewing GT, who is a Compliance Officer, morning GT.

GT – Morning.

RR – Before we start, kindly confirm that we may record this particular interview?

GT – It is confirmed.

RR – Thank you.

First question, are there any formal software development processes defined at your organisation and which areas do these cover?

GT – There are software processes defined and it defines all areas, all departments, all LOBs, as well as, with specific emphasis on IT, the IT department.

RR – Thank you for that.

Are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

GT – Software processes, there are documents, I'm not sure what IT has, but in terms of quality for ISO certification, all the documentation including templates, processes, workflow charts, they were all recorded.

RR – OK cool, and those are part of governance processes?

GT – It's part of governance, yes.

RR – OK, just confirming that, thank you.

Are there any reviews done during the software development process at your organisation?

GT – Any reviews done, well at the moment and going forward, in terms of continual improvement on the ISO certifications. ISO certification requires that there is an annual review of all processes, which will obviously include software, software testing and software associated.

RR – Cool, thank you

RR – Are there any differences in terms of testing processes depending on the nature of development which was done, such as defect fixes or a new website for a client or any updates?

GT – Sorry, say that again, are there any?

RR – Differences in the testing process dependant on the nature of the development which was done? Example, defect fixes, updates?

GT – Sorry, I don't have a close eye on, and familiar with the software testing processes, so I'm not going to be able to answer that question.

RR – No problem.

OK, are there any root cause analysis done on live environment defects in relation to specific development processes at your organisation?

GT – Although I'm, I do take on the responsibility of root cause analysis, I've never come across, I've never done a root cause analysis on that, not at all.

RR – No problem, thank you.

Are there any retrospective or lessons learnt meetings held after each completed project at your organisation?

GT – That we need to, I'm afraid I also cannot answer, it is part of the PMO system, and debriefings of the full project, I'm sure that that could be of the PMO.

RR – OK, no problem.

Are you familiar with the functionality which is present on the enterprise e-commerce website at your organisation?

GT – No, I'm not.

RR – OK.

How is determined that software is ready to be released to a live environment at your organisation?

GT – I am not, aware of that process I'm afraid.

RR – No problem.

RR – Are you aware of which resources are responsible for software testing, for the software testing process rather, at your organisation?

GT – I know that we employ software testers, that's about it.

RR – No problem.

GT – And their full job function obviously I do not know.

RR – No problem, thank you.

And are you aware, rather are there any systems used at your organisation to facilitate the software testing process? Examples being test case management and defect tracking.

GT – I'm not sure about the defect tracking, there should be, and about test cases, yes, there are.

RR – Do you know which tools are used?

GT – I don't know which tools are used, but I do know that there is scenario testing.

RR – OK cool, thank you.

Are you familiar with any software development methodologies used at your organisation?

Example Waterfall or Agile methods?

GT – I'm aware of Waterfall, I know the concept of Waterfall and Agile, but I do not know if the company actually engages with the approach.

RR – No problem, thank you.

And are you aware of how costs are calculated for software development resources at your organisation?

GT – I'm not aware of that no, no.

RR – No problem, thank you.

Are there any financial implications associated with software defects at your organisation?

GT – Yes, I, because I manage service level agreements, where, what, a specific measure that they call for is release management, and should a release not be deployed effectively and successfully, there are service level penalty, penalties that could be affected.

RR – OK, thank you very much for that.

And also how is it determined that software is ready to be released to a live environment at your organisation?

GT – I'm not aware of the process, I'm afraid, I do not have a close eye on that.

RR – OK, no problem.

I think we've covered pretty much everything from my side, thank you very much GT for your time, and for availing yourself, much appreciated.

GT – OK.

RR - Thank you very much.

GT – Thank you.

Interview with KF – 12 August 2016 at 09h15

RR – Today I will be interviewing KF, who is a Business Assistant (Quality), morning KF.

KF – Morning.

RR – Thank you.

Before we continue, kindly confirm that we may record this interview?

KF – Yes.

RR – OK, my first question, are there any formal software development processes defined at your organisation and which areas do these cover?

KF – Yes, there are, they cover the whole testing process, like in the build area, and then it goes right through to the testing end. You have an all encompassing/overriding process, which has just recently been updated.

RR – Thank you for that KF, I will get that particular information for another area of my research.

KF – OK.

RR – OK, in line with that particular question, are there testing processes, are there any specific testing processes used for the enterprise e-commerce website?

KF – I'm not aware of what the testing processes that are used for the website, because I don't do testing.

I'm not really in a position to answer that.

RR – Which resources are responsible for software testing at your organisation?

KF – We have a testing department, which is headed by yourself, and then we have various testers, and I suppose that they have different duties, or that they possibly do different kinds of testing.

But we do have a department dedicated to that within our company.

RR - Thank you.

Are you familiar with any software development methodologies used at your organisation, such as Waterfall or Agile?

KF – I am aware of them, I don't use them because I don't do software development, but I have heard of some of those things.

RR - Thank you.

Are you aware of any reviews being done during the software development process at your organisation?

KF – I think that there is a process if I'm remembering correctly, that there is a point after the testing where it does get reviewed, and then the decision gets made to either go live, or to rollback, or to fix.

So, at some point, there are reviews that get done before it gets made live.

RR – OK, just tying in with that particular question, so how is it determined if software is ready to be released to a live environment at your organisation?

KF – We have various management review meetings that takes place on a daily basis, on a weekly basis, so I think the whole process is very well monitored in various arenas. It's being done by project management, and they have various kinds of meetings. I think there's always at some point a group of people who are the stakeholders that get together, and that decision is made.

RR – Thank you for that.

Also, are there any retrospective or lesson learnt meetings held after each completed project at your organisation?

KF – I think that again the project office does look at the project once it is completed, especially if there were issues along the way, or the end product was not exactly what we wanted to start off with. They do review these things. One thing I did pick up in this whole process of updating everything, RB mentioned that he feels that sometimes the briefs, when they actually start to do the coding, is where it sometimes it needs to go back to, and often it just goes back to the testing section, but the mistake was made way before that. To go back and make those people retest something, sometimes is not actually the right point to actually go back to, and he feels that sometimes you should go back to where you actually get the brief and people code. I don't know, I

going to investigate that more next year with our company. Continuous improvement initiative for our ISO, but that's just something that I've heard and picked up.

RR – Thank you very much for that.

Are there any root cause analysis done on live environment defects in relation to any specific development processes at your organisation?

KF – I'm not sure so much on the development, so I think it's now more when something does already go wrong in the live environment. But, and also, it's very much on one campaign at the moment, but I have also made that suggestion to GT, and it was something that was an observation in our ISO certification this year that they mentioned. We need not only just do it for one piece of work, like a specific business or whatever, we need to have a full register, and it needs to be something that we can still divide up. I suggested to start a tracker we you can categorise it according to client or whatever, but to have a clear view onto all the non-conformances. Not only the ones for a specific client, or the ones for this or for that, so I think she is going to start looking at it a little bit more holistically next year. Instead of just focusing on that one trend, because, you know, it's not the way to do it. We need to look at all of them, but she does do RCAs, but I think it's not so much on the development, it's more on the live environment and when something has gone wrong.

RR – Thank you.

KF – I'm sure GT will be able to give you more detail on that.

RR – I will be chatting to her on that.

KF – OK.

RR – And just to line up with that particular question, are there any governance processes in place at organisation to ensure that software development processes are adhered to?

KF – We do have a software policy, but that is more relating to the kinds of software that we're allowed to install and keep on our systems. I don't really know that there is, there are various IT policies, I'm not familiar with all of them to be able to answer that, but I have the feeling that there isn't.

RR – Thank you very much for that.

OK cool, just coming back to the e-commerce website functionality, are you familiar with the functionality which is present on the e-commerce website at your organisation?

KF – No.

RR – Thank you

Which e-commerce website functionality is deemed to be critical and what are the testing processes around these?

KF – I don't really know, but I know when it comes to testing there's various kinds of testing that gets done in any kind of environment. You're the test lead, whatever it is, I'm not able to answer that part.

RR – Are aware of how costs are calculated for software development resources at your organisation?

KF – I have been involved in costing policy, which is done by our cost account, there's various tables and formulas that they use to do these things. I'm not intimate with them, but I am aware that there is very well thought out costing model and it does get applied.

RR – Thank you.

Are you aware of any systems used at your organisation to facilitate the software testing process, example for test case management and defect tracking?

KF – Yes, I am, can't remember what the name of it now, it's something that you guys use to log all your stuff. Is it con...?

RR – That would be Confluence, but that's not used on the testing side.

KF – OK, I thought that was a tool that you guys used in your environment.

RR – They use it for one of the business units, but to answer your question it's MantisBT and Testlink.

KF – OK.

RR – They are on the process.

OK cool.

KF – Yes, actually I have seen, I had to update it with Mantis this year, it was something else before, but now it's Mantis.

RR – Thank you.

Are you aware, rather, are there any financial implications which are associated with software defects at your organisation?

KF – I'm not so sure on the actual software defects, but if something is not working correctly, you do have financial implications. Especially with some of our clients where there's RAG reports and

things like that. But obviously a mistake in testing and going live, there's always a cost involved. So ja, I'd say there is.

RR – OK cool.

And then lastly, are there any differences in testing processes dependant on the nature of the development that's done? Examples are defect fixes, updates, or a new website for a client?

KF – I don't think that I'm close enough to that kind of work to be able to answer that really. But I think that the way we test is always done, there's certain things, tick boxes that you have to go through and are always done. But ja, I think probably you could answer that better.

RR – I think we've covered all of the questions from my side, thank you very much for availing yourself.

KF – OK , no problem.

RR – I'll get you feedback as soon as I can next week.

KF – No it's fine.

RR – Thank you very much.

iv) Project Management Office:

Interview with EH – 16 September 2016 at 13h20

RR – Good afternoon, today I will be interviewing EH, who is a Project Manager

Good afternoon EH.

EH – Hi.

RR – Thank you.

Before we continue, kindly confirm that we may record this particular conversation?

EH – Yes, that's fine.

RR – Thank you.

First question, are there any formal software development processes defined at your organisation and which areas do these cover?

EH – Yes there are, testing, all development, what kind of thing are you looking for? All software processes?

RR – Thank you for that.

Are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

The online mall, the catalogue?

EH – Yes.

RR – Which e-commerce website functionality at your organisation is deemed to be critical, at your online mall?

EH – Which functionality, in development?

RR – Which functionality on the e-commerce website do you think is the most critical?

Whichever you understanding is.

EH - The viewing of products, payments security, and, like the fulfilment part, those.

RR – Perfect, thank you.

Discuss your understanding of the testing processes used for the enterprise e-commerce website?

EH – OK, so from the experience that I've had, basically there's from a build phase functional testing, and then end to end testing, but then there's also once it's live certain bugs that are picked up, which get logged in a Tracker queue. We basically prioritise all of those and pretty extensive testing as follows the whole SDLC approach, ja that's pretty much, it that fine?

RR - Is that your understanding, thank you.

Just in line with what you mentioned, are there any differences in the testing process dependant on the nature of development which was done, such as defect fixes, updates to a website or a new website?

EH – For the catalogue particularly?

RR – Would there be any differences?

EH – Not really, except for the fact that when it's live, then defects have to be fixed immediately, so they just kind of step up on the priority list.

RR – OK, which resources are responsible for the software testing process at our organisation?

EH – RR.

RR – Is it a specific person or team?

EH – The testing manager or the tester that's been allocated, depending.

RR – OK, thank you for that.

Are you familiar with software development methodologies used at your organisation, such as Agile and Waterfall, and their respective impact on the testing process?

EH – Yes.

RR – Anything specific, which ones are you familiar with?

EH – Both, we use both Waterfall and Agile, they fulfil a different need, it depends on which approach we've chosen to take.

RR – OK, so what would the impact be on the testing process?

EH – On the testing process, well I guess the Agile one the tester will be involved right from the beginning, because it's an iterative process and we test right from the start, whereas the Waterfall one we wait until development is completed and handed over from the developer and then they will test at the end.

RR – OK, thank you for that.

Are there any systems used at your organisation facilitate the software testing process, such as test case management and defect tracking tools?

EH – Yes, there Mantis and ja, we also put a lot of test cases into Testlink, those are the two that I'm aware of. And there's also the software to record the bugs.

RR – OK, thank you for that.

Are there financial implications associated with software defects at your organisation?

EH – There definitely can be if, if it's not tested properly, there can be huge implications on that.

RR – Any specifics around that?

EH – It's very hard to say now, but for example say the catalogue, e-commerce site doesn't work, and payments aren't going through successfully, there could be a loss of revenue or it could be the other way around, which sees that there could be reputational damage for example. That's just on an e-commerce site, but it could also be on the development side that failure to pick up issues in the development could result in a flawed product, which has similar financial and reputational implications.

RR – OK, thank you very much for that.

Are reviews done during the software development process at your organisation?

EH – Yes, some projects are more stringent than others.

RR – OK, and how is it determined that software is ready to be released to a live environment at your organisation?

EH – When the testing reports have been completed, that all coverage and clearances are at its highest point. Ja, and then there's documentation that is completed to actually state that the testing has been completed as per the test case packs supplied.

RR – OK, thank you for that.

Are there retrospective or lessons learnt meetings held at your organisation after each completed project?

EH – Once again, it also depends on the project, but yes they are, the formal processes they definitely is and should be, on all the projects I've worked on there have been.

RR – OK, thank you.

Is root cause analysis done on live environment defects in relation to specific development processes at your organisation?

EH – Yes.

RR – Are there any governance processes in place at your organisation to ensure that software development processes are adhered to? Similar to the previous question.

EH – Ja.

RR – Specifically from a governance perspective?

EH – Not so much, they are in place, but it really depends on the client requirements how hard that governance is enforced.

RR – And lastly, how are software development resource costs calculated at your organisation?

EH – Dependant on the person's salary, are you talking internal or how we bill the client?

RR – For both, how is determined?

EH – I'm not sure how, from what I understand, that I know, I don't believe that our software testers are paid exceptionally high on the scale, obviously depending on level of seniority. In terms of what they are billed out to client, it's dependant on what they earn, we have a standard rate basically for testers, so it's taken at an average, it is based on the average earnings.

RR – Does that apply to all resources, such as analysts, developers?

EH – I don't believe it does, my personal view, the software testers perform a critical role, they should maybe be paid slightly more to be in line with their development and IT knowledge.

RR – Thank you very much again for time and for availing yourself, much appreciated EH.

EH – Cool.

RR – Thanks.

Interview with JH – 22 August 2016 at 07h15

RR – Good morning, today I will be interviewing JH, who is a Project Director.

Good morning JH.

JH – Good morning.

RR – Thank you.

Before we continue, kindly confirm that we may record this particular conversation?

JH – No problem, you may.

RR – Thank you.

First question JH, are there any formal software development processes defined at your organisation and which areas do these cover?

JH – Yes, as far as I know the processes have been formalised, or have been described as formalised. The areas I see we are struggling is definitely capacity, capacity to test, I think the other area we're struggling with is the developers not being available after they've done the initial development, to fix things after it has been tested. That impacts the testing capacity again, and also it's difficult with regards to scheduling testing, and I think that everything you know goes into a bottleneck, and then that impact even the go live. There is another one, I do believe that it's a capacity thing again, it would have been better if we had had a manager of the testing area who had more time to actually just manage the resources, and not become involved with testing as well, and also having enough resources to managed.

RR – OK, thank you for that.

So there were a good couple of areas that you tied into, so are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

JH – As far as I know, I don't know.

If you say governance processes just, is that maybe, just give me an example of that?

RR – Say something from a, like a legal perspective, or any overarching structures or processes in place to make sure that people do what they're supposed to do, because there could be ramifications down the line, for not doing what you're supposed to be doing?

JH – I don't know.

RR – OK, thank you for that.

JH – No problem.

RR – And also, just in line with what you mentioned initially, how is it determined that software is ready to be released to a live environment at your organisation?

JH – I think it's testing that says that it's done, the test cases have been completed, if they have done test cases, and they basically say that it can be released. Then the infrastructure is set up as far as I know, there's some kind of release process and then it's released.

RR – OK, thank you for that.

Are reviews done during the software development process at your organisation?

JH – If you talk about, testing the reviews, or testing the quality of the code while it has been developed, I am not sure if that's really done, like 'buddy buddy' testing, that type of development testing. Sorry, the rest of the question?

RR – So it's just, so just throughout the process, are there any reviews, it could be from any particular phase, could be analysis, could be development, could be testing, but just reviews throughout the development process?

JH – Right, starting at the, the start of the development process, if a functional spec has been developed, then that is being reviewed and signed off. After that it's more IT development prerogative how they manage technical specifications, and I think there's, you know, the documentation and the review of that is not very formalised, it just happens and sometimes I don't think it happens. Testing itself, I'm not sure how well we review the test cases, and the fact that it has been tested, and that we keep those records to actually go back, that is as far as I know.

RR – OK, no problem, and thank you for that.

Are root cause analysis done on live environment defects in relation to specific development processes at your organisation?

JH – I know that, as part of the programs on a specific business unit, if there is a problem, there is a root cause analysis format to be followed, it happens on that side, I do not believe that it's happening at the rest of the business.

RR – OK, perfect, thank you.

Are there also any retrospective or lessons learnt meetings held after each completed project at your organisation?

JH – In, with regards to some projects, yes, it's actually part of the project management process, to actually have a review, a number of reviews have taken place, but it's not properly formalised at this point. It needs to be improved.

RR – OK, thank you for that.

So the research is centred on the e-commerce domain, so, with regards to that, are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

JH – I know what we have payment solutions, we have, a website, we have a catalogue, yes, I am aware of it.

RR – OK, and which e-commerce website functionality is deemed to be critical?

JH – Well, I would say that it's critical that the money process is followed correctly, that payment is properly allocated, that, ja, that points are properly allocated, that it's properly reconciled, that there's no margin for error.

RR – OK, thank you for that.

And what are the testing processes used for the enterprise e-commerce website?

JH – I guess it's the normal IT software testing processes, I can't that there will be other processes followed that the normal processes.

RR – OK, thank you.

And which resources are responsible for the software testing process at your organisation?

JH – The testing resources are responsible to test, we should have, as I said earlier, development testing as well, I think the developers are basically testing their own code as they go along, which is not the best way of doing that, but I know after that the test team is responsible to test all software.

RR – OK, thank you.

Are there any differences in the testing processes dependant on the nature of development which was done? Example defect fixes, updates or a new website for a client.

JH – I can only guess them, I do believe that some things are more rigorously tested than others. I do believe that big releases, like for example a specific business unit, is in all probability tested better, because, you know, it goes live and there's a problem, there's much bigger impact on the

relationship with the client, as well as the participant, whereas I believe with smaller fixes for less critical systems, are probably tested less, and then maybe at some levels it's not really big before it's released.

RR – OK, thank you.

Just in line with what you mentioned, are there financial implications associated with software defects at your organisation?

JH – There's always a financial impact, with any defects you get. The earlier you can pick up the defect, the cheaper it is to fix it, the later you pick it up, the more expensive it is to fix because then it needs to actually go back through the development lifecycle. Yes, there's definitely an impact on that, with regards to a specific program and its service level agreements, there's a huge impact if testing has failed and we are releasing defective software.

RR – OK, perfect.

Also, are you familiar with software development methodologies used at your organisation? Example being Waterfall and Agile methods?

JH – I have an understanding of Waterfall and Agile yes, I do understand that with Waterfall, the testing is scheduled over a very specific period after the development, whereas with Waterfall things happen concurrently with smaller development modules.

RR – With Agile you mean?

JH – Ja, Agile, and being released.

RR – OK , cool.

And, at your organisation, which ones are being used?

JH – We are currently using both.

RR – OK, thank you.

Are there any systems used at your organisation to facilitate the software testing process? Example for test case management and defect tracking.

JH – I guess there is, I know that they have a very specific system, I can't remember the name where tests or defects are actually logged, in order for the developers to fix it, and then release back to testing. I don't have the detail of the processes and the systems.

RR – Perfect, thank you.

Last question, are you aware of how costs are calculated for software development resources at your organisation?

JH – We are developing cost estimates for all our internal and external programs. How good we do that, how standardised that is, is a question, I do believe that it's not that scientific.

RR – Thank you very much for that.

Those are all the questions from my side, thank you very much for your time and for availing yourself this morning JH, much appreciated.

JH – Thank you.

RR – Keep well.

Interview with LB – 24 August 2016 at 10h00

RR – Good morning, today I will be interviewing LB, who is a Senior Project Manager

Good morning LB.

LB – Hi there.

RR – Before we continue LB, kindly confirm that we may record this particular conversation?

LB – You may.

RR – Thank you.

First question from my side, are there any formal software development processes defined at your organisation and which areas do these cover?

LB – Yes there are, from a software, IT client and we have IT web, and obviously enterprise, that I'm aware of, and infrastructure.

RR – OK, thank you.

And are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

LB – That I don't know, I'm not aware of that, there should be.

RR – OK, thank you very much for that.

Are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

LB – No, I'm not.

RR – OK, thank you for that.

Also coming to the software testing process, which resources are responsible for the software testing process at your organisation?

LB – I believe the developer, as well as the tester should be responsible.

RR – OK, thank you for that.

And are you familiar with software development methodologies used at your organisation, such as Waterfall and Agile methods?

LB – Yes, but not in great detail.

RR – Thank you for that.

Are there any reviews done during the software development process at your organisation?

LB – It's in the process, there should be, handovers and midway reviews, but I don't know if these are being managed.

RR – OK, thank you very much for that.

How is it determined that software is ready to be released to a live environment at your organisation?

LB – How it determined? Normally when test are signed off or user acceptance testing is signed off, before a go live is made.

RR - OK, thank you for that.

Are there any differences in the testing process dependant on the nature of the development which was done? Such as defect fixes, updates or a new website for a client?

LB – I believe it should be standardised, but it depends on the budget, resources and time available, how much testing is done.

RR – Perfect, thank you for that.

And are there any systems used at your organisation to facilitate the software testing process, such as test case management and defect tracking?

LB – I don't know the official names, but there are.

RR – OK, thank you for that.

Are there any retrospective or lessons learnt meetings held at your organisation after each completed project?

LB – There should be, but obviously this also depends on the size of the build, but is something that's in the account management or the build process. There should be lessons meeting after each completed build, but whether it's formal or not is up to the build.

RR – OK, thank you for that.

Are there any financial implications associated with software defects at your organisation?

LB – Financial implications yes, both in terms of resources and availability, whether or not there's time to do it, I would say there are, but it's not formalised.

RR – OK.

And are there root cause analysis done on live environment defects in relation to specific development processes at your organisation?

LB – Client specific, I don't think it's, complete RCAs are actioned for everything, but mainly for the bigger clients, where there is a financial implication.

RR – OK, thank you for that.

Also, are you aware of how costs are calculated for software development resources at your organisation?

LB – Yes, I am.

RR – Is there anything you want to elaborate specifically around that?

LB – I know that the budgets are determined, I don't believe that we've got a tight enough control in terms of actually managing the cost of the development, because it's costed upfront, and often at the time of costing we are not aware of what development is required. Therefore what we bill client may be a lot less than what it's actually cost us, but do have recons and reviews after every build.

RR – OK, thank you, that's everything from my side, thank you very much for time and for availing yourself LB.

L B – Pleasure.

RR – Much appreciate.

LB – Great, thank you.

v) Supply Chain:

Interview with CN – 19 August 2016 at 09h15

RR – Good morning.

Today I will be interviewing CN, who is a Graphic Designer.

CN – Morning.

RR – Before we start, would you kindly confirm that we may record this particular conversation?

CN – Yes you may.

RR – Thank you.

First question, are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

CN – Yes, I think so.

RR – Thank you.

Which e-commerce website functionality is deemed to be critical?

CN - Critical functionality, well, I'm a designer, so from a design standpoint it has to be easy for the customer to handle, like to actually go through and understand, to through it, what is the word?

RR – Navigation.

CN - Yes, the navigation, ja, the navigation should be easy enough for the customer to understand, that I know.

RR – Anything else that you can think of that's critical functionality for the e-commerce website?

CN – Well, that links are linking correctly, that as soon as you actually go onto the homepage you know exactly where to go, what to do, what the company is about, instead of going there and thinking to yourself: "OK, what do I do now, what is this company about". Everything must be clear with regards to, from a customer stand point you know, they must know exactly where to go and what the company is about from the first view.

RR – Perfect, thank you.

RR – What are the testing processes used for the enterprise e-commerce website?

CN – The testing processes, my goodness?

RR – Just from, what your understanding would be?

CN – Of testing the website?

RR – Specifically around the enterprise e-commerce website, what the testing processes would be?

CN – That everything is linking correctly, that customer's money is not stolen, we don't want that. That there is no fraud, I don't know, from a testing standpoint?

RR – Correct.

CN – Just making sure that everything is where it should be.

RR – Which resources are responsible for the software testing process at your organisation?

CN – Resources?

RR – Yes.

CN – You guys.

RR – Who's 'you guys'?

CN – Oh, the software testers.

RR – OK, thank you.

Are you familiar with software development methodologies used at your organisation? Examples being Waterfall and Agile methods.

CN – No.

RR – Thank you.

Are any reviews done during the software development process at your organisation?

CN – Reviews to the software testers, for the software testers?

Or just reviews, are there reviews?

RR – Just in general?

CN – Yes.

RR – Thank you.

And are there any differences in the testing process dependant on the nature of the development which was done? Example defect fixes, updates.

CN – Can you say that again, that went right through me?

RR - Are there any differences in the testing processes dependant on the nature of development done. Example being defect fixes, or updates or a new website for a client.

CN – Yes, there has to be.

RR – Thank you.

Are there any formal software development processes defined at your organisation?

CN – Formal software development processes, yes.

RR – Thank you.

Are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

CN – I'm guessing yes, because I mean, that should, we're a big company, so you'd assume that should.

RR – OK.

Are there any systems used at your organisation to facilitate the software testing process? Example for test management and defect tracking.

CN – Are there processes put in place or what?

RR - Are there any systems used at your organisation?

CN – Yes.

RR – Do you know what these systems are?

CN – No, but I'm pretty sure there are systems.

RR – No problem.

Are there retrospective or lessons learnt meetings held at your organisation after each completed project?

CN – After?

RR – Yes.

CN – Sometimes.

RR – Thank you.

CN – Most times, no like all the time, just like, aye, we're done, let's celebrate.

RR – Perfect, thank you.

Are root cause analysis done on live environment defects in relation to specific development processes at your organisation?

CN – Yes, if ask what they are I'd probably be a bit lost.

RR – OK, thank you for that.

Are you aware of how costs are calculated for software development resources at your organisation?

CN – No, but I would actually like to know, can you tell me?

How do they actually measure that?

RR – We can discuss this after the interview.

CN – OK.

RR – Are there any financial implications associated with software defects at your organisation?

CN – Yes.

RR – Lastly, how it determined that software is ready to be released to a live environment at your organisation?

CN – Like how did it get tested?

RR - The process.

CN – Can you repeat the question?

RR – No problem, how is it determined that software is ready to be released to a live environment at your organisation?

CN – Like testing the hell out of it, well like testing, a lot.

Do you guys perhaps, OK, sorry, I shouldn't really ask this question?

RR – Go for it.

CN – But, say for example one software tester tests the software right, and then another tester tests the software after this? The same software that the previous one tested in order for it to be right?

RR – It depends, depending on the scope of work, multiple people might test different areas.

CN – OK.

RR – We do advocate also that the person can review what the other person has also done in terms of what was covered.

CN – I'm actually unsure if, you know, what is process is when the software goes live, like, ja, I can't actually, I don't know that one. Like, you know, the go ahead, the approval of the software, I don't know if it's actually been tested by many people, if, you know, goes down the line, kind of like a brief, that's it, finished, and then it's down on the system to be shown.

RR – I think that's all the questions from my side, thank you CN for your time.

CN – Hopefully it helped hey.

RR – No problem, you answered the questions to the best of your understanding, keep well.

CN – You too.

Interview with DL – 15 August 2016 at 15h00

RR – Good afternoon.

Today I will be interviewing DL, who is the Supply Chain Manager.

Thank you for making yourself available DL.

DL – No problem.

RR – Before we start, DL would you just confirm that we may record this particular interview.

DL – Yes you may.

RR – Thank you.

First question, are familiar with the functionality present on the enterprise e-commerce website at your organisation?

DL – Yes I am.

RR – Which e-commerce website functionality is deemed to be critical and what are the testing processes around these?

DL – I think probably the most critical is the search functions, the way things are displayed, and then checkout process. As for the testing process behind each, I know that it goes through various stages of testing before it reaches myself and my team, and we do user acceptability testing, and from there anything goes to either back into a bugs queue or it gets made live.

RR – No problem, thank you.

Who are the resources who are responsible for software testing at your organisation, are you aware of these?

DL – So within the IT team there is a testing team, my understanding is that RR heads the team along with ADJ, and then I'm not sure who else is in the team, I know there's been some new faces.

RR – Thank you.

Are you by chance familiar with any software development methodologies used at your organisation, such as Agile or Waterfall methods?

DL – I know there's been a lot of talk around using Agile methodology, but more than that I really don't have any sight of.

RR – No problem, thank you.

Are there any reviews done during the software development process at your organisation?

DL – As far as I know yes, again I'm not familiar with the process or approach that they make use of, my understanding is yes definitely there would be.

RR – Are there any differences in the testing process depending on the nature of the development which was done? Say for example there was defect fixes, updates or a new website is created for a client?

DL – I really don't know, I'd like to think so, but I actually don't know.

RR – OK, no problem.

Are there any root cause analysis done on live environment defects in relation to specific development processes at your organisation?

DL – Yes, there are failings I know root causes are done, specifically when it's something that's either had a bottom line impact or a direct impact on a client site, or ability to function.

RR – OK cool.

Just tying in with what you last mentioned, are there financial implications associated with software defects at your organisation?

DL – Yes, potentially, I think it depends client to client, we do have relationships where downtime or non functioning software of any kind, depending on how long it takes us to rectify the situation, we can incur financial penalties. That and aside from the obvious potential loss of income where you know an e-commerce site were to be down, you losing sales every minute your site is not functioning.

RR – OK perfect, thank you.

Are also aware of how costs are calculated for the software development resources at your organisation?

DL – Honestly, no really, I imagine there's a mark-up on labour, other than that I really don't know.

RR – No problem, thank you.

Are there any systems used at your organisation to facilitate the software testing process? Example test case management and defect tracking.

DL – I'm pretty sure we have a defect tracking thing, I'm pretty familiar with Mantis, I dunno whether it's specifically for bug tracking?

RR - That is correct what you said.

Are you aware if there are any formal software development processes defined at your organisation and which areas do these cover?

DL – It's one of those that I'd like to think so, but I really don't know whether the processes have been formalised, and if so, which areas.

RR – OK.

And another one, are there any governance processes in place at your organisation to ensure that software development processes are adhered to?

DL – Sure, another I'd like to think so, but I've never been involved in the IT build team, I really don't know what the formal side of the processes are. I merely see the outcomes for the most part.

RR – OK, thank you.

Lastly, how's it determined that software is ready to be released to a live environment at your organisation?

DL – Where I've been involved is invariably is a sign off process, so if something was being built it get treated as a project, and response of the owner and the customer thereof would all sort of agree and signoff that what is delivered meets the original scope or brief.

RR – Perfect, thank you.

Lastly, thank you very much for your participation and your time and much appreciated. Thank you
DL.

DL – Pleasure.

Interview with JW – 18 August 2016 at 14h00

RR – Good afternoon, today I will be interviewing JW, who is a Product Specialist / Buyer.

Good afternoon JW.

JW – Hi there.

RR – Thank you.

Before we start this particular interview JW, kindly confirm that we record this particular conversation?

JW – No it's fine, you can.

RR – OK, thank you.

First question, are you familiar with the functionality present on the enterprise e-commerce website at your organisation?

JW – Ja, we actually help a lot with the testing of all of the functionality, the reason for that is a lot of the functionality actually comes from us, it gets briefed from us as users of the system. We take our briefs from best business practice, so ja, we are quite familiar with it.

RR – OK, thank you.

Which functionality, e-commerce website functionality is deemed to be critical?

JW – Which functions?

RR – Yes.

JW – There's quite a few, if I work from a customer's point of view I would say the most important thing functionality speaking would be how the site presents itself. So, when I first enter the site, do I know where I am, does the site give me a clear indication of what it's about, and the next thing would be my categorisation of what I'm selling. Is it categorised in a clear manner that makes sense, are people going to be able to find within the categories what I've specified what products I'm selling. The third thing is search functionality, so if I type a certain term in, is this search algorithms or the search terms been implemented going to pick up what I'm looking for, and if it can't find what I'm looking for, is it going to have some sort of algorithm that's going to try and pick up like products. What next, I've searched for it, found it, the next one would be adding products to a wish list or a trolley, is it clear that its added items, and is it showing what its added in a clear manner that makes sense. The next thing would be, I would imagine the comparisons, so on a lot of websites I'd be, especially from searching for technical products, is there an ability for me to compare what I think is good with other type of products in that same category, an example would be TVs. The next thing would be the checkout process, so that's probably the most difficult one to get right, because what is correct way to checkout. Obviously it needs to be quick, because I found what I'm looking for, I just want to pay and get it over with, but there's lots of other little functions within the checkout process that have to make sense and be easy to follow. So most guys are using a single page checkout process, the ability to redeem coupons or vouchers, to lessen the price of my basket, delivery options like do I want to deliver same day, next day and pay a premium

for that. Is it easy to enter my credit card details, and does the site communicate to me if these credit card details are being stored or not. The next thing would be confirmation orders, so entering in my email or my cellphone number to get confirmation of the order being processed, does that come through in a clear manner. And then a final confirmation on the site, to say this is what I ordered and when I can expect it.

Think, the one thing that I missed was payment methods, so am I being presented with options, different options, to make my payment. So I mentioned one which was coupons, the next one would be credit card, debit card, Diner's Club, you know, Ebucks, you know all those different options. I think those are probably the main areas of functionality.

RR – OK cool, thank you very much for that explanation JW.

What are the testing processes used for the enterprise e-commerce website?

JW – So when we get a, whether we briefed it ourselves, do we implement it or whether the brief has come from somebody else in another team, or even outside of the company, the first thing would be to test functionality based on what the brief stipulated. So, can't think of any examples off the top of my head, but if there was something wrong with checkout process and that was a functional thing that had to change, has it changed as per the brief, and has that functionality been implemented. The next thing would be user acceptance testing, so even though, because not all briefs are correct, sometimes somebody will brief something in, and yes it will work, but it doesn't necessarily make sense anymore.

Maybe in having to change something on the site, something else is broken because of that, or now all of sudden that process has changed to such a degree that it no longer makes sense. So we do user acceptance testing as well, and then the final phase of testing is just polish, so once the iterations have gone back between IT and ourselves, and everybody's happy, there a final test on live server to make sure that not only is the functional part of the brief working, but does it all fit together with the other aspects of things that it touches. Make sure nothing's broken.

RR – Thank you very much for that.

Which resources are responsible for the software testing process at your organisation?

JW – We have a team of testers, we've got enterprise testers which look after testing our internal systems, and then we've also got, I suppose client testers is what they're called, client software testers, anything that's going to be shown in the public or for client specific need. And then what we've got in our team are certain individuals that are very close to how the IT functionality of our site works, that would go in and do testing to make sure that not only is it showing correctly from

an outside point of view, but how does it affect us internally. So are we still able to do the same things with the site, so we've probably got, I would say three separate types of testers that look for different things along the way.

RR – Thank you very much for that.

Are there any formal software development processes defined at your organisation and which areas do these cover?

JW – Software development, I would say ja, we definitely do, from a design point of view we've got guys that use the Adobe suite products, from a web development point of view we've got guys that use, you got to use the languages that are out there, so like HTML5, PHP and all those guys. So they definitely have formal training, and formal software packages that they use. From a systems point of view, our databases are obviously SQL, so there's definite formality there, in terms of the structure of the data, the structure of the queries. And then the two teams have to work quite closely with each other to make sure that what's been shown on the web is what's actually being pulled out of the data. Ja, there's definite formal packages that involved, formal software solutions. There is a fair amount in saying that of software that we develop ourselves that isn't off the shelf solutions, so we will build packages aimed at specific enterprise needs internally, and that's where the enterprise testers come in, and you know the system architects and things like that, to make sure that that works for us.

RR – Just to elaborate on the question, just from a process perspective, are there formal software development processes defined?

JW – Oh, just from a process point of view?

RR – That was the question.

JW – Ja, there definitely is, we've got processes for everything, testing and software development is definitely high up on the chain with that. Nothing should ever go live, or even be worked on, without it meeting a specific phase, or is it in a process.

RR – OK, if you can elaborate on what you mentioned earlier, how is it determined that software is ready to be released to a live environment at your organisation?

JW – So we've got a signoff process, so in some cases we've got a five signature signoff, sometimes it's more, it depends on what the brief was and how many people it touched. Sometimes you'll have a pretty basic brief, something is broken, maybe there is a software developer that's involved, maybe a web developer and a testing person. So then there would only be three people that would actually be testing it, and it doesn't affect areas of the website or organisation, such as

design, or changing processes, it's just a quick fix. For more elaborate things, like when we're building a website you might even have as many as twenty people signing it off, because there's vast scopes of work that are happening in different areas of the business, affecting different areas of processes, that have to be signed off by the process owners, by the people not only doing the work, but the testers and then the end user acceptance testing as well. So, it really depends on how many areas are being affected by the work being done.

RR – OK, thank you for that.

Are there any governance processes at your organisation to ensure that software development processes are adhered to?

JW – Not actually sure, but I know, I don't know if this relates to it, but on governance level with regards to the design of the site, there's definite involvement from a corporate identity point of view, as well as legalisation around elements that we are allowed to use. So for instance, we can't go out and Google logos and use them, we have to issued with specific logos for specific clients, specific imagery that has to be used. From a software development point of view, I'm actually not sure if there's legal governance, I would imagine that there is, at a generic level, but from what I've been involved with nothing at client specific. Oh wait, one of the programs would have had a lot of that, so all of the development that took place for that site and for that program, it had to meet certain governance levels within the client's scope. So, we weren't allowed to go out and develop anything without them checking it, and them checking that it met with their own corporate governance. So ja, I would imagine that a lot of it happened on a specific business unit at this organisation, not too much on the other business units possibly, but that's just my thought.

RR – OK, thank you for that.

Are there any reviews done during the software development process at your organisation?

JW – I think in terms once something has gone live, I don't actually know if there's a formal review to make sure that what was working six month ago is still working, that I've been involved with. I think most of the time it's on continual improvement, so maybe something that did makes sense six months ago doesn't anymore, because trends have changed or whatever. So when we would brief in a change for that, I don't know if there's an actual review process where we go through what we've built to make sure if it still makes sense.

RR – So that, so just to clarify the question again, are reviews done during the software development process at your organisation? That's the question.

JW – During, I think that they are, but I'm not convinced that it happens often enough. The reason that I say that is because we got sort of one team, that builds everything, even though they're divided up into client focused and enterprise focused, sometimes the lines can get crossed. So what happens during our development cycle, two people could be involved in the build of one project, and then priorities change. They get pulled off and put onto another project, and then go back onto the old project, I think they just continue. They would probably get guidance from whoever briefed in the work to check on the priorities and if that's still required, but I'm not certain if during the actual production if there's enough reviews to, you know, to warrant is this still necessary. Although, having said that, there have been a couple of occasions where work is paused, priorities have changed, we've come back to it and the question has been asked, do you still need this. You know, because a couple of months have passed, so don't know if that's what you looking for?

RR – It was the just of my question, so thank you for that.

And also, are there any retrospective or lessons learnt meetings held after each completed project at your organisation?

JW – I know that we do have meetings, like a handover meeting once the build has been completed, once everybody has signed off, to showcase, you know, what the product is. In some cases we've had systems built to address specific needs, and we have a handover meeting to hand it over to the team, teach them how the system is used. I don't, I haven't been involved in any situations where reviews have happened in that case, and you know, lessons learnt like that did this build do to us as a team, you know. Did we learn anything from it in terms of how we can do things better, how we can build other projects. I think if those were done it would be mostly within the IT space and we wouldn't be involved, because from our point of view it's really just a brief something, check on the progress, make sure that it's still needed, still required, follow up, do the training and then handover.

RR – OK, thank you for that.

Are you aware if there are any differences in the testing process dependent on the nature of the development which was done? Example being defect fixes, updates or a new website for a client.

JW – Do you mind reading that again?

RR – No problem, are there any differences in the testing process dependant on the nature of the development which was done?

JW – Yes, I know that that does take place, obviously you got to test for different things, so sometimes with a new product that's been built, it goes through different phases of development, so

you would test for functionality, you would test for redundancies, you would test for if what has been done so far is going to be able to go to the next phase. So from a coding point of view you have to check, you know, the integrity of the coding being used. If you're using an off the shelf solution, you going to have to make sure that there's nothing in there that's going to affect, you know security for instance, so you're going to test for different things. When it goes to design, then obviously you test for the integrity of the design, can it hold up in different platforms, different screen sizes, you know that kinda thing, responsive design is an example. So you're not going to look at the coding that much necessarily, you going to be looking more on the front end stuff. The fixes might relate to changes happening in the coding, but it would be probably a different platform, it would be database orientated for instance. So ja, I definitely know that there are different phases of testing that happen throughout the process.

RR – OK, thank you for that.

Are there any systems used at your organisation to facilitate the software testing process? Example test case management and defect tracking.

JW – Ja, we've got a couple that we use. I can't recall the names because I don't actually log any tickets in them, but I know of about three systems that have been used in the time that I've been here. Actually four, four systems that we've used for the logging and testing of cases and bugs and things like that. Like I said, I don't get involved too much with them, but I do know that they do exist.

RR – OK, no problem.

Are there any root cause analysis done on live environment defects in relation to specific development processes at your organisation?

JW - I don't know.

RR – No problem, thank you for that.

And are you familiar with any software development methodologies used at your organisation? Example Waterfall or Agile methods.

JW - I don't know.

RR – OK, no problem.

And are you aware of how costs are calculated for software development resources at your organisation?

JW – Not at all no, not an area that I get involved in.

RR – No problem.

Lastly, are there any financial implications associated with software defects at your organisation?

JW – Ja, absolutely. Depending on what the software is, or the solution that's been built, if that is either delayed, it may have a financial implication to our clients, which will obviously affect us.

RR – Specifically, sorry to break your word, specifically on the software defects side of things?

The financial implications associated with software defects specifically?

JW – Ja, if we have a campaign that's using a system and that system goes down for whatever reason, and they aren't able to use it, that could have multiple delays with a financial implication. Either a complete loss, or a fix that's going to cost more money or just a delay. So ja, it could definitely happen.

RR – OK cool, thank you.

I think I've covered everything from my side, thank you very much for your time JW and for availing yourself, and thank you very much again.

JW – Cool man, no problem.

RR – Thank you.

Interview with NO – 17 August 2016 at 11h00

RR – Good day morning.

Today I will be interviewing NO, who is a Promotions Co-ordinator.

Good morning NO.

NO – Morning.

RR – Thank you. Before we continue, kindly confirm that we may record this particular interview?

No – You may.

RR – Thank you.

OK, first question, are you familiar with the functionality on present on the enterprise e-commerce website at your organisation?

NO – Yes.

RR – Thank you.

Which e-commerce website functionality is deemed to be critical?

NO – I would think, I would think that getting it live, the functionality of getting everything up there.

RR – Just to elaborate more on the question, so out of all the functionality on the website, what you say the top three, as an example, bits of functionality would be?

NO – That it works, that I can process something on it, that I can order something on it. The third one would be, that it's user friendly, for customer experience, and the fourth one would be functionality –wise, no, can't give a third one. I would just say that it works, people can actually use it, it's not just there to look at.

RR – Thank you very much for that.

And what are the testing processes used for the enterprise e-commerce website?

NO – Well from my side, where I get involved in the testing, is making sure that it forms part of what was in the technical spec, and what I need to do I can do, as a user. But from a testing side, I wouldn't really know from the testing side.

RR – OK, no problem.

And who, which resources are responsible for the software testing process at your organisation?

NO – The testers

RR – OK, no problem.

Are you also familiar with any software development methodologies used at your organisation, such as Waterfall or Agile?

NO – No.

RR – Thank you

Are you, are there any reviews done during the software development process at your organisation?

NO – Yes.

RR – OK, thank you.

And do you know anything in terms of the testing processes, if there is any differences depending on the nature of the development which was done? An example being defect fixes, updates or a new website for a client.

NO – Repeat the beginning of the question?

RR – OK, are there any differences in the testing processes dependant on the nature of development done? An example being the defect fixes, updates or a new website for a client.

NO – Yes, there would be.

RR – OK, thank you.

Are there any root cause analysis done on live environment defects in relation to specific development processes at your organisation?

NO – Not that I'm aware of.

RR – OK, no problem.

Are there any retrospective or lessons learnt meetings held after each completed project at your organisation?

NO – Not that I'm a part of, no.

RR – Thank you.

Are you aware of how costs are calculated for software development resources at your organisation?

NO – No, I have no idea.

RR – Thank you, and are there any financial implications associated with software defects at your organisation?

NO – Yes, from a client perspective yes.

RR – OK.

Are there any systems used at your organisation to facilitate the software testing process? Examples being test case management and defect tracking.

NO – I think there is a system, what they are I wouldn't know.

RR – OK, no problem.

Are there any software development processes defined at your organisation and which areas do these cover?

NO – Yes, I'm sure there is a process in place, with regards to development. With regards to development, there must obviously be a process in place that you follow when you testing the development that was done. But what it is, I have no clue.

RR – Alright, no problem.

And lastly, are there any governance processes in place at your organisation in place to ensure that software development processes are adhered to?

NO – I would say no on that one. There could be, but whether they're followed I'm not sure.

RR – No problem, thank you very much for that.

That's all my questions, thanks for your time and availing yourself.

NO – Pleasure.

RR - Much appreciated

NO - Keep well.

APPENDIX B: CASE STUDY SOFTWARE DEVELOPMENT PROCESSES

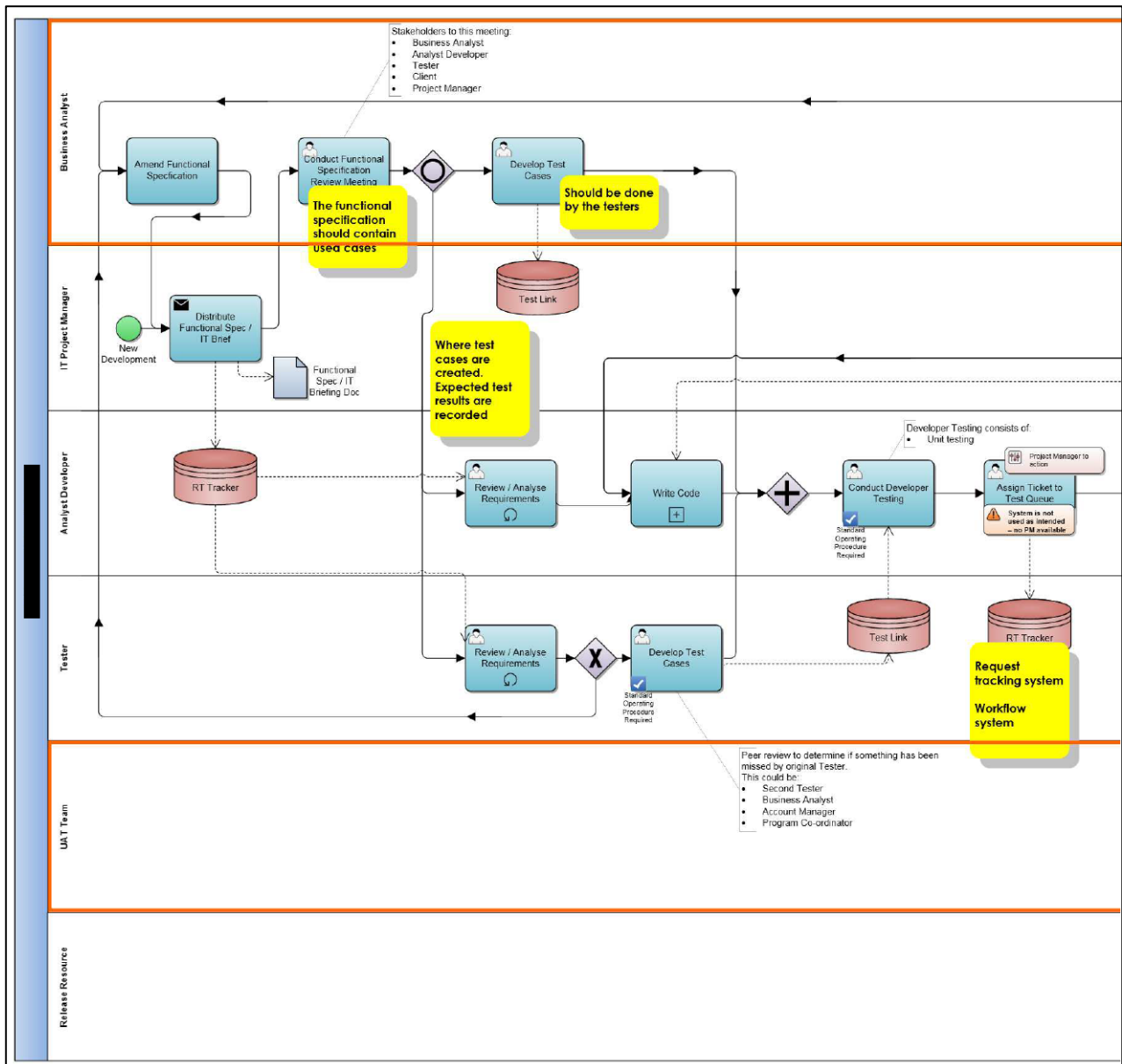


Figure B.1: Software development process 1 of 4

Source: Author, 2017.

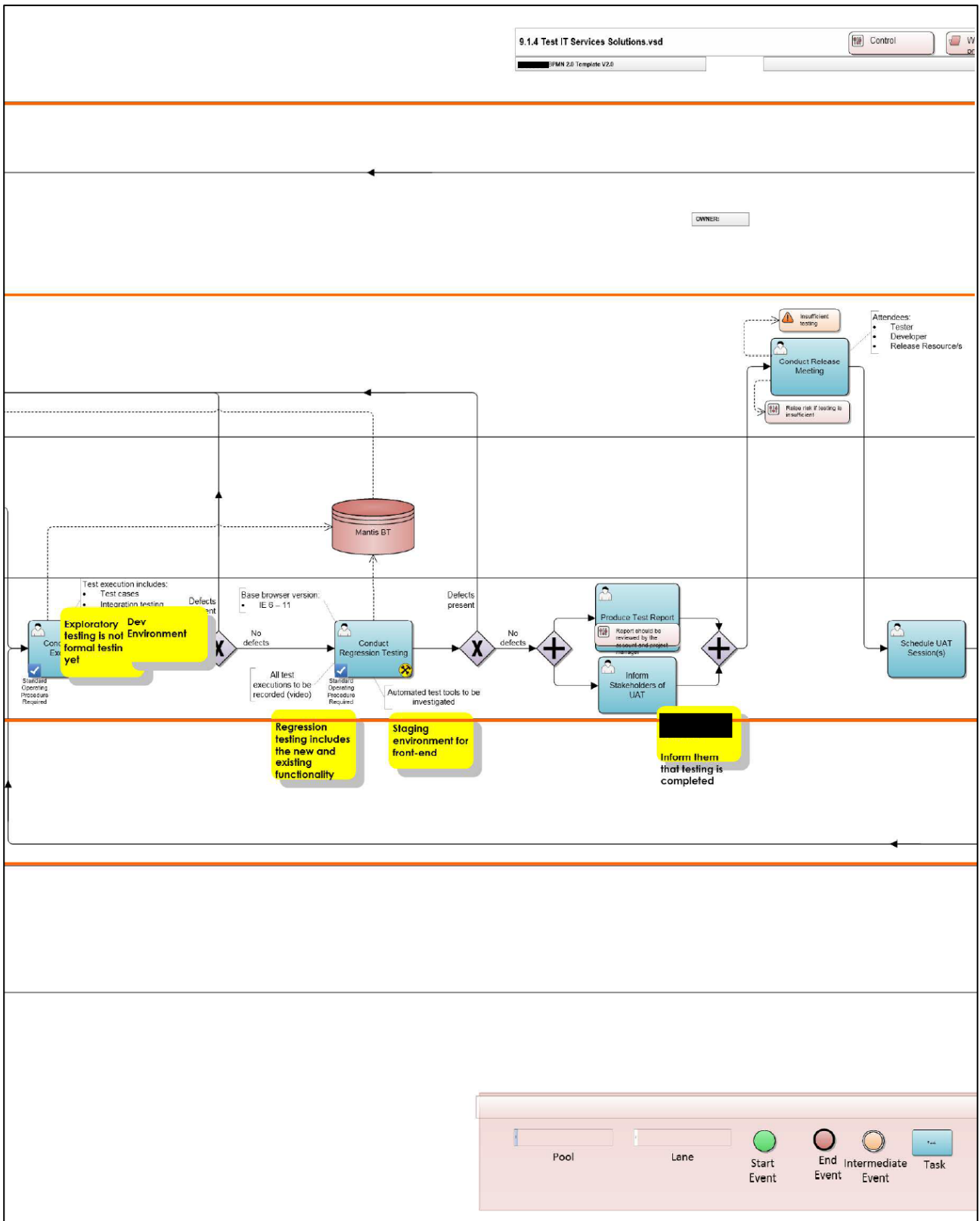


Figure B.2: Software development process 2 of 4

Source: Author, 2017.

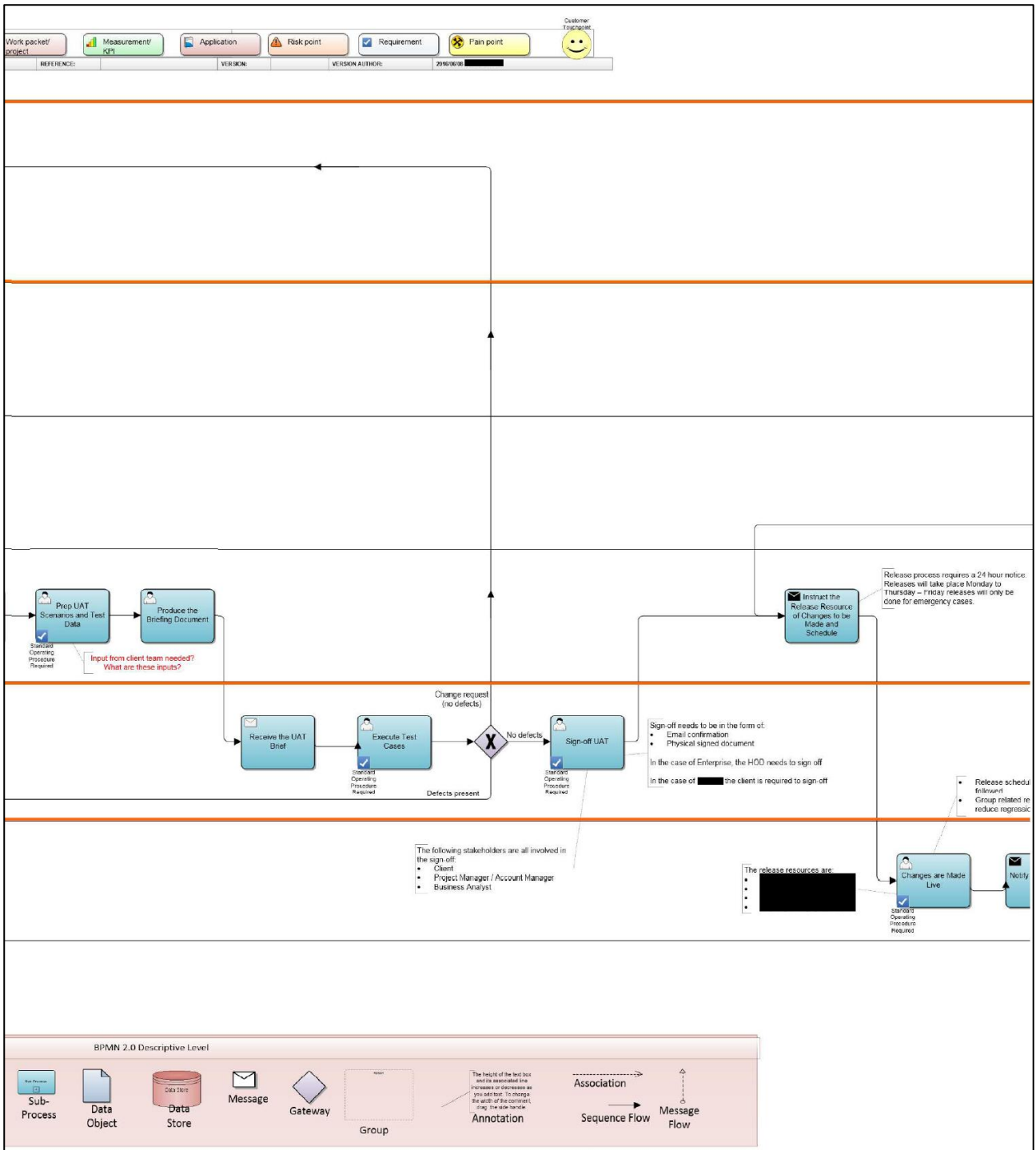


Figure B.3: Software development process 3 of 4

Source: Author, 2017.

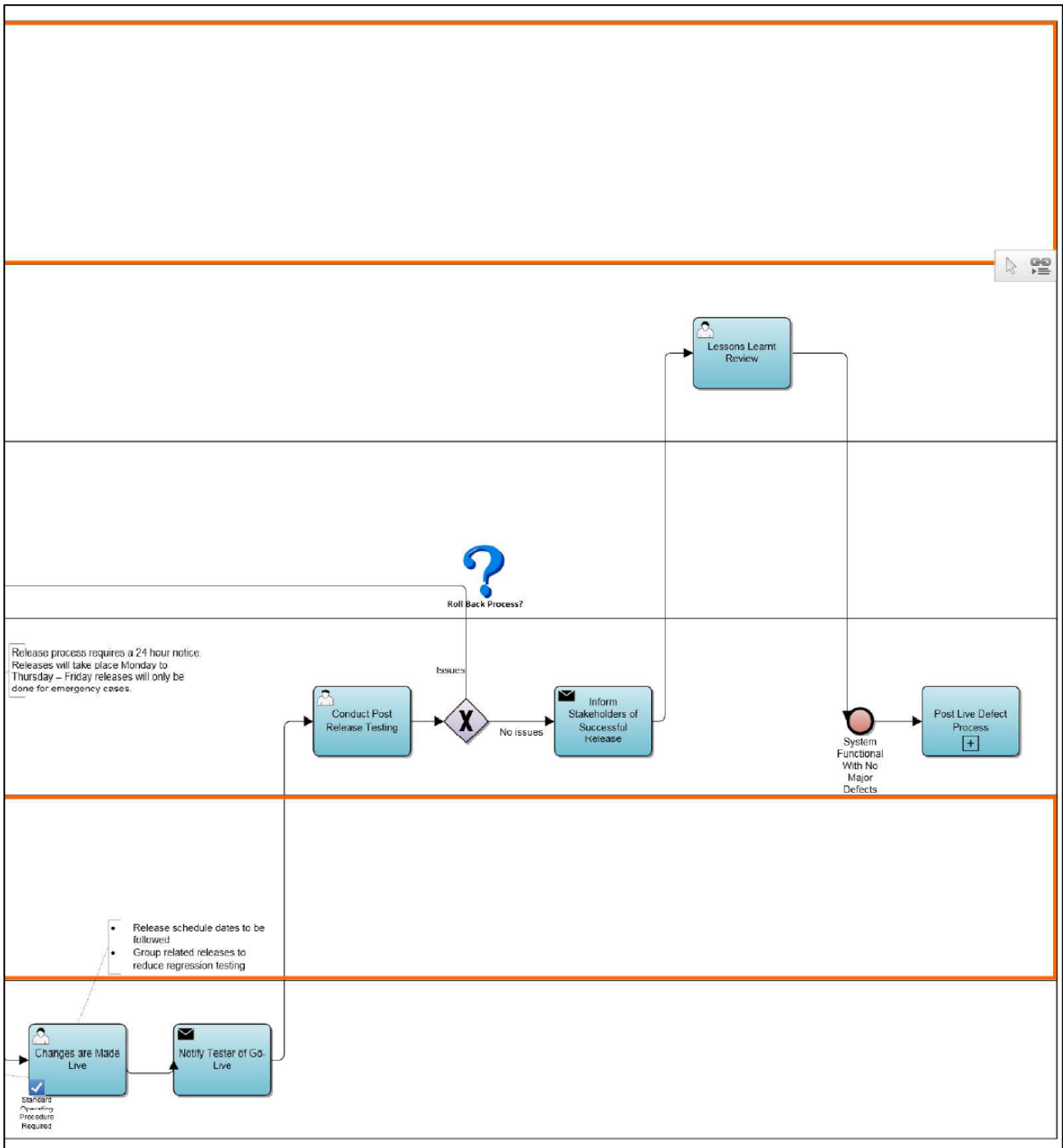


Figure B.4: Software development process 4 of 4

Source: Author, 2017.

APPENDIX C: DEFECT TRACKER REPORTS

000004 #000023 FW: 0581 - Redemption issue

#3565223: FW: 0581 - Redemption issue

The Basics
 ID: 3565223
 Status: resolved
 Priority: High
 Queue: IT Bugs

Custom Fields
 Campaign Code: 0581
 Work Type: IT Bugs
 Module: IT (no value)
 Development Phase: (no value)
 Campaigns affected: (no value)

People
 Owner: [redacted]
 Requester: [redacted]
 CC: [redacted]
 Admin/CC: [redacted]

Attachments
 image001.jpg
 Tue May 12 11:59:21 2015 (15.26 kb)

History
 Mon Feb 01 11:20:30 2015 The RT System itself - Outgoing email recorded
 Mon Feb 01 11:20:30 2015 [redacted] - Status changed from 'open' to 'resolved'
 Mon Feb 01 10:37:55 2015 The RT System itself - Status changed from 'new' to 'open'
 Mon Feb 01 10:37:55 2015 The RT System itself - Outgoing email recorded

000004 #000023 FW: 0581 - Redemption issue

Mon Feb 01 10:37:55 2015 [redacted] - Correspondence added

Hi,

0581 [redacted] - Vat is not included on checkout (functionality was recently added for this campaign, using the following "Supplier->vatVatC=checkout/line").

0581 [redacted] - Vat not included on checkout ? (Was there a spec for this issue ?)

I don't remember adding functionality for this campaign.

On Mon Feb 01 08:00:11 2015, [redacted] <[redacted]> wrote:
 - Show quoted text -

Mon Feb 01 06:04:55 2015 [redacted] - CampaignCode 0100 - [redacted] changed to 0581 - [redacted]

Mon Feb 01 05:00:11 2015 [redacted] - CampaignCode 0581 - [redacted] changed to 0100 - [redacted]

Mon Feb 01 05:00:11 2015 The RT System itself - Outgoing email about a comment recorded
 Mon Feb 01 05:00:11 2015 [redacted] - Comments added
 Expired tickets (= 6 months old with no action)

Tue May 12 12:01:47 2015 The RT System itself - Outgoing email recorded
 Tue May 12 12:01:47 2015 [redacted] - Correspondence added

Hi [redacted]

There is a problem with the 0581 checkout process. Seems to be adding VAT when VAT is already included in the index. Please check if this is the case

Thanks

On Tue May 12 11:59:21 2015, [redacted] <[redacted]> wrote:
 - Show quoted text -

Tue May 12 12:00:17 2015 [redacted] - CampaignCode: 0581 - [redacted] added
 Tue May 12 12:00:17 2015 [redacted] - Work Type: IT Bugs added
 Tue May 12 12:00:17 2015 The RT System itself - Outgoing email recorded
 Tue May 12 12:00:17 2015 [redacted] - Given to [redacted] <[redacted]>
 Tue May 12 11:59:21 2015 The RT System itself - Outgoing email recorded
 Tue May 12 11:59:21 2015 The RT System itself - Outgoing email recorded

000004 #000023 FW: 0581 - Redemption issue

Tue May 12 11:59:21 2015 [redacted] - Ticket created

Subject: FW: 0581 - Redemption issue
 Date: Tue, 12 May 2015 10:00:27 +0000
 To: RT - IT Bugs <[redacted]>
 From: [redacted] <[redacted]>

From: [redacted]
 Sent: 07 May 2015 10:55
 To: [redacted]
 Cc: [redacted]
 Subject: FW: 0581 - Redemption issue
 Importance: High

Hi [redacted]

Please advise if the 0581 [redacted] redemption has been resolved.

The issue with the Vat has been changed after the fact.

We need to revert back to the past

[redacted]

Thanks

From: [redacted]
 Sent: 07 May 2015 10:49 AM
 To: [redacted]
 Cc: [redacted]
 Subject: FW: 0581 - Redemption issue

Hi thank [redacted]

Please could you advise if the issue has been sorted out or if they have advised what the issue was as I need to give feedback to [redacted] regarding this?

Thanks a lot

From: [redacted]
 Sent: 07 May 2015 10:43 AM
 To: [redacted]
 Cc: [redacted]
 Subject: 0581 - Redemption issue

Hi [redacted]

Thank you are well.

I called you about a query last week regarding participant, 009435/N [redacted]

It seems as though she was charged twice for the delivery charges and you advised that IT is looking into this.

Do you have any feedback regarding this query?

Thank you,

[redacted] <[redacted]>

000004 #000023 FW: 0581 - Redemption issue


Administrator

[redacted]
 [redacted]
 [redacted] Cape Town - South Africa

T +27 21 [redacted] = +27 21 [redacted] [redacted] [redacted]

[redacted]

Message body is not shown because it is too large.



626296 #3606284: 0414 - Catalogue inconsistencies

The Basics
 ID: 3606284
 Status: resolved
 Priority: 301
 Queue: IT Bugs

Custom Fields
 CampaignCode: (no value)
 WorkTypeID: (no value)
 ModuleID: (no value)
 DevelopmentPhase: (no value)
 Campaign affected: (no value)

People
 Owner: Nobody in particular
 Requester: [redacted]
 CC: [redacted]
 AdminCC: [redacted]

Attachments
 Catalogue inconsistencies.JPG
 • Thu Jul 09 09:16 2015 (107 KB) by [redacted]

History
 Mon Feb 01 11:34:20 2016 The RT System itself - Outgoing email recorded
 Mon Feb 01 11:34:20 2016 [redacted] - Status changed from 'new' to 'resolved'
 Mon Feb 01 11:34:20 2016 [redacted] - Comments added
 Old (inactive) pivot - no activity in more than 5 months

Thu Jul 09 09:16 2015 The RT System itself - Outgoing email recorded
 Thu Jul 09 09:16 2015 The RT System itself - Outgoing email recorded

626296 #3606284 - Catalogue inconsistencies

Thu Jul 09 09:06:18 2015 [redacted] - Ticket created

CC: [redacted] (cc.za@co.za), [redacted] (cc.za@co.za)
 Subject: 0414 - [redacted] - Catalogue inconsistencies
 Date: Thu, 9 Jul 2015 07:06:16 +0000
 To: RT - IT Bugs <[redacted]@co.za>
 From: [redacted] (cc.za@co.za)

Hi [redacted]

See attached, please can you confirm why for example the Bosch 500W 2-Slice Toaster (top right) is being displayed twice (bottom left) in different formats?

Also, why for the one that has the "Special Sold Out" banner, the in and out prices are the same? (There are a number of "Special Sold Out" items with this problem throughout the catalogue)

I am also assuming that this is a problem for all our campaigns and not just [redacted]

Thank you

[redacted] (cc.za@signaturelogo_top.jpg)
 [redacted]
 [redacted] Manager
 [redacted]
 [redacted] Cape Town * South Africa
 T +27 21 [redacted] F +27 21 [redacted] E [redacted]@co.za
 [redacted]
 [redacted] (signaturelogo_bottom.jpg) [redacted] (cc.za@co.za)

Message body is not shown because sender requested not to inline it.

626296 #3587714: [redacted] transfer issue_ 14489783

The Basics
 ID: 3587714
 Status: resolved
 Priority: 301
 Queue: IT Bugs

Custom Fields
 CampaignCode: 0180 - [redacted]
 WorkTypeID: (no value)
 ModuleID: (no value)
 DevelopmentPhase: (no value)
 Campaign affected: (no value)

People
 Owner: [redacted]
 Requester: [redacted]
 CC: [redacted]
 AdminCC: [redacted]

History
 Mon Feb 01 11:26:30 2016 The RT System itself - Outgoing email recorded
 Mon Feb 01 11:26:29 2016 [redacted] - Status changed from 'new' to 'resolved'
 Mon Feb 01 08:03:07 2016 [redacted] - CampaignCode 0180 added
 Mon Feb 01 08:03:07 2016 The RT System itself - Outgoing email about a comment recorded
 Mon Feb 01 08:03:07 2016 [redacted] - Comments added
 Expired tickets (> 6 months old with no activity)

Fri Jun 20 09:50:50 2015 The RT System itself - Outgoing email recorded
 Fri Jun 20 09:50:50 2015 [redacted] - Given to [redacted]
 Thu Jun 11 11:41:27 2015 The RT System itself - Outgoing email recorded
 Thu Jun 11 11:41:27 2015 The RT System itself - Outgoing email recorded

626296 #3587714 - [redacted] transfer issue_ 14489783

Thu Jun 11 11:41:26 2015 [redacted] - Ticket created

CC: [redacted] (cc.za@co.za), [redacted] (cc.za@co.za)
 Subject: [redacted] transfer issue_ 14489783
 Date: Thu, 11 Jun 2015 09:41:50 +0000
 To: RT - IT Bugs <[redacted]@co.za>
 From: [redacted] (cc.za@co.za)

Hi [redacted]

The following member [redacted] completed a transfer on the 13/04/2015 however the transfer is not reflecting in [redacted] account

The agent called [redacted] (incorrect), she spoke to a consultant who requested proof. Could you perhaps assist with looking into this redemption please.

Redemption number: 2537011
 Membership: [redacted]
 Redemption total: 1200 points

Please let me know if there is anything further you require.

Awaiting your response.

Kind regards,
 [redacted]
 Administrator
 [redacted]
 [redacted] Cape Town * South Africa
 T +27 21 [redacted] F +27 21 [redacted] E [redacted]@co.za
 [redacted]
 [redacted] (cc.za@signaturelogo_bottom.jpg) [redacted] (cc.za@co.za)

#361552: banner showing on [redacted]

The Basics
 ID: 361552
 Status: resolved
 Priority: High
 Queue: IT Bugs

Custom Fields
 CampaignCode: [redacted]
 Issue Type ID: [redacted]
 Module ID: Online Catalogue v3
 Development Phase: [redacted]
 Can page affect: [redacted]

People
 Owner: [redacted]
 Requester: [redacted]
 CC: [redacted]
 Admins: [redacted]

Attachments
 image01.jpg
 Fri Aug 14 10:59:39 2015 (101.36 kb)

History
 Mon Feb 01 11:36:12 2015 The RT System itself - Outgoing email recorded
 Mon Feb 01 11:36:12 2015 [redacted] - Status changed from 'new' to 'resolved'
 Mon Feb 01 11:36:12 2015 [redacted] - Comments added
 Old (inactive) ticket - no activity in more than 5 months
 Thu Aug 27 06:58:58 2015 The RT System itself - Outgoing email recorded

#361552: banner showing on [redacted]

The Basics
 ID: 361552
 Status: resolved
 Priority: High
 Queue: IT Bugs

Custom Fields
 CampaignCode: [redacted]
 Issue Type ID: [redacted]
 Module ID: Online Catalogue v3
 Development Phase: [redacted]
 Can page affect: [redacted]

People
 Owner: [redacted]
 Requester: [redacted]
 CC: [redacted]
 Admins: [redacted]

Attachments
 image01.jpg
 Fri Aug 14 10:59:39 2015 (101.36 kb)

History
 Mon Feb 01 11:36:12 2015 The RT System itself - Outgoing email recorded
 Mon Feb 01 11:36:12 2015 [redacted] - Status changed from 'new' to 'resolved'
 Mon Feb 01 11:36:12 2015 [redacted] - Comments added
 Old (inactive) ticket - no activity in more than 5 months
 Thu Aug 27 06:58:58 2015 The RT System itself - Outgoing email recorded

Hi there [redacted]

Any feedback on the below as to what the extent of the work is?

I also do know that this didn't happen on the old design website so I'm not sure if they have over written a rule and now this is happening as the client website where there is still the old design it is not showing.

Kind regards
 [redacted]

- Show quoted text -

Tue Aug 25 12:17:07 2015 The RT System itself - Outgoing email recorded

Tue Aug 25 12:17:06 2015 [redacted] - Correspondence added
 Subject: RE: [tracker #361552] IT AutoReply: [redacted] banner showing on [redacted]
 Date: Tue, 25 Aug 2015 10:17:06 +0000
 To: RT - IT Bugs - [redacted] on 23rd
 From: [redacted] on 23rd

Ok thanks a lot that would be great.

- Show quoted text -

Tue Aug 25 12:11:54 2015 The RT System itself - Status changed from 'new' to 'open'

Tue Aug 25 12:11:54 2015 The RT System itself - Outgoing email recorded

Tue Aug 25 12:11:53 2015 [redacted] - Correspondence added
 CC: [redacted] on 23rd
 Subject: RE: [tracker #361552] IT AutoReply: [redacted] banner showing on [redacted]
 Date: Tue, 25 Aug 2015 10:11:52 +0000
 To: RT - IT Bugs - [redacted] on 23rd
 From: [redacted] on 23rd

Hi [redacted]

[redacted] will look at this bug today and let us know the extent of the work.

- Show quoted text -

Tue Aug 25 12:02:19 2015 The RT System itself - Outgoing email recorded

#3630064: "READ MORE" query

The Basics
 ID: 3630064
 Status: resolved
 Priority: High
 Queue: IT Bugs

Custom Fields
 CampaignCode: 0160
 Issue Type ID: Bug
 Module ID: Online Catalogue v3
 Development Phase: [redacted]
 Can page affect: [redacted]

People
 Owner: [redacted]
 Requester: [redacted]
 CC: [redacted]
 Admins: [redacted]

Attachments
 image001.jpg
 Fri Jul 17 09:39:00 2015 (101.36 kb)

History
 Mon Feb 01 11:36:19 2015 The RT System itself - Outgoing email recorded
 Mon Feb 01 11:36:19 2015 [redacted] - Status changed from 'new' to 'resolved'
 Mon Feb 01 11:36:18 2015 The RT System itself - Outgoing email about a comment recorded
 Mon Feb 01 11:36:18 2015 [redacted] - Comments added
 Old (inactive) ticket - no activity in more than 5 months
 Fri Jul 17 11:27:59 2015 [redacted] - CampaignCode 0160 - added
 Fri Jul 17 11:27:58 2015 [redacted] - Module: IT Online Catalogue v3 added
 Fri Jul 17 11:27:58 2015 [redacted] - Work Type: IT Bugs added
 Fri Jul 17 11:27:58 2015 The RT System itself - Outgoing email recorded
 Fri Jul 17 11:27:58 2015 [redacted] - Given to [redacted] on 23rd
 Fri Jul 17 09:39:00 2015 The RT System itself - Outgoing email recorded
 Fri Jul 17 09:39:00 2015 The RT System itself - Outgoing email recorded

#3630064: "READ MORE" query

The Basics
 ID: 3630064
 Status: resolved
 Priority: High
 Queue: IT Bugs

Custom Fields
 CampaignCode: 0160
 Issue Type ID: Bug
 Module ID: Online Catalogue v3
 Development Phase: [redacted]
 Can page affect: [redacted]

People
 Owner: [redacted]
 Requester: [redacted]
 CC: [redacted]
 Admins: [redacted]

Attachments
 image001.jpg
 Fri Jul 17 09:39:00 2015 (101.36 kb)

History
 Mon Feb 01 11:36:19 2015 The RT System itself - Outgoing email recorded
 Mon Feb 01 11:36:19 2015 [redacted] - Status changed from 'new' to 'resolved'
 Mon Feb 01 11:36:18 2015 The RT System itself - Outgoing email about a comment recorded
 Mon Feb 01 11:36:18 2015 [redacted] - Comments added
 Old (inactive) ticket - no activity in more than 5 months
 Fri Jul 17 11:27:59 2015 [redacted] - CampaignCode 0160 - added
 Fri Jul 17 11:27:58 2015 [redacted] - Module: IT Online Catalogue v3 added
 Fri Jul 17 11:27:58 2015 [redacted] - Work Type: IT Bugs added
 Fri Jul 17 11:27:58 2015 The RT System itself - Outgoing email recorded
 Fri Jul 17 11:27:58 2015 [redacted] - Given to [redacted] on 23rd
 Fri Jul 17 09:39:00 2015 The RT System itself - Outgoing email recorded
 Fri Jul 17 09:39:00 2015 The RT System itself - Outgoing email recorded

Hi guys

When you view this product [redacted] (apikeycode=05-6645) text in first bullet point is missing, clicking READ MORE reveals text, but in a very weird manner.

[redacted] (cid:image001.jpg@01D0C073.F083DCE)

[redacted] (mailto:login_top.jpg)

Buyer [redacted]

[redacted] Cape Town * South Africa

T +27 21 [redacted] F +27 21 [redacted] E [redacted] on 23rd

[redacted]

[redacted]

[redacted]

Enable IT Reader of South Collector's Edition (PC)
 Price: 700 [redacted]

Enable IT Reader of South Collector's Edition (PC)
 Price: 700 [redacted]

000004
Tue Aug 25 12:02:19 2015 [REDACTED] - Correspondence added
CC: [REDACTED] <[REDACTED]@co.za>, [REDACTED] <[REDACTED]@co.za>
Subject: RE: [Ticket #000000] IT AutoReply [REDACTED] banner showing on [REDACTED]
Date: Tue, 25 Aug 2015 10:02:19 +0000
To: RT - IT Bugs [REDACTED] <[REDACTED]@co.za>, [REDACTED] <[REDACTED]@co.za>
From: [REDACTED] <[REDACTED]@co.za>

Hi there [REDACTED]
That you are well?
Just wanting to follow up on the below query as the banner is still showing on [REDACTED] and I have received no feedback.
Please could you give me an indication as to when this will be looked at?
Thanks a lot
[REDACTED]

-Show quoted text-

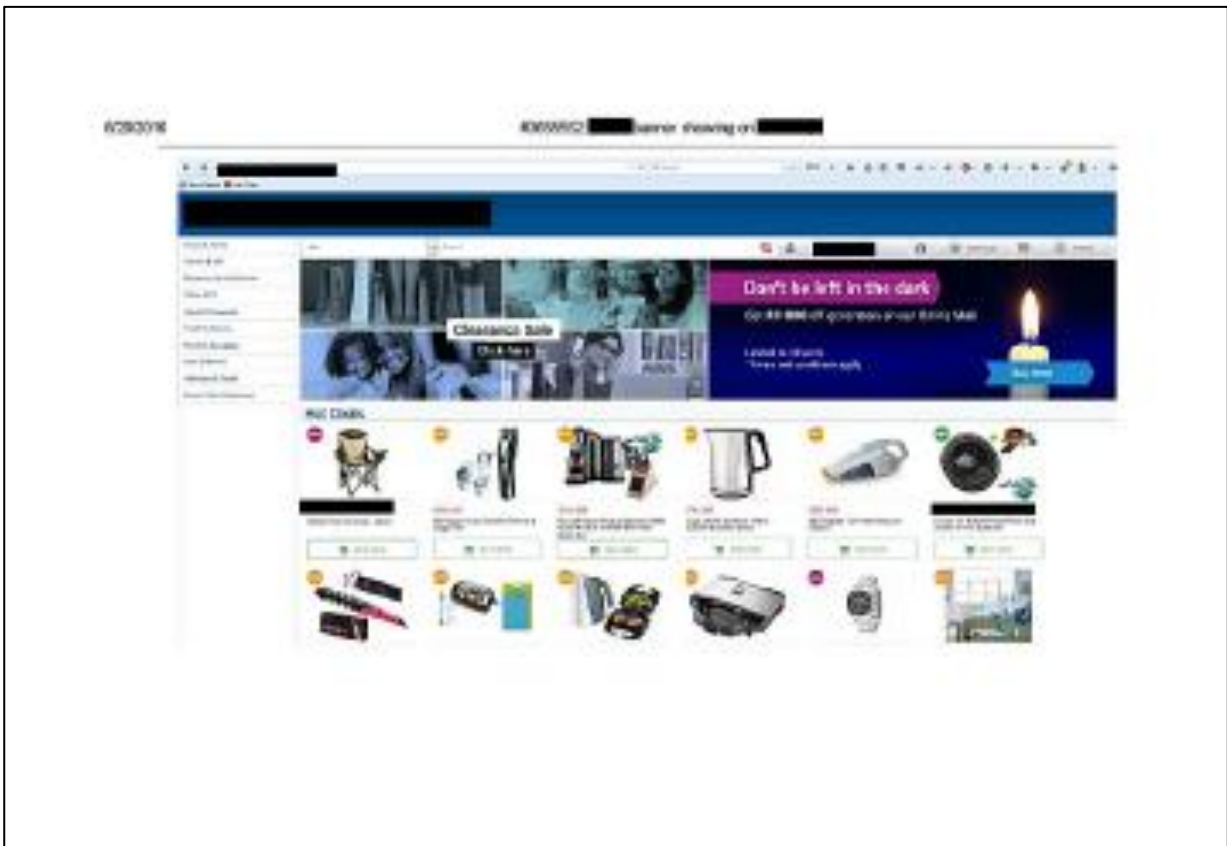
Fr Aug 14 14:32:55 2015 [REDACTED] - Comments added
This is a banner display issue, not a web catalogue build issue. The given itemkeycodes are only linked to 0541 campaigns.
[REDACTED]

Fr Aug 14 14:22:56 2015 The RT System: itself - Outgoing email recorded
Fr Aug 14 14:22:55 2015 The RT System: itself - Outgoing email recorded

000004
Fr Aug 14 16:22:05 2015 [REDACTED] - Ticket created
CC: [REDACTED] <[REDACTED]@co.za>, [REDACTED] <[REDACTED]@co.za>
Subject: [REDACTED] banner showing on [REDACTED]
Date: Fri, 14 Aug 2015 12:22:05 +0000
To: RT - IT Bugs [REDACTED] <[REDACTED]@co.za>
From: [REDACTED] <[REDACTED]@co.za>

Hi there,
We have a banner showing live on [REDACTED] that is supposed to be for [REDACTED] only, if you search the IKC on [REDACTED] as well as the search word nothing come up however the banner shows, when you click on the banner it gives you an error message, please could someone advise as to why this is as it is only happening on [REDACTED] since the new design website launched?
Search word: [REDACTED]
IKC: 05.8701 and 05.8759
Error when clicking on the banner:
[X] image(02.png@01D0D46C.ABF8E0F0)
Banner:
[X] image(05.jpg@01D0D46C.ABF8E0F0)
Thanks a lot
Kind regards
[REDACTED]

404 Not Found
https://[REDACTED].co.za/search
Not Found
The requested URL /search was not found on this server.





#3735094: 0541 travel - part payments functionality

Mon Jun 27 08:15:15 2016 [REDACTED] - Comments added

Closing tickets not actioned for more than 6 months

Wed Nov 25 14:30:59 2015 The RT System itself - Outgoing email recorded

Wed Nov 25 14:30:59 2015 The RT System itself - Outgoing email recorded

Wed Nov 25 14:30:00 2015 [REDACTED] - Ticket created

Subject: 0541 travel - part payments functionality
 Date: Wed, 25 Nov 2015 12:30:46 +0200
 To: RT - IT Bugs <[REDACTED]> cc: zaf
 From: [REDACTED] <[REDACTED]>

H,

Please check the part payments functionality for members purchasing travel products (online mail - tracking & order section).

When a member selects 'pay with points only or with a combination of points and rands' the system prompts the member to enter the points to redeem value. It thereafter shows the outstanding shortfall value, but after clicking proceed, the order is processed/ confirmed & the total value redeemed in points. No [REDACTED] payment page is generated, requesting card details.

Thanks,

[REDACTED] <[REDACTED]>

Travel Co-ordinator

[REDACTED]

[REDACTED] Cape Town - SOUTH AFRICA

T +27 21 [REDACTED] 0 249 [REDACTED] 00 249

[REDACTED]

[REDACTED]

The Basics

ID: 3735094
 Status: resolved
 Priority: 101
 Queue: IT Bugs

Custom Fields

Category/Case: (no value)
 Work Type: IT (no value)
 Module: IT (no value)
 Development Phase: (no value)
 Campaign effect: (no value)

People

Owner: Nobody in particular
 Requester: [REDACTED]
 CC: [REDACTED]
 Admin CC: [REDACTED]

Reminders

Depends on:
 Depends on by:
 Referenced by:

Dates

Created: Wed Nov 25 14:30:00 2015
 Starts: Not set
 Started: Mon Jun 27 08:15:15 2016
 Last Contact: Not set
 Due: Mon Nov 23 14:30:58 2015
 Closed: Mon Jun 27 08:15:15 2016
 Updated: Mon Jun 27 08:15:15 2016 by [REDACTED]

Links

Active Tickets Inactive Tickets All Tickets

This user's 10 highest priority active tickets

- 380250: Nobody in particular (FW: Supplier clarification) [REDACTED] travel
- 376266: [REDACTED] P.L.A can you check the Signature travel request? [open]
- 280190: [REDACTED] CC: Escorted Company - Travel Mail [REDACTED]
- 330710: [REDACTED] FW: RT-Travel v [REDACTED]
- 380250: Nobody in particular (RE: Supplier clarification) [REDACTED]

Group Filter over (change to)

- Unassigned
- Queues

History

Mon Jun 27 08:15:15 2016 The RT System itself - Outgoing email recorded

Mon Jun 27 08:15:15 2016 [REDACTED] - Status changed from 'new' to 'resolved'

#3768576: [REDACTED] Travel Payments [REDACTED]

The Basics
 ID: 3768576
 Status: resolved
 Priority: 0
 Queue: IT-TRAVEL

Custom Fields
 Work Type (IT): 0001
 On-line: Yes
 Files to go Live: [REDACTED]
 Testing Stage: Functional Testing
 Test Priority: High
 Development: Bug Fix
 Product (IT): Catalogue system
 Work Type (IT): 0001
 Bug Category: Critical
 Campaign Code: 0001
 Campaigns of interest: [REDACTED]

Reminders

Dates
 Created: Thu Jan 14 09:58:26 2016
 Status: Not set
 Last Modified: Fri Jan 10 18:55:12 2016
 Due: Not set
 Closed: Fri Jan 10 18:55:12 2016
 Updated: Fri Jan 10 18:55:12 2016 by [REDACTED]

Links
 Depends on:
 Depended on by:
 Parent:
 Child:
 Reference:
 Related to by:

People
 Owner: [REDACTED]
 Reporter: [REDACTED]
 CC: [REDACTED]
 Admins: [REDACTED]

Attachments
 [REDACTED] Travel Payments - Web CMI - 4547180.png
 • Thu Jan 14 16:51:26 2016 0.03 KB by [REDACTED]
 [REDACTED] Travel Payments - Web CMI Redemptions.png
 • Thu Jan 14 16:51:26 2016 0.04 KB by [REDACTED]
 [REDACTED] Travel Payments.png
 • Thu Jan 14 16:51:26 2016 0.04 KB by [REDACTED]

History
 Fri Jun 10 10:55:12 2016 The RT System itself - Outgoing email recorded
 Fri Jun 10 10:55:12 2016 [REDACTED] - Status changed from 'new' to 'resolved'
 Fri Jun 10 10:55:12 2016 [REDACTED] - Comments added
 Change made live on 09 04 2016.

#3768576: [REDACTED] Travel Payments [REDACTED]

Thu Mar 03 14:12:24 2016 The RT System itself - Outgoing email recorded
 Thu Mar 03 14:12:24 2016 The RT System itself - Outgoing email recorded
 Thu Mar 03 14:12:24 2016 The RT System itself - Outgoing email recorded
 Thu Mar 02 14:12:23 2016 [REDACTED] - Correspondence added

Fixed issue the issue regarding the delivery message
 When you have a chance can you verify that the delivery message has been removed.
 [REDACTED]

On Tue Mar 01 13:14:10 2016, [REDACTED] wrote:
 - Show quoted text -

Tue Mar 01 13:14:10 2016 The RT System itself - Outgoing email recorded
 Tue Mar 01 13:14:10 2016 The RT System itself - Outgoing email recorded
 Tue Mar 01 13:14:10 2016 The RT System itself - Outgoing email recorded
 Tue Mar 01 13:14:10 2016 [REDACTED] - Correspondence added

H [REDACTED]
 When you have a chance can you test the travel payment functionality on [REDACTED]
 The [REDACTED] trigger should be working on dev02

On Thu Jan 14 10:58:26 2016, [REDACTED] wrote:
 - Show quoted text -

Tue Feb 09 16:55:02 2016 The RT System itself - Outgoing email recorded
 Tue Feb 09 16:55:02 2016 The RT System itself - Outgoing email recorded
 Tue Feb 09 16:55:01 2016 [REDACTED] - Given to [REDACTED]
 Fri Jan 15 16:54:26 2016 The RT System itself - Outgoing email recorded
 Fri Jan 15 16:54:26 2016 The RT System itself - Outgoing email recorded
 Fri Jan 15 16:54:26 2016 [REDACTED] - Given to [REDACTED]
 Thu Jan 14 10:58:27 2016 The RT System itself - Outgoing email recorded
 Thu Jan 14 10:58:27 2016 The RT System itself - Outgoing email recorded

#3768576: [REDACTED] Travel Payments [REDACTED]

Thu Jan 14 10:58:26 2016 [REDACTED] Ticket created
 CC: [REDACTED] (00:20%)
 Subject: [REDACTED] Travel Payments [REDACTED]

H [REDACTED]

When you have a chance please create a Travel Redemption in Web CMI and then use the Web Catalogue to process the order.

If there is any shortfall on the travel order the payment must be sent to the new [REDACTED]

When you have a chance please verify that the payment functionality works.

Please note that the new [REDACTED] is in safe mode.

Test URL:
 [REDACTED]

File to go live:
 [REDACTED]
 Subject: [REDACTED] Travel Payments - Web CMI - 4547180.png

[REDACTED] Travel Payments - Web CMI - 4547180.png

[REDACTED] Travel Payments - Web CMI Redemptions.png

[REDACTED] Travel Payments.png

Subject: [REDACTED] Travel Payments.png

#3768576: [REDACTED] Travel Payments [REDACTED]

Payment Total: 8,425.00 GBP

Payment by card

Card No: 4242424242424242
 Expiry Date: 12/2015 - 12/2016
 Name on Card: [REDACTED]
 CVC Number: [REDACTED]
 Email Address: [REDACTED]
 Budget Period: [REDACTED]

Wed Feb 03 12:06:44 2016 [REDACTED] Ticket #2706653: Ticket created

Subject: RE: Zero point redemptions
 Date: Wed, 3 Feb 2016 10:06:42 +0900
 To: [REDACTED] <[REDACTED]@co.za>
 From: [REDACTED] <[REDACTED]@co.za>

[REDACTED]

As I've discussed with you, in the case of all three redemptions, the published index item was not yet signed off when the redemption was placed. New published index items have a points value of 0 until a sign off, hence the 0 points redemptions.

The problem is that Airwaves CRM does not exclude published index items that have not been signed off for the first time, so the redemptions were allowed and processed immediately, since there was no points requirement.

The only way that the PNR (cash) point transactions that should have been requested can be processed, is to cancel these redemptions, increase them and process them (the items are all signed off, so the points values on the new redemptions will be correct). The system will use the PNR balance available to process, thereby restoring the participants' PNR accounts to the correct values.

The only caveat is that the picking slips that will be generated as a result should be picked and 'despatched' without delivery. The cancellation of the existing redemptions should also be done with the 'return to stock' option. This will ensure that the new redemptions have stock to allocate.

[REDACTED]

[REDACTED]
 System Architect
 [REDACTED]
 [REDACTED] Cape Town * South Africa
 T +27 21 [REDACTED] D +27 [REDACTED] F +27 21 [REDACTED] E [REDACTED]@co.za

[REDACTED]

From: [REDACTED]
 Sent: 02 February 2016 08:34 AM
 To: [REDACTED] <[REDACTED]@co.za>
 Subject: Zero point redemptions

Hi,

There have been a few redemptions on special quote orders processed recently on 0414 [REDACTED], where the points value has not pulled through correctly and is reflecting as zero in the redemption record. This has stopped the post-transaction points debit record from being created, so the participants' shortfall points are still available. Please assist in correcting:

```

SELECT
*
FROM
[REDACTED]
WHERE
[REDACTED] = [REDACTED]
    
```

[REDACTED]

[REDACTED]
 IT Project Manager
 [REDACTED]
 [REDACTED] Cape Town * South Africa
 T +27 21 [REDACTED] D +27 [REDACTED] F +27 21 [REDACTED] E [REDACTED]@co.za

[REDACTED]

[REDACTED]

Message body is not shown because it is too large.

Tue Feb 02 09:37:25 2016 [REDACTED] - CampaignCode [REDACTED] added
 Tue Feb 02 09:37:24 2016 [REDACTED] - Campaigns affected 0414 added
 Tue Feb 02 09:37:24 2016 [REDACTED] - Work Type: IT Data Change added
 Tue Feb 02 09:37:24 2016 [REDACTED] - Module: IT Redemptions added
 Tue Feb 02 09:37:24 2016 The RT System itself - Outgoing email recorded
 Tue Feb 02 09:37:24 2016 [REDACTED] - Given to [REDACTED]
 Tue Feb 02 09:34:14 2016 The RT System itself - Outgoing email recorded
 Tue Feb 02 09:34:14 2016 The RT System itself - Outgoing email recorded

Tue Feb 02 09:34:14 2016 [REDACTED] Ticket created

Subject: Zero point redemptions
 Date: Tue, 2 Feb 2016 09:34:12 +0000
 To: [REDACTED] <[REDACTED]@co.za>
 From: [REDACTED] <[REDACTED]@co.za>

Hi,

There have been a few redemptions on special quote orders processed recently on 0414 [REDACTED], where the points value has not pulled through correctly and is reflecting as zero in the redemption record. This has stopped the post-transaction points debit record from being created, so the participants' shortfall points are still available. Please assist in correcting:

```

SELECT
*
FROM
[REDACTED]
WHERE
[REDACTED] = [REDACTED]
AND
[REDACTED] = [REDACTED]
AND
[REDACTED] = [REDACTED]
AND
[REDACTED] = 0
AND
[REDACTED] IN ([REDACTED])
    
```

[REDACTED]

[REDACTED]
 IT Project Manager
 [REDACTED]
 [REDACTED] Cape Town * South Africa
 T +27 21 [REDACTED] D +27 [REDACTED] F +27 21 [REDACTED] E [REDACTED]@co.za

[REDACTED]

[REDACTED]

Mon Feb 15 10:34:50 2016 [REDACTED] - Correspondence added
 Subject: [REDACTED] PW: 0581 - Web query
 Date: Mon, 15 Feb 2016 09:24:53 +0000
 To: RT - IT Bugs [REDACTED] (cc.zap)
 From: [REDACTED] (cc.zap)

From: [REDACTED]
 Sent: 15 February 2016 09:01
 To: [REDACTED]
 Subject: RE: 0581 - Web query

Hi [REDACTED]

Any feedback here please...

[REDACTED] the R80 is in the account... we just need to figure out how to get the system to redeem the full R100.

Thanks

[REDACTED]

From: [REDACTED]
 Sent: 15 February 2016 09:59 AM
 To: [REDACTED]
 Subject: RE: 0581 - Web query

Morning Lovely Ladies,

Any feedback for the below query?

[REDACTED]

Administrator

[REDACTED]

[REDACTED] Cape Town * South Africa

T +27 21 [REDACTED] F +27 21 [REDACTED]

[REDACTED]

[REDACTED]

From: [REDACTED]
 Sent: 11 Feb 2016 03:16 PM
 To: [REDACTED]
 Subject: 0581 - Web query

Hi Ladies,

Please assist with below web query:

Name: [REDACTED]

Number: 02730429

Phone: 072

E-mail: [REDACTED]

Query: HI

I just made a purchase (Order number: 4557075) and I thought I was going to be using the free R100 you provide with the registration.

It seems to have only used R20 off this voucher?

Why is this?

I request that you credit my bank account with this R80 as this amount was supposed to be deducted from my purchase total.

Thank you.

[REDACTED]

Administrator

[REDACTED]

[REDACTED] Cape Town * South Africa

T +27 21 [REDACTED] F +27 21 [REDACTED]

[REDACTED]

[REDACTED]

Message body is not shown because it is too large.

Thu Feb 11 10:00:42 2016 [REDACTED] - Campaign Code 0581 - [REDACTED]

Thu Feb 11 10:00:43 2016 [REDACTED] - Work Type: IT Bugs added

Thu Feb 11 10:00:42 2016 [REDACTED] - Module: IT Autoredeemptions added

Thu Feb 11 10:00:42 2016 The RT System (self) - Outgoing email recorded

Thu Feb 11 10:00:42 2016 [REDACTED] - Given to [REDACTED]

Thu Feb 11 10:24:50 2016 The RT System (self) - Outgoing email recorded

Thu Feb 11 10:24:50 2016 The RT System (self) - Outgoing email recorded

Thu Feb 11 10:24:50 2016 [REDACTED] - Ticket created
 Subject: PW: 0581 - Web query
 Date: Thu, 11 Feb 2016 10:24:47 +0000
 To: RT - IT Bugs [REDACTED] (cc.zap), [REDACTED] (cc.zap)
 From: [REDACTED] (cc.zap)

Hi [REDACTED]

Oh so... another 0581 redemption that only a small amount of the R100 reg bonus was used. R80 still in the account.

Please can we get this resolved.....

Thanks

[REDACTED]

From: [REDACTED]
 Sent: 11 February 2016 03:16 PM
 To: [REDACTED]
 Subject: 0581 - Web query

Hi Ladies,

Please assist with below web query:

Name: [REDACTED]

Number: 02730429

Phone: 072

E-mail: [REDACTED]

Query: HI

I just made a purchase (Order number: 4557075) and I thought I was going to be using the free R100 you provide with the registration.

It seems to have only used R20 off this voucher?

Why is this?

I request that you credit my bank account with this R80 as this amount was supposed to be deducted from my purchase total.

Thank you.

[REDACTED]

Administrator

[REDACTED]

[REDACTED] Cape Town * South Africa

T +27 21 [REDACTED] F +27 21 [REDACTED]

[REDACTED]

8332916 #3797042: 0576 : currency changed to Rands for members

#3797042: 0576 : currency changed to Rands for members

The Basics

ID: #3797042
 Status: resolved
 Priority: 0
 Queue: P-TEST

Custom Fields

Work Type ID: 2449696
 TOST: Yes
 Go-Live: Yes
 Plan to go Live: [redacted]
 Testing Scope: Functional Testing
 Test Priority: Normal
 Development Phase: [redacted]
 Module ID: Catalogue system
 Work Type ID: [redacted]
 Bug Category: [redacted]
 Campaign Code: 0576
 Campaign: #3797042

Reminders

Dates

Created: Fri Feb 12 13:30:43 2016
 Starts: Not set
 Expires: Fri Feb 12 13:42:00 2016
 Last Contact: Tue Mar 29 14:54:09 2016
 Due: Not set
 Closed: Tue Jun 29 11:38:59 2016
 Updated: Tue Jun 29 11:38:59 2016 by [redacted]

Links

Discussions:
 Exported as by:
 Parents:
 Children:
 Related to:
 Referred to by:

People

Owner: [redacted]
 Requestors: [redacted]
 CC: [redacted]
 Admin CC: [redacted]

Attachments

[redacted].png
 Wed Mar 09 09:08:29 2016 (21.36 kb) [redacted]
 Prices.png
 Tue Mar 29 14:54:09 2016 (28.11 kb) [redacted]
 [redacted].png
 Tue Jun 29 11:38:59 2016 (78.11 kb) [redacted]

History


Tue Jun 29 10:38:59 2016 The RT System itself - Outgoing email recorded
 Tue Jun 29 10:38:59 2016 [redacted] - Status changed from 'open' to 'resolved'

8332916 #3797042: 0576 : currency changed to Rands for members

Tue Jun 29 10:38:59 2016 [redacted] - Comments added

The issue appears to have been resolved in the mean time. See the screenshot of the same redemption used to test previously, where the correct amount of R20 now appears after purchase and in the email.

Subject: [redacted].png



Tue Mar 29 14:54:09 2016 The RT System itself - Outgoing email recorded
 Tue Mar 29 14:54:09 2016 The RT System itself - Outgoing email recorded
 Tue Mar 29 14:54:09 2016 [redacted] - Correspondence added

Subject: RE: [tracker #3797042] 0576 : currency changed to Rands for members
 Date: Tue, 29 Mar 2016 12:54:07 +0000
 To: RT - IT Test <[redacted]> [redacted]
 From: [redacted] <[redacted]>

After re-testing, I see that the pricing error has crept up again on [redacted]

See the attached screenshot which shows a purchase of 4 times for R20, and how it is displayed as R2000 in various places.

- Show quoted text -

Message body is not shown because sender requested not to list it.

Wed Mar 09 10:54:04 2016 The RT System itself - Outgoing email recorded
 Wed Mar 09 10:54:04 2016 The RT System itself - Outgoing email recorded
 Wed Mar 09 10:54:03 2016 The RT System itself - Outgoing email recorded

8332916 #3797042: 0576 : currency changed to Rands for members

Wed Mar 09 10:54:03 2016 [redacted] - Correspondence added

CC: [redacted] <[redacted]> [redacted] <[redacted]>
 Subject: RE: [tracker #3797042] 0576 : currency changed to Rands for members
 Date: Wed, 9 Mar 2016 08:54:51 +0000
 To: [redacted] <[redacted]>, RT - IT Test <[redacted]> [redacted] <[redacted]>
 From: [redacted] <[redacted]>

I think you're correct.

It just need to know exactly when the fix goes live so that the [redacted] update can be coordinated. Probably the best way is for [redacted] to do both the make-live and ratio updates.

- Show quoted text -

Wed Mar 09 10:53:32 2016 The RT System itself - Outgoing email recorded
 Wed Mar 09 10:53:31 2016 The RT System itself - Outgoing email recorded
 Wed Mar 09 10:53:31 2016 The RT System itself - Outgoing email recorded
 Wed Mar 09 10:53:30 2016 [redacted] - Correspondence added

CC: [redacted] <[redacted]> [redacted] <[redacted]>
 Subject: RE: [tracker #3797042] 0576 : currency changed to Rands for members
 Date: Wed, 9 Mar 2016 08:53:28 +0000
 To: RT - IT Test <[redacted]> [redacted] <[redacted]>
 From: [redacted] <[redacted]>

Hi [redacted]

The points to cents function in the catalogue code was dividing the points by 100. The function detects if there is a Rands symbol denoted by 'R' and subsequently does the currency conversion.

I've removed this code from the catalogue. And I'm not sure why it was originally added.

The sites/campaigns below work correctly (including commas) with the Rands currency:

- 1 [redacted] UseCurrency(R); ICampaign code - 0575 - Display ratio - 0.010
- 2 [redacted] UseCurrency(R); ICampaign code - 0581 - Display ratio - 0.010
- 3 [redacted] UseCurrency(R); ICampaign code - 0583 - Display ratio - 0.010
- 4 [redacted] UseCurrency(R); ICampaign code - 0520 - Display ratio - 0.010

These sites/campaigns will need to be updated in [redacted] that the [redacted] flag goes live:

- 5 [redacted] UseCurrency(R); ICampaign code - 0581 - Display ratio - 1.000 ? must be set to 0.010
- 6 [redacted] UseCurrency(R); ICampaign code - 0445 - Display ratio - 1.000 ?
- 7 [redacted] UseCurrency(R); ICampaign code - 0629 - Display ratio - 1.000 ?
- 8 [redacted] UseCurrency(R); ICampaign code - 0599 - Display ratio - 1.000 ?
- 9 [redacted] UseCurrency(R); ICampaign code - 0579 - Display ratio - 1.000 ?

Note: The [redacted] vouchers have not yet gone live, when they do go live the [redacted] 'display ratio' needs to be updated.

Also I could be wrong. :)

- Show quoted text -

8332916 #3797042: 0576 : currency changed to Rands for members

Wed Mar 09 10:54:03 2016 The RT System itself - Outgoing email recorded

Wed Mar 09 10:54:03 2016 The RT System itself - Outgoing email recorded

Wed Mar 09 10:54:03 2016 The RT System itself - Outgoing email recorded

Wed Mar 09 10:54:03 2016 [redacted] - Correspondence added

CC: [redacted] <[redacted]> [redacted] <[redacted]> [redacted] <[redacted]>
 Subject: RE: [tracker #3797042] 0576 : currency changed to Rands for members
 Date: Wed, 9 Mar 2016 08:09:06 +0000
 To: RT - IT Test <[redacted]> [redacted] <[redacted]>
 From: [redacted] <[redacted]>

Hi [redacted]

Was there any other campaigns that were experiencing the same issue ?

- Show quoted text -

Wed Mar 09 08:08:09 2016 The RT System itself - Outgoing email recorded
 Wed Mar 09 08:08:09 2016 The RT System itself - Outgoing email recorded
 Wed Mar 09 08:08:09 2016 [redacted] - Correspondence added

Subject: RE: [tracker #3797042] 0576 : currency changed to Rands for members
 Date: Wed, 9 Mar 2016 07:06:07 +0000
 To: RT - IT Test <[redacted]> [redacted] <[redacted]>
 From: [redacted] <[redacted]>

Thanks. The amount looks correct now. See this screenshot of an email I received, where the amount displays as 256.00

- Show quoted text -

Message body is not shown because sender requested not to list it.

Wed Mar 09 08:02:45 2016 The RT System itself - Outgoing email recorded
 Wed Mar 09 08:02:45 2016 The RT System itself - Outgoing email recorded
 Wed Mar 09 08:02:45 2016 The RT System itself - Outgoing email recorded

#3806430: RE: Issue: Charity redemption

The Basics
 ID: 3896430
 Status: New
 Priority: High
 Owner: F. Dugg

Custom Fields
 Company Code: 9541
 Work Type: IT - [no value]
 Module: IT - [no value]
 Development Phase: [no value]
 Campaigns: about [no value]

People
 Owner: [redacted]
 Requester: [redacted]
 CC: [redacted]
 Admin CC:

Attachments
 image001.jpg
 • We Feb 24 16:31:43 2016 [redacted]
 image003.jpg
 • We Feb 24 16:31:43 2016 [redacted]

History
 The Feb 25 11:26:28 2016 [redacted] CampaignCode: 9541 - [redacted] added
 The Feb 25 11:26:28 2016 The RT System itself - Outgoing email recorded
 The Feb 25 11:26:28 2016 [redacted] Given to [redacted] co.za
 Wed Feb 24 16:31:04 2016 The RT System itself - Outgoing email recorded
 Wed Feb 24 16:31:03 2016 The RT System itself - Outgoing email recorded

Reminders
 Created: Wed Feb 24 16:31:03 2016
 Status: Not set
 Stored: Not set
 Last Contact: Not set
 Due: Mon Feb 28 16:31:03 2016
 Closed: Not set
 Updated: The Feb 25 11:26:28 2016 by [redacted]

Debs
 Created: Wed Feb 24 16:31:03 2016
 Status: Not set
 Stored: Not set
 Last Contact: Not set
 Due: Mon Feb 28 16:31:03 2016
 Closed: Not set
 Updated: The Feb 25 11:26:28 2016 by [redacted]

Links
 Depends on:
 Depends on by:
 Process:
 Children:
 Refers to:
 Referenced by:

Wed Feb 24 16:31:03 2016 [redacted] Ticket created
 CC: [redacted] co.za, [redacted] co.za
 Subject: RE: Issue: Charity redemption
 Date: Wed, 24 Feb 2016 16:31:01 +0000
 To: RT - IT Supp [redacted] co.za
 From: [redacted] co.za

H [redacted]
 Please see the email issue below
 [redacted]
 From: [redacted]
 Sent: Wednesday, February 24, 2016 3:41 PM
 To: [redacted]
 Cc: [redacted]
 Subject: RE: Issue: Charity redemption

H [redacted]
 I have escalated to [redacted] will see what he says.
 Thank you
 [redacted]
 From: [redacted]
 Sent: 24 February 2016 03:40 PM
 To: [redacted]
 Cc: [redacted]
 Subject: RE: Issue: Charity redemption

H [redacted]
 [redacted] was going to speak to you just now to say that this is most likely an old bug (which has nothing to do with the latest CME change to the Member Info tab) and that since most people have [redacted] email addresses, in the meantime we could do a manual work-around [redacted] for the old exception, since re-publishing changes to the redemption process would involve very extensive regression testing that we don't have time for right now.
 [redacted]
 From: [redacted]
 Sent: Wednesday, February 24, 2016 1:12 PM
 To: [redacted]
 Cc: [redacted]
 Subject: RE: Issue: Charity redemption

H [redacted]
 Thank you for clarifying, can I ask you to please raise a ticket and cc me in.
 Thank you
 [redacted]
 From: [redacted]
 Sent: 24 February 2016 01:02 PM
 To: [redacted]
 Cc: [redacted]
 Subject: RE: Issue: Charity redemption

H [redacted]

I've tested with 2 members: one with a [redacted] email and one without.

When you create a redemption for a charity item, you're required to give an email address. By default, the [redacted] email is prepopulated in the Email field, and you are able to edit it. It is blank for members with no [redacted] email.

If you edit the email (or add an email if it is missing) it has no effect on the [redacted] email in the Contact information section or the email field in the Additional Contact Information section.

Orders that first appear to be created, and appear in the database. However, charity orders of members with a [redacted] email get a status of 'Processed', while there is an error status for members without a [redacted] email (even if the email address saved is a valid one).

This is a genuine bug that should be logged.
 [redacted]

From: [redacted]
 Sent: Wednesday, February 24, 2016 9:53 AM
 To: [redacted]
 Cc: [redacted]
 Subject: Issue: Charity redemption

H [redacted]

Can you please do a test for me. The following participant does not have a [redacted] e-mail address. When s/he completed a charity redemption it created a problem order because of that, which doesn't seem right as you are able to capture your own e-mail.

02772470

Please can you do a few tests to identify

1. Is the e-mail address working on the redemption screen appropriately and allowing the order through?
2. When someone updates the e-mail address, does this affect the [redacted] e-mail at all?

Thank you,
 [redacted]
 [redacted]
 [redacted]
 [redacted] * Cape Town * South Africa
 T +27 21 [redacted] C +27 [redacted] co.za [redacted] co.za

[redacted]

Message body is not shown because it is too large.

#3812960: [REDACTED]: Login process fixed.

The Basics
 ID: 3812960
 Status: new
 Priority: 3
 Queue: IT-ITSI

Custom Fields
 Work Type: (no value)
 On Hold: (no value)
 Files to go live: (no value)
 Testing Stage: (no value)
 Test Plan ID: (no value)
 Development Phase: (no value)
 Module: IT (no value)
 Work Type: IT (no value)
 Bug Category: (no value)
 Component: (no value)
 Component 2: (no value)

People
 Owner: Nobody in particular
 Requester: [REDACTED]
 CC: Admin CC

History
 Fri Mar 04 11:58:23 2016 The RT System itself - Outgoing email recorded
 Fri Mar 04 11:58:23 2016 The RT System itself - Outgoing email recorded

Reminders
 Dates
 Created: Fri Mar 04 11:58:23 2016
 Status: Not set
 Started: Not set
 Last Contact: Not set
 Due: Not set
 Queue: Not set
 Updated: Fri Mar 04 11:58:23 2016 by [REDACTED]

Links
 Dependent on:
 Depended on by:
 Parents:
 Children:
 Siblings:
 Related to:

809008
 #809008 [REDACTED] - Ticket created
 Fri Mar 04 11:58:23 2016 [REDACTED] - Ticket created
 CC: [REDACTED] [REDACTED]
 Subject: [REDACTED] Login process fixed
 Date: Fri, 4 Mar 2016 06:56:21 +0000
 To: RT - IT Team [REDACTED]
 From: [REDACTED]

Hi [REDACTED]
 I've added the requested login functionality for the [REDACTED] site.
 [REDACTED] uses an API service to register users on our [REDACTED] site.
 You will need to verify that the API service data is being stored when the user enters his username and password for the first time.

See the following Table:
 select [REDACTED] from [REDACTED] where:
 select [REDACTED] and [REDACTED] from [REDACTED] where [REDACTED]

Please note that the [REDACTED] in the [REDACTED] indicates a unique [REDACTED]. This [REDACTED] relates to the following tables:
 [REDACTED]
 [REDACTED]

When you have a chance can you verify the login process regarding the [REDACTED]

The users details is mentioned below:
 API Service with the user details:
 [REDACTED]

U:
 P:
 [REDACTED]
 [REDACTED]
 [REDACTED]

Files to go live:
 [REDACTED]

#3821624: FW: Catalogue redesign - Delivery days online

The Basics
 ID: 3821624
 Status: open
 Priority: 3
 Queue: IT-ITSI

Custom Fields
 Campaign Code: 0000 [REDACTED]
 Work Type: F - System Redesign
 Module: F - Catalogue systems
 Development Phase: (no value)
 Campaign affected: (no value)

People
 Owner: [REDACTED]
 Requester: [REDACTED]
 CC: [REDACTED]
 Admin CC:

Attachments
 Image001.png
 • Fri Apr 08 15:12:07 2016 (19.3K) by [REDACTED]
 • Thu Mar 17 15:18:01 2016 (20.0K) by [REDACTED]
 Image002.png
 • Thu Mar 17 15:18:01 2016 (20.0K) by [REDACTED]
 Image003.png
 • Thu Mar 17 15:18:01 2016 (20.0K) by [REDACTED]
 Image004.png
 • Thu Mar 17 15:18:01 2016 (20.0K) by [REDACTED]
 Image005.png
 • Thu Mar 17 15:18:01 2016 (20.0K) by [REDACTED]
 Image006.png
 • Thu Mar 17 15:18:01 2016 (20.0K) by [REDACTED]
 Image007.png
 • Thu Mar 17 15:18:01 2016 (20.0K) by [REDACTED]
 Image012.jpg
 • Thu Mar 17 15:18:01 2016 (21.2K) by [REDACTED]
 BBSA SLA check online.xlsx
 • Thu Mar 17 15:18:01 2016 (14.2K) by [REDACTED]

Reminders
 Dates
 Created: Thu Mar 17 15:18:01 2016
 Status: Not set
 Started: Wed Apr 13 15:29:33 2016
 Last Contact: Tue Apr 12 15:11:52 2016
 Due: Tue Mar 22 15:11:52 2016
 Queue: Not set
 Updated: Thu Apr 14 15:17:29 2016 by [REDACTED]

Links
 Dependent on:
 Depended on by:
 Parents:
 Children:
 Siblings:
 Related to:
 • 384958 [REDACTED] (R): incorrect dispatch period [open]

809008
 Reference by ticket #384958 added
 Thu Apr 14 15:17:29 2016 [REDACTED] - Reference by ticket #384958 added
 Tue Apr 12 15:11:52 2016 The RT System itself - Outgoing email recorded
 Tue Apr 12 15:11:52 2016 [REDACTED] - Correspondence added
 Subject: RE: [Issue] #3821624 [Comment] FW: Catalogue redesign - Delivery days online
 Date: Tue, 12 Apr 2016 13:11:52 +0000
 To: RT - IT Dept [REDACTED]
 From: [REDACTED]

Turns out that 060009 was un-categorized for quite a while, until the category was set again on 05/04/2016. Since delivery days is dependent on stock category, this might explain why 24 hours were displayed.

Stock category was null. Maybe the web should display 12 days if this is the case. Not sure if it defaults to 24 hours if restock category is set?

[REDACTED]
 [REDACTED]
 [REDACTED] - Cape Town - South Africa
 T +27 21 [REDACTED] F +27 21 [REDACTED]
 E [REDACTED]
 Click here to take a look at our new website!
 - Show quoted text -

Tue Apr 12 15:05:49 2016 The RT System itself - Outgoing email recorded
 Tue Apr 12 15:05:49 2016 [REDACTED] - Correspondence added
 CC: [REDACTED]
 Subject: RE: [Issue] #3821624 [Comment] FW: Catalogue redesign - Delivery days online
 Date: Tue, 12 Apr 2016 13:05:49 +0000
 To: RT - IT Dept [REDACTED]
 From: [REDACTED]

The sql used below is correct, i.e. the information is retrieved from the correct tables, and the logic is correct, i.e. if the item is not in stock ETD = supplier SLA + 2 + Courier SLA (10 days).

The 24 hours shown on the website, can never be correct. No physical item can have an SLA of less than 12 days. This requires investigation.

I'm looking into the product to see why this could show an SLA that looks like it is a virtual item.

[REDACTED]
 System Architect
 [REDACTED] - Cape Town - South Africa
 T +27 21 [REDACTED] F +27 21 [REDACTED]
 E [REDACTED]
 Click here to take a look at our new website!
 - Show quoted text -

Tue Apr 12 14:01:12 2016 The RT System itself - Outgoing email about a comment recorded

Tue Apr 12 14:01:12 2016 [redacted] Comments added

Hi [redacted]

Have you had a chance to look at the problem?

Thanks

On Mon Apr 11 11:29:32 2016 [redacted] <[redacted]@co.za> wrote:
- Show quoted text -

Mon Apr 11 15:16:13 2016 The RT System itself - Outgoing email recorded

Mon Apr 11 15:16:12 2016 [redacted] - Given to [redacted] <[redacted]@co.za>

Mon Apr 11 11:30:05 2016 The RT System itself - Outgoing email recorded

Mon Apr 11 11:30:05 2016 [redacted] - Given to [redacted] <[redacted]@co.za>

Mon Apr 11 11:29:32 2016 The RT System itself - Status changed from 'new' to 'open'

Mon Apr 11 11:29:32 2016 The RT System itself - Outgoing email recorded

Mon Apr 11 11:29:32 2016 [redacted] Correspondence added

Message body is not shown because it is too large

Fri Apr 08 17:13:48 2016 The RT System itself - Outgoing email about a comment recorded

Fri Apr 08 17:13:47 2016 [redacted] - Comments added

RT-Sent: CC: [redacted] <[redacted]@co.za> [redacted] <[redacted]@co.za>

Hi [redacted]

This is becoming more urgent - we cannot promise 24h delivery on fridges. Please can you determine where these values are being sourced from?

On Fri Apr 08 15:13:57 2016 [redacted] <[redacted]@co.za> wrote:
- Show quoted text -

Fri Apr 08 17:11:30 2016 [redacted] - Merged into ticket #3821624

Fri Apr 08 17:11:30 2016 [redacted] - Ticket #3821624. Merged into ticket #3821624

Fri Apr 08 15:13:58 2016 The RT System itself - Ticket #3821624: Outgoing email recorded

Fri Apr 08 15:13:55 2016 The RT System itself - Ticket #3821624: Outgoing email recorded

Fri Apr 08 15:13:07 2016 [redacted] - Ticket #3821624: Ticket created

CC: [redacted] <[redacted]@co.za>, [redacted] <[redacted]@co.za>, [redacted] <[redacted]@co.za>, [redacted] <[redacted]@co.za>, [redacted] <[redacted]@co.za>

Subject: FW: Incorrect dispatch period

Date: Fri, 8 Apr 2016 13:13:06 +0000

RT - IT Service Request [redacted] <[redacted]@co.za>

To: [redacted] <[redacted]@co.za>

From: [redacted] <[redacted]@co.za>

Hi [redacted]

Please refer to below screenshot from [redacted] website that shows delivery time as 24 hours?

Apparently [redacted] has raised this issue a few weeks ago but received no response [redacted] - please forward your comment if you have a chance.

Can someone please look into this and respond urgently!

Thanks,

[redacted]

[redacted]

CC Support Services Manager

[redacted]

[redacted] Cape Town * South Africa

T +27 21 [redacted] C +27 [redacted]

From: [redacted]

Sent: 08 April 2016 02:58 PM

To: [redacted]

CC: [redacted]

Subject: Incorrect dispatch period

Hi [redacted]


Please view the below screenshot of the incorrect dispatch period

(cid:image001.png@01D191A0-1EB34FA0)

Thanks

[redacted]

Defy C367 Eco 329L Combi Top Fridge/Bottom Freezer - Metallic



Product Description

Defy C367 Eco 329L Combi Top Fridge/Bottom Freezer - Metallic

The Defy series are Defy's most popular features include energy efficiency, reversible doors and multi-rack.

Price: [redacted]

Rating: 4.5 (3 votes cast)

You should receive your free advice 24 hrs [redacted]

Product Code: 99 2836

Features	Specifications
<ul style="list-style-type: none"> A energy efficiency Eco energy efficient Reversible doors Door open alarm Anti-bacterial gasket Water dispenser Fridge Section <ul style="list-style-type: none"> 295L net fridge volume Safety glass shelves Clear glass Egg tray Interior light Freezer Section <ul style="list-style-type: none"> 190L net freezer volume Four star freezer Ice cube tray 3 freezer drawers 	

Thu/Mar 17 15:31:57 2016 [redacted] - Requestor [redacted] added

Thu/Mar 17 15:19:18 2016 [redacted] - CampaignCode 6100 [redacted] added

Thu/Mar 17 15:19:18 2016 [redacted] - Work Type: IT Specification added

Thu/Mar 17 15:19:18 2016 [redacted] - Module: IT Catalogue system added

Thu/Mar 17 15:19:18 2016 The RT System itself - Outgoing email recorded

Thu/Mar 17 15:19:17 2016 [redacted] - Given to [redacted]

Thu/Mar 17 15:18:52 2016 The RT System itself - Outgoing email recorded

Thu/Mar 17 15:18:52 2016 The RT System itself - Outgoing email recorded

Thu/Mar 17 15:18:51 2016 [redacted] - Ticket created

Subject: FW: Catalogue redesign - Delivery days online

Date: Thu, 17 Mar 2016 15:18:49 +0000

To: [redacted] <[redacted]@co.za>, [redacted] <[redacted]@co.za>

From: [redacted] <[redacted]@co.za>

From: [redacted]

Sent: 17 March 2016 08:10

To: [redacted]

CC: [redacted]

Subject: FW: Catalogue redesign - Delivery days online

Hi [redacted]

There has been a bit of back and forth on a minor issue around the number of days for delivery that are displayed on the web.

The value displayed is meant to be the sum of the applicable leadtimes for a product, using supplier (the item is not in stock) warehouse and courier SLAs to establish the maximum number of days a participant could wait for their order.

I recall AT making the change but it doesn't seem to be working correctly as the days displayed are not indicative of the lead times.

I realise that resources are a little stretched but can you get this onto someone's to list. It is not priority but does need to be corrected.

Thanks

[redacted]

[redacted]

[redacted] Cape Town * South Africa

T +27 21 [redacted] C +27 [redacted]

From: [redacted]

Sent: 17 March 2016 08:50 AM

To: [redacted]

Subject: FW: Catalogue redesign - Delivery days online

Hi there [redacted]

Just you are well?

I have received no feedback regarding this however as I'm not sure as to who originally was involved in this project somehow this needs to be raised or an explanation needs to be given for us to understand how the SLA works as we have had a few queries on this and I don't agree with what is showing here, please could we raise this or find out who we take this up with?

Kind regards

[redacted]

From: [redacted]
 Sent: 10 March 2016 07:24 AM
 To: [redacted]
 Subject: FW: Catalogue redesign - Delivery days online

From: [redacted]
 Sent: 09 March 2016 06:50 AM
 To: [redacted]
 Cc: [redacted]
 Subject: FW: Catalogue redesign - Delivery days online

Hi there [redacted]

Trust you are well?

I have been back and forth on query around the SLA on [redacted] for items in stock and out of stock. [redacted] has let me know that the SLA is as per below:

* In stock: SLADays, add two days [redacted] to pick and despatch.
 * Out of stock: As above and add to this the time that the supplier will take to deliver the out of stock items to [redacted]

However see a few examples below that I don't agree that what is displaying is correct. could you explain this or am I missing something as we have received a lot of queries from contact centre on these SLA's in which either way I don't agree with what is showing or [redacted] around the delivery SLA?

1. Example: 07-0870 (out of stock item)
 a. Item SLA: 15
 b. Dispatch SLA: 2
 c. Delivery SLA: 10
 d. Total: 27 (however website says 25 days)
 [cid:image005.jpg@01D179E9-BAB9F8C]

2. Example: 06-0742 (out of stock)
 a. Item SLA: 5
 b. Dispatch SLA: 2
 c. Delivery SLA: 10
 d. Total: 17 (however website says 20 days)
 [cid:image008.jpg@01D179E9-BAB9F8C]

3. Example: 06-0636 (in stock)
 a. Item SLA: 7
 b. Dispatch SLA: 2
 c. Delivery SLA: 10
 d. Total: 19 (however website says 12 days)

[cid:image013.jpg@01D179E9-BAB9F8C]
 Kind regards
 [redacted]

From: [redacted]
 Sent: 09 March 2016 07:50 AM
 To: [redacted]
 Subject: FW: Catalogue redesign - Delivery days online

Hi there [redacted]

[redacted] has given me the details on the SLA testing that they did for [redacted] either I'm not reading it correctly or something is still incorrect, does it make sense to you?

Kind regards
 [redacted]

From: [redacted]
 Sent: 02 March 2016 03:02 PM
 To: [redacted]
 Cc: [redacted]
 Subject: RE: Catalogue redesign - Delivery days online

Hi there [redacted]

I'm not sure if I am doing it incorrectly however see the attached I have done another 4 items and still don't get to the days they have online as I'm not sure how they are working it out. if you look at the first item in the attached without the weekends it is 27 days but website shows 25 days, so that's why I could be working it out wrong but logically it doesn't look correct as supposed to include weekends to my knowledge?

Kind regards
 [redacted]

From: [redacted]
 Sent: 02 March 2016 02:04 PM
 To: [redacted]
 Cc: [redacted]
 Subject: RE: Catalogue redesign - Delivery days online

Hi [redacted]

Before I ask for this to be logged as a bug, I just want to check if this is the case on all products?

Regards
 [redacted]

From: [redacted]
 Sent: 02 March 2016 01:44 PM
 To: [redacted]
 Cc: [redacted]
 Subject: Catalogue redesign - Delivery days online

Hi there [redacted]

Trust you are well?

On the point in the catalogue redesign spec we mentioned that we need to move over the delivery days as was implemented [redacted] however I have picked up an issue. The way it display now is it include the product SLA, dispatch SLA, delivery days and weekends however see

breakdown on the below item:

Product SLA: 2 days
 Dispatch SLA: 2 days
 Delivery SLA: 10 days
 Weekends: 2 + 4 days
 Total SLA: 15 days

However as per the below screen shot it is showing 25 days and as per the above it should be 15 days so not sure what else it is taking into account?

[redacted]



[cid:image001.png@01D17486-82AC1C00](cid:image002.png@01D17486-82AC1C00)
 [cid:image003.jpg@01D17486-80C23993](cid:image004.jpg@01D17486-80C23993)

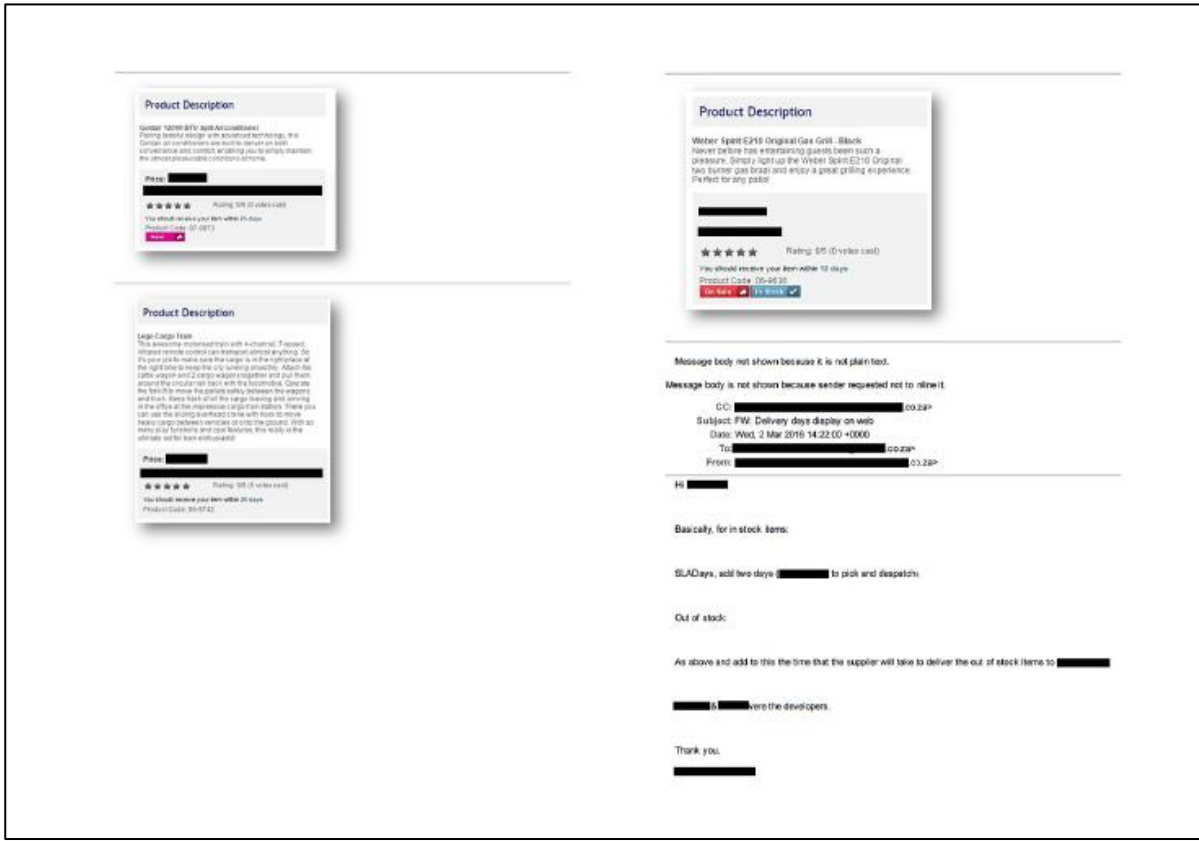
Kind regards
 [redacted]

(X)
 [redacted]
 Promotions Coordinator
 [redacted]
 [redacted] Cape Town * South Africa
 T +27 21 [redacted] E [redacted]
 [redacted]

Message body is not shown because it is too large.

[redacted]
 [redacted]



████████████████████
 ████████████████████
 System Architect
 ████████████████████
 ████████████████████ Cape Town - South Africa
 T +27 21 ██████████ C +27 ██████████ F ████████████████████
 ████████████████████
 ████████████████████

Message body is not shown because it is too large.

#3842824: Banners doing some weird things...

The Basics
 ID: 3842824
 Status: New
 Priority: High
 Queue: IT Bugs

Custom Fields
 CampaignCode: 0000 ██████████
 Work Type: IT - Bugs
 Module: IT - Online Catalogue
 DevelopmentPhase: (no value)
 Campaigns affected: (no value)

People
 Owner: ██████████
 Requestor: ██████████
 Cc: ██████████
 AdminCc: ██████████

Attachments
 image001.png
 • Wed Apr 13 09:37:37 2016 (30-K) by ██████████
 • Wed Apr 13 09:38:28 2016 (30-K) by ██████████

History
 Fri Apr 29 13:00:37 2016 ██████████ - CampaignCode #1000 ██████████ added
 Fri Apr 29 13:00:37 2016 ██████████ - Module: IT Online Catalogue added
 Fri Apr 29 13:00:37 2016 ██████████ - Work Type: IT Bugs added
 Fri Apr 29 13:00:37 2016 The RT System itself - Outgoing email recorded
 Fri Apr 29 13:00:36 2016 ██████████ - Given to ██████████
 Fri Apr 29 13:00:37 2016 ██████████ - Merged into ticket #3842824
 Fri Apr 29 13:00:37 2016 ██████████ - Ticket #3843096: Merged into ticket #3842824
 Wed Apr 13 09:37:37 2016 The RT System itself - Ticket #3843096: Outgoing email recorded
 Wed Apr 13 09:37:37 2016 The RT System itself - Ticket #3843096: Outgoing email recorded


Reminders
 Dates
 Created: Wed Apr 13 09:26:39 2016
 Status: Not set
 Start: Not set
 Last Contact: Not set
 Due: Mon Apr 18 09:30:36 2016
 Closed: Not set
 Updated: Fri Apr 29 13:00:37 2016 by ██████████
 Links
 Depends on:
 Depended on by:
 Parents:
 Children:
 Refers to:
 Referenced by:

Wed Apr 13 09:37:37 2016 ██████████ - Ticket #3843096: Ticket created
 Cc: ██████████ co.za
 Subject: RE: Banners doing some weird things...
 Date: Wed, 13 Apr 2016 07:57:35 +0000
 To: ██████████ co.za, RT - IT Bugs ██████████ co.za
 From: ██████████ co.za

H ██████████
 I can't replicate the issue on ██████████
 IT ask ██████████ to schedule time so that I can look into the issue.
 ██████████
 Analyst Developer
 ██████████
 ██████████ Cape Town - South Africa
 T +27 21 ██████████ C +27 ██████████
 E ██████████ co.za

[X]
 From: ██████████
 Sent: 13 April 2016 09:25 AM
 To: RT - IT Bugs
 Cc: ██████████
 Subject: Banners doing some weird things...
 Importance: High
 Hey guys,
 Please take a look, some banners are not loading properly:
 [url:image001.png@01D1996A.6F5B77E]
 ██████████
 Buyer
 ██████████
 ██████████ Cape Town - South Africa
 T +27 21 ██████████ F +27 21 ██████████ E ██████████

Message body is not shown because it is too large



Wed Apr 13 09:24:37 2016 The RT System itself - Outgoing email recorded
 Wed Apr 13 09:24:37 2016 The RT System itself - Outgoing email recorded


Wed Apr 13 09:24:30 2016 [REDACTED] Ticket created
 CC: [REDACTED] <[REDACTED]@co.za>
 Subject: Banners doing some weird things...
 Date: Wed, 13 Apr 2016 07:24:36 +0000
 To: [REDACTED] <[REDACTED]@co.za>
 From: [REDACTED] <[REDACTED]@co.za>

Hey guys,

Please take a look, some banners are not loading properly:
 [!image001.png@01D19566.4A79BC00]

[REDACTED]

Buyer
 [REDACTED]
 [REDACTED] Cape Town - South Africa
 T +27 21 [REDACTED] F +27 21 [REDACTED] [REDACTED]@co.za



#3884780: [REDACTED] Online mail delivery SLA

The Basics
 ID: 3084780
 Status: new
 Priority: 101
 Queue: IT-Bugs

Custom Fields
 Campaign Code: [REDACTED]
 Store Type: IT: [REDACTED]
 Module: IT: [REDACTED]
 Development Phase: [REDACTED]
 Campaign affected: [REDACTED]

People
 Owner: Nobody in particular
 Requesters: [REDACTED]
 CC: [REDACTED]
 Admins: [REDACTED]

Attachments
 image001.png
 • Tue May 31 16:47:03 2016 (415.31) by [REDACTED]
 image002.png
 • Tue May 31 16:47:03 2016 (247.46) by [REDACTED]
 image003.jpg
 • Tue May 31 16:47:03 2016 (1.26) by [REDACTED]
 image004.jpg
 • Tue May 31 16:47:03 2016 (6.96) by [REDACTED]

History
 Wed Jun 01 15:28:55 2016 The RT System itself - Outgoing email recorded

Reminders

Dates
 Created: Tue May 31 16:47:03 2016
 Starts: Not set
 Expires: Not set
 Last Contact: Not set
 Contact: Not set
 Date: Mon Jun 06 16:47:03 2016
 Created: Not set
 Updated: Wed Jun 01 13:28:55 2016 by [REDACTED]

Links
 Depends on:
 Depends on by:
 Powers:
 Children:
 Refers to:
 Referenced by:

Wed Jun 01 13:28:55 2016 [REDACTED] Correspondence added
 CC: [REDACTED] <[REDACTED]@co.za>
 Subject: RE: [tracker #3884780] IT AutoReply: [REDACTED] Online mail delivery SLA
 Date: Wed, 1 Jun 2016 11:28:54 +0000
 To: RT - IT Bugs [REDACTED] <[REDACTED]@co.za>
 From: [REDACTED] <[REDACTED]@co.za>

H. There,
 Clarification, that we need the endpoint from the config file to know where we are connecting [REDACTED]

Thank you,
 [REDACTED]

- Show quoted text -
 Tue May 31 16:47:04 2016 The RT System itself - Outgoing email recorded
 Tue May 31 16:47:04 2016 The RT System itself - Outgoing email recorded

659293 408001 C116 Shortfall - problem order
 Tue Jun 14 16:33:55 2016 [redacted] - Comments added

Hi [redacted]
 The [redacted] website is incorrectly calculating the delivery charge without VAT. Please can you investigate, or allocate to [redacted]

Thanks
 On Tue Jun 14 12:14:10 2016, [redacted] <[redacted]@co.za> wrote:
 - Show quoted text -

Tue Jun 14 16:32:32 2016 The RT System itself - Outgoing email recorded
 Tue Jun 14 16:32:32 2016 [redacted] - Given to [redacted] <[redacted]@co.za>
 Tue Jun 14 16:32:08 2016 The RT System itself - Outgoing email recorded
 Tue Jun 14 16:32:08 2016 [redacted] - Spoken from [redacted] <[redacted]@co.za>
 Tue Jun 14 13:18:01 2016 The RT System itself - Outgoing email recorded
 Tue Jun 14 13:18:01 2016 [redacted] - Correspondence added
 Subject: RE: [Tracker #3990161] C116 Shortfall - problem order
 Date: Tue, 14 Jun 2016 11:19:50 +0000
 To: RT - IT Bugs [redacted] <[redacted]@co.za>
 From: [redacted] <[redacted]@co.za>

Thanks a mil [redacted] <[redacted]@co.za>

[redacted] <[redacted]@co.za>
 Co-Ordinator
 [redacted] <[redacted]@co.za> Cape Town - South Africa
 T +27 21 [redacted] F +27 21 [redacted] E [redacted]@co.za

- Show quoted text -
 Tue Jun 14 13:16:57 2016 The RT System itself - Outgoing email recorded

659294 408001 C116 Shortfall - problem order
 Tue Jun 14 13:16:57 2016 [redacted] - Correspondence added
 Subject: RE: [Tracker #3863161] C116 Shortfall - problem order
 Date: Tue, 14 Jun 2016 11:16:55 +0000
 To: RT - IT Bugs [redacted] <[redacted]@co.za>
 From: [redacted] <[redacted]@co.za>

Web systems is not my responsibility. [redacted] will probably action it with them to correct.
 The only thing we can do in this case is to issue PCNC points. I cannot 'force' the redemption to process if there are insufficient points.

[redacted] <[redacted]@co.za>
 System Architect
 [redacted] <[redacted]@co.za> Cape Town - South Africa
 T +27 21 [redacted] F +27 21 [redacted] E [redacted]@co.za

- Show quoted text -
 Tue Jun 14 12:22:04 2016 The RT System itself - Outgoing email recorded
 Tue Jun 14 12:22:03 2016 [redacted] - Correspondence added
 Subject: RE: [Tracker #3553161] C116 Shortfall - problem order
 Date: Tue, 14 Jun 2016 10:22:02 +0000
 To: RT - IT Bugs [redacted] <[redacted]@co.za>
 From: [redacted] <[redacted]@co.za>

Thanks [redacted] How do we fix this now seeing that the price on Web was incorrect and it was not the participants fault? Can we override this site and fix it moving forward?

[redacted] <[redacted]@co.za>
 Co-Ordinator
 [redacted] <[redacted]@co.za> Cape Town - South Africa
 T +27 21 [redacted] F +27 21 [redacted] E [redacted]@co.za

- Show quoted text -
 Tue Jun 14 12:14:10 2016 The RT System itself - Outgoing email recorded

#3899596; FW: [redacted] banner on [redacted]

The Basics
 ID: 3899596
 Status: new
 Priority: 100
 Owner: IT Bugs

Custom Fields
 Campaign Code: 9100 [redacted]
 Work Type (IT Bugs): [redacted]
 Module (IT Bugs): [redacted]
 Development Phase: [redacted]
 Campaign phase: [redacted]

People
 Owner: [redacted]
 Requester: [redacted]
 CC: [redacted]
 Admin CC: [redacted]

Attachments
 image004.png
 • Wed Jun 22 08:02:09 2016 (23714) by [redacted]
 image005.png
 • Wed Jun 22 08:02:09 2016 (16930) by [redacted]
 image006.png
 • Wed Jun 22 08:02:09 2016 (12361) by [redacted]
 image007.png
 • Wed Jun 22 08:02:09 2016 (15330) by [redacted]

History
 Wed Jun 22 08:03:38 2016 [redacted] - Campaign Code 9100 added
 Wed Jun 22 08:03:38 2016 [redacted] - Work Type: IT Bugs added
 Wed Jun 22 08:03:38 2016 The RT System itself - Outgoing email recorded
 Wed Jun 22 08:03:38 2016 [redacted] - Given to [redacted] <[redacted]@co.za>
 Wed Jun 22 08:02:10 2016 The RT System itself - Outgoing email recorded
 Wed Jun 22 08:02:10 2016 The RT System itself - Outgoing email recorded

Wed Jun 22 08:02:09 2016 [redacted] - Ticket created
 Subject: FW: [redacted] banner on [redacted]
 Date: Wed, 22 Jun 2016 08:02:07 +0000
 To: RT - IT Bugs [redacted] <[redacted]@co.za>
 From: [redacted] <[redacted]@co.za>

From: [redacted]
 Sent: 22 June 2016 07:53
 To: [redacted]
 CC: [redacted]
 Subject: [redacted] banner on [redacted]
 Importance: High

Hi [redacted]
 That you are well?
 As per the previous issues I have had, I have loaded a banner on [redacted] in which the products are only linked to 0561, and are not in the [redacted] index however the banner is showing on [redacted] and [redacted].
 Please can this be sorted as a matter of urgency as this is incorrect and should be showing anywhere else but [redacted].
 When you click on the banners in [redacted] it shows no product (just a blank page which means the products are not there. Previously on the old catalogue design this did not happen so shouldn't be any reason why it happens on the new catalogue design.

[redacted] <[redacted]@co.za>
 [redacted] <[redacted]@co.za>
 [redacted] <[redacted]@co.za>
 Kind regards
 [redacted]

